

FOGSI FOCUS

Adbhut Matrutva



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Foreword

Jaideep Malhotra



Federation of Obstetric and Gynaecological Societies of India (FOGSI)



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Dedicated to

*Divine mother-baby for
creating beautiful new world*

God's Message for all

*My sweet children look there
the new golden world, just for you all*

Message for Gynecologists

*For you divine angels
you are special
Your positive thoughts and actions
are so powerful that they radiate
peace and happiness to the whole world.*

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Message

I am pleased to learn that, the Federation of Obstetric and Gynaecological Societies of India (FOGSI) has launched a Unique Project “Adbhut Matrutva” in All India Congress of Obstetrics and Gynaecology (AICOG) on January 19th, 2018 in Bhubaneswar, Odisha, India.

“Adbhut Matrutva” program is a unique initiative which focuses on providing holistic antenatal care, which will not only reduce maternal and perinatal morbidity and mortality, but will also prevent several intergenerational, noncommunicable diseases (NCDs) such as diabetes, arterial hypertension and cardiovascular disease. It addresses the fetal origin of adult diseases, thus preventing many NCDs.

While providing quality health care to all is a top priority of the Government, special focus is on health care of the mother and child. The National Health Mission, through its targeted schemes, has made substantial progress in achieving Millennium Development Goals such as reduction in maternal mortality ratio and under-five mortality rate. Several innovative schemes such as the Janani Shishu Suraksha Karyakram, Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), LaQshya-Labor Room Quality Improvement Initiative, Mother Absolute Affection (MAA) Programme, Home Based Newborn and Young Child Care, Poshan Abhiyaan, Anemia Mukta Bharat, introduction of new vaccines, etc. have been launched by the Ministry to provide quality health care to pregnant women and children.

Projects such as PMSMA and Adbhut Matrutva, I believe, play a vital role in highlighting the need for maintaining a physically, mentally and spiritually healthy self during all phases of pregnancy. The role of gynecologist during the crucial phases of motherhood cannot be underscored enough.

It is heart-warming to know that more than 200 Adbhut Matrutva sessions were conducted across India for the enhancement of a quality care-giving to expectant mothers. I am also delighted to know that many programs were conducted on 9th of every month as part of ‘I Pledge for 9’—Pradhan Mantri Surakshit Matritva Abhiyan.

I convey my best wishes to the President and organizers for the fruitful project.



Anupriya Patel
Minister of State
Ministry of Health and Family Welfare
Government of India

Message

It is a matter of immense pleasure that the Federation of Obstetric and Gynaecological Societies of India (FOGSI) has launched a unique project “Adbhut Matrutva” under the dynamic leadership of President Jaideep Malhotra.

The Government of India has a comprehensive reproductive, maternal, newborn, child and adolescent healthcare approach. Janani Shishu Suraksha Karyakram, LaQshya and Pradhan Mantri Surakshit Matritva Abhiyan are key programs implemented across the country for quality healthcare services to pregnant women and newborns.

Although the Government is leaving no stone unturned to provide quality health care, but it would achieve momentum when various organizations join these efforts. In this context, the FOGSI is playing a significant role.

I once again urge all FOGSI members to volunteer at nearby government hospitals on the 9th of every month under the Pradhan Mantri Surakshit Matritva Abhiyan. I also urge all mentors to join hands with the LaQshya-Labor Room Quality Improvement Initiative to ensure quality intrapartum and immediate partum care to pregnant women and newborns.

I am sure that together we can create a better future for the mothers and children of our country. I extend my heartiest congratulations to FOGSI for their efforts in this direction and offer my best wishes for the success of their projects.



Dinesh Baswal

Deputy Commissioner In-Charge (Maternal Health)

Minister of State

Ministry of Health and Family Welfare

Government of India

Message

Om Shanti.

Greeting of Peace and Love for the New Year.

It is a pleasure to witness the unwavering passion and commitment of the Federation of Obstetric and Gynaecological Societies of India (FOGSI) family. Each of you is an Angel who is touching so many lives in the most meaningful and diving way.

The “Adbhut Matrutva” project has begun on an impactful note. By addressing very aspect of spiritual health, emotional health, mental health and physical health, the project has promised a happier and healthier new generation. I am confident that every expectant parent under the project’s ambit will experience a transformation in themselves, which will radiate as beautiful sanskars to their child. Your tireless efforts and pure intention will create miracles in families.

Congratulation, Dr Jaideep Malhotra for your insightful leadership and guidance to roll out Adbhut Matrutva in 2018. This is just the beginning. You have sown the seeds of which the future generations will enjoy the fruit. As every member of the FOGSI family implements this project, each one will experience a new dimension in parent and child care. These experiences will take the project to the world.

For 2019, along with all the wonderful projects you take to heal others, please take up the one main project “Self Care”. Please dedicate at least 30 minutes daily to nourish your mind with spiritual study and meditation. Your Self Caring...will become the Healing Energy for parents and children.



BK Sister Shivani

Awakening with Brahma Kumaris

Foreword

Dear Friends,

Women are the pivot of any family and we obstetricians and gynecologists, our whole life revolves around the women of our country. We have 26 million pregnancies in our country with 20 million births and we today are the obesity, diabetes, and preterm delivery capital of the world. We have brought down our maternal mortality ratio to 130/1,00,000 but we are struggling to bring it down further and much needs to be done apart from institutional deliveries. When we look at the causes of maternal mortality, noncommunicable diseases (NCDs) are rising steadily on the top and so much so that more than 60% of the adult deaths are attributable to the NCDs. What can we do to reduce the burden of NCDs and also build up a healthy doctor-patient relationship, which would encourage bonding of the mother with the baby and have long-term impact on the outcomes maternal mortality ratio (MMR), neonatal mortality rate (NMR), vaginal deliveries, better neurocognitive development of children, make pregnancy a blissful experience and much more. Welcome to the World of Adbhut Matrutva. It is my proud privilege to bring to you this FOGSI Focus dedicated to Adbhut Matrutva and I sincerely hope that the contents are definitely going to benefit each and every one of you in your day-to-day practice and engage the patients much more with the baby and the doctor, because pregnancy is no disease, and giving birth should be the greatest achievement and not fear.

“My dream is that every woman, everywhere, will know the joy of a truly safe, comfortable, and satisfying birthing for herself and her baby.”—Marie Mongan

I would like to place on record, my sincere thanks to BK Sister Shivani, BK Dr Shubhda Neel and all BK Family, Mr Amit Bakshi, Mr Deepak Devgan, Mr Hrishikesh, Ms Padmaja, and the whole team from Eris Montana and I could not have made this concept as popular and reach as many people without your timely support and encouragement. I also have to put on record my gratitude to Dr Dayanand Mishra and Dr Rashid Rizvi for the beautiful Adbhut Matrutva App which I am sure will be very useful for all pregnant mothers and mothers to be. I cannot thank enough to my FOGSI family, especially all my Vice Presidents, Chairpersons, Dr Jaydeep Tank, Dr Madhuri Patel, Dr Suvarna, Dr Parikshit Tank, Dr Neharika Malhotra Bora, and Dr Narendra Malhotra for a full-hearted support for this endeavor and I sincerely hope that all Fogsians will definitely benefit from this concept of Garbh Sanskar and fetal origin of adult diseases.

All the best and happy reading.



Jaideep Malhotra

Preface



Jaideep Malhotra



BK Shubhada Neel



Pushpa Pandey



Neharika Malhotra Bora

FOGSI Focus is a regular update on current developments in the field of Obstetrics and Gynecology by experts in their specialties. This issue is focused mainly on the project Adbhut Matrutva, especially designed for expectant mothers by the Federation of Obstetric and Gynaecological Societies of India (FOGSI).

Previously, it was thought that outcome of pregnancy depends solely on quality of mother's medical care, however, experts now recognize that each child is born with a different personality that depends on the physical, emotional, and spiritual state of mother during pregnancy. Various scientific studies prove that babies taste, listen, learn, feel, and memorize in the womb. Therefore, parenting of children starts even before their birth, right in the womb. Holistic health care, i.e. physical, emotional, social, and spiritual well-being during pregnancy leads to a healthy maternal and fetal outcome. This effort will spread values in the society and will lead to a healthy and a happy future generation.

This issue covers revolutionary recent trends of antenatal care in the three trimesters of pregnancy separately; epigenetics, diet, exercise, stress management, and harmony in relationships. It also covers spiritual health and meditation scientifically. This book is also a gift for medical fraternity, as content included in some chapters can be applied to their own lives to be healthy and happy. It is multiauthored and views expressed are those of their own. We are grateful to all the esteemed contributors for sparing their valuable time to write these chapters. Above and beyond we thank the Almighty for giving the strength, sustenance, and guidance.

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Pushpa Pandey
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Acknowledgments



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Special Acknowledgment to Brahma Kumaris

We should always have an Attitude of Gratitude, because it is this value which would give us the blessings to scale the altitude of success. It is said that God cannot be everywhere and therefore God created Mother. Therefore, we invoke the presence of God, who has always been with us and all through guided in conceiving the idea to launch the unique project “Adbhut Matrutva Garbh Sanskar for Healthy-Happy Mother and Baby”. It is a great pleasure for us to acknowledge the contribution and support of all the individuals who have been a constant source of motivation and inspiration for us to launch the unique project “Adbhut Matrutva Garbh Sanskar for Healthy-Happy Mother and Baby”. We owe special thanks to Respected Rajyogini BK Dadi Janki Ji, Rajyogini BK Gulajar Dadi Ji, Rajyogini BK Ratan Mohini Didi Ji, Rajyogi BK Nirwer Bhai Ji, Rajyogini BK Santosh Didi Ji, Rajyogini BK Shivani Didi Ji, Dr Ashok Mehta, Dr Banarsilal Sah, Dr Satish Gupta, Dr Pratap Midha, BK Gireesh Bhai Ji, BK Swami Bhai Ji, and all the members of the Medical Wing (Brahma Kumaris) for the constant guidance and support for this project. We would hereby take the opportunity to express gratitude to everyone who has helped us for this project. We dedicate this project to all Mothers who are an embodiment of care and love. Last but not the least to this Beautiful Drama which has created such a beautiful role for us to play.

With Godly Remembrance and Love

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Nine Months Windows of Opportunity

Jaideep Malhotra, Vimee Bindra, Neharika Malhotra Bora, Narendra Malhotra, Ragini Singh

“A healthy life depends on a healthy start to life”

INTRODUCTION

Over the last few years there has been exciting progress in our understanding of what creates a healthy start to life. We now know that many aspects of embryonic, fetal, and infant development are affected by somewhat subtle aspects of parental health and behavior. In this way, health—or conversely the risk of disease—is passed from one generation to the next, via processes operating independently of inherited genetics effects. This is important because it means that parents, supported by their families and healthcare professionals can take many positive steps to promote the health of their children, even before those children are born.

Small changes in the developmental environment created by parental health and behavior before birth, and the circumstances of life over the first few years after birth, leave persistent echoes on the Child’s biology, operating both through what are called “epigenetic processes” and through learning.

We are well aware that there are many other sources of information to which such parents-to-be will turn. In fact, there are too many sources, especially on the internet and through variety of media, as well as from peers, formal, and informal support groups or clubs. These are often accessed before or instead of, resorting to healthcare professional advice. Faced with the overload of conflicting information, it is not surprising that some parents do not make the best choices about life style.

Women’s predisposition to many chronic diseases is unmasked during pregnancy because of physiologic changes. Many of the first trimester algorithms can help us identify the women at risk and if we use Barker and Reverse Barker Hypothesis,¹ we cannot only identify chronic diseases in present generation but also past and future generations. These figures depict the facts of pregnancies all over the world and the major causes of deaths in new born (Figs. 1.1 and 1.2).

The antenatal care (ANC) primarily focuses on present or current pregnancy but all of us know that pregnancy complications can have long-term implications and also past history can have impact on present pregnancy and development of the growing fetus as well. We all should be utilizing these 9 months window for detection, management of many medical disorders, and also, we can build a healthy generation and prevent chronic complications. Several researchers have shown that preeclampsia (PE), stress, gestational diabetes mellitus (GDM), high body mass index (BMI) increase chronic diseases and mortality rates in future generations.^{2,3} Now with the help of first trimester screening algorithms, it has become easier to predict PE, GDM, fetal growth restriction (FGR), spontaneous preterm birth (SPB) by utilizing markers of preexisting maternal risk profiles that not only detect pregnancy risks but also confers us the opportunity to lower the thresholds for future diseases.^{4,5}

Is it all predetermined? From all research and observations, it has been proved that pregnancy does interact with the maternal phenotypes and may alter the risks for noncommunicable diseases (NCDs). There is

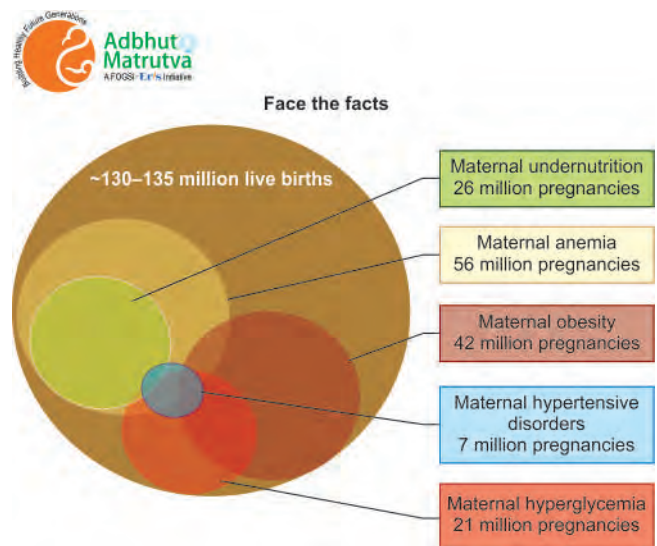


Fig. 1.1: Pregnancy facts.

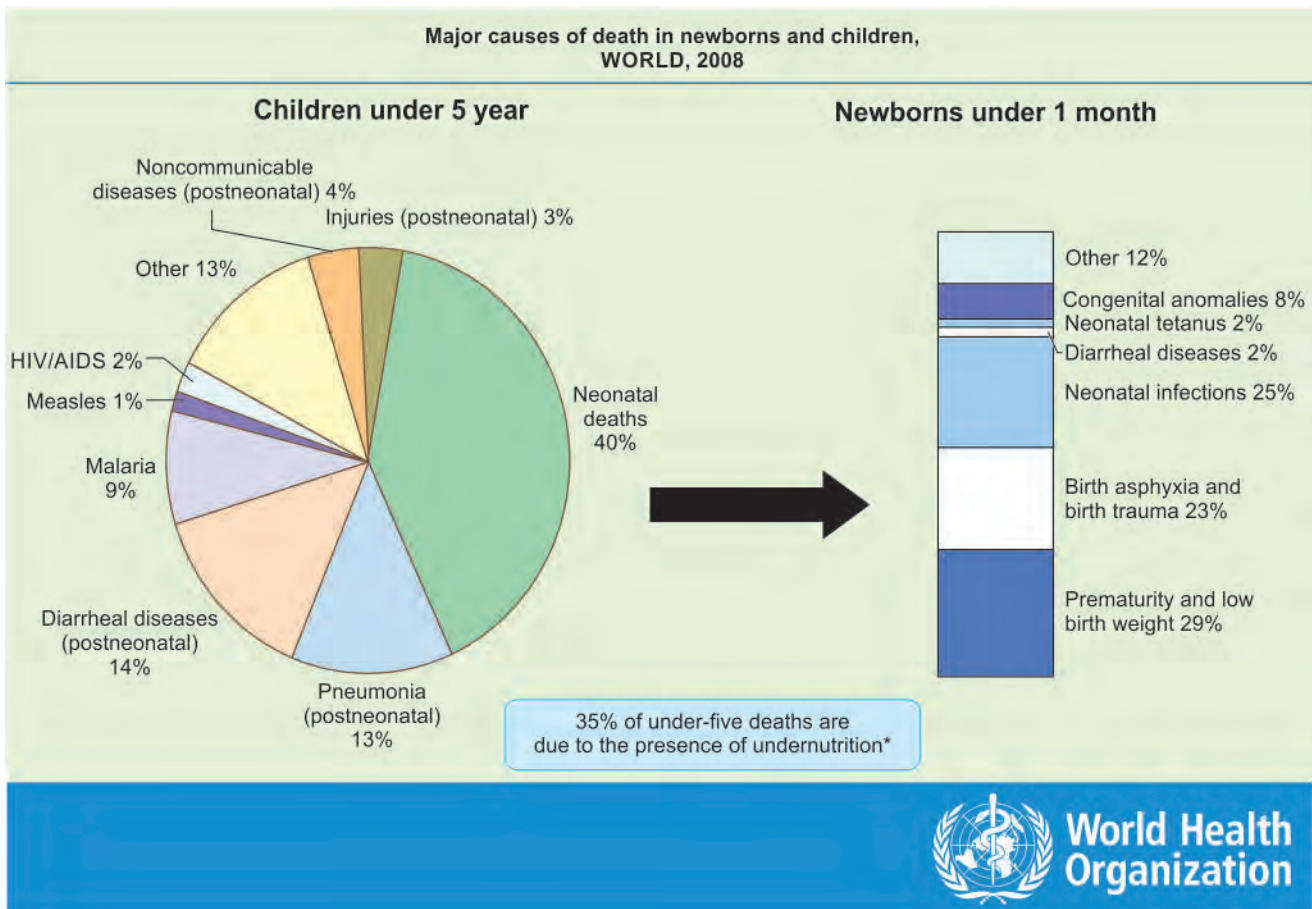


Fig. 1.2: Major causes of death in newborns and children. WHO-2008.
(Source: Causes of death: World Health Statistics 2010, WHO, Undernutrition: Black et al. Lancet, 2008).

an urgent need for a multidisciplinary care for pregnant women which will involve obstetricians, general practitioners, pediatricians, midwives, internists and who can look after not only the current pregnancy but can formulate strategies for population-based screening, prevention, and case-specific secondary prevention. It also needs the help of healthcare NCDs providers and policy makers if we want to avoid and limit the consequences of chronic in future generations.

There are three times in a woman's life when she is looked after most, one is during infancy and two other are during pregnancy and postpartum period. As we know chronic diseases take years to develop, the antenatal and postpartum period provide us a new early window of opportunity to identify risk factors for majority of women and we can aim to improve their long-term health and reduce the disease burden.

Several researchers have shown that maternal complications such as PE, stress, GDM, excessive weight gain, increased chronic disease, and mortality in subsequent generations. This is related to perinatal programming, and a mismatch between prenataally acquired attributes and critical periods in development produces health effects that may be independent of a person's genetic code (Barker hypothesis, Dörners concept of functional teratology).

Multiparity has an independent increased risk of cardiovascular disease (CVD) in later life.⁶ There is an association between number of children and CVD, which is lowest among those who have two children and increases with each additional child beyond two by 30–47% for women.⁷ If there is a coexisting fertility conditions such as polycystic ovary (PCO), there is a 9% increase in CVD risk in women with only one child.⁸

GOALS OF ANTENATAL CARE

Problems in Nine Months of Pregnancy

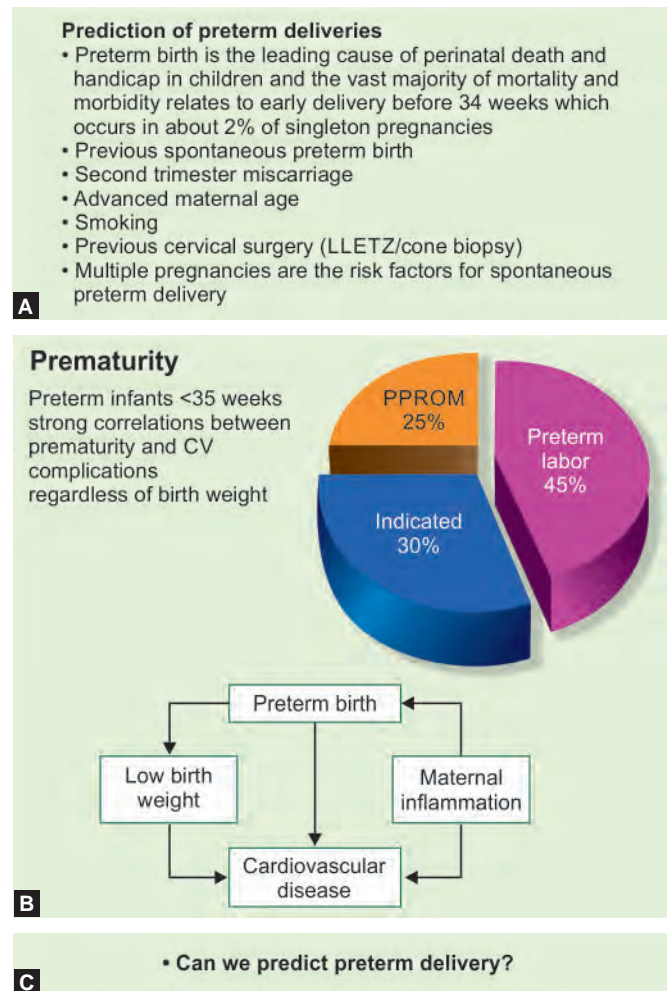
- ✦ Good detailed assessment during first and then subsequent antenatal visits by thorough clinical history, general, physical, and obstetric examination, appropriate investigations to identify high-risk cases.
- ✦ Early identification and treatment of pregnancy complications.
- ✦ To educate the mother regarding the physiology of pregnancy, labor, child care, breastfeeding and contraception through mother craft classes using demonstrations and diagrams. Allay her fears regarding labor and give psychosocial support.
- ✦ To teach women about the importance of antenatal and postnatal breathing, stretching and Kegel exercises, to tone up the muscles, preparing for labor and puerperium.
- ✦ To educate about lifestyle, nutritional supplements, food associated and other infections, risks of over the counter medicines, complimentary therapies, alcohol and smoking, travel, and sexual intercourse during pregnancy.
- ✦ Management of common symptoms of pregnancy, e.g. nausea and vomiting, constipation, heartburn, hemorrhoids, varicose veins, backache, etc.
- ✦ Measurement of weight, height, BMI, BP, breast examination (retracted nipples).
- ✦ This contact must be utilized to be empathetic and enquire about domestic violence, prediction, detection and initial management of any mental disorders.
- ✦ Screen for hematological conditions—*anemia*, red cell alloantibodies, hemoglobinopathies, fetal anomalies, Down’s syndrome, asymptomatic bacteriuria, DM, PE, placenta previa, fetal growth, and wellbeing.
- ✦ Management of specific clinical conditions, e.g. breech presentation, post-term and preterm labor (PTL).
- ✦ To discuss place, time, mode of delivery, and care of newborn (Figs. 1.3A to C).

Prematurity and Low Birth Weight

Women who ever had preterm birth are at risk of developing CVD and type 2 diabetes.^{4,9} The offspring following the preterm birth is at a higher risk of developing hypertension as it grows and also increased insulin resistance in infancy. Also, there exists the negative correlation between maternal diseases in later life and gestational age at delivery. Exact cause for this is not clear, but it may be because of peripartum exposure to cytokines, cardiovascular effect of pulmonary dysmaturity and also placental dysfunction.

Stress

Prolonged activation of the stress response may have adverse consequences. Maternal anxiety and stress can cause immediate changes in blood flow to uterus, changes in fetal heart rate pattern and also fetal movements (FM). Not only short-term changes they also induce long-term changes in growth, behavior, metabolism, and also cognition. Low birth weight (LBW) is associated with negative affections and a rival cynic personality in later life.¹⁰ Listening to soothing music and lullabies has been shown to reduce stress, anxiety, and depression in mother and similarly may be remembered by the fetus.¹¹ Fetus may contribute to its own epigenesis as FM between 20 and 38 weeks stimulate maternal sympathetic arousal. The developing brain of fetus requires some stress, but it should not be an overwhelming stress. FGR due to stress may be associated with poor cognitive development, poor



Figs. 1.3A to C: (A) Prediction of preterm deliveries; (B) Prematurity. (Source: Dalziel et al, 2007; Doyle, 2008; Irving et al, 2000; LK Rogers, M Velten Life Sciences. 2011;89:417-21.)

school education, smoking, drinking habits, poor social activities of mother, and also her poor support system. LBW may also happen because of death of close relative of the mother in FGR, garbh sanskar and birth preparedness and counseling helps (Figs. 1.4A and B).

Smoking or External Toxins

These are the modifiable risk factors. Twenty percent of infants with LBW happen because of active or passive smoking.¹² Parental smoking is associated with increased CVD risk, high BMI after puberty. Exposure to carbon monoxide from wood fuel smoke results in reduction of birth weight. Genetic or epigenetic factors which are responsible for long-term effects of smoke exposure is difficult to determine but many epigenetic factors play an important role as to have an effect on the developing pregnancy.

Miscarriage

Some of the reviews have shown that women with early pregnancy miscarriage are more at risk of developing CVD or ischemic heart disease (IHD) in later life.

Cardiovascular Profile-induced Health Risks

Is preexisting maternal hemodynamics or metabolic disease is the cause of gestational diabetes and hypertensive disease during pregnancy or placental pathology is the cause?

The effect of selected aspect of Garbha Sanskar on stress, coping strategies and well-being of antenatal mothers

- Pregnant women who were exposed to selected aspect of Garbha Sanskar had significantly reduced stress, improves coping strategies, and well-being of antenatal mother after practicing selected aspect of Garbha Sanskar.

A

Birth preparedness and complication readiness (BPCR) counseling

- Detailed discussion of the BPCR
- Allocated CEmONC center for delivery or any complication before delivery
- Information on the transport facilities
- Entitlements of pregnant women at facilities
- Identification of an appropriate birth companion to go along with for delivery

B

Figs. 1.4A and B: Fetal growth restriction (FGR). (IUGR: intrauterine growth restriction).

[Sources: Jyotsna Deshpande, Assistant Professor, Bharati Vidyapeeth College of Nursing, Pune, PhD Nursing, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India; International Journal of Science and Research (IJSR), ISSN (Online): 2319-7064, Index Copernicus Value (2013): 6.14, Impact Factor (2013): 4.438].

Or preexisting disease affects the placenta which in turn causes these medical disorders in pregnancy and also increases later health risks for both mother and offspring exponentially.

Fetal Growth Restriction

It is a known fact that infant birth weight (BW) is related to mother's risk of IHD, coronary artery disease (CAD), cerebrovascular disease or cardiac insufficiency. Also, GDM, PE may be the shared increased risk factors for CVD. We are concerned about SGA for many reasons and need to assess on antenatal visits (Figs. 1.5A to H).

- ✦ *Adequate nutrition and micronutrient* such as iron, copper, zinc, iodine, selenium, and some vitamins such as A and D are necessary for fetal growth. Preventive care and adequate nutritional supplements, poverty reduction should be the utmost goals of maternal care.

Prepregnancy Obesity and Excessive Weight Gain in Pregnancy

Obesity, before or during pregnancy, increases maternal morbidity as well as mortality. As increased fats set a metabolic syndrome and increased insulin resistance.¹³ As abdominal fat is a better predictor of mortality than weight or BMI, so if body fat index is more informative in terms of obstetric complications. Two questions need to be addressed (Figs. 1.6A to H).

Breastfeeding

Mothers with more BMI tend to breastfeed less.¹⁴ BMI greater than 30 kg/m² is associated with more cardiovascular complications and also truncal obesity is associated with increased cancer risk because of hyperinsulinemia, insulin resistance, or high levels of steroid hormones, and cytokines which in turn may be linked to carcinogenesis. Children to obese mothers are obese as early as 16–17 years of age as compared to children of nonobese mothers (Fig. 1.7A).


Thrombosis Risk Profile

Most of the women attending preconception or antenatal clinic are aware of their thrombotic diseases before pregnancy. Pregnancy has a great impact on the coagulation profile and it may modify the disease or make it severe or worse during pregnancy. Thrombophilia, systemic lupus erythematosus (SLE) and antiphospholipid antibody syndrome (APS) are known risk factors for FGR, PE, and also placental dysfunction, miscarriages. Anticoagulant therapy in the form of aspirin and heparin may reduce the adverse outcomes. Anticoagulant for all is not yet

Assessment and advise at subsequent visits

- Fundal height for FGR/Macrosomia
- Body weight
- Blood pressure
- Urine—for albumin, sugar
- Immunization
- Detection of high risk factors

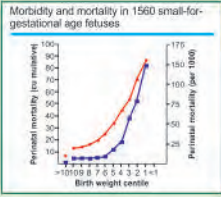

- Anemia prophylaxis
Tab. FS + FA 100 mg 1OD x 6 months
- S/o anemia present-Tab. FS + FA 100 mg one BD x 6 months in ANC and 6 months in PNC period
- Tab. Mebendazol 1 BD x 3 days
- Immunization
- Dietary advise



A

SGA why the concern?

- Global incidence is 3–10% of all pregnancies. The incidence varies from region to region. As per UNICEF survey, incidence of IUGR in India is 25–30%*
- 20% of stillborns are growth retarded
- 30% of infants with Sudden Infant Death Syndrome were FGR
- 1/3rd of infants with birth weight (BW) < 2500 g are growth retarded and not premature
- 9–27% have anatomical or genetic abnormalities.
- Perinatal mortality is 8–10 times higher for these fetuses

*Gogates Intra-uterine growth restriction-Obstetrician's perspective. Int J Dila Dev Countries. 2001;21:51-6

B

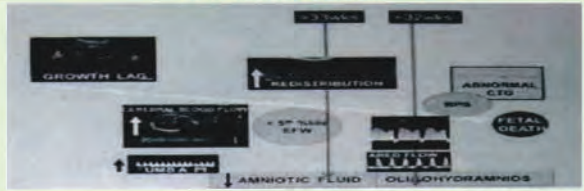
Figs. 1.5A and B: Small for gestation age (SGA). (FGR: fetal growth restriction; IUGR: intrauterine growth restriction).

Aims of antepartum fetal surveillance

- To prevent fetal demise
- To prevent fetal hypoxia (and its consequences)
- To determine the optimal time for delivery
- To determine appropriate mode of delivery

C

The action points...

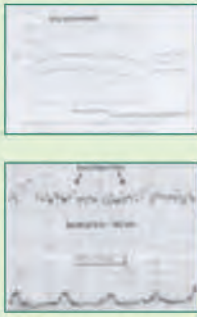


D

Figs. 1.5C and D: Monitoring cardiotocography (CTG).

Monitoring

- AFI weekly or biweekly
- CTG weekly
- If normal reassuring
- CTG cannot show progression of growth restriction
- Cannot prevent hypoxia



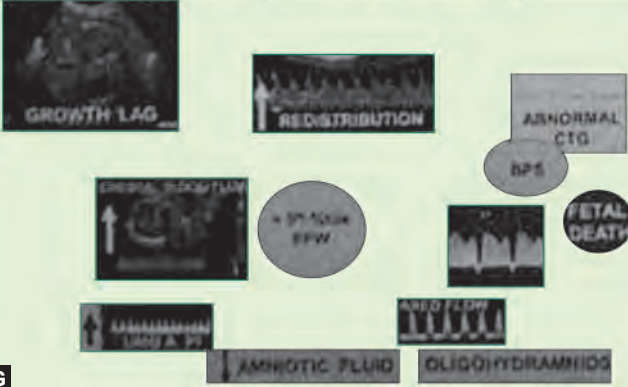
E

Managing FGR babies

24–28 weeks	28–32 weeks	32–34 weeks
Monitor	Monitor	Monitor
Abn Doppler/BPP	Arrested fetal growth A/R EDV UA Abn, DV Abn BPP	Arrested fetal growth Oligo Abn CTG A/R EDV
Discuss with family	Steroids deliver neonatal care	Deliver


F

Sequential changes in tests of fetal well-being



G

Balancing Act



- Intervention
- Iatrogenic prematurity
- Fetal hypoxia
- Fetal demise

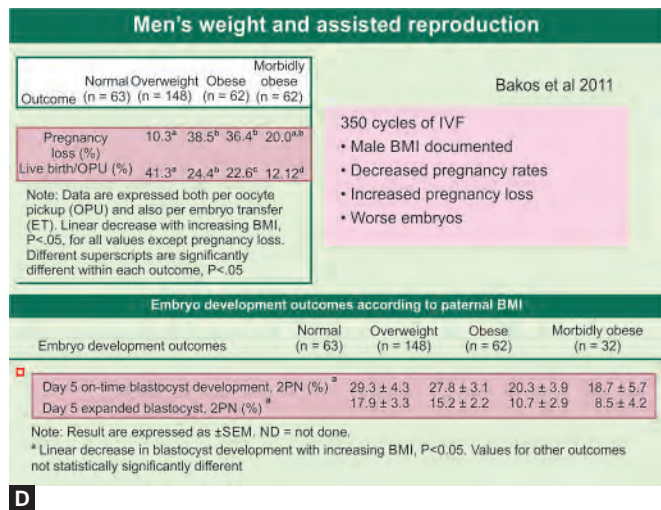
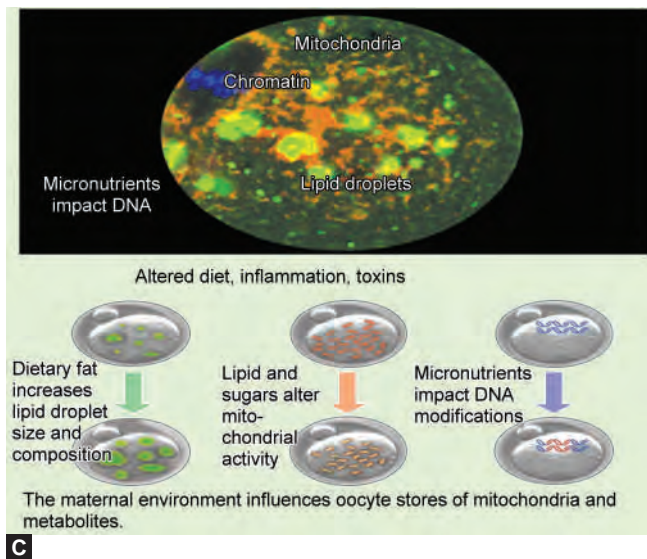
H

Figs. 1.5E to H: Fetal growth restriction (FGR) and cardiotocography (CTG).

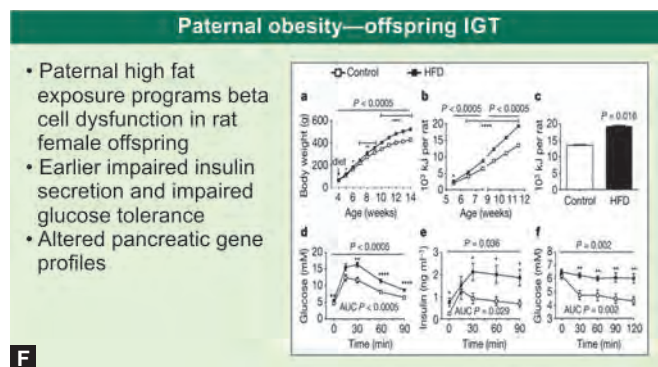
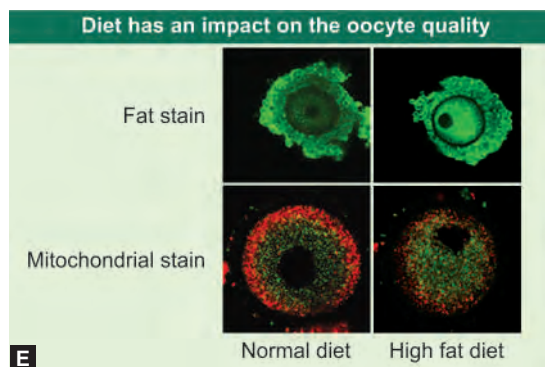
A Does over nutrition or obesity have any implication on pregnancy outcome?

B Implication of paternal obesity and glucose intolerance on progeny?

Figs. 1.6A and B



Figs. 1.6C and D: Weight and reproduction.



Figs. 1.6E and F: Impaired glucose tolerance. (HFD: high fat diet; IGT: impaired glucose tolerance).

recommended until a randomized controlled trials (RCTs) shows the benefits¹⁵ patients with diagnosed SLE, APS, with prior thrombosis will have a better outcomes with anticoagulants and FGR and recurrent thrombosis can be averted.¹⁶ Women with these disorders are at lifelong risk of thrombosis and also women with arterial events should be managed aggressively.

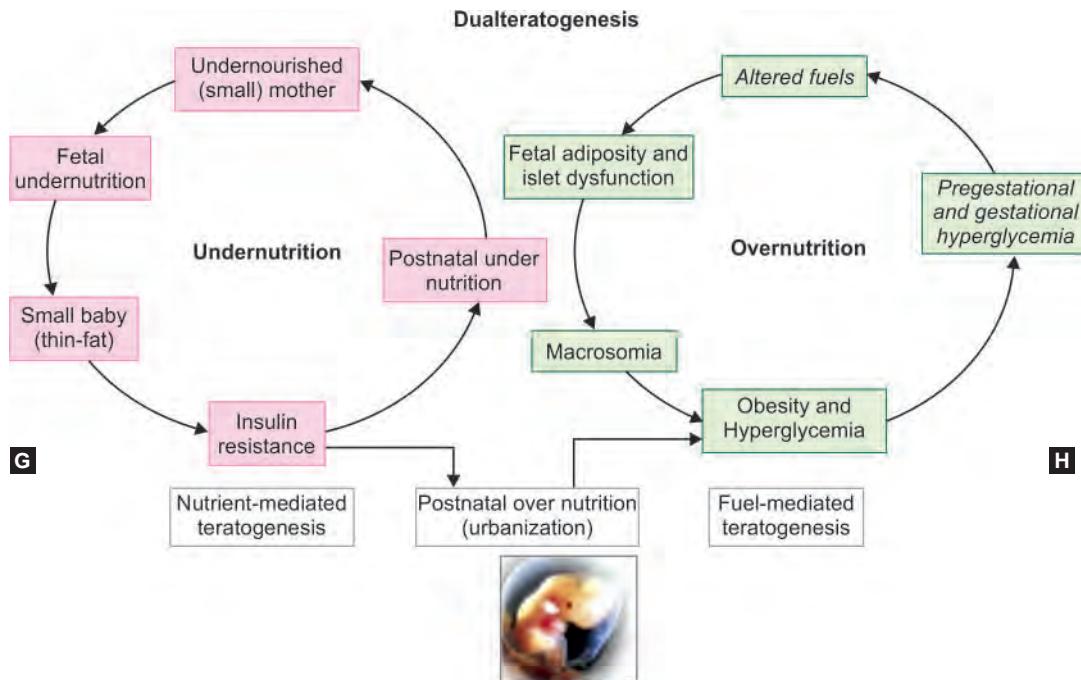
Hyperhomocysteinemia

It increases the risk of PE three to four times in cases of raised first trimester homocysteine.¹⁷ Therapy should

be considered for such cases. Low-dose aspirin helps in reducing the prothrombotic risk profile. Low folate intake increases hyperhomocysteinemia. High-dose folate is required to modify homocysteine levels (Fig. 1.7B).

Gestational Diabetes Mellitus or Preexisting Diabetes Mellitus

Preexisting diabetes may be type 1 or type 2 which exists before pregnancy. GDM is diagnosed first time in pregnancy characterized by glucose intolerance and is related to hyperinsulinemia, type 2 DM, dyslipidemia,



Figs. 1.6G and H

(Source: Yojnik CS, Deshmukh U, 2009).

BREASTFEEDING

GOOD FOR BABY GOOD FOR MOM

Benefits for baby:

- Prevents diarrhea, ear infections, pneumonia and asthma
- Cuts risk of sudden infant Death syndrome
- Lowers risk for obesity, developing allergies
- Everyone knows breastfeeding challenges in initiating breastfeeding? How can we overcome that???

Benefits for mom:

- Lessens risk of breast cancer, ovarian cancer
- Prevents postpartum depression, Type 2 diabetes
- Reduces stress

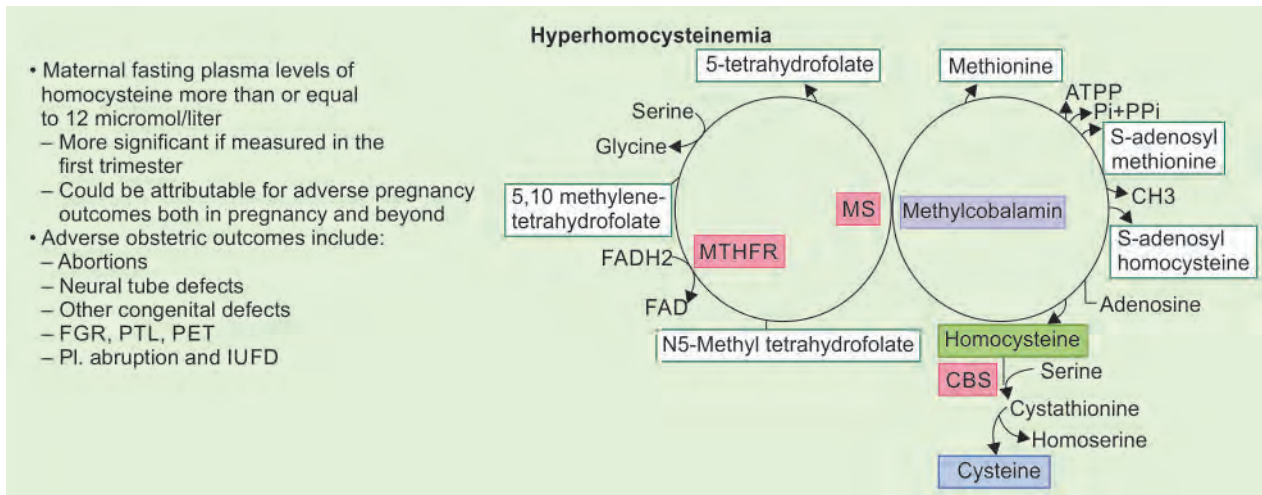
Fig. 1.7A: Benefits of breastfeeding.

obesity, hypertension and CVD. Women with GDM may develop type 2 diabetes within 10 years in 30% of cases due to persistence glucose intolerance.¹⁸ Excessive weight gain during pregnancy is also directly related to increased incidence of GDM. First trimester prediction of GDM by risk profile by history or biochemical tests can be as sensitive as 80%¹⁹ (Figs. 1.8A and B).

“Fetal origins of disease”—this hypothesis explained associations between impaired glucose tolerance (IGT), CVD with LBW.²⁰ Likewise, early malnutrition may

program metabolic syndrome due to poor development of pancreatic beta cell mass. Childhood obesity is more in children of mothers with GDM and fetal macrosomia.

Cesarean delivery is associated with childhood obesity in later life and its independent of the fact that cesarean deliveries are more in obese women and the potential explanation may be the difference in infant intestinal microbiome.²¹ Birth preparedness needs to be discussed during the ANC including neonatal immunization (Fig. 1.9).



- Maternal fasting plasma levels of homocysteine more than or equal to 12 micromol/liter
 - More significant if measured in the first trimester
 - Could be attributable for adverse pregnancy outcomes both in pregnancy and beyond
- Adverse obstetric outcomes include:
 - Abortions
 - Neural tube defects
 - Other congenital defects
 - FGR, PTL, PET
 - Pl. abruption and IUFD

Fig. 1.7B: Hyperhomocysteinemia. (FGR: fetal growth restriction; IUFD: intrauterine fetal death; PTL: preterm labor).

Gestational diabetes

GDM predicts increased risk of developing CV disease, type 1 and 2 diabetes

20 cohort studies including 675,455 women

- 10,859 with type 2 diabetes
- RR 4.69 within the first 5 years after delivery
- RR 9.34 more than five years after delivery

A

Universal screening by DIPSI

• 75 g glucose test

Plasma glucose	In pregnancy
<120 g/dL	Normal
120–139 g/dL	Gestational glucose intolerance
140–199 g/dL	Gestational diabetes mellitus
>200 g/dL	Overt diabetes

B

Figs. 1.8A and B: Universal screening by DIPSI. (DIPSI: Diabetes in Pregnancy Study Group of India; GDM: gestational diabetes mellitus; CV: cardiovascular).

(Source: Figure A—Lancet. 2009;373(9677):1773).

Birth preparedness and complication readiness

Delivering normally

Breastfeeding

Coming back to prepregnant weight

Neonatal and infant immunization

Hygiene

Smoking/ alcohol

Exercise

Fig. 1.9: Neonatal and birth immunization. (HTN: hypertension).

Subfertility/Infertility/Assisted Reproductive Technology Pregnancy

Subfertility such as in cases of PCOs and premature ovarian insufficiency also increases the risk of CVD and metabolic syndrome. Many studies have shown children conceived through artificial reproduction have higher sugar levels as compared to offspring of natural conceptions.

Hypertensive Disorders of Pregnancy, Preclampsia

Of the several risk factors for hypertensive disorders of pregnancy (HDP) most common are personal, cardiovascular, metabolic, and prothrombotic. Circulatory and metabolic syndromes are associated with early onset PE, FGR. First trimester prediction algorithms for PE can identify surrogate markers of cardiovascular and metabolic markers as independent contributors. Early pregnancy risk

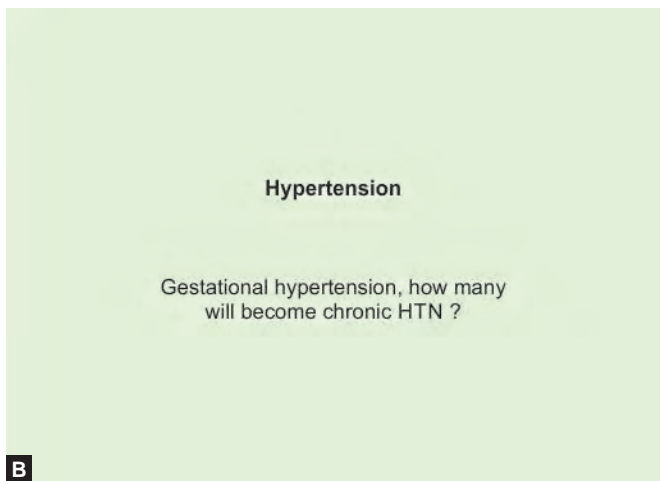
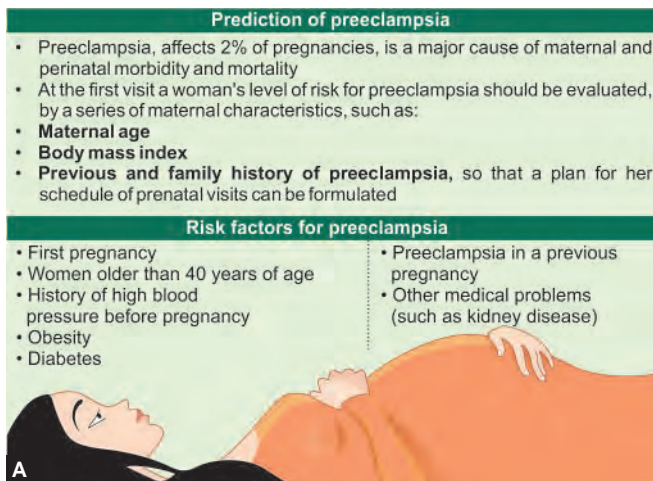
profiles support the fact that there is a parallel rise of PE and long-term maternal complications. Risk factor assessment and prediction of preeclampsia needs attention in all patients (Figs. 1.10A to E).

Placental functions and invasion are sensitive to cardiovascular changes in mother and in turn placenta can modulate fetal response to it. Mothers with HDP may have atherosclerotic diseases. Affected women with FGR, and placental syndromes should have their BP and weight checked 6 months postpartum and dietary lifestyle modifications should be stressed upon although acceptance for such behaviors is pretty low.

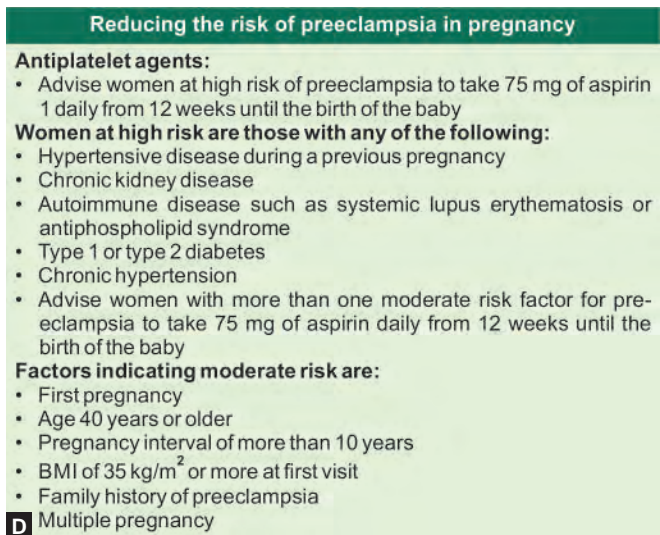
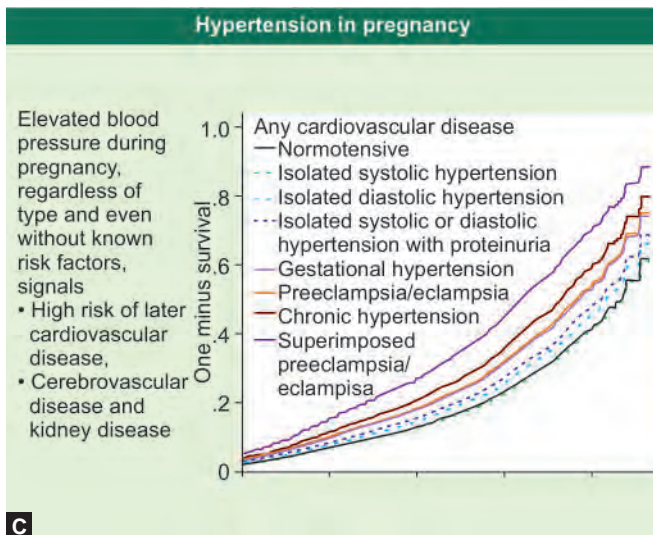
Offspring of women with PE are at increased risk for hypertension, depression, stroke, and delays in cognition.²²

Awareness about these associations may help us to formulate strategies to prevent adult hypertensive disease and we can reduce the burden of disease and it all can start from the antenatal care.

Pregnancy-associated plasma protein-A (PAAP-A) was the first serum biomarkers in first trimester which could correlate with placental function and fetal growth. Currently, first trimester algorithms for FGR and PE offer sensitivity of 60% and risk prediction of up to 90%.²³ Ninety-one percent of women may have cardiovascular and metabolic conditions if they are test positive at first trimester screen and these conditions may be treated. So, first trimester screen have screening as well as therapeutic benefits.



Figs. 1.10A and B: Body mass index and hypertension. (BMI: body mass index; HTN: hypertension).



Figs. 1.10C and D: Body mass index. (BMI: body mass index). (Source: Figure A—Circulation. 2013;127:681-90).

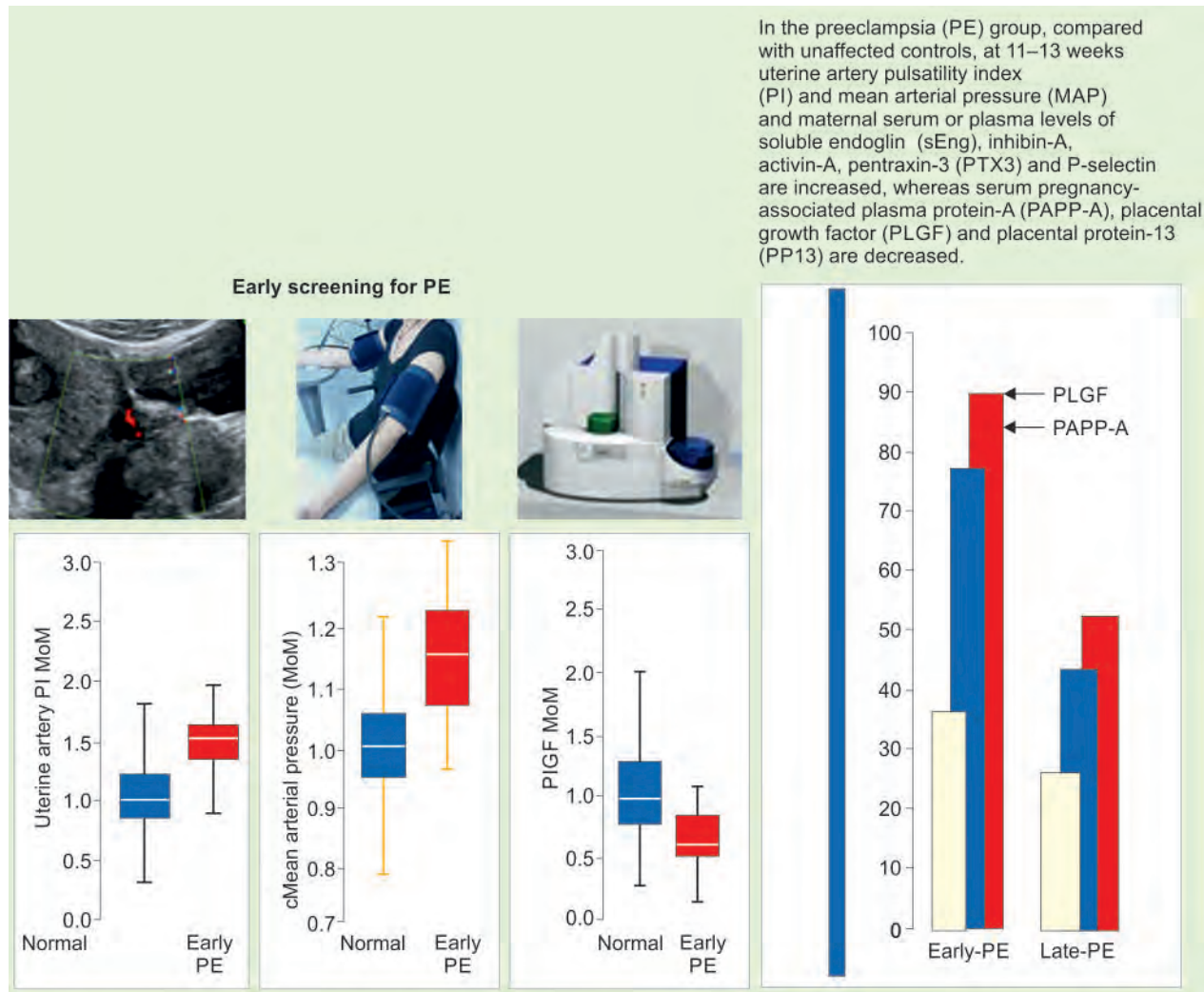


Fig. 1.10E: Prediction of preeclampsia.

(Source: Ekolokart et al. Prenat Diagn. 2011;31:66-74. Poon LC, Nicolaides KH. Obstet Gynecol Int. 2014. Audibert et al. Am J Obstet Gynecol. 2010).

Metabolic Syndrome and its Effects on Pregnancy

Metabolic syndrome and its components put women at risk of PE. Also women with PE have dyslipidemia and insulin resistance which may also continue postpartum and needs to be addressed.

Breastfeeding

Breastfeeding increases fat mobilization along with protection from hypertension (HTN) due to stress. Breastfeeding is also protective against type 2 diabetes, who had GDM along with reducing breast and ovarian cancer. Breastfeeding should be promoted and women to be counseled about its benefit for mother and baby and also its role in preventing obesity, CVD, DM, depression.

■ NINE MONTHS ARE WINDOW OF OPPORTUNITY

How many of us really think that pregnancy is a window of opportunity for neonatal and maternal health? All of us think so (Figs. 1.11 and 1.12).

Pregnancy: A Window of Opportunity (Fig. 1.11)

Pregnancy offers a window of opportunity to provide maternal care services, not only to reduce the traditionally known maternal and perinatal morbidity and mortality indicators, but also great potential for intergenerational prevention of several chronic diseases, such as diabetes, arterial hypertension, cardiovascular disease, and stroke.

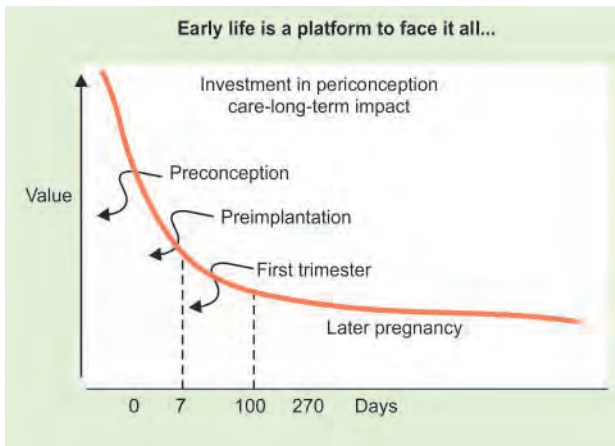


Fig. 1.11: Windows of opportunity. (Source: Mustard, 2006).

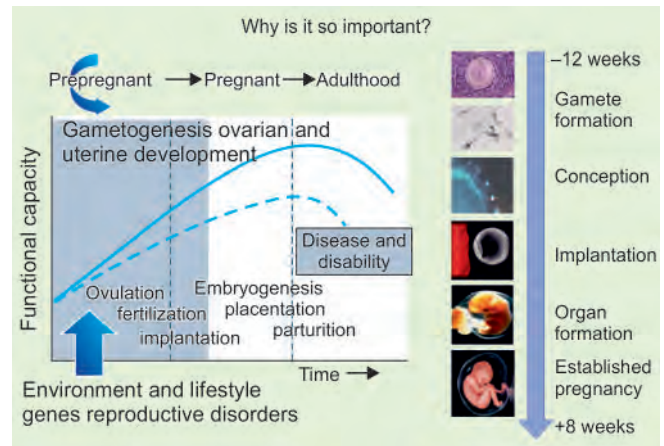


Fig. 1.12: Timeline.

Early Antenatal Care is too Late (Fig. 1.12)

- ✦ To prevent some birth defects critical period of teratogenesis:
 - D17 to D56 heart: Begins to beat at 22 ds after conception
 - Neural tube: Closes by 28 ds after conception
 - Palate: Fuses at 56 ds after conception
- ✦ To prevent implantation errors
- ✦ To restore allostasis: Maintain stability through change. An important objective of pregnancy care center (PCC) is to restore allostasis to women’s health before pregnancy.

Effects of Preconceptional Lifestyle

Negative factors include:

- ✦ Women’s smoking more than 15 cigarettes/day
- ✦ Men’s smoking more than 15 cigarettes/day
- ✦ Men’s alcohol more than 20 units/week
- ✦ Women’s coffee/tea intake more than 7 cups/day
- ✦ Women’s weight more than 70 kg
- ✦ Social deprivation score more than 60
- ✦ Women’s age more than 35 years, and/or partners’ age more than 45 years at the time of discontinuing contraception.

Is Pregnancy Body Mass Index Important?

- ✦ Prepregnancy BMI less than 19.8 kg/m² indicates chronic malnutrition, and BMI of more than 26.1 kg/m² shows an imbalance between energy intake and expenditure.

Several studies have shown that low BMI is associated with:

- ✦ Intrauterine growth restriction (IUGR)
- ✦ Preterm delivery
- ✦ Iron deficiency anemia.

On the other hand, high BMI is related to:

- ✦ Infertility
- ✦ Gestational diabetes
- ✦ Hypertension and preeclampsia induced by pregnancy
- ✦ Birth defects
- ✦ Infant macrosomia (weight ≥ 4500 g)
- ✦ Cesarean section, prolonged labor, and postpartum anemia.

Scope of Preconceptional counseling and Antenatal Care

- ✦ Regular visits for prevention and early detection of high-risk pregnancy
- ✦ Accurate dating of gestation
- ✦ To formulate a plan for continuing obstetric care and delivery
- ✦ Effectively intervene for modifiable factors
- ✦ Reduce emergency interventions
- ✦ Prognostic evaluation.

The First Visit

- ✦ History
- ✦ Physical examination
- ✦ Investigations
- ✦ Risk determination.

Past Obstetric History

- ✦ Parity
- ✦ History of still birth
- ✦ Intrauterine fetal death (IUFD)
- ✦ Bad obstetric history (BOH)
- ✦ Preterm labor
- ✦ Macrosomic baby



Figs. 1.13A to C: Adbhut Matrutva—a FOGSI Eris Initiative.

- ✦ IUGR baby
- ✦ Severe pregnancy-induced hypertension (PIH).

History

- ✦ Last menstrual period/estimated due date (LMP/EDD)
- ✦ Age of the patient less than 18 years, more than 35 years
- ✦ Order of pregnancy primigravida or grand multipara
- ✦ Interval of less than 2 years since last pregnancy
- ✦ History of cardiac disease, diabetes, chronic hypertension or any medical comorbidity.

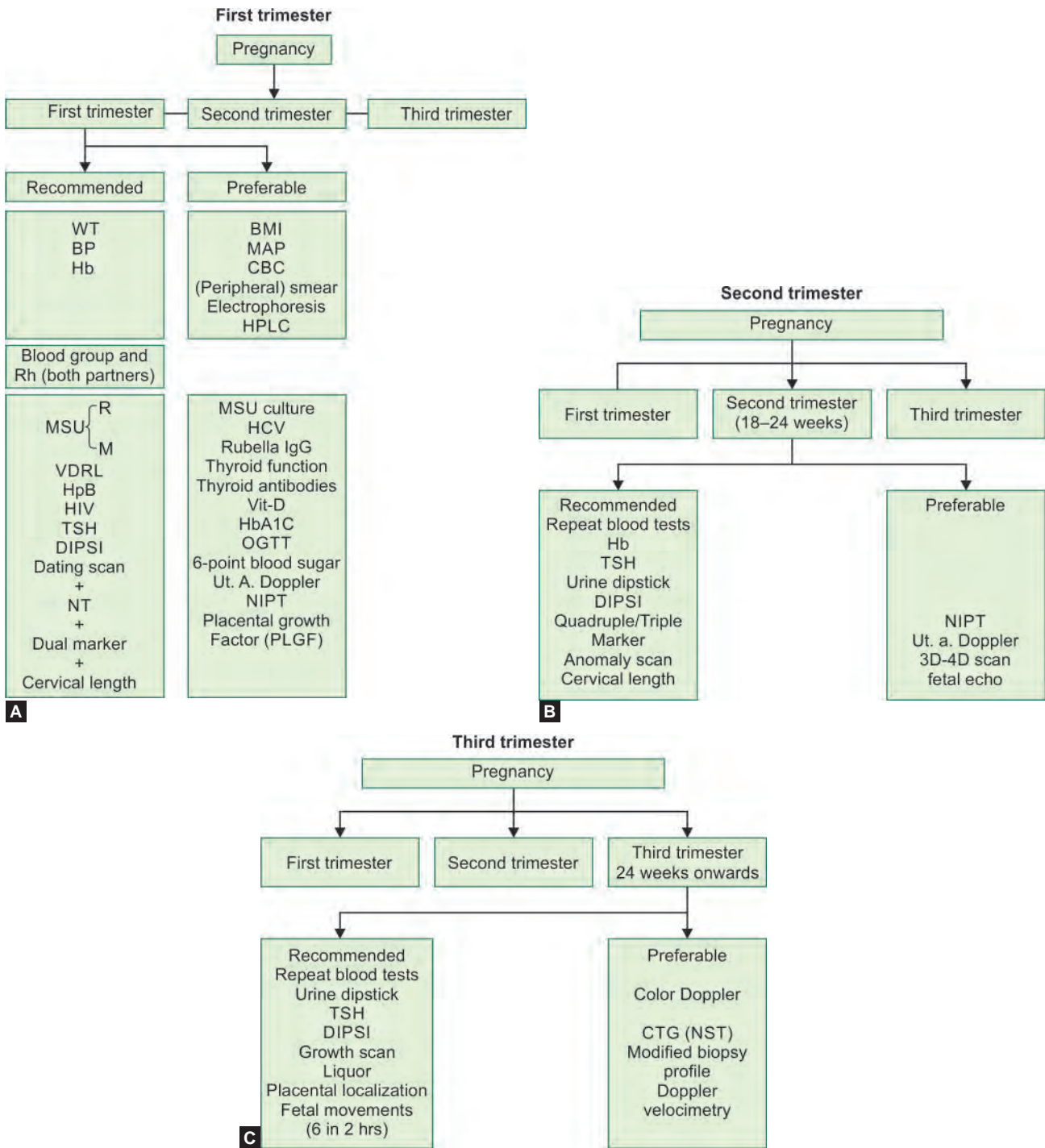
Life-threatening Situations

- ✦ History of postpartum hemorrhage (PPH)
- ✦ History of antepartum hemorrhage (APH)
- ✦ History of maternal recognition of pregnancy (MRP)
- ✦ History of eclampsia/hemolysis, elevated liver enzyme levels, and low platelet levels (HELLP)

- ✦ History of other complications associated with pregnancy which were life-threatening.

DISCUSSION

As we know a lot of NCDs in later life have their origin during pregnancy or fetal life. To reduce the disease burden, it is a unique opportunity for healthcare providers to detect the medical disorders during pregnancy which will help couples prevent NCDs and would reduce the healthcare costs as well. It is a nine-month window of opportunity for maternal-infant care, in turn care for the later life. Adverse pregnancy outcomes can have its origins during fertilization, gamete formation, embryonic development, fetal or placental development, and may translate into long-term health impacts.²⁴ Many complications of pregnancy have been shown to be associated with maternal and infant health risks in later life. By identifying the key periods during pregnancy, and



Figs. 1.14A to C: FOGSI recommended screening tests in pregnancy.

identifying the medical disorders at the earliest, we have this unique window of opportunity for a better maternal and child health care.

The selected time periods such as prenatal and early postnatal life gives us an opportunity in which environ-

mental factors can be modified and which may change epigenetics.

As the pregnant women come in contact with the obstetrician or maternal-fetal medicine (MFM) specialists, it is our responsibility to create healthcare paths after

pregnancy. Introduction of balanced diet and lifestyle modification for reducing the risks of DM in later life. For high risk pregnancies, follow-up at 6 and 12 months for deciding the care pathways is important.

Many European countries are utilizing the maternal passport for lifelong health records. Health apps for targeted health information about risks and intervention could also be useful.

Focused antenatal care by proper history taking, making risk algorithms, and screening tests, we can advance ourselves in detection of future diseases. Increased health literacy, creates a balance between responsible and irresponsible resource management and hence reducing the burden of chronic diseases. The future obstetrician or MFM specialist should aim at giving less medication, less invasive testing, should be giving less medicine but this type of care would be more acceptable as it interests the patient's future health.

Women with a history of FGR, GDM, PE, PTL, miscarriage, high BMI, excessive weight gain, subfertility, PCO, thrombotic risk factors are more frequently associated with CVD, insulin resistance, dyslipidemia, thrombotic episodes in later life. These abnormalities have shown a significant correlation with future metabolic and cardiovascular abnormalities in various studies. So, we want to stress upon the fact that pregnancy is a nine-month window of opportunity for detection of future health. It is a complex interplay of genetics and epigenetics which has consequences for both mother and fetus. We as maternal fetal medicine specialists should be able to prevent these NCDs by proper patient consultation and utilizing multidisciplinary approach. Healthcare providers and also government should be involved in policy making for primary prevention which will help us to detect and reduce metabolic and cardiovascular diseases and reduce the disease burden.

CONCLUSION

FOGSI in 2018 has started an initiative called *Adbhut Matrutva* (Figs. 1.13 and 1.14).

Also FOGSI has now recommended tests and screening in all trimesters as recommended and preferable (Figs. 1.14A to C).

Knowing is not enough; we must apply, Willing is not enough; we must do

—Goethe

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Preconception Care

Lila Vyas, Nidhi Gupta

“Preconception care is defined as the provision of biomedical, behavioral, and social health interventions to women and couples before conception.”

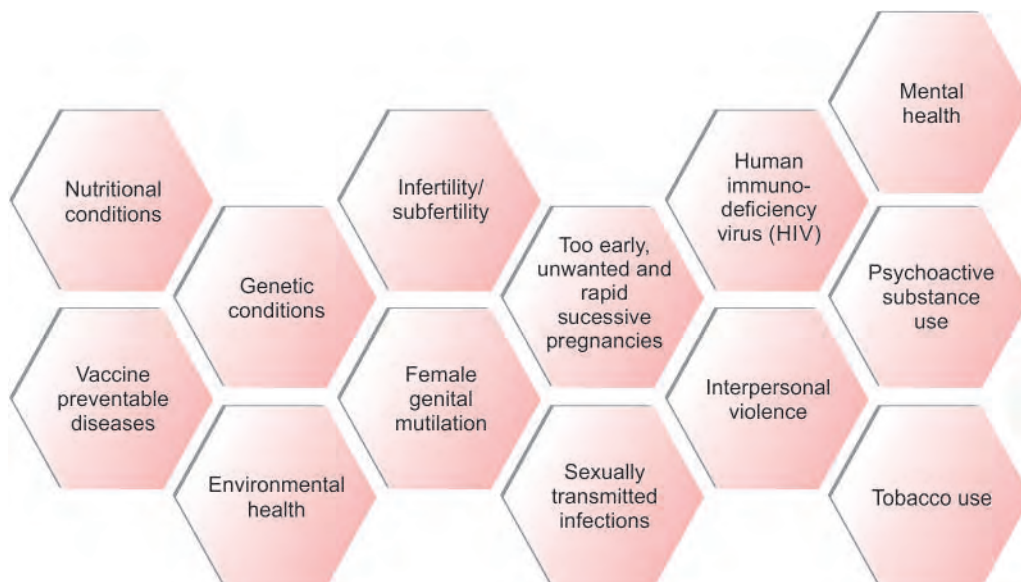
■ BACKGROUND AND HISTORY

Healthy reproductive life is the ambition of all the couples of the childbearing age. In India, where literacy rate is low and child marriage rate is high, women suffer a lot from unintended pregnancies, maternal death and disability, gender-based violence, and their partners' sexual behavior. An effective continuum of care is needed for further reduction in the neonatal and child mortality; maternal mortality and morbidity. At present, the care spectrum is available from early pregnancy to the birth of the baby, childhood and early adolescence, and then there is gap from adolescence to the pregnancy. Preconception care fills this gap and maintains the continuum of health surveillance, so that a woman enters in the pregnancy in her best health.

On preconception care WHO meeting was held in Geneva in 2012 for the global consensus and in South-East Asia Region was organized, an expert group meeting of its members in August 2013. UNICEF, UNFPA, experts from institution of excellence, academic institutes in the region and collaborators of WHO, all took part in the meeting as expert members. This was a logical step in the global concept of preconception care to the regional level and developing a consensus on positioning preconception care as part to improve reproductive health in pregnancy, neonatal outcome, and child and adolescent health collectively. However, the approach depends on socio-demographic and epidemiological situation.¹

Components of Preconception Care

Evidence had been collected from various countries and discussed in Geneva 2012 meeting. Conclusion was drawn regarding major risk factors, affecting maternal and child



health care which had been included as components of preconception care.

■ NUTRITIONAL ISSUES

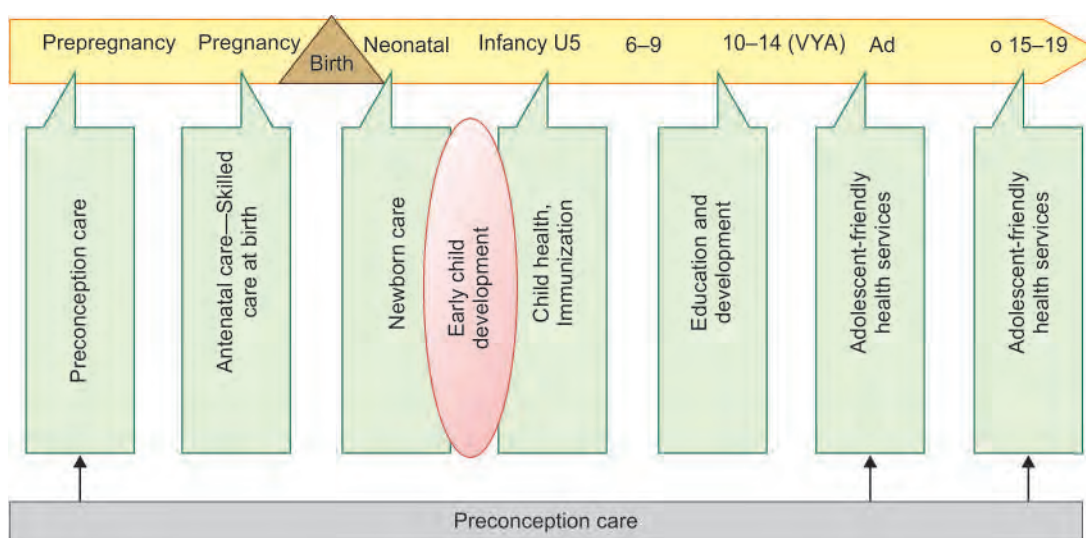
Folic Acid

Deficiency of folic acid causes malformation in fetus so food fortification to supply folic acid in required quantity in preconception period.

Iron, calcium, iodine, and other micronutrients should also be supplied to females of childbearing age.

Nutritional status should be adequately maintained in the preconception care; advice regarding nutrition depends on her present condition and medical co-morbidities; for details of different components please refer to FOGSI GCPR 2016.²

There are currently crucial gaps in the continuum of care in health programs where the critical age group (5–14 years) does not come under child health, maternal health or adolescent health programs. Also, women before and between pregnancies do not benefit from the ongoing maternal and child health program.



■ CONTINUUM OF CARE

Packages of Preconception Care

In the meeting, all the participants agreed for packages of preconception care, e.g. “healthy transitions for adolescents” targeting older children and adolescents and “prepregnancy program” consisting mainly of maternal and reproductive health package for partners/couples (Boxes 2.1 to 2.4).

The package should include *region-specific genetic* diseases (e.g. sickle cell anemia and thalassemia). It is suggested that it may be useful to propose a basic or minimum package to use, in the health and development continuum, addition of preconception care and healthy transitions would ensure health throughout the life-course from adolescence to adulthood.³

Additional Benefits

- ✦ Social and economic benefits for families and communities.

Box 2.1: Healthy transitions for adolescents package.

- Personal hygiene
- Mental health including screening for depression
- Vaccine-preventable diseases
- Prevention of noncommunicable diseases
- Tobacco, drugs, and alcohol exposure (effect on fertility, the fetus and the neonate)
- Substance and medication abuse
- Healthy diet and physical activity
- Screening for eye problems and other diseases, diabetes, body mass index
- Nutritional conditions (deworming, emerging deficiencies, e.g. vitamin D deficiency)
- Iron and folic acid supplementation
- Too-early, unwanted and repeated adolescent pregnancies
- Contraception information services (including emergency contraception)
- Genetic conditions (sickle cell anemia and thalassemia)
- Information on infertility
- STI/HIV
- Reproductive knowledge and managing menstruation and masturbation.

Box 2.2: Expert group consultation on preconception care.

- Sex/gender and violence
- Interpersonal violence (both sexes, bullying, teasing, domestic violence)
- Injury prevention
- Sexual abuse and harassment, violence
- Environmental health (e.g. indoor pollution—cooking practices, evidence base at country level, lead/arsenic/endocrine disruption).

Box 2.3: Basic package.

- Family planning (more than just contraception)
- Vaccine-preventable diseases
- Nutrition and micronutrients (including food and micronutrient supplementation, food fortification, nutrition education)
- Tobacco cessation (including exposure to second-hand smoke)
- Reducing harmful environmental exposures (e.g. indoor air pollution)
- Improving sexual health and behavior (screening, counseling, treatment).

Box 2.4: Expanded package (basic package plus the following issues).

- Mental health problems
- Intimate partner and sexual violence
- Genetic conditions
- Prevention of noncommunicable disease
- Environmental health
- Substance and drug use
- Injury prevention
- Nonpopulation-specific genetic diseases (e.g. Down syndrome).

- ✦ Participation by male in his partner's health and improvement in their own health, irrespective of immediate plans to become parent(s); and controlling exposure to environmental risk factors in early life and their long-term effect.

“Early prenatal care is too late”

This message should be forwarded for social, health, and economic benefits of the society. Awareness should be created in targeted group for preconception care, not for the high risk cases but for all.

Preconception risk assessment recommendations—

(A) For all:

Content	Evidence of association
Sociodemographic data	Good
Menstrual history	Good
Past obstetric history	G
Medical and surgical history	G
Infection history	G
Family and genetic history	G
Nutrition	G
Smoking/alcohol/drug	G
Height/weight	G
Hemoglobin and hematocrit	G

Contd...

Contd...

Rh-factor	G
Rubella titer	G
Urine protein/sugar	G
Gonococcal culture	G
Syphilis test	G
Hepatitis B	G
HIV	G

(B) For targeted population:

Content	Evidence of association
Hemoglobinopathies	G
Toxoplasma	G
HSV	G
Varicella	G
CMV	G
Tay-Sach's disease	G
Parental karyotype	G
Chlamydia screening	G

Obstetrics medicine: management of medical disorders in pregnancy

CONCLUSION

Preconception care brings attention to the missing components, new interventions, and development of new guidelines for addressing the needs of adolescents, young women and their partners throughout reproductive life. Thus, it offers a process of delivering direct or indirect healthcare interventions with the potential to identify and modify the biomedical, behavioral, and social risks that determine reproductive health outcomes. We, the healthcare providers, should learn that it aims at improving the overall health status and continuum of care, by targeting risk behaviors for noncommunicable diseases, alcohol consumption, and substance abuse.²

Overall, preconception care has a positive impact on a range of outcomes:

- ✦ Reduces mortality and improves health indicators of mothers.
- ✦ Improved health outcome for the neonate/child, which will lead to health benefits in later life as an adolescent and adult.
- ✦ Incidence of too-early and too-frequent pregnancies and abortions are reduced effectively; and there is improvement in the nutritional status of women.

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Science of Garbh Sanskar

Pushpa Pandey, BK Shubhada Neel, Keerti Parashar, Shakuntla Kumar

The two powerful gifts we can give to our children, “Sanskar” and “Wings”!

■ INTRODUCTION

Garbh Sanskar is a scientific method to educate the fetus in womb. Garbh denotes the fetus in the womb; Sanskar is to educate the mind. Every parent wants to see their child healthy, happy, intelligent, and virtuous. To make everyone’s dreams to make future generation happy and healthy come true, this project is the need of hour.

As we know, infant mortality rate (IMR) and maternal mortality rate (MMR) have decreased due to the efforts of various organizations working for “healthy mother and healthy baby”. One of today’s challenges in the society is to deal with the younger generation that lacks moral and emotional values which is clearly depicted by the spiraling social crimes and terrorism. This raises the question, how and when can we instill sanskars and increase emotional quotient (EQ) and spiritual quotient (SQ) in the future generation?

The foundation should be strong to build a house. To bring about a change in the society, we have to instill sanskars in the fetus itself. Garbh Sanskar is an effort to purify and refine the accumulated negative evil tendencies and enlighten the pure inner core of the subconscious mind by teaching good things to unborn child right in mother’s womb.

Some of the great examples of “Garbh Sanskar” can be found in many mythological stories in Indian history. The story of Abhimanyu quoted in the Mahabharata is very well known. Abhimanyu, son of Arjuna, learned how to enter the chakravyuha when he was in his mother’s womb. He remembered his father’s story when he became a warrior in the Kurukshetra war. Another great story depicting importance of Garbh Sanskar is the story of Prahlad. He was born to a family of demons. His mother listened to devotional prayers and stories about lord Vishnu, while he was in her womb. As a result, he became a devotee of lord Vishnu. Another one is the well-known story of Hanuman.

His mother, Anjana, was a devotee of lord Shiva. When she was pregnant, she ate a blessed dessert that was meant to produce divine children. Thus, Hanuman was born with divine powers.

A few great examples from the modern world are also worth mentioning. When Zakir Hussain (tabla vada) was in mother’s womb, his father, Ustad Allah Rakha, used to beat lightly with his fingers on his mother’s abdomen. Freedom fighter Savarkar’s mother used to read the courageous tales from Ramayana and Maharana Pratap to her son when he was in womb.

■ SCIENCE ALSO CONFIRMS LIFE IN UTERO— THE BABY CAN HEAR, SMELL, TASTE, AND SEE BEFORE BIRTH

- ✦ Fetus begins to swallow amniotic fluid at 12 weeks of gestation and can learn tastes experienced only prenatally. Fetus favors its mother’s meal and picks up the food taste culture in the womb.¹
- ✦ Touch sensation starts from 16th week after conception, at 23rd week, it fully develops.²
- ✦ From the 7th month, the fetus can hear the sounds from mother’s womb and from the surroundings of the mother and also responds to them. Fifer has found that fetal heart rate slows when the mother is speaking, suggesting that fetus not only hears and recognizes the sound, but calmed by it.
- ✦ Fetus reacts to loud voice and prefers mother’s voice.
- ✦ He has a memory of experiences before birth.³
- ✦ Newborn prefers a story read to it repeatedly when in the womb.

■ PRINCIPLES OF GARBH SANSKAR

It is scientifically proven that fetus has the same life as an adult and can use its senses to see, taste, hear, or feel from much earlier period than previously agreed upon. As per the new model of health (soul, mind, body and medicine), “human being” is derived from two words, “humus” and “being”; or “body” and “psyche” or “consciousness”. Health

is a dynamic process of harmony in the flow of spiritual, mental, and physical energy.⁴ Due to advancements in technology, antenatal care is not only routine palpation, but it includes diagnostic modality of imaging, biochemical, biophysical marker, vaccination, and screening for medical and obstetric disorders. However, in routine antenatal care, even now no attention is being given to mental and spiritual energies (being) of developing fetus. Garbh Sanskar gives equal importance to holistic development of growing fetus.

Personality (sanskar) of a human being is nonphysical. It remains in subconscious mind which makes 90% of consciousness (Fig. 3.1). Holistic personality development also needs three types of energies: (1) soul (being) has spiritual energy which is primary and works as software, (2) brain works as hardware, and (3) the body is like a robot. Flow of spiritual energy is the root of good health and personality.

How are our personalities shaped?

Every thought word and action we create becomes our sanskar (i.e. personality). Sanskar (health or behavior) of any person is influenced by:

- ✦ Owns original sanskars, i.e. innate qualities of soul (spiritual energy).
- ✦ Sanskar (spiritual energy) carried forward from the past birth.
- ✦ Sanskars received from the mother and father (parent's role, Garbh Sanskar).

A pregnant mother has two lives within, hers and the fetus'. It has been proven that personality of the future generation is greatly influenced by pregnant mother's feelings and state of mind. Likewise, most of the behavioral traits also originate in the womb. Infants, toddlers, and adolescents largely suffer from many emotional and behavioral problems, the seeds of which are sown on the unborn baby due to negative hormonal secretions that are activated by mother's thoughts in response to stress.

By keeping harmony in spiritual, mental, and physical energy, she can nourish both making both (herself and fetus) physically and mentally healthy. Foundation of intelligence quotient (IQ), EQ, and SQ is mainly laid down inside the womb. The best time to develop good qualities in the baby is from the day of conception to 2–5 years of life because the subconscious mind is active. All negative or positive sanskars remain in the subconscious mind. After 5 years, conscious mind starts to work. It is very difficult to change once the personality of fetus is laid down within the womb.

- ✦ Personality is colored by family, company, and environment.

Garbh Sanskar means that expectant mothers should take care of their physical, mental, and spiritual energy. By

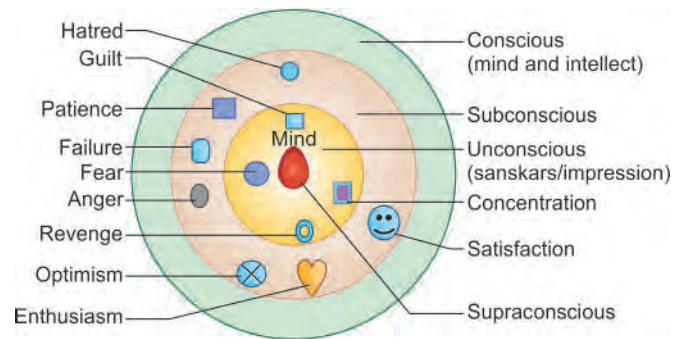


Fig. 3.1: Model of consciousness (90% subconscious mind 10% conscious mind).

taking care of her own sanskars, she can draw the portrait of her child's elevated fortune.

GOOD TIPS FOR GARBH SANSKAR

Keeping a High Self-esteem

This is the best way of emotionally nourishing an unborn child during pregnancy. Happiness is truly a choice, it not only depends on the surroundings but also depends upon one's self-esteem. Antenatal mother should take care of her self-esteem by keeping her thoughts pure, positive, and purposeful. She should respect herself, read positive books, and preferably write down positive versions many times daily to keep her self-esteem high, for example:

- ✦ I am a powerful being.
- ✦ I am loveful being.
- ✦ I am peaceful being, I am the child of ocean of peace.

Such types of thoughts create a positive feeling that reaches the unborn child through neuropeptides. It should be remembered that expectant mother cannot hide her feelings from the unborn child.² A pregnant woman's thoughts have a physical connection to her unborn child. "Everything the pregnant mother feels and thinks is communicated through neurohormones to her unborn child, just as surely as are alcohol and nicotine," says Dr Thomas Verny. It is also suggested that positive thinking can shape the body, heal internally, and even nurture a healthier child during pregnancy.

It is advised to keep pictures of great leaders in the room and watch good programs on TV. Reading fiction novels and watching horror or sad movies in social media or TV are inadvisable.

In the new study, carried out at Nagasaki University in Japan, 10 pregnant volunteers were asked to watch an upbeat 5-minute clip from the Julie Andrews musical, "The Sound of Music." Another 14 watched a tear-jerking 5-minute clip from the 1979 Franco Zeffirelli film "The Champ", in which a boy cries at the death of his father.

The clips were “sandwiched” between two extracts of neutral programs so that the researchers could measure any changes in the movement of the babies.

The mothers-to-be listened to the movies using earphones to guarantee their unborn babies were not being influenced by the movie’s soundtrack.

Dr Kazuyuki Shinohara, who led the study, used ultrasound scans to count the number of arm, leg, and body movements of the babies while their mothers were watching the clips.

Researchers found that the fetuses moved their arms significantly more during the happy clip from “The Sound of Music”. But in the other group, the unborn babies moved significantly less than normal while their mothers watched the weepie.

What we see daily creates thoughts in our mind, which shape sanskars of the expectant mothers of the unborn child. Watching good scenes and pictures also helps expectant mother in creative visualization, at a subconscious level, of how her child should be.

Listen Calm Music

Garbh Sanskar can be an effective by means of sound in the form of mantras, shlokas because the rhythmic sounds are captured by a child’s subconscious mind very effectively. The vibrations of sound waves can influence both mother and her fetus; therefore, the music designed for Garbh Sanskar is useful for the health and personality development of fetus. If the mother listens to relaxing music, in last trimester of pregnancy, the baby responds positively to the resonant sound and after birth when it is exposed to the same music, it calmed down.

A study researched the ability of the fetus to learn a TV theme tune. On hearing the theme tune, it became alert, stopped moving, and the heart rate decreased (orienting). In this study, the first group consisted of pregnant mothers who frequently watched “Neighbors”, an Australian television soap opera.⁴ After delivery, these mothers were asked to watch the TV show again along with their babies. It was observed that the newborn babies (2–4 days of age) became alert, stopped moving, and their heart rate decreased (orienting) upon hearing the theme song. These same individuals showed no such reaction to other unfamiliar tunes. The newborns of the second group of pregnant mothers, who did not watch the same TV program during pregnancy, showed no reaction to the tune.

Communicate with Unborn Baby

Communicate with the child with unconditional love. Good communication builds strong bonds. Dr Komal Jain,

gynecologist from Jabalpur, says “When I was pregnant I used to say to my unborn child, “you are the most beautiful child in the world”, when my baby grew up and start talking first sentence, she spoke “mommy you are the most beautiful mother in the world”. Reading out loud good stories and healthy discussions between parents improves baby’s memory. Baby learns around 5,000 words from mother other than from siblings, father, and family members. So, 4–5 hours quality sound exposure is necessary. Negative words have negative effects on unborn fetus. The mythological story of Saint Ashtavakra depicts the traumatic effect of loud noises and abuses on the fetus. Ashtavakra is a sage mentioned in Hindu scriptures. His parents wished for an intelligent and a spiritual child. Kahod, his father, was a scholar yet arrogant. He would recite scriptures to his wife, Sujata, during her pregnancy. Consequently, the baby learned everything when inside the womb and grew up to be very intelligent. It is believed that Ashtavakra, when still in womb, interrupted his father eight times to indicate that his knowledge is pedantic and not spiritual. Kahod rebuked and cursed his own baby eight times that caused the eight curves in his body. Ashtavakra epitomizes a baby with cerebral palsy (CP) and high IQ. CP is a general term for a group of permanent, nonprogressive movement disorders that cause physical disability. It is caused by damage to the motor control centers of the developing brain that can occur during pregnancy, during childbirth, or after birth due to some reason which is still debatable. As prenatal events are thought to be responsible for approximately 75% of all causes of CP, although it is usually impossible to determine the nature and exact timing of event.⁵

Spiritual Lifestyle and Regular Meditation Practice

It is an important aspect of spirituality and helps to adapt positive thinking, manage stress, and improve mental, social, and spiritual health. Spiritual lifestyle is a disciplined healthy lifestyle.

Waking up and sleeping should be according to circadian rhythms. When activities are in rhythm with one’s biological clock, they reduce energy expense and stress, and prove beneficial for the health of mind, intellect, and body.⁴ Practice meditation for 20 minutes in the morning and evening before going to bed when the subconscious mind is active. Recitation of some shlokas with feeling is also useful.

The mothers are advised to consume good nutritious food mixed with vibration of God’s love. Avoid spicy food and addictive substances.

Practice Asanas under the guidance of a yoga expert and sleep adequately.

It is also recommended to read good books and listen to positive verses and relaxing alpha music everyday throughout the pregnancy.

Practice of celibacy is advised, as the feeling of sexual arousal is transmitted to the unborn fetus. By practicing celibacy, many cases of rape and teenage pregnancy can be prevented in future generation.

“Dear mother,

You are the most important person in my life. I am blessed to have a divine mother like you. Please take care of your physical, mental, social, and spiritual health. Please hug me, protect me, praise me, read to me, sing to me, love me, and make me safe so that I will grow up to be a happy person with great personality. I like the good vibrations when you practice meditation. This will decide my future health and personality. The two little words “Thank You” can be never enough to appreciate every little thing you will ever do for me.

Regards

Unborn little baby (fetus)”.

■ CONCLUSION

- ✦ Garbh Sanskar is scientific method of building physical and mental character of a child during pregnancy.
- ✦ Positive mental energy (thoughts, emotions, attitude, and memory—a positive TEAM) release positive neurotransmitters which help to develop good qualities like happiness, cheerfulness, relaxation, instructiveness, intelligence, attentiveness, creativity, self-esteem, and increases logical skill and inner silence.
- ✦ The baby listens and feels mother’s feelings even when it is developing in womb. Expectant mother can shape up her baby by listening to good music, visualizing, and massaging gently while meditating.
- ✦ The advantages of Garbh Sanskar are not only to educate the child but to develop a bond between the mother and child. In fact, this has a great impact on the health of the mother as well. Positive thinking and attitude promotes physical well-being of the mother.

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■ INTRODUCTION

Supporting massive experiences and holistic approach in the field of medical support given to parents-to-be, right from the “Planning for a Baby” stage to the ultimate arrival of the “Bundle of Joy”, the article details about how the parents-to-be, especially the mother should be aware, informed, constantly nourish her own mind, body and spirit, exercise, eat healthy and bond with this most wondrous Creation of God, which only she has the privilege to bring to this Earth.

Birthing is a momentous occasion that will always be treasured by couples for the rest of their life. Although everyone wishes to have a perfect start for the new life joining them but apprehensions and worries of everyday life surround them always. They have to stay parallel with their own set of responsibilities, corporate as well as domestic duties, busy and hectic schedules, and daily targets. Stress, anxiety, and depression are hence, perceived as natural by them. The reality is that these problems during pregnancy may have some severe consequences for the health of her unborn baby, if a would-be mother does not learn to manage it.

Lifelong well-being of the baby begins in the womb. Dr. David Chamberlin, a well-known psychologist who has done research in psychology, prenatal development, and bonding elaborates, “*The womb is a classroom every child attends*”.

Birth imprints have a long-term effect on the baby that last for a lifetime. Indian mythology is littered with stories that illustrate the power of *Garbh Sanskar*.

Curt A Sandman, Elysia P Davis, and Laura M Glynn of the University of California-Irvine in a study discovered how the mother’s psychological state affects a developing fetus. The study was conducted on pregnant women and they were examined for depression before and after they gave birth. They also performed tests on their babies to understand the trajectory of their development.

A compelling observation was made—a significant factor that mattered to the babies was the consistency of the environment before and after birth. Those babies had a

healthier development whose mothers were healthy both before and after birth. Similarly and surprisingly, babies did best if they had mothers who were depressed before birth and stayed depressed afterward.

However, it was change in the environment that impaired the development of the baby.

A mother who was depressed before birth and became healthy afterward or was healthy before and became depressed after giving birth, had a negative effect on the psychological state of the baby.

Scientists revealed that the strength of this finding shook them.

Pacific Lutheran University in a new study found that babies begin listening to their mother’s talk during the last 10 weeks of pregnancy. They, at birth, have the ability to demonstrate what they have heard inside the womb.

Moreover, under *Birth Psychology*, science has now proven that programming of lifetime health is dependent not only on our genes but also by the environment a mother offers to her baby within the womb. Therefore, all would-be parents can honor the sacred journey of *bringing forth life* and help protect their baby’s lifetime health and emotional well-being and support healthy psychological patterning from the moment they plan to conceive.

■ NINE MONTHS: NO MORE GRACE PERIOD!

Contrary to the widespread notions, several childcare experts and pediatrics strongly believe that the emotional development of a child begins even before it comes into this world. Anne Murphy Paul’s recent cover story for Time Magazine elaborates how “A pregnant women’s mental state can shape her offspring’s psyche”.

It was concluded that the 9 months of gestation considerably affected the physical, mental, intellectual, and emotional functioning of the unborn baby.

Motherhood is not confined to the physical growth and development of the baby. Thus, those crucial 9 months should not be considered as a “grace-period” for the mother.



During this phase, every moment, every day of the pregnancy should be filled with love, tolerance, peace, and patience. The mother should have faith in herself as it is this self-trust that will enable her to blossom into the mother and person she is meant to be.

There is uncertainty—especially for those women who have conceived for the first time. This uncertainty of the unknown may create fear and anxiety. This is where members of the family, friends, and colleagues, and healthcare providers should play a role in creating a positive environment for the mother and the child.

Generally, when we consider the factors that affect our health, we think of exercise and nutrition, i.e. those elements that have a direct impact on our “physical well-being”.

However, equally significant is the role played by the mind and emotions as they mould our values and beliefs. Our values shape our character and how we respond to stress, relationships, and our support networks. The nature of our response reveals how aware we are about ourselves—and a pregnancy must be created in awareness.

How can we create this mindfulness? By making enquiries about our beliefs, experiencing true feelings, investigating mental patterns, releasing old systems, and continuing to evolve to become a better human being.

Basic underlining that forms the complete edge of the topic is that emotional development stands as a main pillar for the baby’s overall health.

During pregnancy, as the baby grows inside the womb, it can recognize the voices and sounds outside

the mother’s body. These external stimuli along with the mother’s mood—whether she is happy or stressed or upset shape the baby’s emotional well-being.

When you step into motherhood, you shoulder the responsibilities of two lives. Thus, care must be taken about lifestyle choices, even before conception begins. This is vital, not just for your own baby but for future generations as well. A mother needs to begin before birth.

■ SCIENCE BEHIND GARBH SANSKAR

Babies, undoubtedly, pick up cues even before they are born.

The knowledge that we have garnered over the years about life before birth has driven us to retune the clock on parenthood. This information about the womb has made us believe that the womb is not a secret place anymore.

Ancient scriptures, including the *Vedas*, are testimony to the fact that the creation of a child’s personality begins in the womb. There are ample theories of *Garbh Sanskar* suggesting that your baby has the ability to sense and respond to external stimuli, such as music as well as the internal influences of your thoughts and feelings.

Once the baby is conceived, his/her mental and behavioral development starts. This growth is largely affected by the emotional state of the mother, precisely why the elderly have always taught about staying positive and relaxed during pregnancy.

The need of the hour is to honor the synthesis of a holistic and natural trend in pregnancy and childbirth

with a whole-hearted acceptance of all that is modern in medicine. During pregnancy, whatever emotional perceptions a woman experiences, same are transmitted to the fetus/*garbha*. Selecting and transmitting positive influences by means of yoga, reading, thinking, praying including healthy eating and cheerful behavior is really significant for overall personality of the baby. Recent scientific studies on the subject, and evidences from past researches, all indicate that a baby's brain develops while in the womb.

How Maternal Stress Affects Growing Fetus?

Pregnancy is a long, evidently complex and a dynamic experience. The psychological state of a mother is perpetually changing. This induces a number of reactions in the body, including changes in blood flow to the uterus as well as alterations to the intrauterine sensory environment experienced by the fetus.

We are aware that pregnant women share an intricate physiological relation with their fetus. Therefore, it is obvious that the maternal psychological environment plays a role in shaping the neurodevelopment of the fetus and ultimately that of the child.

The fetus, however, requires the transduction of a maternal physiological signal since there are no direct neural connections between the pregnant woman and the fetus.

Studies on maternal psychological stress and emotions has emerged over the past decades, focused both on pregnancy outcomes, such as timing of delivery and infant size at birth, as well as more persistent effects on child development, behavior, and temperament.

Studies that show links between prenatal maternal distress and measured child outcomes reveal a complex pattern of results that can be instrument, age or gender-specific.

The effect of stress experienced by a mother is similar to the harmful consequences of a potent teratogenic agent. Surprisingly, as per a study, proper fetal motor and cognitive development does require stress in small amounts.

It is interesting to note that prenatal stress can affect the fetus in different ways. It can result into absolutely contrasting fetal outcomes—either a more progressive physical development or a more anxious child.

How does emotional stress or insult incite an adaptive response inside the body? This process involves the hypothalamic-pituitary-adrenal axis, with various immune (Interleukins 1, 6, and tumor necrosis factor-alpha), hormonal (prostaglandins), and neurohormonal (corticotropin-releasing hormone, hence cortisol and catecholamines) mediators.

The result is a proinflammatory state, occurring as a response to excessive maternal stress. This was found to be similar to that resulting from exposure to numerous non-emotional situations. In both the cases, heavy production of free radicals or reactive oxygen species (ROS) such as trauma, infections, ionizing radiation, heat injury, obesity, smoking, and environmental pollution.

The excessive production of ROS must be balanced by the defensive antioxidant activity of the body. Failure of this counterbalancing act leads to oxidative stress, causing oxidation of essential macromolecules and DNA. This can cause change in vital cell functions along with systemic inflammatory leading to perpetual repercussions.

In addition, the placenta produces heavy metals like iron. Hence, mostly from the second trimester, pregnancy becomes a stressful condition.

In case of additional insult, emotional or non-emotional, the release of stress mediators increases, which can cause extensive visceral injuries, alterations in sub-decidual angiogenesis, increased maternal-fetal transfer of stress substances, and decrease in intrauterine blood flow.

A direct consequence of these developments is the increase in myometrial irritability and fetal inflammatory climate, responsible for higher rates of pregnancy losses, preterm deliveries, intrauterine growth restriction, low birth weight babies, and neonatal intravascular hemorrhage.

It has been found that the elevated prenatal maternal cortisol is one of the strongest predictor of these neonatal outcomes. The biochemical profile of newborn babies of depressed mothers is generally alike to their mother's prenatal biochemical profile with high cortisol levels and reduced dopamine and serotonin levels.

Effects of Prenatal Stress on Fetus

The theory of harmful consequences of maternal stress and anxiety on the developing fetus finds mention in old tradition and fables. According to scientific evidence, antenatal stress and depression can have the following harmful effects on the developing fetus:

- ✦ Preterm birth
- ✦ Low birth weight
- ✦ Reduced cognitive ability
- ✦ Increased fearfulness
- ✦ Increased incidence of respiratory and skin illnesses in early life.

The effect of stress is so deep-seated that it puts depressed women at a higher risk of delivering prematurely. The neonates, thus, born require intensive care for

postnatal complications as compared to normal pregnant women.

There is also an increased risk of having low birth weight (< 2500 g), small for gestational age babies (<10th percentile), higher rates of placental abnormalities, pre-eclampsia, and spontaneous miscarriage.

In another study, it was found that fetal heart rate, fetal activity; sleep patterns and movements, which are all indicators of fetal neurobehavioral development, were drastically affected by maternal stress, depression, and anxiety.

Paradoxically, a meta-analytic review found that there was a weak link between psychosocial stress during pregnancy and neonatal weight and risk for low birth. The meta-analysis of 50 studies reported similar findings of no relationship between anxiety symptoms during pregnancy and poor perinatal outcomes.

The analysis thus follows that along with extreme prenatal stress, the environment and circumstances prevailing around pregnant women such as everyday hassles, pregnancy-specific anxiety or relationship strains, etc. all carry adverse effects on developing fetus.

■ PRENATAL DEVELOPMENT

Prenatal development is the process in which a human embryo or fetus grows and develops during pregnancy, from fertilization until birth.

The process of prenatal development occurs in three main stages:

1. *Germinal period (single-cell zygote → morula → blastocyst)*: Conception to attachment (8–10 days later).
2. *Embryonic period (embryo)*: Attachment to end of 8th week (when all major organs have taken primitive shape).
3. *Fetal period (fetus)*: 9th week (with first hardening of the bones) until birth.

The early body systems and structures established in the embryonic stage continue to develop in this period. This stage of prenatal development lasts the longest and is marked by amazing change and growth as summarized below:

- ✦ *10th week*: Intestines in place; breathing and jaw-opening movements
- ✦ *12th week*: Sexual characteristics; well-defined neck; sucking and swallowing movements
- ✦ *16th week*: Head erect and lower limbs well-developed
- ✦ *5th month*: As many nerve cells as it will ever have
- ✦ *7th month*: Eyes open and lungs capable of breathing
- ✦ *8th month*: Many folds of the brain present
- ✦ *9th month*: Brain more convoluted
- ✦ Fetus doubles in weight in final weeks before birth.

Fetal stage

7 month period of prenatal development, spanning 9 weeks from conception to birth:

- Begins to look distinctly human
- Organs grow and start to function:
 - *By 3 months*: can kick, make fist, turn head, open mouth, swallow, frown
 - *In 6th month*: eyelids open, has tastebuds, well-developed grasp, can breathe regularly as long as 24 hours at a time
 - Could potentially survive premature birth by end of 6th month
 - Organ systems typically functional by end of 7th month
 - 8th and 9th month: respond to light and touch, hear outside sounds
 - Can also learn—respond differently to sound of mother (faster heartbeat) and stranger (slower heartbeat)



Table 4.1: Fetal behavior.

Behavior	Gestational age (weeks)
Just discernible movement	7
Startle	8
Hiccup	9
Fetal breathing movements	10
Hand-face contact	10
Yawn	11
Sucking and swallowing	12
Rooting	14
Eye movements	16

Age of First Fetal Behavior

Despite a number of techniques to assess fetal well-being (e.g. analysis of genetic/chromosomal constitution, structure, and autonomic function), none directly assess the functioning of the brain. Since the behavior of the fetus directly represents the functioning of its nervous system, observation of the fetus's behavior provides an excellent means of assessing neural function and dysfunction (Table 4.1).

■ MATERNAL EMOTIONAL IMPLICATIONS AND PRENATAL CARE

We now understand that fetuses are fully sentient and aware beings. In this new climate of appreciation for the surprising dimensions of fetal behavior, sensitivity, and intelligence, our endeavor should be to bring a host of new information and light about the transformative journey that a baby undergoes in the womb.

Study of fetal psychology wonderfully unravels the significance of prenatal period and behavior for our development. Moreover, with greater understanding of fetal behavior; health of the fetus can be improved to a great level. Early views of the fetus portrayed its environment as one of sensory deprivation. Research has revised this view and demonstrated that the fetus has considerable sensory abilities. It is argued that maternal anxiety influences the functioning of the maternal hypothalamic-pituitary-adrenal axis, which in turn influences fetal brain development, resulting in the subsequent poorer psychological and behavioral performance.

The maternal womb is an optimal, stimulating, interactive environment for human development.

For the overall health of the baby, it is important to pay equal attention to the physical as well as the emotional development. A baby can sense when the mother is upset or reeling under stress. The intimate connection shared by the baby and the mother enables the baby to feel whatever the mother is feeling. Therefore, it is important for the mother to remain calm and avoid stress as much as possible during pregnancy.

After the baby is born, he/she is surrounded by a number of conditions and situations. These experiences further expand the babies' emotional development. This exposure enables the baby to understand their needs—hunger, comfort or need to be changed, which helps the baby to remain emotionally satisfied.

Research suggests that the behavior of the fetus is important for its development both before and after birth. Adapting to the womb—the fetal environment is very different from that experienced after birth.

The experiences attained during the prenatal period are significant for the development of the brain and for normal growth as well. It is well-established that the nervous system develops in response to the experiences it receives and from activity generated within the system.

The more informed we become about the fetus behavior and the factors that affect its development, the more chances we have to enhance the health of the fetus.

Woman today, empowered by the atmosphere of enquiry are asking for answers. Moreover, with their partners they chose to be as much in-charge as they can and affirmatively participate in all activities pertaining to their lives and their bodies. Today's mother does a lot of research by reading books and surfing variegated baby sites. She is often confused about the right way to look after her unborn baby because of the confusing thoughts she has when she compares what she has read and the well-meaning advice she has been given by the elderly members in family. *Conception should be a conscious and planned decision.* To conceive is a significant event in a

woman's life. Everything the mother eats and the emotions she experiences influence the child and long before he/she comes into this world, the baby is prepared for several situations.

Exemplifying a positive example of moral challenge to the modern world, this article forms a middle path between imbibing traditional as well as modern ideas in a practical manner.

Science and technology has unlocked secrets and discoveries of a baby's nine-month journey that could change perspectives and inspire us to formulate a new viewpoint about both unborn and newborn fetuses. However, the old view that unborn babies have always been inactive and nothing short of insignificant growing clump of human cells has been replaced with the view that sensory and psychological development of an unborn fetus is rapid and full of constant activity and reaction.

■ TRAINING THE FETUS

Can babies learn while still in the womb of their mother? It has been long believed more as folklore that they can and do. It is with this belief that mothers-to-be and family members sing lullabies and soft songs to the baby even before birth.

Pregnancy and birth can be a time of joy, elation, fun, and heartfelt love. Every woman innately knows how to nurture and birth her baby. The phase of pregnancy and birth becomes a very clinical time, where we do not trust our intuition and bodies to gently guide and lead us through this beautiful journey.

Although a concentric series of barriers buffer the fetus from the outside world; but still surrounded with amniotic fluid, embryonic membranes, uterus, and the maternal abdomen; the fetus lives in a stimulating matrix of sound, vibration, and motion.

Conclusively, society today is under great pressure with people resorting to violence and terrorism to demonstrate their anguish. More and more people are blaming parents and the family of the offender. The article trains, offers solutions, providing quick fix techniques and conditions the mother to thus, remain relaxed, happy, spiritually inclined and strong enough for conceiving a healthy and happy baby, who grows to be a world citizen. This preparation thus sets the foundation for a very hopeful new generation of individuals who are the future of this great human race.

The first 38 weeks of our development has been shrouded in mystery, but now the embryonic science of fetal psychology is revealing the importance of this period for the rest of our lives. As well as advancing our knowledge of the ontogenetic processes before birth, the greater understanding of prenatal development presents

an opportunity to promote the health and well-being of the fetus and provide individuals with the best start in life possible.

■ CONCLUSION

Thus, it has been proved, time and again, that positive maternal emotions advance the health of the unborn child.

In the first formal study of fetal temperament in 1996, it was recorded the heart rate and movements of 31 fetuses six times before birth and compared them to readings taken twice after birth (They have since extended their study to include 100 more fetuses). Their findings—fetuses that are very active in the womb tend to be more irritable infants. Those with irregular sleep/wake patterns in the womb sleep more poorly as young infants. And fetuses with high heart rates become unpredictable, inactive babies.

A fetus constantly receives messages from its mother as it grows in the womb. This communication is not limited to hearing her heartbeat and whatever music she might play to her belly; it also gets chemical signals through the placenta.

Therefore, the environment a fetus is growing up in—the mother's womb—is very important. Some effects are obvious. Smoking and drinking, for example, can be devastating. But others are subtler; studies have found that people who were born during the Dutch famine of 1944, most of whom had starving mothers, were likely to have health problems like obesity and diabetes later.

A pregnant women's psychological as well as physiological health have consequences for fetal neurobehavioral development, and consequently, child outcomes. Studies have underscored the importance of considering the effects of women's mental health on child development during the prenatal, as well the postnatal, periods.

Stressful situations must be avoided to provide a congenial womb environment for the baby. Parents-to-be who want to further their unborn child's mental development should start by assuring that the antenatal environment is well-nourished, low-stress, and drug-free.

The transition to motherhood begins antenatally and is influenced by an array of factors, such as the life circumstances of the parents, the social environment, and the circumstances of conception. It is also influenced by the level of support provided by the woman's partner and family, as well as the physical health of the mother and her unborn baby. The mother's experiences within her family of origin, her past or current mental health issues and any current or unresolved conflict, loss or trauma can also affect, and sometimes disrupt, this transition.

Scientists are finding that our health throughout life is greatly determined by the prenatal circumstances in

which we develop. The fetus is sensitive and the stimuli coming from the mother has a deep, often life-long impact on the development of the child.

While the baby is in the womb, his/her brain seemingly develops in direct response to the mother's experience of the world. If a mother is plagued by anxiety or stress during her pregnancy, the "message" communicated to her baby (via stress hormones) is that they are in an unsafe environment—regardless of whether or not such information is factual. The baby's brain will actually mutate, or adapt, to prepare for the unsafe environment into which it expects to arrive.

Chronic stress in pregnancy tends to sculpt a brain suited to survive in dangerous environments—quick to react, with reduced impulse control, and a dampened capacity to remain calm and content. Chronic joy, by contrast, allows for the optimal development of each organ, the brain in particular—predisposing the baby to greater health and serenity. Such traits constitute the foundations of lifelong personality.

Hence, it has become indispensable to foster an optimal womb environment for the life-long healthy development of the child.

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Epigenetics: Nature's/Nurture's Role in Fetal Origin of Adult Disease

Madhu Jain, Shuchi Jain, Nitika Sobti

■ INTRODUCTION

Fetal origin of adult disease (FOAD), a concept first proposed by Barker^{1,2} postulates that exposure to hostile environment to the developing fetus during critical period of development may have significant consequences on an individual's short- and long-term health.² The recent nomenclature of FOAD is developmental origin of health and disease (DOHD). It was noted that low-birth weight babies are associated with host of diseases ranging from coronary artery disease (CAD), type II diabetes mellitus, cancer, and osteoporosis to various psychiatric illnesses etc. (Box 5.1).

■ CHRONIC DISEASES ASSOCIATED WITH THE FETAL ORIGIN OF ADULT DISEASES HYPOTHESIS

This is a new idea on biological phenomenon. It is not only an individual gene, but also epigenetic factors like improper uterine environment (caused by insults such as poor nutrition, infection, chemicals, metabolites or hormonal perturbations) that had proven to have a bearing on adulthood diseases. The implications of this Barker

Box 5.1: Chronic diseases attributed to “developmental fetal origin”.

- Diabetes mellitus
- Obesity
- Dyslipidemia
- Hypertension
- Coronary artery disease
- Stroke
- Kidney failure—glomerulosclerosis
- Liver failure—cholestasis and steatosis
- Lung abnormalities—bronchopulmonary dysplasia and reactive airway disease
- Immune dysfunction
- Reduced bone mass
- Alzheimer's disease
- Depression, anxiety, bipolar disorder, and schizophrenia
- Cancer

hypothesis notably for social and public health policy are that a lot of interventions can be planned and done to make the uterine environment favorable to a disease-free fetus, infant, and hence a healthy adult.³ FOAD is based on the concept of the “*developmental plasticity*”: a single genotype influenced by specific intrauterine events, has the capability to produce different phenotypes. There exist definite or specific developmental periods when the organism is sensitive or plastic to its environmental diversity to provide the best fit between phenotype and the environment. Thus, the fetus in order to preserve neurodevelopment and survival will undergo remodeling or programming of various organs in terms of structure and function (Fig. 5.1).

■ FETAL ORIGIN OF ADULT DISEASES— BIOLOGICAL BASIS AND UNDERLYING MECHANISMS

Thrifty Phenotype Hypothesis

On this hypothesis if the developing fetus is exposed to any hostile uterine environment such as poor nutrition, infection, chemicals, metabolites, etc. it responds by developing adaptations predictive adaptive responses (PARs). This PAR not only predetermines immediate viability, but also its survival in later life if a similar environment is encountered in later life. Short-term adaptation may be in terms of downregulation of endocrinal and/or metabolic function (like insulin resistance or impaired glucose tolerance), and/or specific organ function to slow down its growth rate to match the nutrient supply in the deprived uterine environment. Long-term irreversible change in the development structure and function of some tissues and vital organs may occur as a result of alterations in gene expression, cell differentiation, and proliferation. However, if the individual then grows up in an extrauterine environment of high-energy food or with nutritional abundance environment, the reverse of that experienced in utero, would be highly susceptible to noncommunicable disease (NCD) due to “*mismatch and poorer fit*” environment (Fig. 5.2).

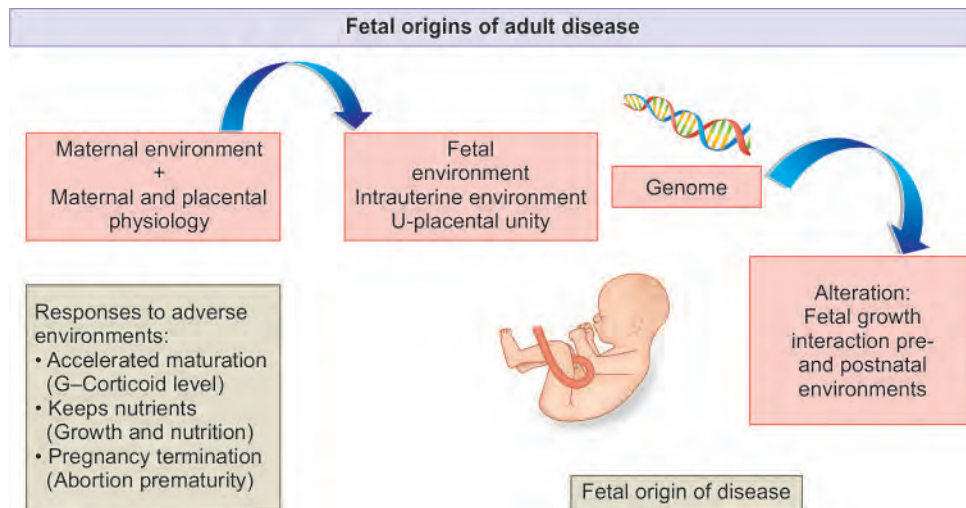


Fig. 5.1: Fetal programming.

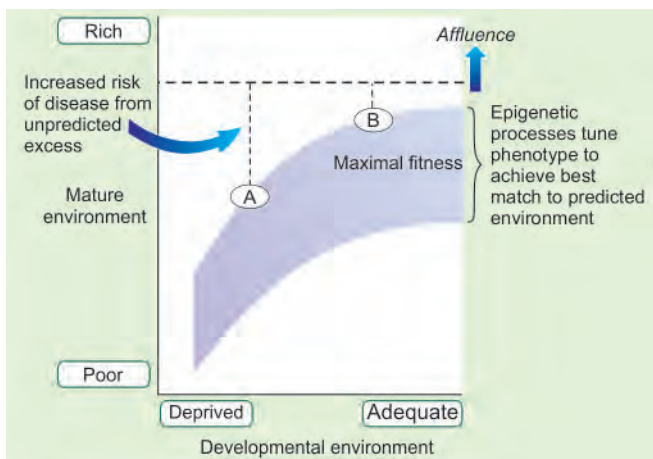


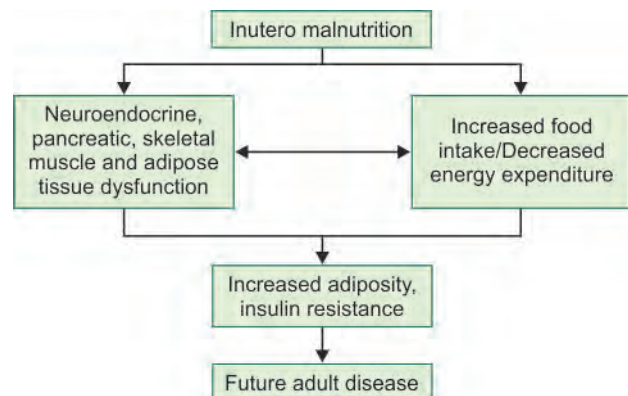
Fig. 5.2: Influence of nature and nurture in development of FOAD.

Thus, this thrifty phenotype hypothesis adds to the understanding on diabetes epidemic in our country and proved the role of environments on the origin of FOAD.⁴

Excessive Exposure to Glucocorticoids

Maternal undernutrition will cause excessive fetal exposure to glucocorticoids (GCs) by creating a stress response. This GCS provide a common mechanism as shown in Flowchart 5.1 through which other insults exert their effect. Repeated or chronic stress through the increased secretion of adrenocorticotropic hormone (ACTH) could ultimately result in decreased secretion of insulin-like growth factor binding protein-I and alteration in hepatic gluconeogenesis. This hypothalamus pituitary adrenal axis programming would persist later on in life and

Flowchart 5.1: Hypothesis of fetal origin of adult diseases.



would lead to aberrant behavior and thoughts in children. These children also show alteration in hippocampus functional activity due to reduction in pyramid neurons and decreased synaptogenesis at the neural and decreased synaptogenesis at the neural level.

Dysregulation of Hypothalamic Pituitary—Adrenal Axis

A number of environmental factors during early part of intrauterine life will alter the activity of hypothalamic pituitary adrenal axis and thus development and regulation of various organs and homeostatic system.

Irreversible Changes in Organ Structure

Early life insult will result permanent dysfunction and disease through irreversible changes in organ structure. For example, under nutrition and hypoxia in utero would

result in decrease in number of nephrons' numbers/function and subsequently increase risk of hypertension and renal diseases in older age.

Alteration in Gene Expression through Epigenetics

Prenatal insults such as under nutrition can cause epigenetic modulations by altering deoxyribonucleic acid (DNA) methylation, histone marks, and noncoding ribonucleic acids (RNAs) regulate gene expression which is independent of the changes in the DNA sequence. For example, in utero exposure to famine during the Dutch Hunger winter of 1944–1945 showed that due to reduce methylation at regulatory regions for the insulin growth factor II can lead to adult disease (a hormone critical for growth and development).⁵ Similarly, undernutrition in utero alters the methylation rates of the 11BHSD2 and hormonal receptor sites (GC receptors) that can disturb hormone homeostasis and can lead to FOAD. Changes in noncoding RNA and histone modification at genes of transcription factors can affect organ development and cellular metabolism and differentiations of cells and increase susceptibility to type 2 diabetes mellitus (T2DM). Other proposed mechanisms are genetic, cellular aging, and intergenerational effects. Small for gestational age (SGA) babies are having alteration in activity of promoters of glucose transporter 4, PDX-1, GCs receptor, and peroxisomal proliferator-activated receptor alpha gene due to epigenetic modifications. This could be responsible for obesity and insulin resistance later on.

MANIFESTATION OF FETAL ORIGIN OF ADULT DISEASE

Prenatal development of child growth when organogenesis and rapid growth are occurring is critical for the immediate future health of the infant. If undernutrition occurs in early life of the infant, it shows not only retarded growth but also inducts lifelong changes in hormonal concentrations, abnormal organ development, and diseases such as T2DM and cardiovascular disease, kidney disease, obesity, hypertension, osteoporosis, and metabolic syndrome in later life. In contrast, if undernutrition occurs during midpregnancy, it may alter placental development along with fetal wasting that can result in indistinct metabolic phenotypes in adulthood. Exposure to various other environmental factors including maternal stress, infections, hypertension, obesity, teratogen, alcohol, drugs, undernutrition, smoke, and over nutrition within the critical windows of growth and development is associated with increased risk of FOAD.

Malnourishment during pregnancy or infancy is associated with diminished power to cope with high calorie diets in later life. This concept can be utilized as a mean by which phenotypic modifications can be induced within a single generation in order to best accommodate prevailing or anticipated environmental circumstances.

THE EFFECT OF FETAL ORIGIN OF ADULT DISEASE ON NONCOMMUNICABLE DISEASE

Noncommunicable diseases are the leading causes of death globally accounting for about (70%) deaths annually.⁶ The risk factor responsible for NCD is poor diet, lack of exercise, tobacco, smoke, and consumption of alcohol. However, in developing countries many other factors are said to be responsible because presentation of NCD occurs at earlier stage and disease progresses at a faster rate. A proportion of NCD could be probably explained by FOAD⁷ due to adverse experiences during critical periods of growth. Thus, FOAD science would be greatly helpful in future to prevent NCD by using approaches that addresses the influence of environmental factors on growth and development.

CONTROVERSIES FOR FETAL ORIGIN OF ADULT DISEASE HYPOTHESIS

A recent rise in NCD in developing countries suggests a susceptibility to environmental changes which could be either a genetic basis (thrifty genotype) or fetal programming (thrifty phenotype). However, these would make different predictions for the future. Thrifty genotype theory would stress the need to improve lifestyle factors and to become less obese. On the other hand, the thrifty phenotype would concentrate on the need of better nutrition of girls and mothers and subsequently fetal nutrition and thus to prevent FOAD.

RELEVANCE OF FETAL ORIGIN OF ADULT DISEASE IN INDIA AND DEVELOPING COUNTRIES

In India, the mean full-term birth weight is 2.6–2.7 kg, almost 1 kg lower than in Western Europe.⁸ A high proportion of infants and children in India are still undernourished but with economic progress, the obesity is an emerging problem. It is calculated that by the year 2020,⁹ 20% of women and 16% of men in India will be overweight. Together with other often related NCD, these represent a significant burden of ill health and economical strain not only on individuals but also on families and overall on

health systems, societies, and economy of the Nation. Thus, this is the high time to setup the momentum to tackle this burning problem by utilizing knowledge of FOAD and thus to decrease the burden of the disease by first improving maternal nutrition and fetal development. There is an urgent need to make environment ecofriendly at the same time by implanting trees at large scale along with spiritual empowerment of mankind. This is the only method by which we can harmonize the nature and the mind by transmitting positive vibrations to the environment.

CONCLUSION

Fetal programming is a well-established phenomenon and maternal nutrition is central programming stimulus. It is well-accepted that fetal nutrition can influence both fetal growth and later risk of disease. There is indeed, a nutritional basis for FOAD. This fetal programming would lead to alternation in both fetal birth size and permanent changes in structure and function of the organs, subsequently leading to disease in adult life. However, clear distinctions need to be drawn between maternal nutrition and fetal size at birth at one hand and between fetal nutrition and fetal growth on the other hand.

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First Trimester Screening

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INTRODUCTION

John Langdon Haydon Down first described the genetic condition classified as Down syndrome in 1862. The condition was identified to be due to Trisomy 21 by Jerome Lejeune in 1958. (Fig. 6.1)

First trimester screening has focused on the detection of this syndrome primarily, for the past few decades but is no longer limited to only this. The identification of the association of advancing maternal age and the incidence of aneuploidies was the starting point for the evolution of screening for aneuploidies. Serum markers were identified and added to the screening protocol to improve the detection rate for lower false positive rates. First trimester screening has now become the standard of care due to its proven benefits.¹ First trimester screening now screens for the common aneuploidies in chromosome 13, 18, 21, X and Y, risk of early onset growth restriction and pre-eclampsia (PE), preterm labor and major structural anomalies. So, it is a comprehensive yet extensive screening exercise with maternal and fetal implications.

Even though the care for mentally handicapped has improved, the debate will always go on, can we avoid such individuals from being born and is it right to do so. Usually, nature does not allow babies with major chromosomal aberrations be born and early pregnancy miscarriages occur. Even in aneuploidies the incidence of aneuploid fetuses in early pregnancy are higher than those that reach term as many of them miscarry.

Incidence and Prevalence

The estimated incidence of Down syndrome is between 1 in 1,000 to 1 in 1,100 live births worldwide. Each year approximately 3,000 to 5,000 children are born with this chromosome disorder.¹ With advances in the understanding and medical facilities available, the life span of people with Down syndrome has increased and many of them have near normal life span. Down syndrome can have a spectrum of presentation. They can present with varying degrees of mental retardation, with

or without structural abnormalities like cardiac defects, gastrointestinal obstruction, etc. hormonal abnormalities, immunological abnormalities, and growth issues. The association between maternal age and the increased risk of aneuploidy is known and as the maternal age increases the incidence of Down syndrome increases. But the majority of Down syndrome babies are born to younger mothers simply because majority of pregnancies occur in younger mothers. (Figs. 6.2 and 6.3)



Fig. 6.1: Down syndrome.

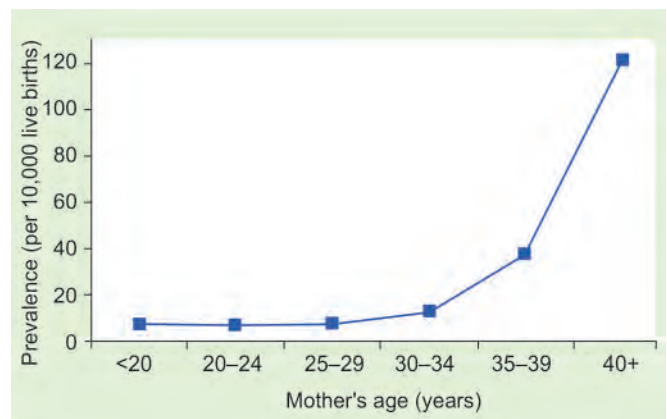


Fig. 6.2: Prevalence of Down syndrome by mother's age.

Maternal age	Incidence of Down syndrome	Maternal age	Incidence of Down syndrome	Maternal age	Incidence of Down syndrome
20	1 in 2,000	30	1 in 900	40	1 in 100
21	1 in 1,700	31	1 in 800	41	1 in 80
22	1 in 1,500	32	1 in 720	42	1 in 70
23	1 in 1,400	33	1 in 600	43	1 in 50
24	1 in 1,300	34	1 in 450	44	1 in 40
25	1 in 1,200	35	1 in 350	45	1 in 30
26	1 in 1,100	36	1 in 300	46	1 in 25
27	1 in 1,050	37	1 in 250	47	1 in 20
28	1 in 1,000	38	1 in 200	48	1 in 15
29	1 in 950	39	1 in 150	49	1 in 10

Fig. 6.3: Prevalence of Down's syndrome.

Screening for aneuploidies has undergone evolution to include serum markers which reflect fetal secretions and placental secretions [Alpha fetoprotein (AFP) and free serum beta-human chorionic gonadotropin (HCG)], maternal factors (age, weight, smoking history, diabetes, assisted reproduction, ethnicity, and previous history of aneuploidy) and ultrasound markers of aneuploidy [nuchal translucency (NT) thickness, ossification of nasal bone (NB), presence of tricuspid regurgitation (TR), reversal of a wave in the ductus venosus (DV) flow and facial angle]. In the past few years the use of cell-free fetal DNA for detection of aneuploidy has come into clinical practice.

First trimester screening also screens for adverse pregnancy outcomes like development of early onset growth restriction, placental dysfunction, pregnancy induced hypertension, intrauterine growth restriction and fetal demise. This includes maternal hemodynamic factors like mean arterial pressure (MAP), uterine artery pulsatility index (Ut PI) and placental secretions like placenta associated plasma protein-A (PAPP-A), placental growth factor (PlGF) and soluble fms-like tyrosine kinase (sFlt-1).

The window of opportunity offered at the time of first trimester screening is also used to rule out major structural defects. Screening of the cervical length can also be done to stratify women at risk for preterm labor. So, the first trimester screening forms the base of the pyramid of care where maximum information regarding the risks and future pregnancy care is obtained. This is described as "inverting the pyramid of care"² (Figs. 6.4 and 6.5).

SCREENING FOR ANEUPLOIDY

Every year millions of women get pregnant:

- ✦ Regardless of the risk category (low or high) all women are at a risk of fetal anomaly

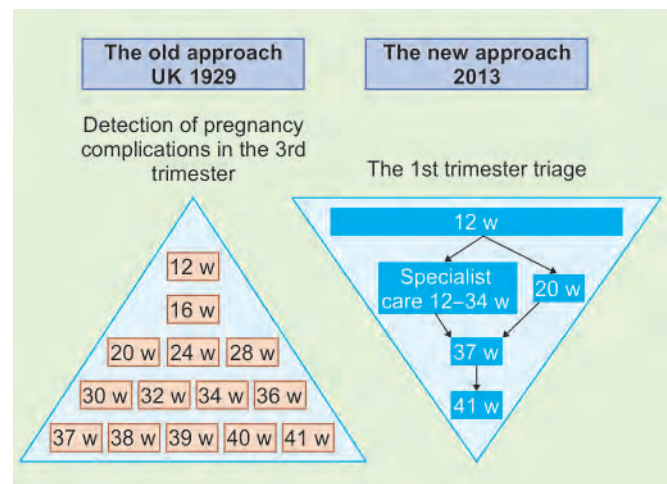


Fig. 6.4: Pyramid of antenatal care.

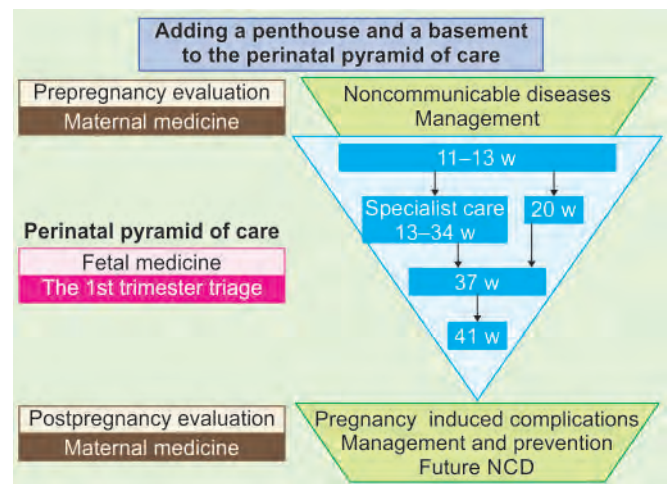


Fig. 6.5: Inverting the pyramid of care.

- ✦ Some are at a greater risk
- ✦ Prevalence of anomalies is about 6.5% though only about 2% are potentially life-threatening.

■ PRENATAL DIAGNOSIS

- ✦ Many fetal anomalies can be diagnosed today.
- ✦ But only a few are common enough for screening to be worthwhile.
- ✦ Anomaly can be *chromosomal* or only *structural*
- ✦ So we need to do a *genetic scan* (11–14 weeks) and an *anomaly scan* (18–24 weeks).

As in any other screening modality, pre-test and post-test counseling is essential, with explanation of the method of screening, what the risk assessment implies, how it is interpreted and what the confirmatory tests are, to allow the patient to make an informed choice. The detection rates, predictive rates, the sensitivity, and specificity rates for the tests quoted is heavily dependent on the tests being performed in adherence to the protocols with quality control and regular audit. The operators performing the ultrasound markers are ideally required to undergo training in the protocols, have certification and periodic audits. Similarly, the laboratories performing the serum screening are required to have regular standardization, audits and use validated software for the assessment of risk.

The basic parameter for the aneuploidy screening is the maternal age-based risk. As the maternal age increases, the aging oocyte has a higher probability of undergoing errors

in disjunction and causing aneuploidy in the offspring. To the age-based risk, the other risk assessment parameters are applied. The continuous variables like NT and the serum analytes are always converted to multiples of median (MoM) for the sample population. This use of MoM makes the evaluation relevant to the test population and makes it gestational age independent. Each parameter has a positive and negative likelihood ratio that alters the risk accordingly. The parameters vary with gestational age, are continuous variables, and percentile charts are available for most of them. Hence, the gestational age of the fetus should be assigned accurately. The combined test which includes the serum markers and the ultrasound markers for a software-based calculation of risk assessment is the most popular.

First trimester screening for aneuploidies based on maternal age, maternal levels of free β human chorionic gonadotropin and pregnancy-associated plasma protein-A (PAPP-A), and measurement of fetal NT has a false positive rate of 5%, detection rate of DR 78.7% (95% confidence interval, 66.3–88.1).³⁻⁹ There are various testing protocols in use. Ideally the highest feasible detection rate for the lowest achievable false positive rate is aimed at keeping feasibility and cost constraints in consideration (Table 6.1).

Contingent: 1 in 50–1500 borderline risks (at term, equivalent to 1 in 38–1200 at mid-trimester), stepwise: borderline or lower risks, anomaly: major malformation, large NF, short femur, echogenic intracardiac focus,

Table 6.1: Model predicted Down syndrome detection rate for a 3% false-positive rate and positive predictive value for various screening protocols.¹⁰

	Protocol (completed weeks*)	DR	OAPR 1: n
1a	PAPP-A+ free β (10), NT (12)	82%	29
1b	PAPP-A+hCG (10)	80%	29
1c	PAPP-A+free β (12), NT (12)	80%	29
1d	PAPP-A+hCG (12), NT (12)	79%	30
2a	AFP+free β +uE3+InhA (15-19)	64%	36
2b	AFP+hCG+uE3+ InhA (15-19)	60%	39
3a	PAPP-A+free β (10), NT (12), contingent AFP+ free β + uE3+InhA (15-19)	90%	26
3b	PAPP-A+hCG (10), NT (12), contingent AFP+hCG+uE3+InhA (15-21)	88%	27
3c	PAPP-A+free β (10), NT (12), stepwise AFP+free β +uE3+InhA (15-21)	92%	25
3d	PAPP-A+hCG (10), NT (12), stepwise AFP+hCG+uE3+InhA (15-21)	91%	26
4a	PAPP-A (10), NT (12), AFP+free β +uE3+InhA (15-19)	91%	26
4b	PAPP-A (10), NT (12), AFP+hCG+uE3+InhA (15-19)	89%	26
4c	PAPP-A+free β (10), NT (12), AFP+free β +uE3+InhA (15-19)	93%	25
4d	PAPP-A+hCG (10), NT (12), AFP+hCG+uE3+InhA (15-19)	91%	26
4e	PAPP-A+free β (10), AFP+free β +uE3+InhA (15-19)	80%	29
4f	PAPP-A+hCG (10), AFP+hCG+uE3+InhA (15-19)	75%	33

Contd...

Contd..

5a	PAPP-A+free β (10), NT+NB (12)	91%	26
5b	PAPP-A+free β (10), NT (12), contingent NB	89%	26
5c	PAPPA+free β (10), NT (12), contingent TR	88%	27
5d	PAPPA+free β (10), NT (12), contingent DV	88%	27
6a	AFP+free β +uE3+InhA+NF+NBL+PT (15-19)	90%	26
6b	AFP+hCG+uE3+InhA+NF+NBL+PT (15-19)	89%	27
7a	PAPP-A+free β (10), NT (12), ANOMALY (18+)	88%	27
7b	PAPP-A+hCG (10), NT (12), ANOMALY (18+)	86%	27
8a	ANOMALY (18+)	56%	41
8b	AFP+free β +uE3+InhA (15-19), ANOMALY (18+)	80%	29
8c	AFP+free β +uE3+InhA (15-19), contingent ANOMALY (18+)	77%	30
9a	PAPP-A+free β (10), NT (12), AFP+free β +uE3+InhA (15-19), ANOMALY (18+)	96%	25
9b	PAPP-A+hCG (10), NT (12), AFP+hCG+uE3+InhA (15-19), ANOMALY (18+)	95%	25

The rates specified are for the purposes of comparison of protocols and do not necessarily indicate optimal cut-offs.

(AFP: alpha fetoprotein; DV: ductus venosus; hCG: human chorionic gonadotropin; Inh A: inhibin A; NB: nasal bone absence; NBL: nasal bone length; NF: nuchal skinfold; NT: nuchal translucency; PAPP-A: pregnancy-associated plasma protein-A; PT: prenatal thickness; TR: tricuspid regurgitation; uE3: unconjugated estriol).

pyelectasis, echogenic bowel and ventriculomegaly, completed weeks, e.g. 10 = 10 weeks 0 days to 10 weeks 6 days (*see* recommendations for optimal times to provide tests).

Predicted performance is based on published statistical parameters for NT and biochemical markers (Cuckle and Benn, 2010), NB (Cicero et al., 2004), TCR and DV (Sonek and Nicolaidis, 2010), NF, NBL and PT (Migueluez, et al. 2010).

The serum markers perform better as screening parameters earlier in gestation (10–11 weeks) but the ultrasound markers perform better in later gestation of 12–14 weeks. The greatest advantage of doing the ultrasound later in the screening period is that the anatomical survey of the fetus can be done to rule out major anomalies. So often the compromise is by having the serum parameters assessed earlier and this is combined with the ultrasound parameters later.

The other alternative is by having the patient come for screening around 12 weeks and both the serum test as well as the ultrasound is done to give a combined test report. Once the risk assessment reports are available the post-test counseling is to be done to help the patient understand the risk calculated and in case of a screen positive report, to inform them of further testing options and the implications. Ideally, the entire screening process, as well as the confirmatory tests is to be available to the patient in the same place and to be completed in one visit. In a screen positive case, the option of invasive fetal testing like amniocentesis or chorionic villus sampling (CVS) to test the chromosomes of the fetal cells directly or the

option of cell-free fetal DNA testing is to be offered with their pros and cons. This concept is called “one stop clinic for assessment of risk (OSCAR)”¹¹

■ PRE-ECLAMPSIA SCREENING

Screening for women who are at risk for development of PE and its related complications is done along with the aneuploidy screening using maternal MAP measurement, mean uterine artery resistance/pulsatility index, placental factors—PAPP-A and PIGF. Other placental markers like placental protein-13 (PP-13), vascular endothelial growth factor (VEGF) and sFlt-1 showed association too. For a false positive rate of 5%, first-trimester uterine artery Doppler studies will detect 50–65% of women who will develop severe PE (i.e. needing delivery before 35 weeks).¹² Combined screening using maternal factors, Uterine artery-PI, MAP and PIGF predicted 90% of early PE, 75% of preterm PE and 41% of term PE requiring delivery less than 37 weeks, at a screen-positive rate of 10%.¹³ The calculation of the risk assessment is done using the appropriate software. The early assessment of risk allows for the institution of prophylactic aspirin by the end of the first trimester. The benefit of prophylactic aspirin 150 mg at bed time, started before 16 weeks, has been demonstrated in the Aspirin for evidence-based pre-eclampsia prevention (ASPREE) trial. In all participants with adherence of 90%, the adjusted odds ratio of development of early PE in the aspirin group was 0.24 (95% confidence interval, 0.09e0.65); in the subgroup with chronic hypertension it was 2.06 (95% confidence interval,

0.40e10.71); and in those without chronic hypertension it was 0.05 (95% confidence interval, 0.01e0.41).¹⁴ The recent screening program for pre-eclampsia (SPREE) trial (screening for PE) compared the performance of use of maternal history and demographic details for screening as in the NICE guidelines versus multimarker combined screening as discussed earlier. The screen-positive rate by the NICE method was 10.3% and the DR for all PE was 30.4% and for preterm PE it was 40.8%. Women found to be screen positive in this protocol were started on aspirin but had only 23% compliance. In screening for preterm PE by a combination of maternal factors, MAP and PIGF, the DR was 69.0%, which was superior to that of the NICE method by 28.2% (95% CI, 19.4–37.0%) and with the addition of uterine artery-PI the DR was 82.4%, which was higher than that of the NICE method by 41.6% (95% CI, 33.2–49.9%).¹⁵

■ PENTA MARKER SCREENING

Now first trimester penta-marker screening is also available. It includes human chorionic gonadotropin (HCG), PAPP, PIGF, AFP and Inhibin-A. This has the advantage of effective screening for aneuploidies as well as PE as a one-step comprehensive test in the first trimester itself.

■ NONINVASIVE PRENATAL TEST (NIPT) OR CELL FREE DNA ANALYSIS

Following the screening for aneuploidies using the ultrasound markers and the serum markers, the screen positive cases are to be confirmed. This is conventionally done by invasive fetal testing—amniocentesis or CVS for fetal karyotyping. The invasive tests amniocentesis has a pooled risk of miscarriage of 0.11% (95% CI, -0.04 to 0.26%) and CVS 0.22% (95% CI, -0.71 to 1.16%).¹⁶ Noninvasive prenatal test (NIPT) which tests the cell-free fetal DNA in the maternal circulation circumvents this risk as it is only a blood test for the mother.

The cell-free fetal DNA from the placenta enters the maternal circulation and can be tested from 10 weeks of gestation onwards. Following delivery, it is cleared from the maternal circulation in a few hours. When combined first trimester screening is done, a contingent screening protocol can be offered. Women with risk of more than or equal to 1 in 100 are offered an invasive test and women with an intermediate risk from 1 in 100 to 1 in 1000, NIPT can be offered. In this method where ultrasound examination with the combined test was followed by NIPT in intermediate risk cases, it reduced the number of false positives and the rate of invasive tests¹⁷ on one hand as well as picked up the major structural anomalies in the ultrasound. The option of only NIPT in the first trimester is not preferred

for this reason. NIPT had the same sensitivity for Trisomy 21, Trisomy 18, and Trisomy 13, but significantly increased specificity, when compared with offering an invasive test to all women with a risk of more than or equal to 1 in 300.¹⁷ NIPT using cell-free fetal DNA has very high sensitivity and specificity for Down syndrome (detection rate 99.9%), with slightly lower sensitivity for Edwards and Patau syndrome. However, it is not 100% accurate and should not be used as a final diagnosis for positive cases.¹⁸

■ SUGGESTED AND RECOMMENDED ALGORITHMS

1. First trimester FOGSI screening protocol (Figs. 6.6 and 6.7).
2. First trimester genetic screen protocol (Figs. 6.8 to 6.10).
3. Extended first trimester screening (genetic + pregnancy-induced hypertension (PIH) + preterm) (Figs. 6.11 to 6.13).

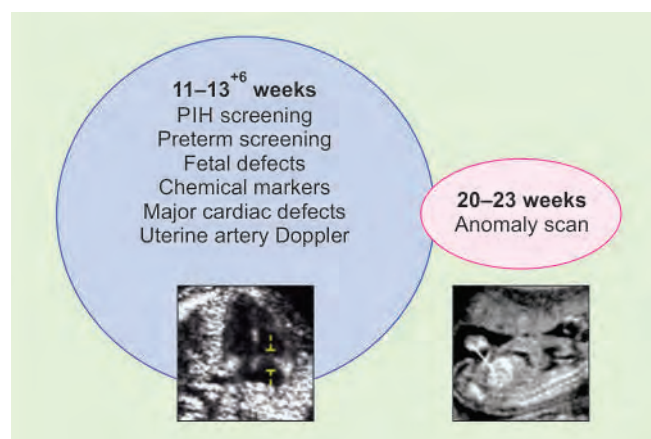


Fig. 6.6: The 11 to 13 weeks scan.

Ultrasound in pregnancy	
6–7 weeks	Fetal viability scan
11–14 weeks	Pregnancy assessment scan
22–23 weeks	Pregnancy assessment scan
32 weeks	Fetal growth and well-being
38 weeks	Fetal condition before birth

Fig. 6.7: First trimester FOGSI screening protocol.

4. What to do after screening (Fig. 6.14).
5. Diagnostic tests in first trimester (Figs. 6.15 and 6.16)

6. Diagnostic genetic tests (Figs. 6.17 and 6.18).
7. FOGSI recommended first trimester antenatal check list (Fig. 6.19)

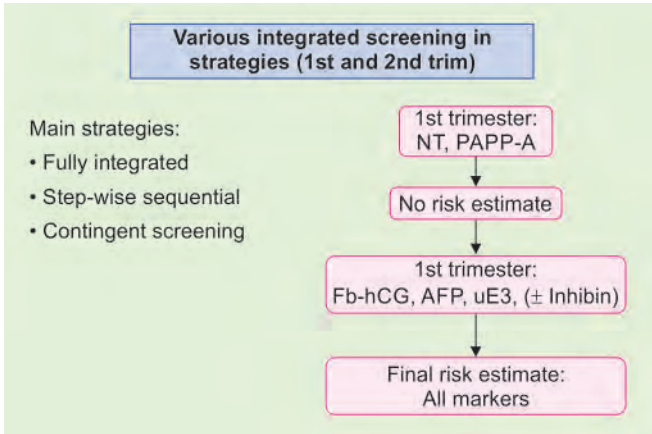


Fig. 6.8: Full integrated screening.

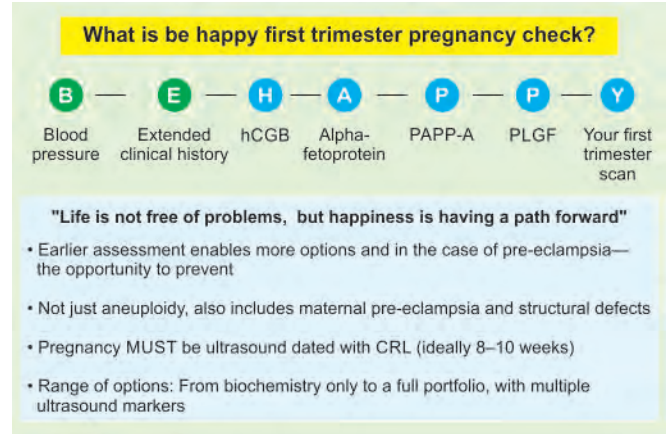


Fig. 6.11: Screening in first trimester.

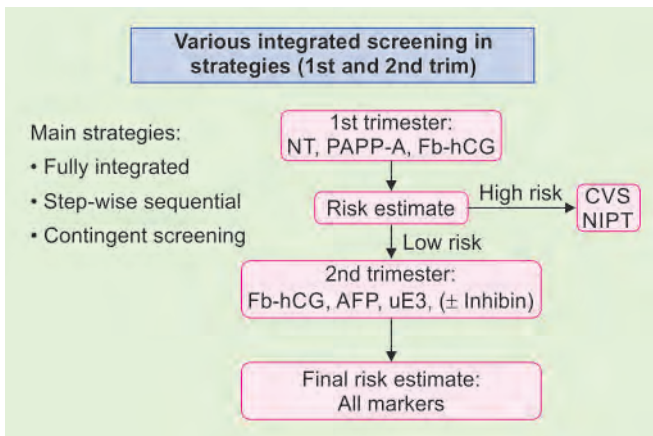


Fig. 6.9: Integrated step wise.

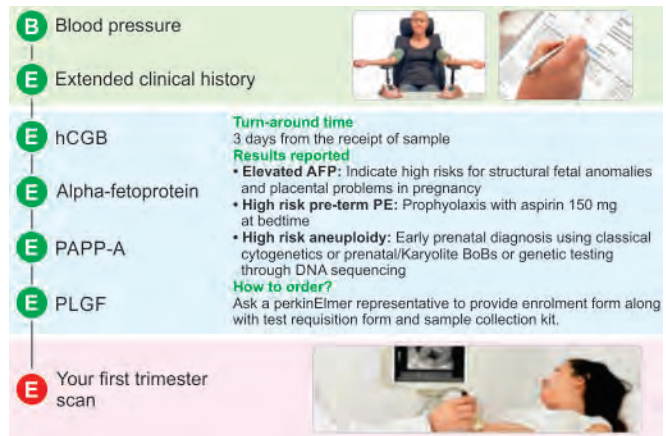


Fig. 6.12: Be happy protocol.

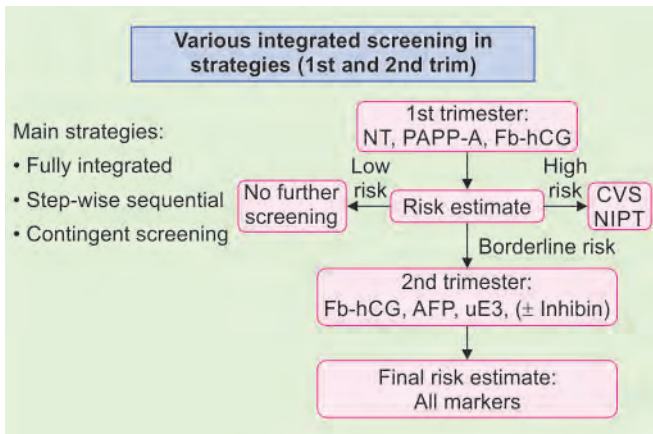


Fig. 6.10: First trimester genetic screen protocol (contingent screening).

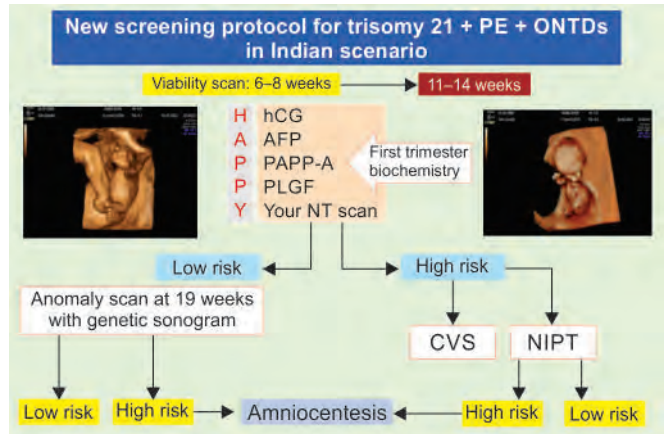


Fig. 6.13: Extended first trimester screening.

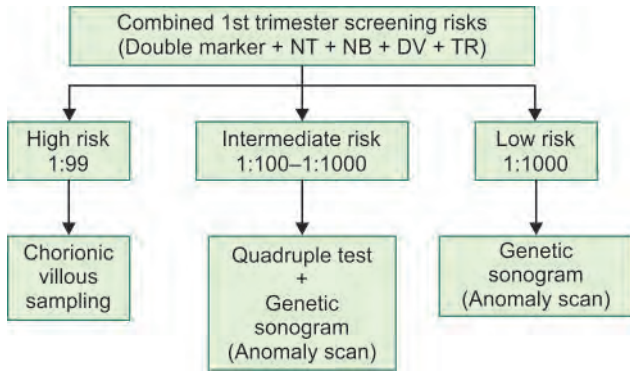


Fig. 6.14: After screening activities.

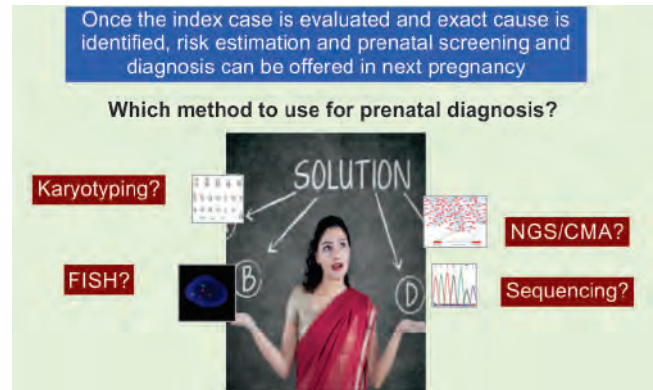


Fig. 6.17: Diagnostic genetic tests.

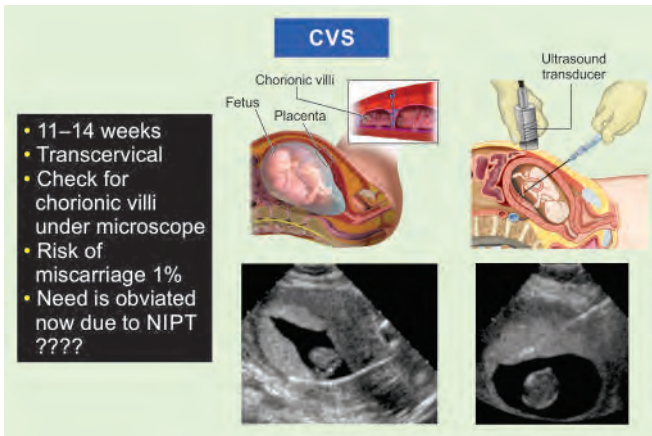


Fig. 6.15: Chorionic villus sampling (CVS). (NIPT: noninvasive prenatal testing).

Assay	Diagnostic genetic testing	Genetic abnormality
Karyotyping	Detect structural, numerical defects	Chromosomal syndromes
FISH	Syndromes where gene locus is known	Aneuploidies, microdeletions, 22q del., 9:22 in CML
Microarray based on RNA analysis	Deletion and duplication at higher resolution. Cannot detect inversions and balanced translocations	Intellectual disability, Structural defects, physical/USG
Biochemical tests (chromatography techniques)	Examines proteins (blood, urine, CSF) instead of the gene, metabolite or protein structure	Disrupts key metabolic pathway IEM
PCR	Detect specific disease-causing mutations	Triple repeats fragile-X
Molecular testing - Sanger, NGS, Exome, whole genome	Single gene mutations including point mutations, deletions, duplications within the gene	Holt-oram syndrome (TBX5) Alagille syndrome (JAG1) Char syndrome (TEAP2B) Noonan syndrome (PTPN11)

Fig. 6.18: Diagnostic genetic tests. (CMA: chaperone-mediated autophagy; FISH: fluorescence in situ hybridization; NGS: next-generation sequencing; PCR: polymerase chain reaction)

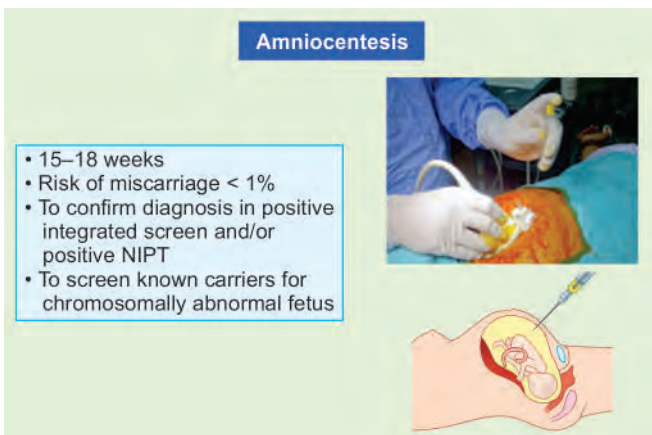


Fig. 6.16: Amniocentesis. (NIPT: noninvasive prenatal testing)

First trimester	Recommended	Preferable
	Weight	BMI
	Blood pressure	Mean arterial pressure
	Hemoglobin	Complete blood count/ Peripheral smear/Hb Electrophoresis / HPLC
	Blood group ABO and Rh (both partners)	
	Urine routine	MSU culture
	VDRL/Hep B/HIV	HCV / Rubella IgG
	TSH	Thyroid function test / Thyroid antibodies Vitamin D
	DIPS1 test 75 gm 2 hours blood sugar	Hb A1C / OGTT / 6 point blood sugar test
	Dating scan + NT Double marker (Free beta hCG + PAPP A ¹) Contingent screen ²	Cervical length Uterine artery Doppler NIPT Placental growth factor (PLGF)
	Per speculum exam	Pap Smear, Bacterial vaginosis and Chlamydia screen

¹Low levels predict pre-eclampsia

²Low risk no further test (1:1000)

Intermediate risk (100 : 999) to proceed to second trimester screening vs NIPT

High risk (1:99) to go for CVS/NIPT

Fig. 6.19: Antenatal check list as recommended by FOGSI.

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Second Trimester Screening and Antenatal Care

Pratima Mittal, Sumitra Bachani

■ INTRODUCTION

Goal of antenatal care (ANC) is to ensure birth of a healthy baby with minimal risk for the mother. Antenatal care aims at accurate estimation of gestational age, monitoring of fetal growth, and identification of pregnancies at increased risk of maternal or fetal morbidity and mortality. It is ideal to register the pregnancy as soon as a woman misses a period, so that an accurate assessment is possible. Evaluation involves history, physical examination, and basic investigations (as explained in first trimester screening). If the first ANC visit is in second trimester then all the investigations advised in first trimester should be done in second trimester and further management is done as described later.

Goals for antenatal care in second trimester are:

- ✦ To provide an ongoing screening program to confirm that pregnancy continues to be low risk.
- ✦ To provide ongoing primary preventive health care and identify the high risk cases.
- ✦ To prevent, detect, and treat complications at the earliest, if any.
- ✦ To educate the mother about the physiology of pregnancy, labor, newborn care, and lactation.
- ✦ To provide advice, reassurance, education, and support for woman and family.

Main focus of second trimester ANC care is to screen for any genetic or structural congenital anomalies in the fetus and to identify high risk pregnancy.

■ SCREENING FOR FETAL ANEUPLOIDY

Fetal aneuploidies are less common than structural defects however they have profound impact on the quality of life. The most common congenital cause of mental retardation is Down syndrome (DS).^{1,2} These fetuses do not have any pathognomonic criteria on sonography, 50% may have soft markers which are nonspecific. The definitive way of diagnosing DS is by karyotyping the fetal cells obtained by amniocentesis, chorionic villus biopsy or fetal blood sampling. This is expensive, labor intensive,

and is associated with a risk of abortion. Screening for aneuploidies can differentiate those women who are in high risk category and will need to undergo invasive testing.

Protocols for screening: Presently screening for aneuploidies has not been incorporated in a national program hence it is most important to have a uniformity in the screening protocols to prevent confusion amongst caregivers and the clients.

Table 7.1 lists the details of the various screening tests in second trimester.

The Dual test (11–13 weeks), the triple test, and quadruple tests (16–22 weeks) are routinely recommended. “Penta” screening [alfa-fetoprotein (AFP), human chorionic gonadotropin (hCG), unconjugated estriol (uE3), dimeric inhibin A (DIA), hyperglycosylated-hCG (h-hCG)], adding a fifth element (hyperglycosylated hCG) to the Quad screen, has been recently introduced but there is limited data to compare Penta with Quad screening’s accuracy.³

Table 7.2 lists the maternal serum marker pattern in selected fetal syndromes.

Recommendations: Every pregnant woman should be informed and counseled about the available screening tests and the conditions for which they can be done. A clearly defined and appropriate screening program can be tailored as per the local situation. Each test should be preceded and followed up by a pre-test and post-test counseling. The woman and her partner should be assisted to make an informed decision to participate in the screening program.

■ SCREENING FOR STRUCTURAL ANOMALIES

Screening is advocated at 18–20 weeks of pregnancy. Box 7.1 lists components of assessment of structural anomalies.

ANC Visits in Second Trimester

WHO (2016 WHO ANC model for positive pregnancy experience) has recommended minimum of eight contacts

Table 7.1: Screening tests in second trimester.

Test	Variables	Adequate POG	Detection	Drawbacks	Remarks
Triple test	AFP, β -hCG, uE3	BPD 32–52 Mm	65–70%	Transport of blood or serum may result in higher false positives	Being replaced by quadruple screen with higher detection rate
Quadruple test	AFP, β -hCG, uE3, DIA	BPD 32–52 Mm	80%	Transport of blood or serum may result in higher false positives	Standard of care of combined first trimester screen is missed
Integrated test	NT, PAPP-A in first trimester AFP, β -hCG, uE3, DIA in second trimester	As per the visits in each trimester	94%	Dilemma of partial reporting, patient anxiety lost to follow-up	Less practical utility can be used, if woman in high risk category not willing for invasive testing
NIPT	Cell free fetal DNA from maternal blood	9–18 weeks	99%	4% no call rate. Effectively 95%. Not cost-effective for low risk population	Can be used for women in intermediate risk category after triage based combined screen

(AFP: alfa fetoprotein; BPD: biparietal diameter; β -hCG: beta-human chorionic gonadotropin; DIA: dimeric Inhibin A; NIPT: noninvasive prenatal test; PAPP-A: pregnancy associated plasma protein-A; uE3: unconjugated estradiol)

Table 7.2: Maternal serum marker pattern in selected fetal syndromes.

	Second trimester markers				First trimester markers		
	AFP	uE3	hCG	Inh A	PAPP-A	β -hCG	Nuchal translucency
Genetic disorder							
Down syndrome	↓	↓	↑	↑	↓	↑	↑↑
Trisomy 18	↓	↓↓	↓↓		↓↓	↓↓	↑↑
Trisomy 13					↓↓	↓	↑
Turner syndrome with hydrops	↓	↓	↑	↑	↓↑	↓↑	↑
Turner syndrome without hydrops	↓	↓	↓	↓	↓↑	↓↑	↑
Triploidy (paternal)		↓	↑	↑	↓↑	↑↑	↑
Triploidy (maternal)		↓	↓	↓	↓↑	↓↓	↑
Smith-Lemi-Opitz syndrome	↓	↓↓	↓	NR	NR	NR	NR

in pregnancy, with healthcare provider to reduce perinatal mortality (at 12, 20, 26, 30, 34, 36, 38, and 40 weeks). *The recommended visits in the second trimester are at least two visits.*⁴

Box 7.1: Fetal anatomic survey.

- Head, face, and neck
- Lateral cerebral ventricles, choroid plexus, midline falx, cavum septi pellucidi, cerebellum, cistern magna, upper lip
- Chest: Shape/size of chest and lungs
- Heart: Four-chamber view, left ventricular outflow tract, right ventricular outflow tract
- Abdomen: Stomach (visualization, size, and situs), kidneys, urinary bladder
- Umbilical cord insertion site into the fetal abdomen
- Spine: Cervical, thoracic, lumbar, and sacral spine
- Extremities: Legs and arms.

If the first ANC visit is in second trimester, do all investigations advised in first trimester screening in addition to ones advocated in second trimester screening.

- ✦ **Confirm period of gestation** by history of amenorrhea and examination. If last menstrual period (LMP) is not known then confirm period of gestation as per first time pregnancy was confirmed by urine pregnancy test (UPT)/ultrasonography (USG)/last obstetric examination:
 - Review medical, obstetrical, and past history
 - Register any present complaints.
- ✦ **Assess:**
 - Measurement of weight, height, blood pressure
 - General physical and systemic examination
 - Assess fetal growth through measurement of fundal height/ultrasound

- Evaluation of women with risk factors for fetal growth restriction
- Assessment of maternal perception of fetal activity and documentation of fetal heart rate, if heard.

✦ **Review investigations:**

- Check routine antenatal investigations (Box 7.2)
- Screening and testing for genetic abnormalities/aneuploidies/neural tube defects (NTD)
- Quadruple marker: 16–22 weeks
- Level II USG/Anomaly scan: 18–20 weeks of gestation for fetal structural anomalies (*see* Box 7.1). Also assess:
 - ◆ Fetal number, multiple gestations: Chorionicity, amnionicity, comparison of fetal sizes, estimation of amniotic fluid volume (increased, decreased, or normal) in each gestational sac.
 - ◆ Qualitative or semi-quantitative estimate of amniotic fluid.
 - ◆ Placental location, appearance, and relationship to the internal cervical os.
 - ◆ Umbilical cord: Number of vessels in the cord, and placental cord insertion site.
 - ◆ Measurements: Biparietal diameter, head circumference, abdominal circumference, and femoral diaphysis length.
 - ◆ Transvaginal assessment of cervical length as short cervical length (<24 mm at 24 weeks) is associated with spontaneous preterm birth.⁵
 - ◆ Maternal anatomy: Evaluation of the uterus, adnexal structures, and cervix should be performed when appropriate.

Second trimester screening algorithm is described in Flowchart 7.1.

✦ **Selective screening:**

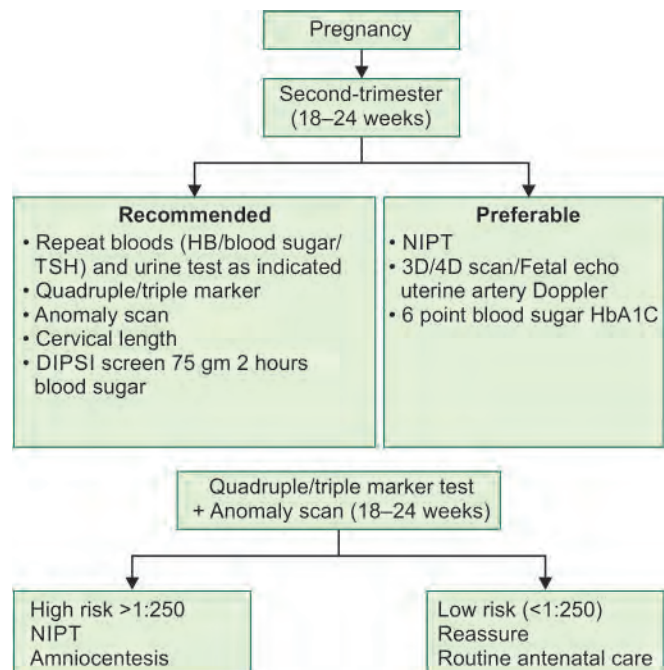
- Thyroid profile [T3, T4, thyroid-stimulating hormone (TSH), antithyroid globulin]

Box 7.2: Routine antenatal investigations.

- Hemoglobin (Hb): If Hb <10.5, investigate for anemia including thalassemia, if MCV <80
- Blood group, If Rh-negative recommend husband's BG
- If wife Rh-negative and husband Rh-positive recommend indirect Coombs test
- Oral glucose tolerance test at 24–26 weeks. If normal to be repeated at 32 weeks in women at risk for diabetes in pregnancy.
- Thyroid-stimulating hormone and antithyroid globulin as per protocol
- Venereal disease research laboratory, HIV, and HBsAg
- Qualitative assessment of urine protein
- Urine culture and sensitivity (mid stream clean catch sample)
- Screening for cervical cancer as per protocol.

- Hemoglobinopathies
 - Lead level
 - Infection screen (Box 7.3)
 - Screening for depression: Pregnant women should be assessed at least once during pregnancy or the postpartum period for depression and anxiety symptoms using a validated screening tool.⁶
 - Screening for GBS by vaginorectal culture at 37–38 weeks is recommended by ACOG.⁷
- ✦ **Counseling:**
- Nutrition, dietary and food hygiene. Recommended weight gain in pregnancy (Table 7.3).
 - Pregnant women of normal weight with a singleton pregnancy need to increase daily caloric intake

Flowchart 7.1: Second trimester screening algorithm.



Box 7.3: Selective infection screen.

- Hepatitis C
- Tuberculosis
- Toxoplasmosis
- Bacterial vaginosis
- Trichomonas vaginalis
- Herpes simplex virus
- Cytomegalovirus
- Zika
- Chagas disease
- Documentation of rubella and varicella immunity.

by 340 and 450 additional kcal/day in the second and third trimesters, respectively, for appropriate weight gain.

- Recommended daily allowance (RDA) for an Indian reference woman 20–29 years, weighing 50 kg (Table 7.4).
- Exercise during pregnancy: In the absence of any contraindication—regular, moderate intensity physical activity for 30 min/day is recommended for pregnant women.
- Travel: Pregnant women need to be counseled regarding the risk of pregnancy complications away from their usual source of medical care, as well as the availability of medical resources and their medical insurance coverage at their destination. There is an increased risk of venous thromboembolism during pregnancy and with prolonged immobility during the trip. Counsel regarding issues related to air travel (e.g. access to medical providers, lower oxygen environment, and restricted movement). There is also a potentially increased risk of exposure to infectious diseases.
- Sexual intercourse: In the absence of pregnancy complications (e.g. vaginal bleeding, ruptured membranes), there is insufficient evidence to recommend against sexual intercourse during pregnancy.
- Warning signs necessitating emergency consultation (Box 7.4).
- ✦ Recommendations:
 - *Elemental iron*: 100 mg + folic acid 400–500 µg/day supplementation starting in second trimester and

Table 7.3: Recommended weight gain in pregnancy.

Category	BMI	Weight gain (kg)
Low	<19.5	12.5–18
Normal	19.8–26	11.5–16
High	26–29	7–11.5
Obese	>29	≥ 7

Table 7.4: Recommended calorie and protein intake.

Particulars	kcal/d	Protein (g/d)	Fat (g/d)
Nonpregnant	2,200	50	20
Pregnant	+300	+15	30
Lactating	+550	+25	45
	+400	+18	

Box 7.4: Warning signs for emergency consultation.

- Vaginal bleeding
- Leakage of fluid per vagina
- Decreased fetal activity
- Signs of preterm labor (e.g. low backache; increased uterine activity compared to previous patterns; menstrual-like cramps; diarrhea; increased pelvic pressure; vaginal leaking of clear fluid, spotting or bleeding, contractions)
- Signs of pre-eclampsia (e.g. headache not responsive to acetaminophen, visual changes that do not resolve after a few minutes, persistent right upper quadrant abdominal pain)
- Signs or symptoms suggestive of a medical or surgical disorder.

continuing for the rest of pregnancy. Prophylactic iron and folic acid (FA) given for 180 days in pregnancy and 180 days after delivery.

- ◆ Nonanemic pregnant women: 100 mg elemental iron and 500 µg of FA daily
- ◆ Anemic pregnant women: 200 mg elemental iron and 1 mg folic acid/day.
- ✦ *Immunization*:
 - Tetanus toxoid: 2 doses at 4–6 weeks interval
 - Influenza vaccine recommended in all women, regardless of trimester, who will be pregnant during influenza season. Though FOGSI recommends giving it after first trimester as immunity for 6 months is transmitted to fetus also. Immunity for this vaccination lasts for 1 year. Vaccines which can be given and those which are contraindicated are described in Table 7.5.
- ✦ *Radiation*: No increased risk of malformations, growth restriction or abortion from a radiation dose of less than 5 rad.
- ✦ *Employment*: Any occupation causing severe physical strain should be avoided. Women with previous/present pregnancy complication (IUGR, preterm delivery) should minimize physical work. Women with uncomplicated pregnancy can continue work till onset of labor.
- ✦ *Smoking and alcohol consumption*: Abstinence is recommended.

CONCLUSION

Prenatal screening should be performed within frequent established intervals to allow adequate time for follow-up of screening tests, performance of diagnostic tests, counseling about test results, so that management options can be discussed and early intervention is executed in high risk cases.

Table 7.5: Recommended vaccination in pregnancy.

Strongly recommended	Recommended	Not recommended
TT: 2 doses or Tdap TT 1st dose: Between 16–20 weeks, 2nd dose: 4–6 weeks after the 1st dose. Tdap <ul style="list-style-type: none"> ◆ Can replace TT (wherever available) ◆ Single dose replaces both doses of TT: Administered 28–36 weeks, if previously immunized but if not immunized two doses of TT and one dose of Tdap 	Influenza vaccine (during flu season) Intramuscular Can be given at any gestation but FOGSI recommends after 1st trimester. Immunity of this vaccination lasts for 1 year and baby remains immune against flu for 6 months, if vaccine is given to mother, 6 months before delivery	HPV MMR varicella

Vaccination for which indication is not altered by pregnancy : Rabies, Pneumococcal/Meningococcal/Hepatitis.

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Third Trimester Workup

Jayam Kannan, Prashitha Panneerselvam

INTRODUCTION

Screening in third trimester is done in both low-risk pregnant mother and high-risk for diagnosing of late pregnancy complications such as late onset intrauterine growth restriction (IUGR), pre-eclampsia, gestational diabetes, anemia, and infections.

SCREENING FOR HEMATOLOGICAL CONDITIONS

Complete blood count is repeated again at 28 weeks which allows enough time for treatment of anemia. Pregnant women with anemia are at a 4-fold increase risk of anemia, 2.2-fold risk of low birth weight, and 1.8-fold risk of low APGAR. WHO estimates 591,000 perinatal deaths and 1,150,000 maternal deaths globally, directly or indirectly related to anemia.¹

Indirect Coombs test in Rh-negative mother is repeated again at 28 weeks and if found positive, the mother should be referred to appropriate center for further investigations.²

SCREENING FOR INFECTIONS

Screening for asymptomatic bacteriuria is done at 12–16 weeks; if not done earlier, it can be done at 28 weeks.

Venereal disease research laboratory (VDRL)/human immunodeficiency virus (HIV)/Hepatitis B are repeated in third trimester. Third-trimester testing has the potential to prevent pediatric HIV infection and universal testing should be considered in high-prevalence areas.³

Testing pregnant women for group B *Streptococcus* is done at 35–37 weeks and if found positive, they are treated with antibiotics. It is a simple test and clinicians use a sterile swab to collect sample from vagina and rectum.

SCREENING FOR MEDICAL CONDITIONS

Hypothyroidism is usually detected in first trimester screening; if the mother does not have a thyroid-stimulating hormone (TSH) report it can be repeated in third trimester normal cut-off TSH—less than 3 mU/L.

Hyperglycemia in Pregnancy

The recent concept is to screen for hyperglycemia in the first trimester itself as the fetal beta cell recognizes and responds to maternal glycemic level as early as 16th week of gestation.⁴ If the first trimester screening is negative it is performed again at 24–28th weeks and 32–34th weeks. The diagnostic test for gestational diabetes mellitus (GDM) advised by the Diabetes in Pregnancy Study Group of India (DIPSI) is an estimation of plasma glucose after 2 hours of 75 g glucose load irrespective of meal timings and the threshold plasma glucose level of more than or equal to 140 mg/dL is taken as cut off for diagnosis of GDM. This has also been included in the guidelines issued by the Ministry of Health and Family Welfare, Government of India.⁵ FIGO declaration 2018 recommends universal screening for all pregnant mothers at first visit and at 24–28 weeks. It recommends WHO 2013 criteria for diagnosis of GDM [fasting plasma glucose (between 92 mg/dL and 125 mg/dL) and 1-hour plasma glucose (180 mg/dL) and 2-hour plasma glucose (between 153 mg/dL and 199 mg/dL) following a 75 g oral glucose load] and diabetes mellitus [fasting plasma glucose (greater than 126 mg/dL) and 2-hour plasma glucose (higher than 200 mg/dL) following a 75 g oral glucose load or random plasma glucose (200 mg/dL) in the presence of diabetes symptoms.

Monitoring Glycemic Control

If the target blood glucose level is achieved, blood sugars are monitored at least once in 2 weeks from 28 weeks to 32 weeks, and once a week till delivery after 32 weeks. In uncontrolled blood glucose level, frequency of monitoring depends on the glucose levels. The patients are thought self-monitoring of blood glucose. In women with pre-existing diabetes, retinal assessment and renal assessment is repeated at 28 weeks.

Gestational Hypertension and Pre-eclampsia

Blood pressure assessment and urine protein estimation is done at each antenatal visit to screen for pre-eclampsia

and all pregnant women should be made aware of the imminent symptoms of eclampsia.⁶ Significant proteinuria is considered if the dipstick reading is 1+ and protein/creatinine ratio greater than equal to 0.3 or greater than or equal to 300 mg per 24 hours urine collection. In the absence of proteinuria, high blood pressure associated with thrombocytopenia (<100,000/mL), elevated serum creatinine more than 1.0 mg/dL or elevated blood liver transaminases to twice normal are diagnostic of pre-eclampsia.

In gestational hypertension and pre-eclampsia women, ACOG task force recommends daily serial assessment of symptoms and fetal movements, twice weekly BP measurement and weekly platelet count and liver enzymes. Ultrasonography is done to determine fetal growth every 2 weeks and amniotic fluid volume is assessed weekly.⁷

Fetal Growth Restriction

Symphysis fundal height is to be measured every visit from 24 weeks. Evidence does not support routine ultrasound scanning and Doppler after 24 weeks in low-risk pregnancy through it is important in diabetes or hypertension complicating pregnancy.

Fetal growth restriction (FGR) is one of the most common and complex problems in obstetrics and the perinatal complication are preventable if diagnosed early. There is increased risk of perinatal mortality and morbidity for infants with FGR. Hence, screening, diagnosis, and management is important for clinicians. Cochrane review could not conclude the effectiveness of symphysis fundal height (SFH) measurement in detecting FGR,⁸ SFH measurement is routinely used in developing countries, especially in low-risk cases. In a prospective cohort study conducted in 4,000 pregnant women showed that routine third trimester scan tripled the identification of small for gestational age (SGA) infants and could detect growth restricted infants⁹ while Cochrane review 2015 does not show benefit in performing routine third trimester ultrasound unless indicated (Box 8.1).

Identifying small for gestational age (estimated fetal weight EFW <10th centile) and large for gestational age

(LGA) (EFW > 90th percentile) is important in patients with medical disorders complicating pregnancy especially in low resource settings so that the patients can be referred to higher center for appropriate management. If the FGR is identified, Doppler studies are done further to assess the uteroplacental insufficiency and additional Doppler studies like middle cerebral artery, ductus venous, and aortic isthmus are done at specialized fetal medicine centers, but there use in monitoring growth restricted fetus needs more evidence.

The timeline for hypoxia with abnormal arterial Doppler (CIA, MCA is approximate 2 weeks and abnormal venous Doppler is 2 days). The periodicity of antepartum testing largely remains unclear, since there are no large clinical trials, however, fetal well-being tests [nonstress tests (NSTs), biophysical profile (BPP) and umbilical artery Doppler] is repeated once or two times weekly and growth estimation done every 2 weeks.

FETAL SURVEILLANCE

In low-risk pregnancy, regular growth and fetal heart rate monitoring during antenatal visit and maternal monitoring of kick count (10 movements in a period of 2 hours) every day is done. Other fetal surveillance tests like NST, contraction stress test (CST), BPP, modified BPP, and umbilical artery Doppler are done in high risk pregnancy for fetal wellbeing and to plan the time and mode of delivery.

Nonstress Test

Normal acceleration during fetal movements is good indicator of fetal autonomic function. Reactive NST is with normal beat to beat variability, with minimum two acceleration of 15 beats from baseline lasting up to 15 seconds in a 20-minute trace. 15% of normal 28–32 weeks fetus can show abnormal NST. Cause of nonreactive NST includes fetal sleep cycle or fetal distress. If NST is nonreactive it is extended to 40 minutes or vibro acoustic stimulation of fetus is done. Contraction stress test is the response of fetal heart rate to contraction of uterus.¹¹

Biophysical Profile

Five components [NST, fetal breathing movements, fetal movements, tone and amniotic fluid volume (single vertical pocket >2 cm)], each is assigned a score of 2. A score of 8–10 is normal, 6 is equivocal, and less than 4 is abnormal. Modified BPP includes only NST and amniotic fluid assessment only.

Umbilical artery Doppler velocimetry plays a significant role in monitoring growth restricted fetus.

Box 8.1: Third trimester ultrasonography indications.¹⁰

- Fetal growth: Estimation and fetal well-being
- Antepartum hemorrhage, placental position
- Abdominal or pelvic pain evaluation
- Multiple gestation
- Suspected small for gestational age/large for gestational age
- Amniotic fluid abnormalities
- Preterm premature rupture of the membranes or preterm labor

Normal umbilical artery wave form shows high velocity diastolic flow. In growth restricted fetus, there can be decreased diastolic flow and severe growth restriction is absent or reversed diastolic flow is seen.¹¹

MENTAL HEALTH

The prevalence of antenatal depression is reported up to 42.7%. Research has reported that 33% of postnatal depression begins in pregnancy. Diagnosis of antenatal depression is made difficult by the physiological signs that overlap with symptoms of depression. The clinicians should identify the risk factors like lack of social support, stress, fear of pregnancy problems and childbirth, domestic violence and if the pregnant women show any signs of depression, prompt referral to psychiatry services will help the patient to cope up with stress and prevent postpartum depression.¹²

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Diet and Nutrition during Pregnancy

Shilpa Joshi

■ INTRODUCTION

Nutrition is important in all stages of life. But it has special importance in pregnancy as it is critical in maintaining good health of mother and well-being of unborn child.

In addition to changes in the anatomy and physiology of the mother, there are adjustments in nutrient metabolism. These changes are to support fetal growth and development while maintaining maternal homeostasis and preparing for lactation. These adjustments in nutrient metabolism are complex and evolve continuously throughout pregnancy. The changes in nutrient metabolism can be described by several general concepts—adjustments in nutrient metabolism are driven by hormonal changes, fetal demands, and maternal nutrient supply; more than one potential adjustment exists for each nutrient; maternal behavioral changes augment physiologic adjustments; and a limit exists in the physiologic capacity to adjust nutrient metabolism to meet pregnancy needs, which when exceeded, fetal growth and development are impaired.¹

■ IS NUTRITION DURING PREGNANCY ONLY IMPORTANT FOR MATERNAL WELL-BEING?

Prenatal nutrition is important to prevent metabolic diseases in fetus later in their life. Famine studies from Dutch winter hunger showed that the rates of obesity at 19 years of age were significantly higher in offsprings whose mothers were exposed to famine in first half of pregnancy as compared to those who were exposed to famine in first trimester of pregnancy. The offsprings who were exposed in their last trimester, had lower rate of obesity and hence metabolic diseases. Furthermore, recent studies from the Dutch famine population showed that low-energy intake (<900 kcal per day) during pregnancy was associated with higher weight and greater fat deposition at several sites in female offspring at ~58 years of age, but not in males.² The associations were stronger when exposed to famine during the middle 20 weeks of gestation than when exposed during the first and last 10 weeks of gestation. Another investigation

found that exposure to famine during pregnancy increased offspring's BMI and waist circumference in women at ~50 years of age, but not in men.^{3,4}

There may also be some small and weak positive associations between exposure to famine during pregnancy and energy balance, physical activity and percent energy from fat for their offspring in later life in the Dutch famine population.

These observations have led us to strengthen the belief that maternal nutrition has more than a short-term impact of maternal and fetal health, but the real and long-term impact is that of prevention of metabolic disease in offspring. Hence, maternal diets are responsible for lesser metabolic burden of nation.

Effect of Prepregnancy Weight

There is a considerable information documenting the effect of increased prepregnancy weight on pregnancy outcome. Obesity leads to an increase in rates of infertility (often associated with polycystic ovary syndrome) and a negative impact on infertility treatments.⁵ For those who successfully conceive, early pregnancy is characterized by an increased risk of spontaneous miscarriage. Rates of congenital malformations increase with increasing obesity. For every unit (kg/m^2) increase in BMI, the risk of neural tube defect (NTD) increases by 7%.⁵ Obesity and overweight is characterized by increase in insulin resistance. It therefore comes as no surprise that the rate of gestational diabetes (GDM) is increased in pregnancy of overweight and obese women. There are increased rates of gestational hypertension, pregnancy-induced hypertension, and pre-eclampsia in obese and overweight women during pregnancy. The rate of stillbirth has increasingly been recognized to be associated with obesity.

There is very little data on the effect of underweight on pregnancy. Generally, low BMI are correlated with nutritional deficiencies both in macronutrients and micronutrients. Low BMI are at risk of intrauterine growth restriction, preterm birth, and iron deficiency anemia.⁶

■ NUTRITION IN PREGNANCY

Pregnancy is categorized by additional energy requirements of 300 kcal per day.⁷ Rather than traditional belief of eating for two, the emphasis should be on eating twice as well in terms of quality of food. Therefore, nutrient density of food is very important. Nutrient density is defined as the quantity of protein, vitamins, and minerals per 100 kcal of food.⁸ Many women especially in India have diets rich in low-density nutrient foods. This is due to cultural factors, food preference, economics and also the traditional food patterns. Various studies in India have shown that Indians eat very little proteins in their diets.^{9,10} The protein intake in traditional Indian diet of both vegetarians and non-vegetarians is about 12% , as opposed to recommended of 20%. These studies are not on pregnant women. But it has been observed that women who are pregnant tend to eat the same foods cooked at home, it probably increased in quantities. Also, it has been observed that Indians consume very limited quantities of vegetables and fruits. Research all over the world have shown that birth weight of infant is dependent on mother's intake of green leafy vegetables and fruits rather than energy dense foods they tend to consume.¹¹ Also, research has shown that in India the traditional preference for eating food during pregnancy is rich in sugar, which in excess can be detrimental for growth and development of the baby.¹²

In summary, caloric needs increase, but the increase is less than that of other nutrients. Small frequent meals and more nutrient-dense foods should be emphasized, especially as pregnancy progresses. Women should be encouraged to choose milk or yogurt (change to low fat), choose lower fat meats, minimize juice (fruits and vegetables), choose whole grains, and drink water instead of processed drinks like sherbet, aerated drinks or sport drinks. Fresh fruits and vegetables should be stressed. Highly processed foods like fried foods should be avoided, and other added fats and sugars minimized, to maximize high nutrient density with lower caloric count.¹³

Prenatal vitamins (multivitamin/multimineral) are recommended for those who have higher than average needs (women pregnant with multiples, women who have HIV, and women who smoke, drink alcohol, or take drugs) or those who eat little or no animal products.¹⁴ For others, they are used as insurance, not as a substitute for a good diet.

■ CONCLUSION

In India, it is consistently seen that women who are pregnant are culturally fed for two. There is a lot of emphasis on quantity of food rather than quality. Time has come to change the thought process of women and their families to not only to ensure well-being of mother and child but also preventing metabolic burden of this nation.

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Feel Good Yoga for Body, Mind and Soul

BK Shubhada Neel, Sonal Richharia, Pushpa Pandey, Sunita Lodaya

■ INTRODUCTION

In this electronic age, where on one hand we have made great materialistic developments, on the other hand in this electronic age, undue stress during pregnancy is likely to affect the physical fitness of mother, the physical and mental development of the baby as well as the process of delivery. Yoga has an answer to address these issues as it works on the mind, body, and soul.

To have healthy body, we need a peaceful mind and enlightened soul, union between the body, mind, and soul offers a positive balanced life. In antenatal period to have healthy and intelligent baby, it is required to empower expectant mothers with good thoughts and have flexible body for easy and safe delivery. So yoga improves functional capacity of mother's body and mind.

Yoga achieves union between the body, mind, and soul and offers a positive, balanced lifestyle. It enhances the physical and mental health of the pregnant women. Yoga can be practiced in all the stages of pregnancy.

It has three basic principles:

1. *Asanas:* It increases mother's flexibility, stretchability, muscle tone, and joint flexibility.
2. *Pranayama and Om chanting:*
 - i. It will regulate mother's breathing
 - ii. Maintain emotional balance
 - iii. Ensure proper oxygen supply to the breathing fetus during labor and delivery.
3. *Rajyoga meditation:*
 - i. Connects the self to supreme
 - ii. Helps mother to relax and calm down mind and body.

Yogic practices will improve the functional capacity of mother's body and mind and will heighten the neuron-muscular coordination which will help in natural delivery process.

Physical and mental, stresses are very often the main causes of difficult and obstructed delivery. Expectant mother has to be physically, mentally, and emotionally

empowered and healthy. So that baby will be physically, mentally, and emotionally empowered and healthy. This can be easily managed by undertaking certain regular yogic practices like asanas, pranayama and meditation especially under supervision of yoga expert, so as to avoid any harm to the expectant mother or the growing baby in the uterus. With the yogic practice, expectant mother approaches with confidence the ordeal of delivery process with relaxed frame of body and mind.

This presentation on the subject is very crucial for all expectant mothers and I am sure this information will serve as a guideline for both expectant mothers as well as the antenatal healthcare providers. Feel good yoga and meditation for mother and baby will become popular and acceptable soon.

Come One! Come All!

Come and learn how to keep yourself fit and fine.

Enjoy and experience yogāsanas, pranayama, and meditation, something unique which you have been missing!

■ WHAT IS YOGA?

The word "Yoga" is derived from the Sanskrit root "yuj" meaning "to join", "to connect" or "to unite".

Achieve union between the body, mind, and soul to attain self-realization.

Leads to the union of an individual consciousness with the universal consciousness.

It overcomes all kinds of sufferings and leads to holistic health, happiness, and harmony in all walks of life.

■ WHAT IS THE REQUIREMENT OF YOGA IN PREGNANCY?

In ancient India, at the time of our grandmothers, pregnancy and childbearing occurred at very early age so muscle and joint flexibility used to be more, hence vaginal delivery was easy. Secondly they used to do all household works like cooking, cleaning, washing clothes, which

automatically strengthened their thigh and calf muscle. In today's scenario, marriages occur late and due to carrier constrain one plans baby late, so joints are stiffer. One enjoy pleasure of machines and maids so no household activities, that's why to improve on flexibility, it is required to do yoga and asanas during pregnancy.

For Mental Development and Sanskar

Highly intelligent child is aim of all parents nowadays, but for that what they can do, nobody knows. 80% of brain and nervous system is developed in intrauterine period, to have spiritually and mentally evolved child it is required that pregnant lady should live in *satvik* environment—means stress-free and happy. By different methods of pranayama, mother can have proper oxygenation which is important for brain development.

OM chanting helps in neuromuscular synapses formation and we know more synapses that mean more intelligence.

■ HOW YOGA CAN HELP DURING ANTENATAL PERIOD?

Medical research has shown marked benefits of yoga to the mother and fetus. Adverse effects of stress in pregnancy are pregnancy-induced hypertension, pregnancy-induced diabetes, abortion, preterm labor, eclampsia, and intrauterine growth restriction (IUGR). Yoga is multi-dimensional, physical, mental, emotional, intellectual, and thus provides total answer to the challenge of stress. Yoga is a technique for total personality development at physical, mental, emotional, and spiritual levels.

The chief aim of these exercises is to improve the overall elasticity and strength of the body's muscles and more importantly those sets, which are vital for delivery like muscles of lower back, waist, lower abdomen, leg, and pelvic floor. The exercises also improve blood circulation. Regularly doing these exercises also prepares you mentally for the process of childbirth as well as dispels misconceived fears and notions.

■ GENERAL GUIDELINES FOR YOGA PRACTICE

Before the Practice

- ✦ Cleanliness of surroundings, body, and mind.
- ✦ Calm and quiet atmosphere with a relaxed body and mind.
- ✦ Empty stomach or light stomach—small amount of honey in lukewarm water if you feel weak.

- ✦ Bladder and bowels should be empty.
- ✦ A mattress, yoga mat, durrie or folded blanket.
- ✦ Light and comfortable cotton clothes.
- ✦ Do not do yoga in a state of exhaustion, illness, in a hurry or in acute stress conditions.
- ✦ Chronic disease/pain/cardiac problems, during pregnancy and menstruation, a physician or a yoga therapist should be consulted.

During the Practice

- ✦ Start with a prayer to create a conducive environment to relax the mind.
- ✦ Slow, in a relaxed manner, with awareness of the body and breath.
- ✦ Do not hold the breath unless instructed. Breathing through the nostrils unless instructed otherwise.
- ✦ Do not hold the body tightly, or jerk the body.
- ✦ Practice with own capacity.
- ✦ Persistent and regular practice.
- ✦ Keep in mind contraindications/limitations.
- ✦ End with meditation/deep silence/Sankalpa Shanti path.

After Practice

- ✦ Bath may be taken only after 20–30 minutes of practice.
- ✦ Food may be consumed only after 20–30 minutes of practice.

Food for Thought

- ✦ A satvik, balanced vegetarian diet recommended.
- ✦ Over 30 years, two meals a day should suffice.
- ✦ As the food, so the mind,
As the mind, so the life.
- ✦ Satvik—full of positive energy (Prepared and consumed in positive state of mind in Godly remembrance)
- ✦ Balanced diet = Proteins + carbohydrates + fats + vitamins + minerals in appropriate quantities.

Daily Sadhana

- ✦ Prayer
- ✦ Stretching exercise
- ✦ Yogāsanas
- ✦ Om chanting
- ✦ Pranayama
- ✦ Rajyoga meditation
- ✦ Sankalpa
- ✦ Shantipath.

Prayer

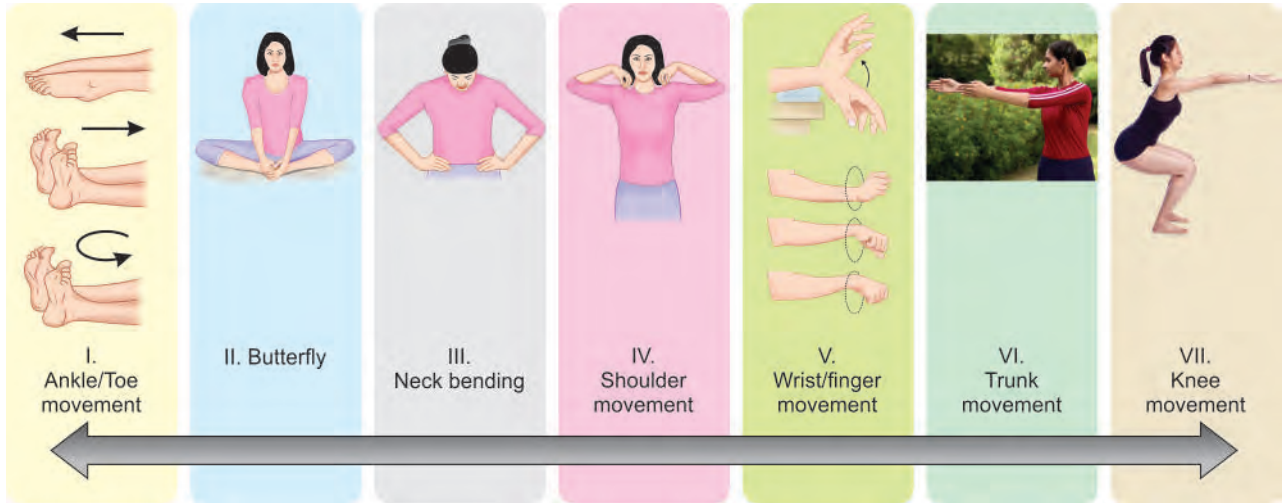


सर्वे भवन्तु सुखिनः
 सर्वे सन्तु निरामयाः ।
 सर्वे भद्राणि पश्यन्तु
 मा कश्चिद्दुःखभाग्भवेत् ।
 शान्तिः शान्तिः शान्तिः ॥

Everybody should be happy, everybody should be healthy. There should be divinity everywhere. Nobody should be in distress.

Loosening Practices

- ✦ Ankle/toe movement
- ✦ Butterfly
- ✦ Neck movement
- ✦ Shoulder movement
- ✦ Wrist/finger movement
- ✦ Knee movement.



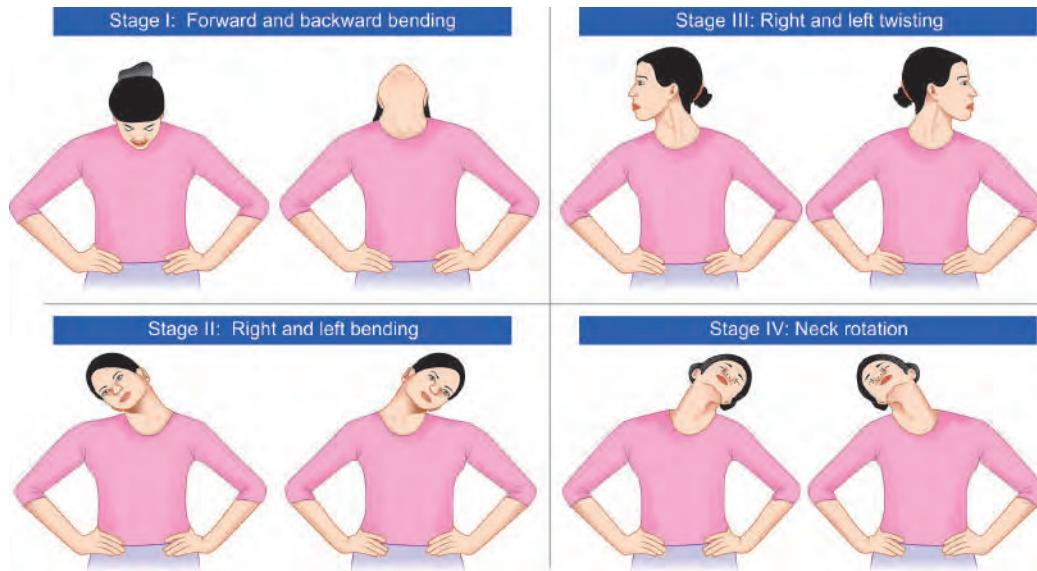
Ankle/Toe Movement



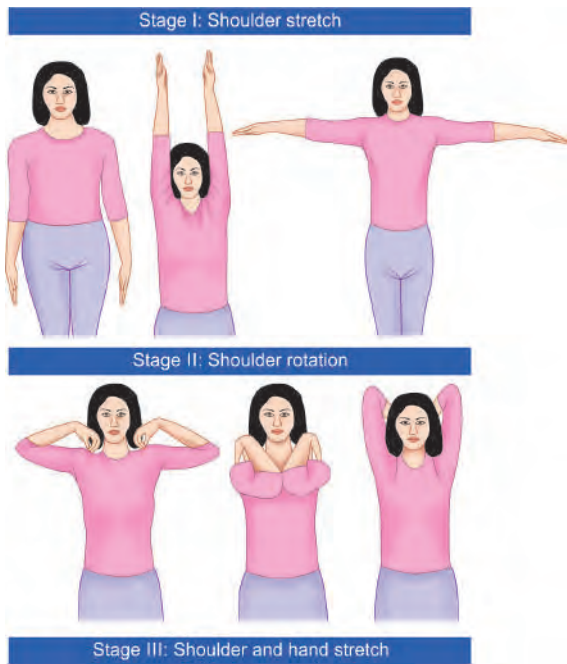
Butterfly



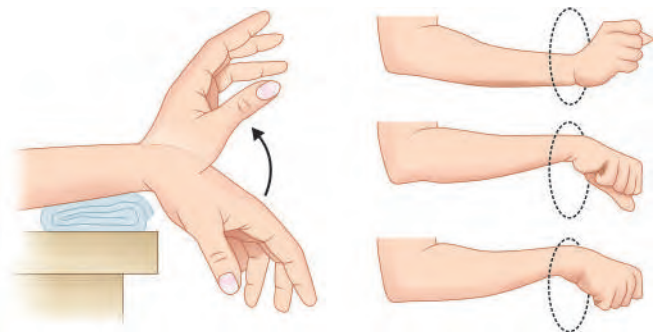
Neck Bending



Shoulder's Movement



Hand and Wrist Movement



Trunk Movement



Knee Movement



YOGASANAS

Points to Remember

- ✦ Starting position of asana
- ✦ Reach slowly to final position
- ✦ Hold for sometimes in final position
- ✦ Slow release of asana
- ✦ Relax.

Standing Pose



Sitting Pose

- ✦ Dandasana
- ✦ Bhadrasana (The firm/auspicious pose)
- ✦ Sukhasana
- ✦ Parvatasana (The mountain pose)
- ✦ Sukha Purva
- ✦ Kativakrasana
- ✦ Chakki chalan
- ✦ Upavista Konasana
- ✦ Parsva Uttanasana
- ✦ Janushirasana
- ✦ Matsyendrasana
- ✦ Vajrasana (The thunder bolt pose)



Supine Pose



Vipritkarni



Uttana Tadasana
(The palm tree pose
in lying position)



Uttana Bhadrasana
(The thighs-stretch
pose in lying position)



Sulabha Uttana
Ek padasana (Raised leg pose)



Janu Skandhasana
(The knee-shoulder pose)



Kegel's exercise
Tensing relaxing

What is Pranayama?

- ✦ Also known as “yogic breathing” or “controlled deep breathing”.
- ✦ “Prana” means energy in Sanskrit.
- ✦ “Ayama” means distribution of energy.

Pranayama teaches you to breathe well, with an equal balance of nourishing oxygen inhaled and unwanted carbon dioxide exhaled. This keeps your body oxygenated giving you more energy.



Pranakarshan Kriya



Anuloma Viloma/Nadishodhan



Bhamari Pranayama



Udgit Pranayama



Shittli Pranayama



Sitkari Pranayama

Benefits of Pranayama

- ✦ Improves the circulation of blood.
- ✦ Increases the oxygen level in your blood.
- ✦ Helps your body to remove waste effectively; reduces stress.
- ✦ Cope during labor by calming you and distracting you from pain.
- ✦ Breathing deeply now will help to prepare you for giving birth.
- ✦ Your body produces increasing amounts of adrenaline when you are afraid, which can prevent the production of oxytocin, a hormone that helps labor along. Deep breathing in labor can help you fight the urge to panic when you feel the pain of contractions.
- ✦ Keeping your body relaxed means you can save your energy for when it is needed.

Om Mantra



Dhyana mudra

Benefits of Chanting the Powerful Om Mantra

- ✦ Helps reduce stress
- ✦ Improves concentration
- ✦ Sets your mood right
- ✦ Strengthens spinal cord
- ✦ Helps in detoxifying your body
- ✦ Takes care of your heart and digestive system
- ✦ Helps in getting you enough sleep
- ✦ Enables you to have control over your feelings
- ✦ Helps you in getting rid of negativity.

RAJYOGA MEDITATION



All are welcome in this miraculous journey of life. To make this journey comfortable practice the following commentaries for 10 minutes three times in a day. If possible, early in the morning, at about 4–5 AM. Early morning is the most auspicious time. Also do this before going to bed too. The meaning of Yog is to establish a connection, reunion of self (soul) with Supreme. The practice of remembering/visualizing Supreme, with love, affection, and experiencing every possible relation with *him* is Rajyoga meditation.

COMMENTARY FOR RAJYOGA EXPERIENCE



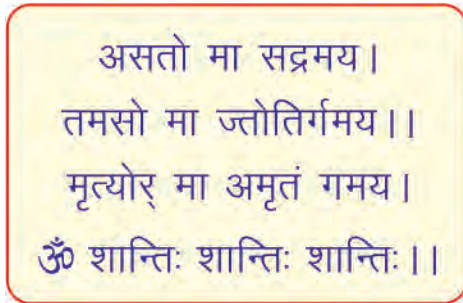
I am spiritually empowered soul which is different than this body. I am seated between the two eyebrows and shining like a star. This body is like a motor car..... and I am a soul working as its driver. This body is made up of perishable five elements. But I am the imperishable soul ever young and indestructible. I am the master of the house called the “Body”. I am the soul in the form of tiny point of light. I feel more and more powerful as I become light, radiating light. On the screen of my mind, I begin to sense a warm, golden-red glow. My home, I travel far beyond to my home of peace. In my home I am so free, light, and peaceful. I feel the presence of a powerful light. As I come closer and closer to the source of immense energy spiritual power, a brilliant light, a wave of love showers over me. I am in the presence of the Supreme soul, the Supreme father, the Unlimited, the purest, most immaculate soul of all. The Supreme is the ocean of all these treasures, *bliss, knowledge, peace, love, happiness, purity, power*. Going deeper into this peace I feel so still and light. I begin to explore this soft aura of peace. I am filling with feelings of warmth, love and comfort from God the Supreme whose gentle waves of golden, tender love, pass over me and soothe my mind. I become so still and quiet, *peaceful, powerful* Om Shanti.... Om Shanti..... Om Shanti



Sankalpa

I am a divine soul. My every thought, word, and action is full of happiness for others. Today throughout the day whomsoever I will meet, I will give peace, love, and happiness to everyone. As I think like this, baby in the womb is getting empowered with peace, love, and happiness. He/She is coming in this world to give peace, love, and happiness to others. He/She is coming to change this world. Like Shree Krishna and Shree Radhe my baby will remain ever happy and empowered with all virtues/values. My body is perfect, healthy “As we think, so we become.” My blood pressure is normal, my sugar is normal. Every cell of my body is full of love and purity. Everything is perfect. The world is beautiful. I will do this meditation every day, due to which me and my baby will remain physically and mentally healthy. Every moment GOD is with me, as GOD is my companion, my day is going to be successful. My career is extremely successful. I am GOD’s angel. I am spreading vibrations of peace, love, and happiness, in entire Universe, due to which this World will again become Golden age/paradise.

Shantipath



Lord Almighty, please show us the light which travels us from falsehood to truth, from the darkness of ignorance to the light of knowledge, from mortality to immortality.

Walking

Walking is safe all 9 months of pregnancy and one of the easier ways to start exercising. At least 30 minutes a day, preferably outdoors for the fresh air, sunlight, and natural surroundings.

- ✦ Time table for morning walk in pregnancy
- ✦ Benefits of walking
- ✦ Pregnancy safe walking tips.

Pregnancy Safe Walking Tips

- ✦ Drink about half glass of milk/half a piece of apple/dry fruit before you start your walk. Always remember to carry a water bottle along with you.

- ✦ Get your doctor’s approval before starting.
- ✦ When pregnant you have to be more careful.
- ✦ Look forward while walking, to avoid sudden falls.
- ✦ Walk at a comfortable pace that is not too fast.
- ✦ Slow down if you are not able to walk with your growing belly.
- ✦ If in case you feel hot, breathless or tired, take a break.
- ✦ Do not walk in extremely humid or hot conditions.

Benefits of Walking during Pregnancy

- ✦ Retrospective data suggest that exercise may prevent gestational diabetes, reduce the risk of developing pre-eclampsia, and prevent excessive weight gain during pregnancy.
- ✦ Gaining weight at a steady rate can lower your chances of having—
 - Hemorrhoids
 - Varicose veins
 - Stretch marks
 - Backache
 - Fatigue
 - Indigestion
 - Shortness of breath during pregnancy.
- ✦ A review of the evidence suggests that, in most cases, exercise is safe for both mother and fetus during pregnancy and women should therefore be encouraged to initiate or continue exercise to derive the health benefits associated with such activities. Overall the body of literature in this field thus far is provocative, and when taken as a whole, suggests that exercise during pregnancy may be associated with a reduced risk of cesarean delivery.

BENEFITS OF EXERCISE IN PREGNANCY

- ✦ Pregnancy usually leaves women feeling tired; exercise gives you more energy to make through the day.
- ✦ Exercise allows you to sleep better.
- ✦ Improves your mood, lessens mood swings, improves yourself image, and gives you some sense of control.
- ✦ Prepares you for childbirth. Studies show shorter labor, fewer medical interventions, and less exhaustion during labor.
- ✦ Easier to lose weight after baby is born.

IMPORTANT POINT TO REMEMBER

Women with miscarriages or abortions in the past or those who have conditions like “placenta previa” should do exercises only according to their doctor’s advice. Routine sonography during the third month is useful.

■ BENEFITS OF YOGA IN PREGNANCY

- ✦ It minimizes common pregnancy symptoms like morning sickness and constipation.
- ✦ Effective for reducing pregnancy-related back and leg pains.
- ✦ Strengthen abdominal organs and muscles.
- ✦ Better sleep, prevents excessive weight gain, and have more energy overall.
- ✦ Improves balance, increases flexibility, and better blood circulation.
- ✦ It increases secretion of endorphin (happy hormone) that keeps mother energetic and positive so decreases erratic mood swings.
- ✦ Reduces cortisol levels so rate of prematurity also decreases.

■ CONCLUSION

So in Adbhut Matrutva programme we want to emphasize about the role of different asanas to prepare mother for process of delivery and to have intelligent baby, a peaceful mind by pranayama and meditation. Always remember you are having a pure soul in your womb and *God* gave you an opportunity to create it in better way. We as a doctor have major role in all this process, we know that subconscious mind of baby is always alert in womb, so we can teach a fetus more easily and can make a whole generation intelligent and Sanskarwan. It is time for action so try to teach everyone about the methods and spread the knowledge.

OM SHANTI

Role of Meditation during Pregnancy

BK Shubhada Neel, Pushpa Pandey, BK EV Swaminathan, Manju Gupta, Awantika

To the mind that is still, the whole world surrenders

—Anonymous

When meditation is mastered, the mind is unwavering like the flame of lamp in a windless place

—Bhagavad Gita



INTRODUCTION

Meditation and medicine have come from the Greek word “*medri*”, which means “to heal”. It is a mental exercise, which has many physiological and psychological benefits in mind and body. Pregnancy is a condition in which women undergo various physiological changes and is accompanied by unique physical and psychological demands. Maternal stress and anxiety, which are very common even in uncomplicated pregnancy is associated with a host of negative consequences for the fetus and subsequent development. Hence, there is a need to manage the various physical, emotional, and mental pain that arise throughout the stages of pregnancy and labor. Meditation not only takes care of physical and emotional health, but also helps to improve the state of spiritual health. The word “Holistic”, means “whole” or “complete”.

Around 70–80 years back, when the dichotomy in the state of being of the human being used to be emphasized, i.e. “spirit” the psyche and consciousness energy that drives the force “being”. So, the multidimensional health model is the need of the hour.

Spiritual health refers to that part of the individual, which reaches out and strives for meaning and purpose in life. However, present medical scenario is devoid of this aspect. We need to understand spirituality to comprehend and become spiritual healthy. Spirituality is to know oneself and the higher self, i.e. to explore “*swa*”, the inner self (soul) and “*sth*”, the consciousness. Ipso facto, the Hindi word for health “*swasth*” literally means “the inner self-consciousness”. The inner self-consciousness encompasses aspects of the enduring and the immortal spirit. Practicing this fact will lead to stability and security, which, in turn, would lead to peace, love, and happiness. On the contrary, the outer self-consciousness encompasses aspects, role, or material things that are ever-changing and mortal. Focusing merely on the of the outer leads to instability and insecurity, which, in turn, leads to anger, anxiety, depression, type-A behavior, isolation, and chronic life stresses. By abstraction, we can conclude that a healthy lifestyle means an “inner self-conscious lifestyle”¹.

Meditation enables us to look within and make contact with our inner truth. The inner peace and silence that emanate during meditation also affect our physical bodies. Various types of meditation are practiced by the individuals, few of them are:

- ✦ **Mantra meditation:** Wiki describes “Mantra” as a sacred utterance, a numinous sound, a syllable, word or phonemes, or group of words in Sanskrit believed by practitioners to have psychological and spiritual powers. An alternate meaning of the sacred word is “advice”. The mantra “Om Shanti” advises us to be conscious of our essential spirituality. We should chant this mantra with its true understanding—“*I am a spiritual being and my essence is peace*”.
- ✦ **Dhyan meditation:** Aimed at developing concentration on a sacred object. When one focuses upon a sacred

object for a long period of time, the impact of that vision can bring an internal state of sacred awareness.

- ✦ *Pranayam*: Meditation upon breath is a favored technique, because breath is considered to be sacred life force. Pranayama improves our physical health.
- ✦ *Rajyoga meditation*: Rajyoga meditation is the communion of inner self with supreme. It is also known as “Sahaja yoga” and taught by Brahma Kumaris. “Yoga” means “union”. It is the science and art of harmonizing spiritual, mental, and physical energy through a connection with the ultimate source of spiritual energy called the “supreme soul” (power house of spiritual energy).¹ It is the state of soul consciousness and a positive lifestyle. Rajyoga has two components:
 - *Soul*: Soul is the metaphysical energy, which controls the body. Soul is eternal, immortal, imperishable, and divine metaphysical entity. It should be clear; fetus in womb has a same life as an adult. Every human being either adult or fetus is made up of physical energy and metaphysical energy.

Human being – Human + being

Up to 3 month’s body of fetus formed completely in mother’s womb. “Soul” enters in body, which is imperishable entity with subconscious mind (Sanskar) carrying from previous birth.

Soul is located in the center of forehead between hypothalamus, pituitary gland, and pineal gland. Surface marking is center of forehead. Soul has seven innate qualities—(1) knowledge, (2) purity, (3) love, (4) peace, (5) happiness, (6) bliss, and (7) power. These innate qualities (metaphysical energies) are manifesting as thoughts forms a quantum field, which has no mass. Thoughts are not mere vibrations, but they are definite electrochemical phenomenon occurring in hypothalamus of brain. This metaphysical energy acts through the mind “thoughts, judgments, feelings, and emotions”, integrates with the biological energy of the body through the nervous and endocrine system, thereby nourishing every cell of body.² So physical health is dependent on positive vibration of metaphysical energy. In fact, mind radiates its energy to each cell of body.

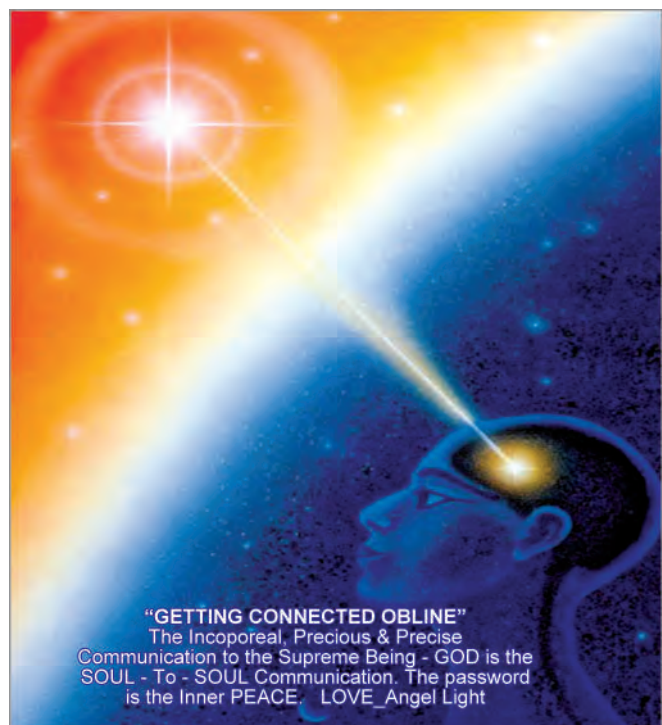
Scientific evidence of soul:

- ✦ In 40 epileptic patients while practicing meditation positron-emission tomography (PET) scan was done. It was observed that during meditation, the prefrontal area of the seat of the soul showed increased light energy. The scientists termed this as “God’s Spot”.
- ✦ Near death experiences and out of body experiences—Dr Raymond Modi in his book recorded 100 cases

about near death and out of body experiences and came to conclusion that death is not the end of life.

- ✦ Past birth regression therapy—Dr Ian Stevenson devoted 40 years to the scientific documentation of past life memories of children. He has over 3,000 cases in the files and found that reincarnation is true.
 - *Supreme*: It is a powerhouse. He is ocean of knowledge, peace, purity, power, bliss, love, and happiness. The most accepted form of Supreme is point of light and might in all religions.

■ METHOD OF RAJYOGA MEDITATION



Meditation is practiced while sitting in morning and evening two times at least for 20 minutes. Everyday sit in a clean and pure spot with no TV or other distractions. In this simple yoga, we can sit quietly in the lotus posture or the half lotus posture.

Sit comfortably and relax your body from head to feet. Take a few deep breaths. During inhalation, visualize positive energy from the environment entering in your body. Negative energy is going out during exhalation. Experience calmness and watch your thoughts. Thoughts are slowing down.

Visualize a point of light, symbolic of your spirit, in center of your forehead. This peaceful light is emitting rays of tranquility, rays of peace. These rays are reaching my brain, which is now filled with divine peaceful rays. I am now becoming peaceful. The rays have spread throughout

my body. I am relaxed and peaceful. Now, I am shifting my attention to the space outside the body, where exists another powerful point of light that is the ocean of peace and ocean of love. Different colored rays are falling upon me; I am absorbing love, peace and healing energy from the supreme surgeon, the Godfather. The energy is entering through my face and eyes and is spreading out to fill every cell of my body. I am now feeling restored and healed. Healing energy is radiating from within me to my baby inside the womb. He/she is also a point of divine light playing a part in his/her body. The baby inside the womb is also experiencing unconditional love and peaceful vibrations. Staying connected to the ocean of peace is making my child's mind powerful and his/her body is becoming healthier.

Experiment 1

Offer water and meal to supreme father and surgeon, God, before taking it. Experience that the powerful rays coming from supreme energy are charging water and food. This healing energy in the food and water is healing your baby now.

Experiment 2

At night and early morning after meditation, visualize God's power falling on your hands. Touch your abdomen, while thinking healing energy of God is entering to my baby through my hand.

Rajyoga can also be practiced while walking and moving around which changes the aura (thought, emotions, attitude, and memory) of person that affects the health of expectant mother and her fetus inside the womb.

With continuous practice of meditation life changes. When we want to join two wires, we must remove the insulating rubber. Similarly, when we remove the rubber of the body from the mind and concentrate on supreme (God is not the body or the rubber) then spiritual current flows easily.

■ BENEFITS OF MEDITATION—PHYSIOLOGICAL BENEFITS

- ✦ Meditation decreases metabolic rate and lowers the heart rate, thus indicating a state of deep rest and regeneration.
- ✦ Meditation reduces stress by decreasing stress hormones. In various studies, it was found that the number of preterm labor and pregnancy induced hypertension with associated intrauterine growth restriction (IUGR), were significantly lower, in the group of mothers that practiced yoga and meditation.³

- ✦ Endorphins and enkephalins are secreted due to yogic lifestyle, which helps in detaching oneself from the various kinds of pains.
- ✦ It raises energy level and strengthens the immune system to ward of infections.
- ✦ Positive changes in electrocardiogram (ECG) and electromyogram (EMG) and increases skin resistance.
- ✦ Creates a state of deep relaxation and reduces anxiety due to decreased level of blood lactate.
- ✦ Improves sleep and digestion.
- ✦ It helps to give up addictions, and decrease depression anxiety, diabetes, hypertension, and migraine tension headache.⁴

Psychological Benefits of Meditation

- ✦ It enhances positivity of a person and reduces stress; lessen catastrophic reaction, caused by adverse environment, unwanted pregnancy, and economic problems by changing attitude and belief system.
- ✦ It strengthens patients to tolerate various types of pains during antenatal period as well as during labor and promotes vaginal delivery.
- ✦ Meditation improves memory.
- ✦ Meditation increases the subjective feeling of happiness and contentment.
- ✦ Meditation increases emotional stability. Increases concentration and strengthens the mind.

Spiritual Benefits of Meditation

- ✦ Studies show that people who meditate are likely to report a shift in their outlook and goals in life toward growth and spiritual fulfillment rather than more materialistic goals.
- ✦ Pure vibrations give healing touch to others.
- ✦ As subconscious mind becomes active, visualization power increases which can be used for self-progress and self-healing.
- ✦ Meditation increases the spiritual energy within, neutralizes the cause and effect of karma, and improves birth outcome.
- ✦ By nourishing fetus with spiritual energy, it can be protected from the negative environment and by nourishing brain and body make the baby healthy.

■ CONCLUSION

Meditation is a simple technique that brings profound results. Rajyoga meditation makes the process of self-transformation light and natural and helpful in reducing stress. Thus, it contributes in decreasing the

risk of premature delivery or low birth weight babies, the complications like pregnancy-induced hypertension (PIH) and IUGR and eventually would decrease:

- ✦ Developmental and behavioral problems in the children, as a toddler and adolescent.
- ✦ Risk of developing depression later in life.
- ✦ Mental health problems in the mother.
- ✦ Fetal origin of adult diseases such as insulin-dependent diabetes mellitus, hypertension, and coronary heart disease.

All the suffering, stress and addiction come from not realizing you already are what you looking for

—Jon Kabat-Zinn

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■ INTRODUCTION

Routine ultrasound examination has become an established part of antenatal care (ANC). It is beneficial in detection of congenital malformations, multiple pregnancies, placenta previa, and for confirmation of period of gestation. The prevalence of congenital anomalies ranges from 2% to 4% of all births, but they account for 20–25% of all perinatal deaths and an even higher percentage of perinatal morbidity. Diagnosis of malformations by routine ultrasound provides early information and helps in making timely decisions during pregnancy for termination, appropriate treatment at birth, and prompt transfer to units specialized in the care of the newborn, thereby reducing perinatal mortality and morbidity. Certain conditions such as ectopic pregnancy, multiple gestations, and placenta previa, which may lead to potential life-threatening complications, can be identified earlier and appropriately managed with the help of ultrasonography (USG). Accurate gestational dating from ultrasound can assist in the management of abnormal fetal growth in pregnancies, which is a leading cause of perinatal morbidity and mortality in both developed and developing countries.

■ NUMBER OF ULTRASOUND IN PREGNANCY

At least one obstetric ultrasound should be done during pregnancy between 18 weeks and 22 weeks of pregnancy. If affordability is not an issue, additional ultrasound in 1st trimester and 3rd trimester improves the clinical management.

No prior preparation of the woman is required for the ultrasound examination. As far as possible, the day of ultrasound should coincide with ANC examination day and fixed days for USG should be avoided, as this may lead to multiple visits by the pregnant women.

■ PURPOSE FOR ULTRASONOGRAPHY

- ✦ To detect chromosomal abnormalities, fetal structural defects, and other abnormalities

- ✦ Estimation of gestational age which results in reduction of post-term pregnancies
- ✦ To detect number of fetuses and their chorionicity
- ✦ Evaluation of placental position and abnormalities
- ✦ Assessment of cervical canal and diameter of internal os to detect incompetent os.

■ CLASSIFICATION OF ULTRASOUND IN PREGNANCY

- ✦ *Standard 1st trimester ultrasound:* A standard ultrasound in 1st trimester includes the evaluation of presence, size, location, and number of gestational sacs (GSs). The GS is examined for presence of yolk sac and embryo or fetus inside it. When an embryo is seen, it is measured for estimation of gestational age by measuring crown-rump length (CRL). Its viability is seen by documenting fetal cardiac activity. The uterus, cervix, adnexa, and pouch of Douglas are examined to rule out any pathology.
- ✦ *Standard 2nd and 3rd trimesters ultrasound:* It includes evaluation of fetal number, cardiac activity, presentation, placental position, amniotic fluid volume, fetal biometry, and anatomical survey. Maternal cervix and adnexa should also be examined.
- ✦ *Specialized ultrasound examination:* A detail anatomic evaluation of fetus considered to be at risk for anomalies is done, e.g. in cases of advanced maternal age, pregnancy conceived by artificial reproductive techniques, abnormal biochemical markers, or a suggestive history for anomalies. Other examples of specialized ultrasounds are fetal echocardiogram, nuchal translucency scan, cervical length, Doppler ultrasound, etc.

Most common indications for 1st trimester ultrasound are:

- ✦ Confirm an intrauterine pregnancy and to rule out an ectopic pregnancy
- ✦ Confirmation of viability
- ✦ Estimation of gestational age
- ✦ Confirmation of multiple pregnancy and their chorionicity

- ✦ To diagnose gestational trophoblastic disease
- ✦ To ascertain cause of vaginal bleeding or pain
- ✦ Measurement of nuchal translucency
- ✦ To diagnose certain fetal anomalies
- ✦ To evaluate uterine or ovarian masses and uterine anomalies.

Gestational Sac

At around 31st day, transvaginal sonography (TVS) allows the detection of a GS representing the chorionic cavity, as small as 2–3 mm in diameter. GS is usually round or elliptic with a smooth rounded contour. As the sac grows, it gradually deforms the central cavity echo complex, giving rise to characteristic double decidual sac sign formed by two echogenic rings.

Yolk Sac

The secondary yolk sac is the earliest embryonic landmark that can be recognized within the GS. The diagnosis of intrauterine gestation can be made with certainty after yolk sac is visible. By TVS, it is visible as early as at 5th week. It is spherical in shape with echogenic periphery and sonolucent center.

Embryo and Cardiac Activity

Between 34th day and 35th day, the developing embryo may be seen as line of echoes or a subtle area of focal thickening along the periphery of yolk sac. Cardiac contractions begin around 36–37 days GA. Cardiac rates are relatively slow at 6 weeks, typically between 100 beats/min and 115 beats/min. By 8 weeks, it measures around 144–176 beats/min. Subsequently, heart rate declines to 150–160 beats/min by 12 weeks.

Amnion

Two blebs representing the amnion and yolk sac and in between them, the embryonic disk can be identified as early as 5 weeks 3 days when CRL is 2 mm. The echogenicity of yolk sac is more than that of amnion.

Musculoskeletal System

The upper limbs start to develop during the latter part of 6th week followed by lower limbs. From 7th week onward, the upper and lower limb buds can be imaged. The tail section usually protrudes caudally and exceeds the lower limbs in length at this time. Spine is seen as parallel echogenic lines starting from 7 weeks. The toes form during the 8th and 9th weeks, and by 10th week, they are fully developed. The fingers assume their final shape during the 8th week.

Others

Scanning of the facial structures becomes practical only after 11th week. Urinary bladder becomes visible after 8th week, but kidneys cannot be identified until the end of 1st trimester. At 7–8th weeks, the cranium can be distinguished from the abdomen. Head appears larger than the trunk. By 10th week, head size is almost half of the embryo. The symmetrical brain anatomy within the developing calvarium can be appreciated by TVS.

Placenta

As placental development begins during 8th week, the hyper-echogenic ring surrounding the sac becomes asymmetric with focal peripheral thickening, which becomes future placenta.

Umbilical Cord

The umbilical cord can be detected by TVS by 7–8th weeks. *Nuchal translucency* measurements along with serum biochemistry should be used to determine the risk of having a fetus with aneuploidy or other abnormalities during 11 weeks to 13 + 6 weeks gestational age.

■ VIABILITY CRITERIA IN 1ST TRIMESTER PREGNANCY

The following criteria have been suggested for predicting a nonviable pregnancy:

- ✦ *For the initial scan:*
 - An empty GS of mean sac diameter (MSD) more than or equal to 25 mm
 - An embryo with no heart activity and a CRL more than or equal to 7 mm
 - Beyond 70 days gestation, an MSD more than or equal to 18 mm with no embryo.
- ✦ *For repeat scans:*
 - A pregnancy with an embryo with no heart activity on initial scan and a repeat scan more than or equal to 7 days later
 - A pregnancy with no embryo and an MSD less than 12 mm if sac size had not doubled after more than or equal to 14 days
 - A pregnancy with no embryo and an MSD more than or equal to 12 mm with no embryo heart activity after more than or equal to 7 days.

■ DATING OF A PREGNANCY

Most accurate time of dating a pregnancy is 1st trimester, as the biologic variation is minimal at this time. First structure to be measured is the GS. The measurement of

a GS is expressed as MSD, which is the average of three dimensions (length, width, and depth) measured from inner edge to the other inner edge. A yolk sac without an embryo detected by TVS corresponds to 5.5 weeks GA. Between 6 weeks and 12 weeks, CRL is considered as most accurate for dating, which is measured as the maximum straight line length of the fetus. The 1st trimester dating is accurate up to $\pm 3-5$ days. Beyond 1st trimester, the following sonographic parameters can be used to estimate gestational age and for fetal size assessment:

- ✦ Biparietal diameter (BPD)
- ✦ Head circumference (HC)
- ✦ Abdominal circumference (AC) or diameter
- ✦ Femur diaphysis length (FDL).

Second and third trimesters ultrasound mainly focuses on fetal biometry and anatomy. Fetal cardiac activity, fetal number, and presentation should be documented. In case of multiple pregnancies, chorionicity is determined. Comparison of fetal sizes and evaluation of amniotic fluid in each sac should be determined.

Fetal anatomic survey should be carried out to evaluate the followings:

- ✦ *Fetal head:* The standard axial fetal brain planes include the BPD, the transventricular plane, and the cerebellar plane. Many of the fetal measurements are taken from these planes including the BPD and HC. Measurements of the cerebellum, cisterna magna, and nuchal fold can be useful.
- ✦ *Biparietal diameter plane:* The continuous midline echo representing the falx is broken in the anterior third by the cavum septum pellucidum. Behind this in the middle of the falx, a thin slit representing the third ventricle is often visible. The BPD measurement is obtained from outer skull bone to inner skull bone perpendicular to the falx at the maximum diameter. The HC is measured as an ellipse around the outside of the skull bones. Slight gaps in the echogenic skull bone outline are evident and represent the skull sutures. There should be a normal oval skull shape with no depression of the petrous temporal bones and no angulation near the sutures. The normal bone density of the skull should be more echogenic than the falx.
- ✦ *Transventricular plane:* This image is a cross-section of the head just above the BPD plane, at the level of the atrium of the lateral ventricles. The lateral ventricular measurement can be taken from inner wall to inner wall at the level of the glomus of the choroid plexus. Over the gestational range of 15–40 weeks, 10 mm or larger is considered abnormal.
- ✦ *Cerebellar plane:* This plane is inferior to the BPD plane. The cerebellum is a dumbbell-shaped structure, with symmetrical lobes. The central vermis is slightly more echogenic than the lateral lobes. The cisterna magna can be measured from the posterior margin of the cerebellar vermis to the inside of occipital bone in the midline. A measurement of 2–10 mm is normal in the 2nd and 3rd trimesters. The nuchal fold is a measurement taken from outer skin line to outer bone in the midline. Less than 6 mm is considered normal up to 22 weeks.
- ✦ *Fetal face:* The facial structures can be examined both coronally and axially. The orbits, nose, and mouth need to be separately visualized. The orbits should be equal in size with the gap between each orbit approximately the same as the width of each orbit. The lenses can be seen as central circles with no internal echogenicity. The two nostrils and an intact upper lip and hard palate should be seen. By visualizing all structures, i.e. the forehead, the nose, upper lip, lower lip, and chin in sagittal section rules out nasal bone, chin, and forehead abnormalities.
- ✦ *Fetal chest and heart:* It is important to establish situs. Both the heart and stomach should be seen to be on the left side of the fetus. Both hemidiaphragms can be visualized sagittally. The lung fields should be carefully inspected for cystic or echogenic areas.
- ✦ *Heart:* The heart should be positioned on the left side of the chest, with the interventricular septum at about a 45° angle and is of normal size. Four-chamber view, left and right outflow tracts, and three vessel trachea view should be assessed. The heart rate should be noted to look for arrhythmias.
- ✦ *Diaphragm and lungs:* This sagittal image demonstrates intact diaphragms on each side especially posteriorly near the spine, a common site for diaphragmatic defects. The stomach is visible beneath and heart above the diaphragm. It is also beneficial to identify homogeneous appearing lung fields to attempt to exclude echogenic or cystic lung lesions.
- ✦ *Fetal abdomen:* The AC is a standard biometry measurement. The stomach should be visualized in the left side of the abdomen. A “J”-shaped hypoechoic structure is seen in the midline, which represents the internal portion of the umbilical vein branching to the right portal vein. The AC is measured around the outside of the skin line. The section should be circular not oval, the kidneys should not be visible in the section, the cord insertion should not be visible, and the “J” should not extend all of the way to the skin line anteriorly.

Occasionally, the gallbladder is visible as a tear-shaped hypoechoic structure situated to the right anterior of the umbilical vein. The adrenal glands can sometimes also be seen in this section. There should be no cystic dilatation of the bowel or abdominal cysts visible.

The umbilical cord insertion should be imaged to look for abdominal wall defects. The renal tract is reviewed by imaging urine in the bladder with surrounding umbilical arteries and assessing the kidneys. The fetal kidneys should be imaged in two planes, both coronal and axial.

- ✦ *Fetal musculoskeletal system:* It is beneficial to image the fetal spine throughout its length and the spine is best imaged in three planes: (1) Coronal, (2) Sagittal, and (3) Axial. There should be an intact skin line overlying the back, especially over the sacral region. There should be no spinal angulation or deformity. At the inferior end, there should be sacrococcygeal tapering of the spine. In axial section, the three ossification centers forms an approximately equilateral triangle throughout the length of the spine.

Each of the 12 long bones should be separately visualized. Although both femurs could be measured, usually only one is measured provided both have been seen to be of similar lengths. The femur is measured horizontally across the ossified diaphysis down the middle of the shaft of the bone avoiding any triangular echogenic extensions. Hands and feet should be separately imaged taking particular care to ensure that both left and right sides are separately seen.

- ✦ *Other structures:* A qualitative or semiquantitative estimation of amniotic fluid (like amniotic fluid index or single deepest pocket) should be done to rule out oligohydramnios or polyhydramnios. Umbilical cord should be evaluated to look for number of vessels in the cord, and placental cord insertion site. The placenta should be visualized throughout to look for abnormalities, placenta previa, or hemorrhages. The presence of succenturiate lobe should be excluded. The position of the placenta in relation to the internal os should be ascertained. The maternal cervical canal can also be measured.

The presence of any myoma or adnexal mass should be documented. Presence of uterine anomalies should also be documented.

Cervical length measurement by TVS is done for prediction of preterm birth.

Color Doppler ultrasound is done to predict preeclampsia and fetal growth restriction and also to diagnose fetal jeopardy.

■ SAFETY

Diagnostic ultrasound in pregnancy is generally considered safe.

■ CONCLUSION

Ultrasonography is now an established tool in the clinical management of pregnancy. To ensure appropriate maternal and neonatal health, it is important that the quality of ANC is optimized with addition of ultrasound.

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Immunization during Pregnancy

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■ INTRODUCTION

Vaccination during pregnancy plays an important role for the health of mother and the baby. It reduces their chances of morbidity and mortality from vaccine preventable diseases. It protects newborn infant at a critically vulnerable time and before neonates can be vaccinated. After vaccinating a pregnant woman, antibodies (immunoglobulin G) cross the placenta from mother to fetus especially in the final weeks of pregnancy that protects against the disease. Additional antibodies are transferred from the mother to infant via breast milk.

■ VACCINATION TO PREVENT TETANUS, DIPHTHERIA, AND PERTUSSIS

Vaccines routinely recommended during pregnancy are to prevent tetanus, diphtheria, and pertussis (Tdap). Tetanus is an acute, often fatal disease caused by exotoxin produced by *Clostridium tetani*. Neonatal tetanus may occur in neonates who have low levels of antitetanus antibody due to lack of passively transferred maternal antibody.

Diphtheria is an infectious disease caused by the bacterium *corynebacterium diphtheria*, which primarily infects the throat and upper airways and produces a toxin affecting other organs. Complications may include myocarditis, inflammation of nerves, kidney problems, and bleeding problems due to low levels of platelets.¹

Pertussis also known as whooping cough is a highly contagious respiratory disease. It is caused by bacterium *Bordetella pertussis*. Initially, symptoms are those of common cold with a runny nose, fever, and mild cough. This is followed by weeks of severe coughing fits. Children less than 1 year may have little or no cough and instead have periods where they do not breathe.²

Tdap vaccination—The American College of Obstetricians and Gynecologists (ACOG) recommends giving diphtheria toxoid, tetanus toxoid, and acellular pertussis vaccine to pregnant women.³

To maximize maternal antibody response, passive antibody transfer and levels in the newborn optimal time

for Tdap administration is between 27 weeks and 36 weeks of gestation although Tdap may be given at any time during pregnancy. It is safe to administer Tdap to breastfeeding women. If Tdap was not administered during pregnancy, it should be administered immediately postpartum.

■ INFLUENZA VACCINATION

Influenza is a contagious respiratory illness caused by human influenza virus. The influenza virus type A, B, and C and their various subtypes and strains cause seasonal epidemics.⁴

Influenza is more likely to cause severe illness in pregnant women than in women who are not pregnant. Changes in the immune system make pregnant women more prone to severe illness from influenza as well as hospitalizations and death. Influenza vaccination is the best way to prevent influenza and its consequences. It is given well before influenza viral exposure occurs, when pregnant women get influenza the risk of preterm labor and birth defects increases.

Centers for Disease Control and Prevention (CDC) and ACOG recommend inactivated influenza vaccination for women who will be pregnant during the influenza season.⁴

Live attenuated influenza vaccine, which is available as intranasal spray is not recommended for pregnancy women but is safe for use in the postpartum period.

Inactivated influenza vaccine is safe for pregnant women and their fetus and can be given during any trimester. It is recommended for mothers from 26 weeks onwards.⁵

■ VACCINES, WHICH ARE CONTRAINDICATED DURING PREGNANCY

Measles, mumps, and rubella (MMR) vaccine, varicella vaccine, oral polio vaccine, and human papillomavirus (HPV) vaccine are not recommended to be given during pregnancy.

Most live attenuated vaccines are contraindicated and not recommended during pregnancy. Women should

avoid becoming pregnant until 3 months after receiving the MMR vaccine.⁵

Incidence of congenital rubella syndrome following inadvertent vaccination of pregnant mother has been evaluated through rubella registers in the USA and Europe.⁶⁻¹³

By administration of oral polio vaccine containing live attenuated polio virus type 1, 2, and 3 to pregnant women has shown possible development of viremia following immunization and cases suggestive of vaccination-associated anomalies have been reported.^{14,15}

■ VACCINES, WHICH MAY BE GIVEN IN PRESENCE OF SPECIFIC RISK FACTORS

- ✦ Yellow fever vaccine is not recommended for pregnant women and lactating mothers unless there is an epidemic or the woman is traveling to a high-risk area.¹⁶
- ✦ *Hepatitis A*: If women have specific risk factors for hepatitis A, they may receive vaccine. It is given in 2 doses, 6–12 months apart.¹⁷
- ✦ *Hepatitis B*: Pregnant women who are at risk for this disease and have tested negative for the virus can receive this vaccine. A series of 3 doses is required to have immunity. Birth dose vaccination is a key intervention of prevention of hepatitis B virus (HBV) infection in infants. Universal HBV vaccination in newborn has dramatically changed the epidemiology of chronic HBV infection.¹⁸
- ✦ *Hepatitis C*: The World Health Organization (WHO) estimates that 3–4 million people annually are infected with hepatitis C virus (HCV) and approximately 130–170 million people with chronic disease may go on to develop cirrhosis or hepatocellular carcinoma. There is no pre-exposure prophylaxis, vaccine or postexposure prophylaxis for HCV and immunoglobulin is not effective in preventing infection. Mothers and children with chronic hepatitis C should be immunized against hepatitis A and B.¹⁸
- ✦ *Hepatitis D*: It is caused by hepatitis delta virus. A coinfection with HBV or a super infection on chronic HBV infection is ways of getting infected. Immunization against HBV prevents (HDV) infection.¹⁸
- ✦ *Hepatitis E*: Waterborne epidemics of hepatitis in developing countries are mostly caused by hepatitis E virus (HEV) infection. Pregnant patients may have fulminant hepatitis. Mortality from acute infection is in range of 20% in the third trimester. The recombinant hepatitis E vaccine was approved in China in December 2011 although there is no global recommendation. Immunoglobulins are not effective. Women traveling to HEV endemic countries should strictly follow food and water precautions.¹⁸
- ✦ Meningococcal A, meningococcal B, and pneumococcal vaccine may be given, if certain risk factors.

■ SIDE EFFECTS

Like all medicines, vaccines can have side effects. However, the chance of a life-threatening reaction is small. The CDC says the dangers of developing pertussis, tetanus, or diphtheria far outweigh the risks of vaccination.

Side effects of Tdap may include:

- ✦ Pain, redness, or swelling in the arm where the shot was given, mild fever, headache, tiredness, stomach upset, including nausea, vomiting, or diarrhea, muscle aches and pains and swollen glands.

Someone may have a severe allergic reaction to an ingredient in the Tdap or Td vaccine. This generally happens in less than one in a million doses. Most of the time, such reactions occur within a few minutes of receiving the vaccine. The following can be signs of a severe allergic reaction, called anaphylaxis:

- ✦ Behavior changes
- ✦ Breathing difficulty, including wheezing
- ✦ Dizziness
- ✦ Hoarse voice
- ✦ High fever and pale skin
- ✦ Rapid heart beat
- ✦ Weakness.

One should seek immediate medical care, if any of these signs after receiving the Tdap are noticed.

Flu vaccines have a good safety record. Hundreds of millions of Americans have safely received flu vaccines over the past 50 years, and there has been extensive research supporting the safety of flu vaccines.

■ CONCLUSION

Vaccination during pregnancy is a cost-effective strategy to improve pregnancy outcomes in India. All live vaccines should be avoided during pregnancy. Common barriers regarding vaccination during pregnancy are lack of awareness regarding benefits and lack of concerns about vaccine safety.

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The Road to Birth Naturally

Evita Fernandez

■ INTRODUCTION

There is a rapidly growing lobby of women who are screaming for the freedom to birth naturally. These voices are not restricted to any socioeconomic group or supposedly educated women. There is a strong desire in every woman to birth normally despite the deep fear she holds of the pain she needs to endure. Women's voices need to be heard. A woman's body is built to nurture a baby within her womb. Nature has ensured a woman is capable of birthing her baby if only she is left alone to do what comes naturally.

In the last six decades, birth has been medicalized and dehumanized. With women all around the globe, being encouraged to birth in healthcare facilities, we have institutionalized birthing into a "conveyor belt" like environment. We, the obstetric fraternity have grown interventional and have begun to look at pregnancy and childbirth as a medical catastrophe waiting to happen. Our entire training prepares us for life-threatening emergencies, and somewhere in this journey, we have lost our belief in the woman's ability to birth. We have unfortunately also lost our sense of wonder and awe at the mystery of childbirth.

In the 1940s, Dr Grantly Dick-Read, an obstetrician, authored a book titled "Childbirth without Fear: The Principles and Practice of Natural Childbirth" where he claimed if a woman is prepared antenatally to cope with the pain of labor, and has a supportive companion, this woman would birth with confidence and less fear.¹ These women would certainly have a higher possibility of birthing normally.

Later in the 1950s, Dr Fernand Lamaze, a French obstetrician, was influenced by childbirth practices in the Soviet Union where midwives supervised breathing and relaxation techniques for women in labor. This observation led to the popular Lamaze classes for pregnant women. The objective was to teach expectant mothers various methods of coping with the discomfort/pain of labor and childbirth in order to enjoy a physiological birth.

■ WHAT DO WE MEAN BY NATURAL BIRTH?

*The ability to give birth without routine medical interventions.*² Over the years, the obstetric community may not have witnessed in private hospitals, a birth without any intervention. It is indeed a rare occurrence.

Due to the government's policies, Janani Shishu Suraksha Karyakaram (JSSK) and Janani Suraksha Yojana (JSY) there is an increase in the number of institutional births in our country. Women birthing in public facilities where there is overcrowding, limited access to analgesics, and inadequate staff are more likely to experience birth without interventions. These circumstances as described, offer women no choice but to birth naturally.

The Maternity Care Working Party, comprised of National Childbirth Trust (NCT), Royal College of Midwives (RCM), and Royal College of Obstetricians and Gynaecologists (RCOG), issued a consensus statement in November 2007 defining a normal birth as:³

- ✦ *A birth without:*
 - Induction
 - Medication
 - Use of instruments
 - Episiotomy
- ✦ *Not by cesarean section.*

In the year 2012, the consensus statement by American College of Nurse-Midwives (ACNM), Midwives Alliance of North America (MANA), and National Association of Certified Professional Midwives (NACPM) defined a physiological birth as follows:⁴

- ✦ Spontaneous onset
- ✦ No restriction on time
- ✦ Eat and drink during labor
- ✦ Mobility assured
- ✦ Nonmedical pain relief
- ✦ Freedom of choice
- ✦ Pushing/birthing position
- ✦ Delayed cord clamping
- ✦ Skin-to-skin contact.

When a pregnant woman is empowered with knowledge, given the right information based on evidence, offered a companion of her choice during labor and childbirth, seeks alternative nonmedical options for pain relief, births in the position she finds most comfortable, then this woman has indeed stepped into motherhood with a deep sense of accomplishment, empowerment, and confidence. Furthermore, if this woman has indulged in holding her baby close to her skin and has successfully breastfed her newborn within an hour of its birth, this woman has firmly established her bond with her baby.

This woman has truly enjoyed a natural birth, but more importantly a positive birthing experience.

The World Health Organization (WHO) (2018) emphasized that a positive childbirth experience as one that fulfills or exceeds a woman's prior personal and sociocultural beliefs and expectations, including giving birth to a healthy baby in a clinically and psychologically safe environment with continuity of practical and emotional support from a birth companion(s) and kind, technically competent clinical staff.⁵

Women who have experienced a negative or traumatic birth experience will request an elective cesarean section in their subsequent birth despite having no medical indications.⁶

■ HOW CAN WE ENSURE EVERY PREGNANT WOMAN IS GIVEN THE OPTION TO BIRTH NATURALLY?

To make this vision a reality, we the obstetric fraternity first need to unlearn our old practices, relearn the physiology of normal labor and birth to understand, accept with conviction and believe in a woman's ability to birth without interventions. Unless this first step is taken, the journey cannot begin.

The second vital step is to empower every pregnant woman, regardless of her socioeconomic status, literacy level, caste, creed or religion—with knowledge and honest information based on evidence. Women should be encouraged to be physically fit and eat a healthy diet. Weight gain should be restricted based on the body mass index (BMI) of the woman. Such women who are prepared antenatally with childbirth preparation classes that teach them comfort measures to use during labor are more confident and determined to birth naturally.

The third important step is to ensure every woman is given the choice of a birth companion.

Research has suggested that women with support in labor had shorter labors, less cesarean births and augmentation of labor increasing the chance of a normal birth.⁷

Further evidence has consistently demonstrated that women greatly value and benefit from the presence of someone they trust. A supportive companion will help provide emotional, psychological, and practical support and may reduce fear and stress for women who birth in unfamiliar environments.^{8,9} A birth companion helps provide comfort measures like a massage, ensures the woman is hydrated with adequate fluids to drink, helps the woman stay mobile, upright and more importantly becomes an advocate for the woman.

Oxytocin, the love hormone, is released freely in such an environment where trust, kindness, and compassion reduce fear to a minimum. Oxytocin we know helps in the progress of labor. It is important to remember that no woman should birth alone as this is a violation of her fundamental human rights in childbirth.

The fourth step is to offer professional midwifery care to every childbearing woman. A professional midwife is a unique healthcare professional who offers highly skilled, knowledgeable, and compassionate care for childbearing women, newborn infants, and families across the continuum, throughout prepregnancy, pregnancy, birth, postpartum, and the early weeks of life.¹⁰

She is especially trained to focus on normality. Women allocated to continuous support are more likely to have a spontaneous vaginal birth, less likely to use pain medications, more likely to be satisfied with their birthing experience, and have slightly shorter labors.¹ Professional midwifery care is essentially woman-centered. There is no sense of urgency on the woman to birth in a time convenient for the midwife.

WHO (2016) highlighted the importance of midwifery led, continuity of care during pregnancy and childbirth.¹¹

Cochrane review (2016)¹² reinforced the evidence that low-risk women must be offered midwifery led continuity of care. These women are more likely to experience a natural birth, less likely to use analgesics or synthetic oxytocin. Women are happier with their birthing experience.

The birth environment is also a concept to be considered to promote normal births. Normalizing the birth environment ensuring it is more woman friendly may help in promoting normal birth.¹³ Sheila Stubbs has beautifully quoted *"The midwife considers the miracle of childbirth as normal, and leaves it alone unless there's trouble. The obstetrician normally sees childbirth as trouble; if she leaves it alone, it is a miracle"*.

The fifth step is for the obstetric community to step out of the arena of caring for low-risk pregnant women who form almost 80% of the pregnant population. These women must be cared for by professional midwives who will support them through their labor and birth.

We should use our time and expertise to look after high-risk complicated pregnancies.

We obstetricians should open our minds, hearts, and our birthing rooms to professional midwives and accept them as professional colleagues. When we work with mutual respect and trust, only then will women feel respected and be assured of birthing naturally.

The Indian government in the recent Global Partners Forum hosted in December 2018, announced a policy Guidelines on Midwifery Services in India. This is a *big* step forward on the road to helping mothers' birth naturally.¹⁴

CONCLUSION

It is a woman's fundamental right to choose the circumstances under which she wishes to birth. It is her basic human right to have a companion of her choice. Professional midwives and obstetricians must begin a new working relationship built on mutual respect and trust. This calls for a serious change in attitude. It calls for us obstetricians to admit with grace and humility the urgent need to change childbirth practices in India. Only then, will women be able to walk on the road to birth naturally. Only then will women feel respected, cherished, and believe their voices are indeed being heard.

As John Bowlby said "If a community values its children, it must cherish its mothers."¹⁵

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How to Reduce Cesarean Section Rate?

Shakuntla Kumar, Somnath Bhattacharya, Keerti Parashar

■ INTRODUCTION

One of the most commonly performed surgeries in obstetrics—cesarean section has revolutionized maternity care and saved lives of millions of women and babies. However, over the last few decade, cesarean rates have increased owing in part to the widespread perception that the procedure is of little or no risk to healthy women. In 2011, one in three women who gave birth in the United States did so by cesarean delivery.¹ Although cesarean delivery can be life saving for the mother, the fetus or for both in some cases, the rapid rise in rate of cesarean births without concomitant decline in maternal or neonatal morbidity or mortality raised doubts on overuse of cesarean delivery.² In parts of rural India, the cesarean rates are as low as 2–3% accounting for high maternal and perinatal mortality. Whereas in urban India, even in public sector hospitals of Delhi, the cesarean section rates are as high as 19–35% and in private sector the rate is still higher accounting for 40–70% of the deliveries. According to World Health Organization (WHO), an increase in cesarean section rates above 10–15% does not improve maternal or neonatal outcomes. Therefore, healthcare providers should understand that cesareans must be performed only when medically indicated and should not be a surgical tool of convenience for the doctor or the patient.

■ RISKS OF CESAREAN SECTION

A large population-based study from Canada found that there was a threefold increase in risk of severe maternal morbidities—like hemorrhage, uterine rupture, anesthetic complications, venous thromboembolism, and major infection for cesarean delivery as compared with vaginal delivery (2.7% versus 0.9%, respectively). There are also long-term risks associated with cesarean delivery, particularly those associated with subsequent pregnancies. The incidence of placental abnormalities, such as placenta previa and morbidly adherent placenta previa in future pregnancies increases with each subsequent cesarean

delivery, from 1% with one prior cesarean delivery to almost 3% with three or more prior cesarean deliveries. These complications increase maternal morbidity but also increase the risk of adverse neonatal outcomes.^{3–6}

Maternal factors, such as age, weight, and ethnicity, do not fully account for the increase in the cesarean delivery rate.^{7,8} Certain potentially modifiable factors have led to escalation in cesarean delivery rates such as patient preferences, practice variation among hospitals, systems, and healthcare providers. The variation in the rates of nulliparous term singleton vertex (primary) cesarean births indicates the clinical practice patterns in hospitals. For instance in private sector hospitals in India, the percentage is as high as 40–70% as compared to public sector 19–35%.

Indications of Primary Cesarean Deliveries (FIG. 15.1)

- ✦ Labor arrest (34%)
- ✦ Nonreassuring fetal heart rate (23%)
- ✦ Malpresentation (17%)
- ✦ Multiple gestation (7%)
- ✦ Macrosomia (4%)
- ✦ Maternal request (3%)
- ✦ Preeclampsia (3%)
- ✦ Maternal fetal (5%)
- ✦ Other obstetric indications (4%).

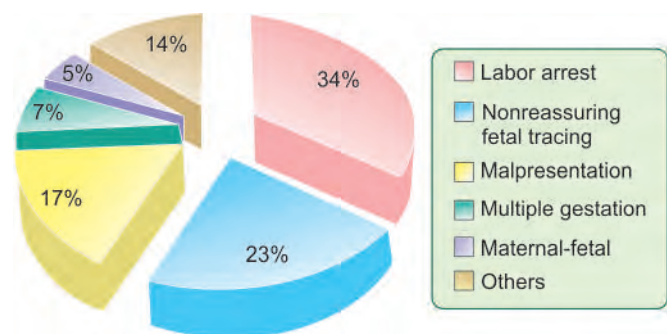


Fig. 15.1: Indications for primary cesarean delivery.

Nonprogress of labor and fetal distress (abnormal or indeterminate fetal heart rate tracings) are two major indications leading to more than 50% of all primary cesarean deliveries. Therefore, safe reduction of the rate of primary cesarean deliveries will require different approaches for each of these indications.

What is driving this upward trend?

- ✦ Rising maternal obesity, age, and chronic disease
- ✦ More multiple births
- ✦ Higher birth weight babies
- ✦ Perception of safety
- ✦ Pressure on physicians to practice “defensive medicine” (Sprague, 2014; Joseph et al 2003; Zhang 2010) (Tables 15.1 to 15.3).

Factors Responsible for Rising Primary Cesarean Rates in India

- ✦ The concept of solo (consultant centric) practice especially in private hospitals.
- ✦ Lack of assigned labor room team (nurses, doula, etc.). Continuous rotation of staff.
- ✦ Lack of fixed clinical protocols or labor manuals.
- ✦ Not much emphasis paid on patient education (importance of exercises in pregnancy, timely check-ups, identifying warning signs, antenatal workshops, etc.).
- ✦ Poor doctor or nurse to patient ratio. Overburdened health providers especially in public sector.
- ✦ Inefficient cardiotocography (CTG) training.
- ✦ Lack of audits.

- ✦ Lack of continuous time-to-time training and upgrading knowledge of doctors and paramedics especially in private sector.

How to reduce second-stage cesarean section rates?

The second stage of labor begins with full dilatation of cervix and ends with delivery of the neonate. Parity, delayed pushing, use of epidural analgesia, maternal body mass index, birth weight, occipital posterior position, and fetal station at complete dilation all are shown to affect the length of the second stage of labor.⁹

In the era of electronic fetal monitoring, adverse neonatal outcomes generally have not been associated with the duration of the second stage of labor. In a multi-center randomized study of fetal pulse oximetry of 4,126 nulliparous women who had a longer duration of active labor, pushing was not associated with adverse neonatal outcomes, even in women who pushed for more than 3 hours.¹⁰ However, a longer second stage of labor more than 3 hours is associated with adverse maternal outcomes, such as higher rates of puerperal infection, third and fourth-degree perineal lacerations, and postpartum hemorrhage. Moreover, for each hour of the second stage, the chance for spontaneous vaginal delivery decreases progressively.

However, the consequences of prolonged second stage duration appear to be low with appropriate monitoring. Here comes the role of *operative vaginal delivery* (via either vacuum or forceps), which has decreased significantly during the past 15 years.¹¹

In addition to greater expectant management of the second stage, two other practices could potentially reduce

Table 15.1: Risk of adverse maternal and neonatal outcomes by mode of delivery.

Outcome	Risk	
	Vaginal delivery	Cesarean delivery
Overall severe morbidity and mortality	8.6%	9.2%
Maternal mortality	3.6:100,000	13.3:100,000
Amniotic fluid embolism	3.3–7.7:100,000	15.8:100,000
Third-degree or fourth-degree perineal laceration	1.0–3.0%	NA
Placental abnormalities	Increases with each subsequent Cesarean delivery	
Urinary incontinence	No difference at 2 years of delivery	
Postpartum depression	No difference	
Respiratory morbidity	<1.0%	1.0–4.0% (without labor)

(Source: Caughey AB, Cahill AG, Guise JM, et al. ACOG, Society for Maternal-Fetal Medicine. Safe prevention of primary cesarean delivery. Am J Obstetric Gynecol. 2014;210(3):179-93).

Table 15.2: Change in approach—in order to reduce the primary cesarean section rates.

Organizational changes: Care providers	Clinical interventions: Expecting mothers	
Following standard clinical practice	Eliminate elective deliveries/inductions <39 weeks for low risk pregnancies	Antenatal education (workshops and handouts)
New clinical leadership	No nonmedically indicated cesarean or inductions	Partner support and education throughout pregnancy and labor delivery
Quality department—conducting Audits time-to-time	Setting protocols and labor room manuals	Counseling
Close collaboration with IHI's perinatal community	Standardized definition-failed induction and arrest of labor	Physiotherapy and exercise
Adopting the Robsons classification in data analysis	Effective trial in second stage of labor	Labor support 1:1
	CTG training of staff (doctors/nurses)	
	Admitting low risk pregnancies in labor at dilatation >3 cm	
	Quiet solo practice, adopting group practice by consultants in private sectors	

(CTG: cardiotocography; IHI: Institute for Healthcare Improvement)

Table 15.3: ACOG recommendations for safe prevention of primary cesarean delivery.

Recommendations	Grade of recommendations
<i>First stage of labor</i>	
A prolonged latent phase (>20-hour in nulliparous women and >14-hour in multiparous women) should not be an indication for cesarean delivery	1B Strong recommendation and moderate quality evidence
Slow but progressive labor in the first stage of labor should not be an indication for cesarean delivery	1B Strong recommendation and moderate quality evidence
Cervical dilation of 6 cm should be considered the threshold for the active phase of most women in labor	1B Strong recommendation, and moderate quality evidence
Cesarean delivery for active phase arrest in the first stage of labor should be ≥ 6 cm of dilation with ruptured membranes who fail to progress despite 4-hour of adequate uterine activity, or at least 6-hour of oxytocin administration with inadequate uterine activity and no cervical change	1B Strong recommendation and moderate quality evidence
<i>Second stage of labor</i>	
A specific absolute maximum length of time spent in the second stage of labor beyond, which all women should undergo operative delivery has not been identified	1C Strong recommendation and low quality evidence
Before diagnosing arrest of labor in the second stage, if the maternal and fetal conditions permit, allow for the following: <ul style="list-style-type: none"> ◆ At least 2-hour of pushing in multiparous women and 3-hour of pushing in nulliparous ◆ Women (1B). Additional 1-hour in case epidural analgesia is used 	1B Strong recommendation and moderate quality evidence
Operative vaginal delivery in the second stage of labor by experienced and well-trained physicians should be considered	1B Strong recommendation and moderate quality evidence

Contd...

Contd..

Recommendations	Grade of recommendations
Manual rotation of the fetal occiput in the setting of fetal malposition in the second stage of labor is a reasonable intervention to consider before moving to operative vaginal delivery or cesarean delivery	1B Strong recommendation and moderate quality evidence
<i>Fetal heart rate monitoring</i>	
Amnioinfusion for repetitive variable fetal heart rate decelerations may safely reduce the rate of cesarean delivery	1A Strong recommendation and high quality evidence
Scalp stimulation can be used as a means of assessing fetal acid-base status when abnormal or indeterminate fetal heart patterns are present and is a safe alternative to cesarean delivery	1C Strong recommendation and low quality evidence
<i>Induction of labor</i>	
Before 41 0/7 weeks of gestation, induction of labor generally should be performed based on maternal and fetal medical indications	1A Strong recommendation and high quality evidence
Cervical ripening methods should be used when labor is induced in women with an unfavorable cervix	1B Strong recommendation and moderate quality evidence
If the maternal and fetal status allow, cesarean deliveries for failed induction of labor in the latent phase can be avoided by allowing longer durations of the latent phase (up to 24-hour or longer) and requiring that oxytocin be administered for at least 12–18 hours after membrane rupture before deeming the induction a failure	1B Strong recommendation and moderate quality evidence
<i>Fetal malpresentation</i>	
Fetal presentation should be assessed and documented beginning at 36 0/7 weeks of gestation to allow for external cephalic version to be offered	1C Strong recommendation and low quality evidence
<i>Suspected fetal macrosomia</i>	
Cesarean delivery to avoid potential birth trauma should be limited to estimated fetal weights of at least 5,000 g in women without diabetes and at least 4,500 g in women with diabetes, particularly late in gestation, are imprecise. In Indian scenario cut off is 4,500 g in women without diabetes and 4,000 g in women with diabetes	2C Weak recommendation and low quality evidence
<i>Excessive maternal weight gain</i>	
Women should be counseled about the maternal weight guidelines in an attempt to avoid excessive weight gain	1B Strong recommendation and moderate quality evidence
<i>Twin gestations</i>	
Perinatal outcomes for twin gestations in which the first twin is in cephalic presentation is not improved by cesarean delivery. Thus, women with either cephalic or cephalic-presenting twins or cephalic or noncephalic presenting twins should be counseled to attempt vaginal delivery	1B Strong recommendation and moderate quality evidence
<i>Other</i>	
Individuals, organizations, and governing bodies should work to ensure that research is conducted to provide a better knowledge base to guide decisions regarding cesarean delivery and to encourage policy changes that safely lower the rate of primary cesarean delivery	1C Strong recommendation and low quality evidence

cesarean deliveries in the second stage—(1) operative vaginal delivery and (2) manual rotation of the fetal occiput for malposition.

■ OPERATIVE VAGINAL DELIVERY

In a large, retrospective cohort study, the rate of intracranial hemorrhage associated with vacuum extraction did not differ significantly from that associated with either forceps delivery [odds ratio (OR), 1.2; 95% confidence interval (CI), 0.7e2.2] or cesarean delivery (OR, 0.9; 95% CI, 0.6e1.4).¹² In a more recent study, forceps-assisted vaginal deliveries were associated with a reduced risk of the combined outcome of seizure, intraventricular hemorrhage, or subdural hemorrhage as compared with either vacuum-assisted vaginal delivery (OR, 0.60; 95% CI, 0.40e0.90) or cesarean delivery (OR, 0.68; 95% CI, 0.48e0.97), with no significant difference between vacuum delivery or cesarean delivery.¹³

Fewer than 3% of women in whom an operative vaginal delivery has been attempted go on to deliver by cesarean.¹⁴ Performing low or outlet procedures in fetuses that are not believed to be macrosomic is likely to safely reduce the risk of cesarean delivery in the second stage of labor. However, the number of healthcare providers, who are adequately trained to perform forceps and vacuum deliveries, is decreasing. In one survey, most (55%) resident physicians in training did not feel competent to perform a forceps delivery upon completion of residency.¹⁵ Thus, training resident physicians in the performance of operative vaginal deliveries and using simulation for retraining and ongoing maintenance of practice would likely contribute to a safe lowering of the cesarean delivery rate.¹⁶ Hence, operative vaginal delivery in the second stage of labor by experienced and well-trained physicians should be considered a safe, acceptable alternative to cesarean delivery. Training in, and ongoing maintenance of, practical skills related to operative vaginal delivery should be encouraged.

■ MANUAL ROTATION OF THE FETAL OCCIPUT

Occiput posterior and occiput transverse positions are associated with an increase in cesarean delivery and neonatal complications. Historically, forceps rotation of the fetal occiput from occiput posterior or occiput transverse was common practice. Today this procedure, although still considered a reasonable management approach, has fallen out of favor. An alternative approach is manual rotation of the fetal occiput, which has been associated with a safe reduction in the risk of cesarean delivery.^{17,18} To consider an intervention for a fetal

malposition, the proper assessment of fetal position must be made. To safely prevent cesarean deliveries in the setting of malposition, it is important to assess the fetal position in the second stage of labor, particularly in the setting of abnormal fetal descent.

■ NONOPERATIVE INTERVENTION IN FETAL DISTRESS

Given the known variation in interpretation and management of fetal heart rate tracings, a standardized approach is a logical potential goal for interventions to safely reduce the cesarean delivery rate.

- ✦ *Category I*—fetal heart tracings are normal and do not require intervention unlike the category 3 CTG tracings which are abnormal, demanding immediate intervention.
- ✦ *Category II*—most intrapartum fetal heart rate tracings are category II, which is where the dilemma arises. Most cesarean deliveries done for nonreassuring fetal heart rates belong to this category. These are indeterminate, require evaluation, continued surveillance, and initiation of appropriate corrective measures.¹⁹

Scalp stimulation can be done when the cervix is dilated to assure that the fetus is not acidotic. Conservative measures—position change and amnioinfusion with normal saline also have been demonstrated to resolve variable fetal heart rate decelerations^{20,21} and reduce the incidence of cesarean delivery.

■ FETAL MALPRESENTATION

Breech presentation at more than 37 weeks of gestation is estimated to complicate 3.8% of pregnancies, and more than 85% of pregnant women with a persistent breech presentation are delivered by cesarean.²² In one recent study, the rate of attempted external cephalic version was 46% and decreased during the study period.²³ Thus, external cephalic version for fetal malpresentation is likely underutilized, especially when considering that most patients with a successful external cephalic version will give birth vaginally.²³ Fetal presentation should be assessed and documented beginning at 36 0/7 weeks of gestation to allow for external cephalic version to be offered. Before a vaginal breech delivery is planned, women should be informed that the risk of perinatal or neonatal mortality or short-term serious neonatal morbidity may be higher than if a cesarean delivery is planned, and the patient's informed consent should be documented.

■ SUSPECTED FETAL MACROSOMIA

Suspected fetal macrosomia is not an indication for delivery and rarely is an indication for cesarean delivery. To avoid potential birth trauma, American College of Obstetricians and Gynecologists (ACOG) recommends that cesarean delivery be limited to estimated fetal weights of at least 5,000 g in women without diabetes and at least 4,500 g in women with diabetes.²⁴ This recommendation is based on estimations of the number needed to treat from a study that modeled the potential risks and benefits from a scheduled, nonmedically indicated cesarean delivery for suspected fetal macrosomia, including shoulder dystocia, and permanent brachial plexus injuries.²⁵ Screening ultrasonography performed late in pregnancy has been associated with the unintended consequence of increased cesarean delivery with no evidence of neonatal benefit.²⁶ Thus, ultrasonography for estimated fetal weight in the third trimester should be used sparingly and with clear indications.

■ TWIN GESTATION

The rate of cesarean deliveries among women with twin gestations increased from 53% in 1995 to 75% in 2008.²⁷ Even among vertex-presenting twins, there was an increase from 45%–68%.²⁷ Perinatal outcomes for twin gestations in which the first twin is in cephalic presentation are not improved by cesarean delivery. Thus, women with either cephalic or cephalic-presenting twins or cephalic or noncephalic-presenting twins should be counseled to attempt vaginal delivery.²⁸ To ensure safe vaginal delivery of twins, it is important to train residents to perform twin deliveries and to maintain experience with twin vaginal deliveries among practicing obstetric care providers.

■ KEY TO SUCCESS—CONTINUOUS LABOR AND DELIVERY SUPPORT

A Cochrane meta-analysis of 12 trials and more than 15,000 women demonstrated that the presence of continuous one-on-one support during labor and delivery was associated with improved patient satisfaction and a statistically significant reduction in the rate of cesarean delivery. Modal for education of patients and families should be developed. Education should begin from the early antenatal period, in the form of handouts explaining benefits of healthy eating habits and exercise. Conducting workshops for preparation for normal labor and normal delivery is helpful. Families especially husbands were encouraged to participate in care and in promoting

concept of normal delivery. Team-based clinical care to be promoted for a stress free work environment.

Our journey of reducing interventions in maternity care is a complex ongoing challenge. The culture change in the department with emphasis on the physiological basis of pregnancy and childbirth is the guiding principles, which will make us walk on the road of success.

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■ A BEAUTIFUL AND UNIQUE JOURNEY OF MOTHERHOOD

A student of engineering spends approximately four years and thereafter works with machines, a student of law studies for five years and later on dabbles with law, similarly a MBA student spends another two years after graduation so as to deal with various resources, a MBBS graduate studies for so many years to master dealing with human anatomy.

Just think, an expectant mother has a span of only nine months to create a *life* which ought to be physically, mentally, socially, and spiritually developed and moreover she has no structured guidance whatsoever. This project is an effort in this holistic direction to formulate a syllabus which the expectant mother can bank upon for guidance and empowerment.

■ DESIGNER CONCEPT

If you ask any mother what dream you have for your child, then the answer would be they want the child to be healthy, wealthy, happy, successful, and bestowed with all divine values and qualities.

But they are not aware of the process or flowchart.

Just as we design any product, there are some design parameters and they are as follows:

- ✦ Quality
- ✦ Procedure
- ✦ Process.

Let's analyze these parameters:

Quality

Quality of life depends on the quality of TEAM which means TEAM:

- T—Thoughts
- E—Emotions

A—Attitude

M—Memories.

If the internal team of the baby is positive then the child born would be bestowed with all positive qualities. These shape the personality and thereby the destiny of the child.

It is referred as sanskars in Hindi language. Positive sanskars are inculcating the good qualities and doing away with bad qualities or in other words, adding the good and subtracting the bad. Self-transformation process can be initiated at different functional levels of the soul of mind, intellect and karma.

Procedure—Formation of Sanskars

There is a flowchart as to how sanskars are formed (Flowchart 16.1).

Process

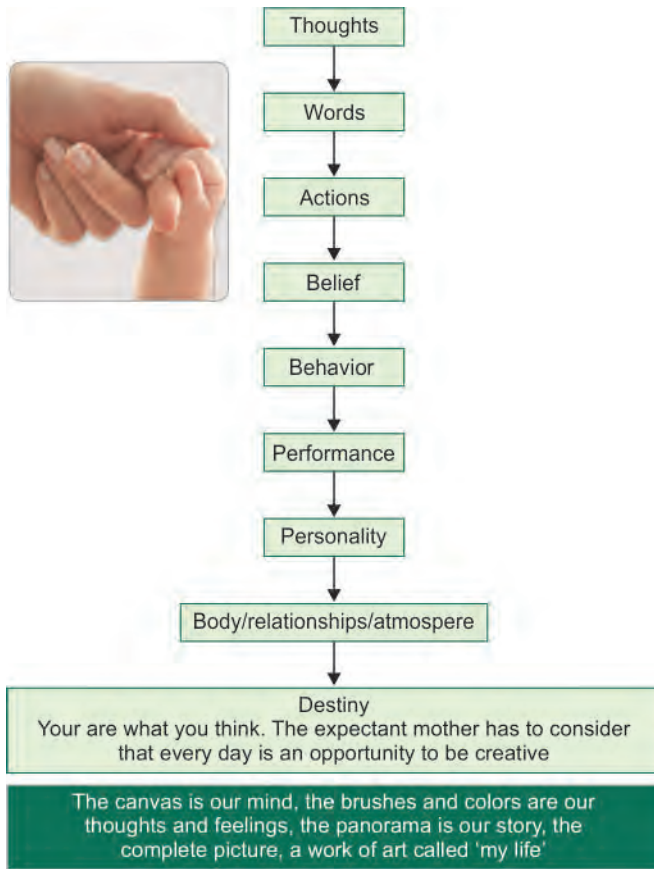
To inculcate new and positive sanskars the mother has to communicate with the baby inside the womb and therefore she should understand the language of the mind which is as follows:

- ✦ Music
- ✦ Color
- ✦ Images.

Music

A baby in the mother's womb is influenced by the heart-beat of the mother. It respond to the soothing music at later stages in life, perhaps associating it with the safe, relaxing, protective environment provided by the mother. Music restores, maintains and improves emotional, physiological and psychological well-being. The articulation, pitch, tone and specific arrangement of swars (notes) in a particular raga stimulates, alleviates and

Flowchart 16.1: Formation of sanskars.



cures various ailments inducing electromagnetic changes in the body.

Therefore, the mother is motivated to listen to soothing music and different meditation songs which influence the child very positively. We all are blessed with the gift of Indian classical music which is very melodious. Mostly sitar, santoor, and flute constitute the rhythm of classical music, and it said that babies love that rhythm; music touches the soul. It calms you from inside, the rhythmic music makes the baby move rhythmically. As researches have proved that the baby can hear the surrounding music also, the mantras, the recitation of mantras whichever language you feel comfortable are to be chanted daily, e.g. omkar mantra, namaskar mantra, gayatri mantra, any mantra you can chant in your own voice. It is said that if you are reciting with your husband, they are more effective. Doing meditation with music will nourish and soothe the baby's soul. The jazz and fast music is known to increase hyperactivity of the fetus, so quiet and classical music is helpful for your baby.



Color

Color is a form of vibrational energy and each color of the spectrum is associated with a range of wavelength. In *Divine Garbh Sanskar*, we give the expectant mothers to color various drawings to invoke the necessary emotions, which in turn, will nourish, heal and empower the baby.



<i>Red:</i>	Symbolizes <i>power</i>
<i>Orange:</i>	Symbolizes <i>purity</i>
<i>Yellow:</i>	Symbolizes <i>happiness</i>
<i>Green:</i>	Symbolizes <i>love</i>
<i>Blue:</i>	Symbolizes <i>peace</i>
<i>Indigo:</i>	Symbolizes <i>knowledge</i>
<i>Violet:</i>	Symbolizes <i>bliss</i> .

In *Divine Garbh Sanskar*, the education is imparted through painting and the mother is inspired to draw different painting through colors thereby making the child very healthy as each quality effects the functioning of a particular system. While drawing and using the colors, every thought that is created by the mother influences the baby. So the mother should experience the value and the color simultaneously.

Power strengthens our muscular system
Purity for circulatory system

Happiness for digestive system
Love for cardiovascular system
Peace for respiratory system
Knowledge for neuro system
Bliss for endocrine system.

Seven colors and their values:

1. *Red color—Power:*

As I fill this picture with red color, my mind and heart towards the ultimate artist who is the creator of this world, the “Almighty Authority”, my father. And so all his values are mine as well. Originally, I too possess all of his values.



Through visualization, let's imagine: vibrations of extremely powerful rays from the Almighty is entering my entire body and reaching the baby in my womb through me, making the soul in the baby's body strong and powerful. The “muscular system” of my body and the baby is getting stronger.

2. *Orange color—Purity:*

Orange is the symbol of purity. Purity means cleanliness of mind, heart and soul. As I fill this color I feel like all the impurity in my mind and heart are going away. “I am a divine and pure soul”. Originally “I am a pure soul”. My heart is filled with love, respect, kindness and equality for all the people. I feel a sense of respect towards the soul in the body of my baby. My role as a mother with this baby is going to be wonderful, which I begin from now. This feeling is sending out pure vibrations to the baby making its circulatory system healthy and keeping it well in control.



3. *Yellow color—Happiness:*

As I fill in yellow color, it is creating some happy thoughts in my mind. I always searched for happiness as I feel comfortable when I'm happy. Happiness is my original quality. “I am a happy soul”. I now look at the soul which is in the costume of a baby in my womb. We both share a lovely relationship. This divine soul for whom we all are waiting so eagerly is going to fill our lives with happiness. He himself is “a peaceful and happy soul” and this thought is spreading the vibrations of happiness. This is making the digestive system of the baby healthy and keeping it in good shape.



4. *Green color—Love:*

Green color is directing my mind towards mother nature. There are so many colors in our surrounding. As I think of the different trees, plants and greenery, it makes my mind light. There is so much harmony in our mother nature. This body of mine which is made up of 5 elements of nature is a gift of Mother Nature to me. “I the soul” in this body have played a wonderful relationship with Mother Nature in the world drama. Slowly, my mind is going towards the Almighty who is the creator of the world. He is the ocean of love. I am his child. And so I possess all of his qualities. I feel a sense of respect and love for everyone. This divine Thought is creating a pathway to good qualities for the baby. It is filling the baby's heart with love. The “Heart and cardiovascular system” of the baby is becoming healthy and keeping it well in control.



5. *Blue color—Peace:*

As I fill in blue color, my mind goes towards the blue sky. As the sky is a shelter to us, similarly the baby experiences absolute silence and peace in his mother's shelter. The vibrations of peace are spreading through my entire body. The baby is also under this shelter of peace. These vibrations of peace are making the baby's respiratory system healthy and in control.



6. *Indigo—Knowledge:*

Indigo is the symbol of knowledge. Knowledge is also known as wisdom. The Almighty Authority is the only one who can give the entire world true knowledge. He is the ocean of knowledge. Now I concentrate my mind on that Almighty Authority who is my Father. His values are my values as well.



Thought for visualization: I take my mind away from all the boundaries of limitations and concentrate on the Almighty. We all are his children. My heart is filled with *unconditional and pure love* for everyone. We are all one big family. My mind and thoughts are broadening and becoming pure with every single thought. These pure thoughts are helping in the proper functioning of my neuro system. I am experiencing a feeling of divinity in me and these pure vibrations are making the baby's neuro system healthy and keeping it well in control.

7. *Violet color—Bliss:*

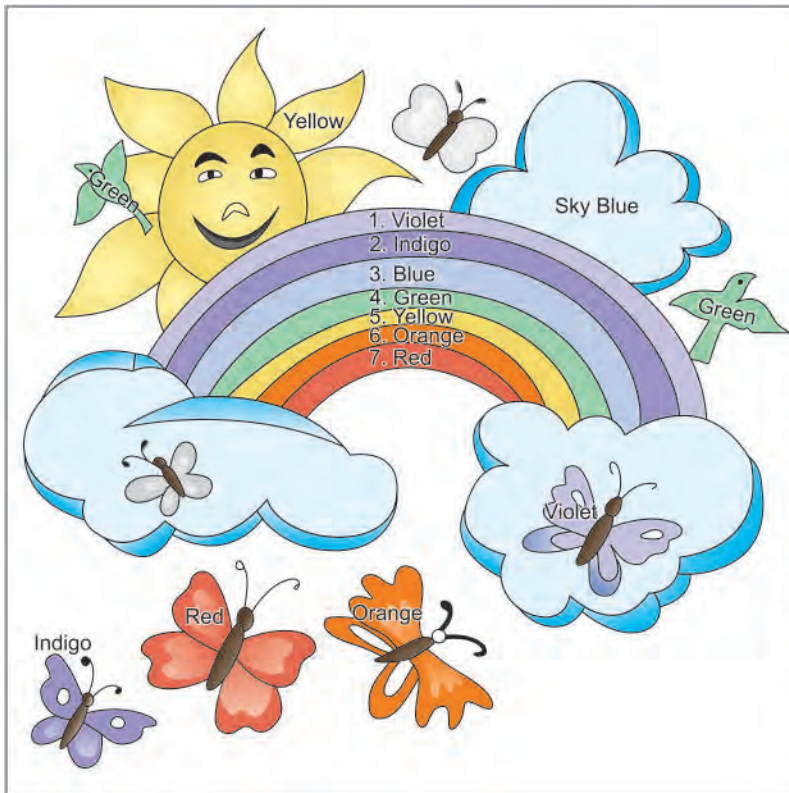
As I fill in this color, I feel as if the most beautiful moments of my life are about to begin where there is

a lot of happiness. "I am a blissful and a blessed soul". All the worries of my life have vanished. My life is filled with color of bliss. My mind and heart is flowing towards the ocean of bliss. Who is the bestower of bliss, who takes away all our worries merciful and forgiving; who is remembered by different people by different names. He is the supreme soul the Almighty God Father. We both look the same. He is a point of light and I am a point of light. Originally, our values are also the same but he is the ocean of all good values. He is my father-mother, friend, companion, brother, sister, teacher, role model. As I create these thoughts, my heart is filled with lots of love for the Almighty. These pure vibrations are spreading in my entire body and going to the baby in my womb. That soul is also becoming aware of his original values. His endocrine system is becoming healthy and keeping it well in control. Our body is made up of five elements: water, air, fire, earth, and sky. We also consume a lot of vitamins and minerals to stay healthy. Now the question is what am "I"? What am I made up of? The answer is I am a tiny point of light "soul". And I possess 7 qualities, i.e. power, happiness, purity, love, peace, knowledge and bliss. To replenish I "the soul", we need to consume or feel all the above qualities from the ocean of all virtues, i.e. God and that can be possible through pure, positive and powerful thoughts through Raj Yoga Meditation.



Images

We have seen earlier that our beautiful thought is the seed that we implant for our better and beautiful future. In the same way, we often think as to how our baby will be. What qualities and values should he possess, or the way he'll walk, the way he will talk, how will he behave with others, how beautiful our child will be, how good our child will be in studies, his thinking process, and his overall personality. Or how does his or her mother wish to see her child in future; these things depend on our strong thought process that we make towards our child today. From now



1. Violet	Anand Bliss	Hormones Endocrine
2. Indigo	Gyan Knowledge	Brain Neuro
3. Sky Blue	Shanti Peace	ENT/Lung Respiratory
4. Green	Prem Love	Heart Circulation
5. Yellow	Sukh Happiness	Stomach Digestive
6. Orange	Pavitrata Purity	Blood/ Sensory Organ Immunity
7. Red	Shakti Power	Muscle/Bone Skeleton

onwards, the thought process that we create and implant in our babies mind, the baby will imbibe all those values and qualities in him. This actually means that we can create a beautiful dream for our baby which will culminate into reality when our baby comes into this world. And not only this, but the baby use these values to create a beautiful world of his or her own imagination.

These images and thoughts will get imprinted on the subconscious mind of the mother, which will create a bright and a beautiful future of the baby. The mind understands the language of the images. It is rightly said that imagination is more powerful than knowledge. Whatever the mother visualizes she creates that kind of emotions and feelings which in turn programs the psyche of the baby. Designer baby chart is a tool in which the mother prepares the chart with the feeling of wanting a baby similar to the personality. In the process of preparing the designer baby chart, she is able to think and feel the value or the quality of the personality. Whatever the mother feels, the baby is automatically programmed with that quality or virtue. Given below is a designer baby chart for all the expecting mothers. It is a sample chart provided through *Divine Garbh Sanskar*. Mothers can also make their own charts.



CONCLUSION

So to design a baby with all positive qualities, the expectant mother should adopt a healthy lifestyle wherein the meditation should play a significant role. The mother should experience soul consciousness and empower herself and the baby with all positive energies.

Role of Obstetrician in Creating Divine World

Keerti Parashar, Sangita Rani, BK EV Swaminathan, BK Shubhada Neel, Veena Sinha

“Change is the only constant”

■ INTRODUCTION

Divine world a world of peace, harmony and thus happiness remembered by us as the heaven.

There is a world of peace, harmony, and thus happiness, remembered by us as the heaven. This is actually the golden age (new world) when everything of this world was “new” or just made. This is when world cycle starts all souls are “*Satopradhan*” (pure and perfect).

The world of happiness is such a perfect world where is no trace of sorrow, where everyday is a festival, nature is perfect and peace giving, we human souls are pure, loving, blissful, and powerful fully filled with all divine virtues.

It is possible to create such a divine world?

Definitely yes! It is the call of time.

We need a multipronged approach to deal with the ongoing crisis.

Strengthening the primary healthcare framework along with technological aid just deals with targeting the symptoms of the problem.

In order to address the cause of it and eliminate it from its roots we need to focus on capacity building measures of the individuals.

One way to go for it is to learn from our historical heritage and energize the individuals with spiritual energy so that the external negative influences cannot penetrate within.

The advantage with this approach is that the individual does not need a complex technical knowledge and training for it and it would be easier for him to relate to and have faith in this strategy.

The best starting point of this exercise would be the birth stage. It is important to impart spiritual energy to child as well as mother so that she can overtime herself inculcate such values within her and her children as they grow up and the most eligible agent to bring this change is an obstetrician taking care of the prenatal and postpartum period.

■ ACTION PLAN FOR OBSTETRICIAN



Divine garbhsanskar

There are three prongs action plan for obstetrician in antenatal clinic and labor room, which are discussed below:

Raise your Vibration

“Modern science has concluded that everything that exists in the universe is made of vibration.”

—Hiroshi Doi Senei

Raising one’s vibration is an effective way to live a more balanced and happy life, and also a way to send positive energy out into the universe. While emitting a lower vibration or frequency, one will never really come into harmony and balance and experience a more peaceful and happy life. It is the life of discord/dissonance that facilitates lower vibration energy, and can be sensed manifesting in the world today.

*In 2008, Emoto published his findings in the Journal of Scientific Exploration, a peer reviewed scientific journal of the Society for Scientific Exploration.*¹

Emoto said that water was a “blueprint for our reality” and that emotional “energies” and “vibrations” could change the physical structure of water.² Emoto’s water crystal experiments consisted of exposing water in glasses to different words, pictures, of music, and then freezing

and examining the aesthetic properties of the resulting crystals with microscopic photography. Emoto made the claim that water exposed to positive speech and thoughts would result in visually “pleasing” crystals being formed when that water was frozen and that negative intention would yield “ugly” frozen crystal formation.³

It can be concluded how important it is to raise our vibration as fetus live in amniotic fluid which is 98% water and we come in direct contact of the pregnant women with the womb.

What is “Vibration”?

As described by Cassandra Sturdy,⁴ “Your vibration is a fancy way of describing your overall state of being. Everything in the universe is made-up of energy vibrating at different frequencies. Even things that look solid are made up of vibrational energy fields at the quantum level. This includes you.”

From a scientific and metaphysical perspective, Sturdy further explains that we are a “being” that is made-up of different energy levels: physical, mental, emotional, and spiritual. Each of these levels has a vibrational frequency, which combine to create your overall vibration of being.

As you can see, positivity, love, compassion, and hope are of higher vibrations than negativity, fear, and hate. Looking at the cymatics experiments and the Dr Emoto’s water crystals, it is easy to understand why you would want to raise your vibration.

There are many ways to raise your vibration.

You could try any number of meditations, exercises, spiritual practices, and energy healing. In the end, it is the focus on love and compassion that will raise your vibration. Some routes just get you there faster and easier.

Everyone is different, so try a few different methods and see how you feel. You will know your vibration is raising because you will feel more confident, calm, joyful, and kind.

Raj Yoga Meditation

Gupta⁵ defines Brahma Kumaris’ Rajyoga meditation is a science and art of harmonizing spiritual energy (energy of soul), mental energy (energy of mind), and physical energy (energy of physical body), through the connection with ultimate source of spiritual energy, i.e. supreme soul, for enjoying ever healthy, ever-wealthy, and ever-happy life.

Establishing Divine Doctor-Patient Relationship

“To attend those who suffer, a physician must possess not only the scientific knowledge and technical abilities, but also an understanding of human nature. The patient is not

just a group of symptoms, damaged organs, and altered emotions. The patient is a human being, at the same time worried and hopeful, who is searching for relief, help, and trust. The importance of an intimate relationship between patient and physician can never be overstated because in most cases an accurate diagnosis, as well as an effective treatment, relies directly on the quality of this relationship.”⁶

The Role of Spirituality in Health Care⁷

The technological advances of the past century tended to change the focus of medicine from a caring, service-oriented model to a technological, cure-oriented model. Technology has led to phenomenal advances in medicine and has given us the ability to prolong life. However, in the past few decades physicians have attempted to balance their care by reclaiming medicine’s more spiritual roots recognizing that until modern time’s spirituality was often linked with health care. Spiritual or compassionate care involves serving the whole person—the physical, emotional, social, and spiritual. Such service is inherently a spiritual activity. Rachel Naomi Remen, MD who has developed Commonweal retreats for people with cancer, described it well: Serving patients may involve spending time with them, holding their hands, and talking about what is important to them. Patients value these experiences.

Integrated Approach of Antenatal Care

- ✦ Stress management through Rajyoga Meditation (Brahma Kumaris)
- ✦ Nutritious and *satwik* food
- ✦ Antenatal physical and breathing exercises.

WHO has issued a new series of recommendations to improve quality of antenatal care to reduce the risk of stillbirth and pregnancy complications and give women a positive pregnancy experience.⁸

■ ROLE OF OBSTETRICIAN IN CREATING PRENATAL DIVINE CONDITIONS

An obstetrician besides prescribing medicines can also prescribe daily sessions of yoga and meditation to shape mother’s attitude towards the whole process. Special meditation facilities can be opened in the hospital or in vicinity of the premises so that a mother can daily practice it and develop positivity towards various spheres of life. This will not only keep the mother physically and mentally fit, but also provide her motivation to deal with pregnancy complications. The mother has complete trust on words of obstetrician and if he encourages her to take a proactive

role in this exercise it would surely lead to compliance without friction. Just like the Hindu mythological character Abhimanyu learnt how to invade a “*Chakravyuh*” while he was in his mother’s womb. This daily routine would surely have a trickle-down effect on the baby providing positive vibrations of spiritual energy, which would later help him survive the negativity of the external influences of the world.

■ ROLE OF OBSTETRICIAN IN CREATING POSTPARTUM DIVINE CONDITIONS

After the birth of the child, the obstetrician can periodically monitor mother’s activities and suggest continuation of the spiritual exercise taught during the prenatal stage. Keeping a track of the evolutionary mother child relationship and preventing any negative influence of the environment shall be a prime duty of the obstetrician along with helping the mother coping up with the postpregnancy issues. Minor advices like keeping the child in a peaceful place without and disturbance or noise, not leaving the child alone for too long, passionate breastfeeding, etc. can have a big impact of child’s perception of the bonding with the mother. A strong bond will ensure easy transfer of the inculcated spirituality of the mother to the baby.

A spiritual journey of the child and mother from the prenatal to postpartum stage facilitated by the obstetrician will make the mother physically and mentally fit and help her cope up the stress period.

It will also sow the seeds of an *empathetic, positive, and compassionate attitude within the child along with all the*

divine virtues ultimately leading to a new era of optimism, full of life, a world with less anxiety, and more spiritualism, a divine world.

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■ INTRODUCTION

Pregnancy is a really beautiful period of a woman's life. First of all there is the joy, the miracle of creating a new life that adds a brilliant glow to your face. And the changes that take place in your body, especially the hormonal changes, enhance your beauty manifold.

But let not this nice side effect of pregnancy make you forget that you still have to take care and look after your hair, skin, nails, and actually your whole body! Here are a few points to guide you.

Your body goes through many changes during the 9 months of pregnancy, as do your skin and hair. At one time the skin may be oily, another time it may be dry. It could even be mixed—oily in some places and dry in others. It is critical that all that you do and all the products that you use are not only *safe* for you and baby, but also *suitable* for your skin *at the time*. Therefore, *do* visit a cosmetologist at least once in 3 months, learn about your skin type, and get recommendations about products to use.



■ FIRST TRIMESTER

It is early days; you are still ecstatic with your discovery that you are pregnant. But the morning sickness may be

hitting you; the vomiting can have a dehydrating effect on your body causing various problems associated with dryness. Sometimes, the hormonal changes in the body cause the skin to become oily, with its own problems.

It is very important to care for your skin and hair right from day one, just as you take care of your baby by having correct diet and medicines. Appearance plays a very large role in a woman's happiness quotient, and always remember that only happy mothers can have happy babies, so it is very important for you to stay happy.

Problems Associated with Dryness

- ✦ Dry flaky skin (Fig. 18.1):
 - Face
 - Elbows
 - Knuckles
 - Knees
 - Heels
- ✦ Dry eyes
- ✦ Chapped lips
- ✦ Dandruff
- ✦ Brittle and dry hair.

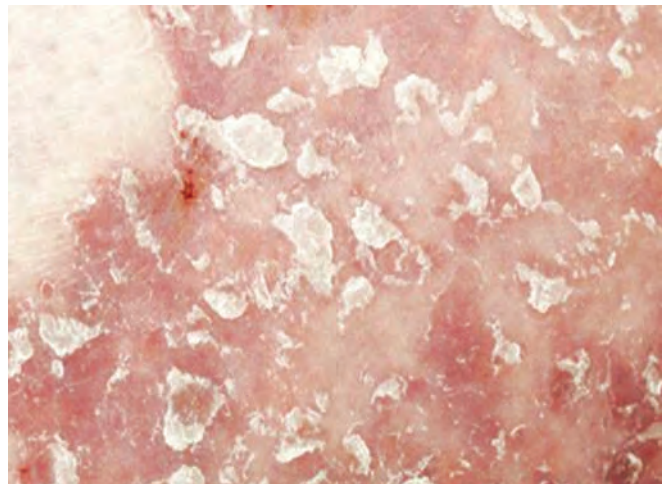


Fig. 18.1: Dry flaky skin.

Problems Associated with Oiliness

- ✦ Acne on the face (Fig. 18.2) and back
- ✦ Body rashes especially on the back and legs
- ✦ Blackheads and whiteheads.

Problems Associated with either Oily or Dry Skin

- ✦ Pigmentation
- ✦ Dark circles around the eyes.

Taking Care of Yourself

- ✦ First and foremost, avoid chemicals as far as possible; use only natural products.
- ✦ Even with natural products, *always* try on a small area first to make sure you are not allergic, even if you have used in the past.
- ✦ Remember that even natural products such as lime, sugar, and curds are quite harsh and must be used with care and in moderation.
- ✦ For dry skin conditions, you can use products such as compressed coconut oil, almond (*badam*) oil, aloe vera gel, etc.
- ✦ For oily skin, you can use the traditional *haldi chandan* (turmeric and sandalwood) paste.
- ✦ Whether your skin is oily or dry, keep yourself well hydrated. Drink plenty of water, *nimbu pani* (be careful about your sugar and salt intake), coconut water, etc. Remember that fruit juice has lot of vitamins, but also lot of sugar, and most canned or bottled juices also have plenty of chemicals as preservative.
- ✦ It is most advisable to consult a cosmetologist to know the products exactly suited to your skin type.

■ SECOND AND THIRD TRIMESTERS

By now the vomiting is over or at least reduced, but keep hydrating yourself with plenty of fluids. Hormonal changes continue, and now your body also starts growing. Keep close track of your diet and weight; be sure to consult a nutritionist; keep in mind that over nourishment is just as harmful for you and the baby as is under nourishment. Appearance wise, the major concerns during this period are:

- ✦ **Stretch marks:** These are caused by the skin losing its elasticity and can appear on your belly, thighs, arms, etc. wherever you put on weight (Fig. 18.3). To prevent them, first of all be sure not to put on more weight than recommended by your doctor. Keep your skin elastic by regular, gentle massage with aloe vera gel or a good oil like coconut or *badam* (avoid creams and moisturizers as they may contain chemicals).
- ✦ **Pigmentation:** You could develop dark patches on your face (Fig. 18.4), body, and limbs. Mostly these are caused by hormonal changes and clear up by

themselves as your body starts normalizing after delivery. While you are still carrying, you should just ensure that you keep yourself clean and protect yourself from the sun. In case the pigmentation does not clear up within 4-6 months after delivery, your cosmetologist will have many treatments available that will quickly solve the problem.

- ✦ **Linea nigra,** a dark vertical line running from the pubis to the navel, is so common and is also known as pregnancy line (Fig. 18.5). This also mostly reverses by itself after delivery; just keep the area clean and moisturized.
- ✦ **Hair fall** is very common in the third trimester (Fig. 18.6). Again, it is caused by hormonal changes. Keep the scalp clean and apply good oil regularly. Your cosmetologist can suggest oil that will suit your skin type. The hair growth should improve in 4-6 months after the baby comes; if it is does not, your cosmetologist will suggest a suitable treatment.



Fig. 18.2: Acne on the face.



Fig. 18.3: Stretch marks during pregnancy.



Fig. 18.4: Dark patches on face.



Fig. 18.5: Linea nigra.



Fig. 18.6: Hair fall.



Fig. 18.7: Nail fungus in the toes.

✦ Nail fungus in the toes is a frequent occurrence in the last few months of pregnancy simply because it is difficult to reach your feet to dry them properly (Fig. 18.7). Be particularly careful to dust your feet and toes with an antifungal powder.

Your body is your baby's first and most important home. You love your baby; you must also love your baby's home and look after it really well. The most important prescription—keep your body clean and dry at all times. Bath frequently, wash off sweat quickly, dry thoroughly, and wear clean clothes. And above all, do not worry if there is any change in your body that does not reverse after delivery, there is a treatment available for it and you will soon be back to your original beauty, with the added glow of motherhood!!



Harmony in Relationships and Anger Management

BK Shubhada Neel, Pushpa Pandey, Bharati Ghivalikar, Asha Thakare

The highest education is that which does not merely give us information but makes our life in harmony with all existence.

—Rabindranath Tagore

■ INTRODUCTION

No man is on an island, we live in societies. We all want to live in a better society where everyone is happy, respected and loves each other because our wellness depends upon the quality of relationships. Harmony in relationships should be needed not only with family and personal friends, but also with the wider groups and communities we belong to. Relationships also play a major role in shaping our character, personality and life as a whole.

Anger is one of the negative emotions. It not only spoils many relations but is also harmful for physical, mental, social and spiritual health of the expectant mother and her unborn child. If anger is suppressed it may lead to depression. Aggression may cause heart attack, various types of pains in the body and also reduces immunity power due to excessive release of cortisol and other steroid hormones but assertiveness, i.e. expressing in a right way at right time, is healthy. Anger is temporary insanity; for those moments the person becomes irrational and illogical. Hence, learning the art of prevention and control anger, improve the harmonious relationships and promote mental, emotional and physical well-being. The higher option to keep harmony in relationship is not to experience anger at all.

The expectant mother should understand that she has been given the task of making a living idol at this time. She is an architect of her child. Whatever energy she sends in the form of thoughts, words or action to anyone it will be absorbed by the subconscious mind of her own child which will become his or her Sanskar. She should keep herself away from anger during the nine months of this precious time.

“There once was a little boy who had a bad temper. His father gave him a bag of nails and told him that every time he lost his temper, he must hammer a nail into the fence.

The first day the boy had driven 37 nails into the fence. Over the next few weeks, as he learned to control his anger, the number of nails hammered daily, gradually dwindled down. He found it was easier to hold his temper than to drive those nails into the fence. Finally, the day came when the boy didn't lose his temper at all. He told his father about it and the father suggested that the boy now pull out one nail for each day that he was able to hold his temper.

The days passed and the young boy was finally able to tell his father that all the nails were gone. The father took his son to the fence and said “you have done well, my son, but look at the holes in the fence. The fence will never be the same. When you say things in anger, they leave a scar just like this one.” You can put a knife in a man and draw it out. It won't matter how many times you say I'm sorry, the wound is still there.”

It is better to control anger at the thought level before coming into words and action, so not to repent later.

Here are few simple steps to control anger and consciously create harmonious relationships.

■ ACCEPT EVERYONE AS THEY ARE

One of the main causes of anger is that people do not behave according to our desires. In this universe every human being is unique, has different sanskars and may have different opinions about things. We should respect others' ideas and working patterns, else, we may get irritated, creating negative energy that radiates to the other person either at a subtle or a gross level (thoughts, words, action). He will also get irritated and the relationship will be damaged. Thus, acceptance means understanding the other person's nature and not getting disturbed by it.

■ BECOME TRUSTY

Become a trusty and earn a fortune. This story written in scriptures captures the essence beautifully. King Janak was called 'Vaidehi'. He looked after his kingdom as a trusty. Though he was living in palace, he felt detachment towards life. Many saints and ascetics used to ask themselves why

was he called Vaidehi? Why is he put in the category of a saint when he lives in a palace and enjoys all the pleasures?

An ascetic once asked the king—why are you called Vaidehi? The king said we will discuss this in the evening, this is the time for business. Till then, go and see my new palace. It is beautifully made and the engraving is also very beautiful. But it is always dark, so take a lamp with you. While returning make sure that the lamp does not blow out. While seeing the palace suddenly strong winds started blowing. The ascetic got scared that the lamp might be blown out. In the evening when he returned to the king, the king asked him how was the palace, and how was the engraving. The ascetic replied that he did not notice the engraving because all the time his attention was on the lamp. The king said—similarly I live in the palace but living there in a detached stage.

■ CONTENTMENT AND POSITIVE ATTITUDE

Contentment is a great virtue. The list of complaints is long if there is dissatisfaction in life with self and others or have excessive desires. Such people even grumble after waking up in the morning, “Why does the sun rise so early?” Something to learn from the following incident.

A few children were playing near a newly constructed building. They used to play “train-train” by grabbing others’ shirts one by one and become engine and themselves becoming the train bin. They would change their positions daily, except for the one child who always became the guard. Someone asked this child why he would become guard daily. The boy answered, “I don’t have a shirt, how can I become the engine and train bins, so I enjoy daily by becoming the guard.” Hence, it is the attitude which determines our lives.

Lessen your desires, *you will be contented*. Contentment is reflected by a cheerful and happy personality. Happiness and contentment go hand in hand. We should focus on the things we have in our lives.

■ DETERMINATION

Making a determination that I have to conquer anger to keep good relations. This is one of the important steps in building harmonious relationships.

■ EMPOWER YOURSELF

Empowerment can be achieved by energizing life at a physical, emotional and spiritual level.

Physical Empowerment

It needs a healthy diet and exercise which releases endorphins.

Emotional Empowerment

With the help of positive thoughts, emotional empowerment is done; feelings and emotions associated with anger can be minimized.

Spiritual Empowerment

Be an introvert and practice silence. Spiritual empowerment is important to improve relationships with self and with the supreme. Relationship starts with the self. Those who respects and love themselves are the only ones who can give unconditional love and respect to everyone. If one has control over self, control over the outer world is very easy. This needs introspection and a lot of practice.

Once Gautam Buddha sent his disciple, Ananda, to fetch water from a nearby stream. He came back without the water because animals had bathed in the stream and the water was muddied. He was sent back three times. The fourth time the water was clear so he brought back the clean water. Lord Buddha explained that life was similar. We must never be afraid of bad thoughts but observe them arising from the mind with total awareness and watching the direction they take. With this practice, the mind will start becoming quiet, just like a mischievous child soon calms down if observed quietly.

Be an introvert and observe the flow of thoughts the entire day and then change their direction. Do it every hour. With practice the incoming thoughts will naturally become pure. Even if you do not want them to be.

The practice of silence is done by practicing meditation. Meditation also helps in healing life in all three extents, i.e. physical, emotional and spiritual. Our healing will then heal humanity.

■ FORGIVENESS AND MERCY

Forgiveness and mercy are acts of the wise and brave. They increase the power of humility and patience.

Practice

“I am a compassionate soul. I understand that people’s sanskars and way of working are different from mine. I follow discipline with love. I forgive them for their mistakes... my mind is clean... I radiate love and respect... I appreciate their goodness... then I give correction and direction.”

■ GIVING ATTITUDE AND GRATITUDE

The purpose of human life is to give. Giving attitude creates happiness in our lives. By replacing the energy of taking by

giving, anyone can notice the positive shift in day, week and month with regular practice. Give unconditional love to everyone is an antidote for anger. Making gratitude a daily practice is like a vitamin, says David Destine, professor in psychology at Northeastern University in Boston and the author of the book “Emotional Success”¹

Robert Emmons, professor in psychology at University of California and the author of the book, “The little book of gratitude”, in one study, asked a group of volunteers to write down five things they are grateful for once a week for 10 weeks. The other group recorded either small hassles or neutral daily events. At the end of the study the blessing-counters reported feeling 25% happier and had fewer health complaints, but the rest of the findings were far more tangible.

Practice

“I am a loving being. I thank God for what I have. I thank everyone whom I met and everything I used today. I thank the elements of nature for sustaining me today. I thank my body for being healthy today.”

Let us express our gratitude not only to people but also to things. We will create a beautiful karma with objects also; the house, car, mobile and everything that is there for us. The attitude of gratitude will finish our Sanskar of complaining and criticizing.

■ GIVE UP EGO

Become a trusty and earn a fortune. True renunciation means to let go of the consciousness of ‘mine.’ The point is aptly delineated by the following story:

An artist saw death coming, so he made 10–12 replicas of himself. When Yamraj sent his men to get him, he stopped his breath and hid amongst the statues. The messengers could not recognize him so they returned. Yamraj asked them why had they returned without the man? The messengers answered—“Maharaj, there, there were 10–12 people looking alike, we tried but could not recognize the real person”. Yamraj then decided to go himself. When he too started getting confused, he thought of a trick. He said, “Wow, what a good artist in this mortal world I have never seen such an artist who is able to fool my messengers. If I can meet the artist once I would like to thank him”. On hearing this the artist got up and said, “I have made these statues”. On which Yamraj replied, “let’s go! I have come to get you”.

If the artist’s body consciousness (self-esteem and ego) had not come to the forefront then he would have been saved. These words, ‘Me’ and ‘Mine,’ give birth to ignorance.

■ HAVE FAITH IN GOD AND FOCUS ON YOUR DUTY

Surrender every relation and every action to God and perform your duties. Time to quote the very beautiful story of ‘THE PREGNANT DEER’!

In a forest, a pregnant deer is about to give birth. She finds a remote grass field near a strong-flowing river. This seems a safe place. Suddenly labor pains begin. At the same time, dark clouds gather around above, and lightning starts a forest fire. She looks to her left and sees a hunter with his bow extended pointing at her. To her right, she spots a hungry lion approaching her.

What can the pregnant deer do? She is in labor! What will happen? Will the deer survive? Will she give birth to a fawn? Will the fawn survive? Or will everything be burnt by the forest fire? Will she perish to the hunters’ arrow? Will she die a horrible death at the hands of the hungry lion approaching her?

She is constrained by the fire on the one side and the flowing river on the other and boxed in by her natural predators. She focuses on giving birth to a new life.

The sequence of events that follow are:

- ✦ Lightning strikes and blinds the hunter.
- ✦ He releases the arrow which zips past the deer and strikes the hungry lion.
- ✦ It starts to rain heavily, and the forest fire is slowly doused by the rain.
- ✦ The deer gives birth to a healthy fawn.

In our lives too, there are moments of choice when we are confronted on all sides with negativity and possibilities. We should focus on what is in our hands. Maybe we can learn from the deer. The priority of the deer, in that given moment, was simply to give birth to the baby. The rest was not in her hands; any action or reaction that might have changed her focus would have likely resulted in death or disaster.

We should have faith in the Almighty and his creation. We are the instrument of God we must focus on the work which is allotted to us, rest is taken care of by Him.

■ INCREASE TOLERANCE POWER

Tolerance is a way of showing respect for the essential humanity in every person. Tolerance means to accept differences and changes with grace. It means to be calm amid people and situations that we may not be in agreement with.

■ POSTPONE ANGER

Postponing anger for a few minutes dilutes anger. In that moment of surge, practice, “I am a peaceful being”. Absence of peace is anger.

■ **SIMPLICITY AND SWEETNESS**

Simplicity is the nature of great souls. They are simple and sweet in thoughts words and deeds thus create harmony in society.

■ **REPROGRAMMING OF MIND**

Our consciousness is like a computer. Program the consciousnesses, well in advance, to remain stable and peaceful in midst of anger provoking situations.

■ **RENOUCE JEALOUSY AND HATRED**

Jealousy and hatred not only ruin relationships but also are root causes of many health problems. Jealousy can be a major relationship problem—a survey of marital therapists reported that romantic jealousy was a serious problem for a third of their clients.^{1,2}

■ **TAKE RESPONSIBILITY TO CULTIVATE HARMONIOUS RELATIONSHIPS**

We cannot change the past. Put stop to rethink the past negative behaviors of others. We cannot change the way people act. We have control over our 'responses'. Even if the

other person harmed, betrayed, belittled, disrespected, or ignored us, that was their part. Our response of anger, hurt, and resentment was our choice and creation. When we stop blaming the other person and look at our role in creating the conflict, healing begins.

■ **CONCLUSION**

- ✦ Harmony in relationships can be achieved by learning the art of managing self, by keeping harmony in thoughts, words and actions.
- ✦ Changing new way of thinking, sweetly speaking and doing good for others helps in healing relationships.
- ✦ Expectant mother should focus on the present task of making a living idol in the womb.
- ✦ Keep fast of anger and negativity for nine months.

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Gestational Diabetes Mellitus

Uma Pandey, Anupama Singh

INTRODUCTION

It is defined¹ as carbohydrate intolerance of variable severity with onset or first diagnosed during present pregnancy [American College of Obstetricians and Gynecologists 2013 (ACOG 2013)].² This definition includes women whose glucose tolerance will return back to normal after pregnancy and also those who will develop type 2 diabetes. The latter group also includes those females who had pre-existing type 2 diabetes. Gestational diabetes mellitus (GDM) usually presents in the second or during third trimester.

EPIDEMIOLOGY

The prevalence of GDM in India varies from 3.8–21% and it is more in urban than rural areas.^{3–10}

Risk Factors

- ✦ Positive family history of diabetes (parents, sibling, aunts, uncles, grandparents)
- ✦ History of GDM or impaired glucose tolerance test¹¹
- ✦ Age >30 years
- ✦ Ethnic group (East Asian, Pacific island ancestry)
- ✦ Obesity
- ✦ History of overweight baby (≥ 4 kg) in previous pregnancy
- ✦ Unexplained perinatal loss or malformed infants
- ✦ Previous history of stillbirth with pancreatic hyperplasia (revealed on autopsy)
- ✦ Persistent glycosuria
- ✦ Presence of polyhydramnios or recurrent vaginal candidiasis in present pregnancy
- ✦ Polycystic ovarian syndrome, cardiovascular disease, hypertension, hyperlipidemia.

Screening¹²

- ✦ Every pregnant female, fasting or random blood glucose during the first antenatal visit (*universal screening*).^{13–18} Compared to selective screening, universal screening for GDM detects more cases and

improves maternal and neonatal prognosis.^{19–21} Hence, universal screening for GDM is essential, as women of Asian origin and especially ethnic Indians are at a higher risk of developing GDM and subsequent type.

- ✦ Type 2 diabetes.^{22–24}
- ✦ Fifth International Workshop-Conference on Gestational Diabetes²⁵ endorsed *Selective Screening*^{26,27} in pregnant females based on risk assessment for detecting GDM using either:
 - *Two step procedure* (Flowchart 20.1):^{2,12,26}
 - *One step procedure*:^{31–34} Diagnostic 100 g oral glucose tolerance test (OGTT) performed on all subjects.

If high risk; blood glucose test is done as early as possible, using the procedures described previously. If GDM is not diagnosed, blood glucose testing should be repeated at 24–28 weeks' gestation or at any symptoms or signs suggesting hyperglycemia.

GDM Risk Assessment²⁵

It should be ascertained at the first prenatal visit (Table 20.1).

DIAGNOSIS

There are various diagnostic criteria for diagnosis of GDM: Criteria for diagnosis of GDM with 100 g oral glucose

Flowchart 20.1: Two step procedure for screening of gestational diabetes.

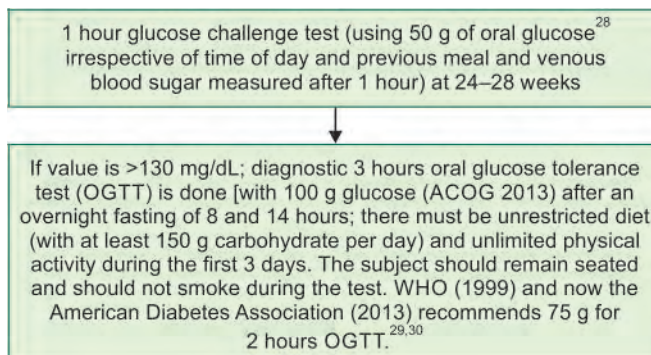


Table 20.1: GDM risk assessment.

Low-risk	Average-risk	High-risk
If all of the following are present: <ul style="list-style-type: none"> Age <25 years No history of diabetes in first degree relative Weight normal at birth Weight normal prior to pregnancy No history of abnormal glucose metabolism Ethnicity with low prevalence of GDM No history of poor obstetrical outcome 	<ul style="list-style-type: none"> Age >25 years Diabetes in first degree relative High weight at birth Overweight since nonpregnant stage Ethnicity with high prevalence of GDM 	If 1 or more of these present: <ul style="list-style-type: none"> Strong family history of type 2 DM Previous history of GDM or impaired glucose tolerance test or glucosuria or macrosomic baby Severe obesity

(DM: diabetes mellitus; GDM: gestational diabetes mellitus)

Table 20.2: Criteria for diagnosis of GDM with 100 g oral glucose (O'Sullivan and Mahan modified by Carpenter and Coustan)³⁵ and National Diabetes Data Group (NDDG).³⁶

Glucose Tolerance Test: Venous Plasma Glucose (mg/dL)		
Time	Carpenter and Coustan	NDDG
Fasting	95	105
1 hr	180	190
2 hr	155	165

GDM diagnosed when any two values are met or elevated

(GDM: gestational diabetes mellitus)

Table 20.3: Criteria for diagnosis of impaired glucose tolerance and diabetes with 75 g oral glucose (WHO).³⁷

Time	Normal tolerance	Impaired glucose tolerance	Diabetes
Fasting	<100	≥100 and <126	≥126
2 hr post-glucose	<140	≥140 and <200	≥200

Note: (1) Venous whole blood values are 15% less than the plasma values;^{38,39} (2) mmol/L = mg% × 0.0555.

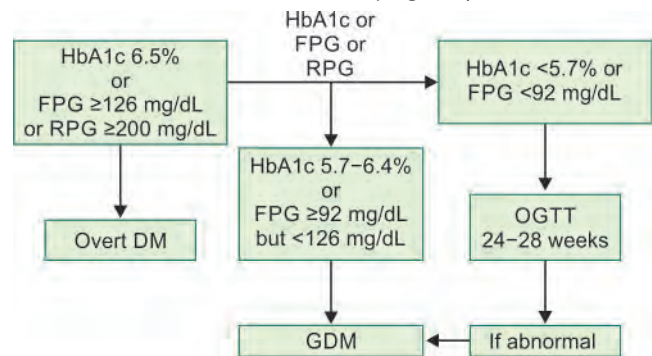
Table 20.4: International association of diabetes and pregnancy study groups (IADPSG) (75 g oral glucose) (mg/dL).

Time	Values
Fasting	92
1 hr	180
2 hr	153

[O'Sullivan and Mahan Modified by carpenter and Coustan]³⁵ and National Diabetes Data Group (NDDG)³⁶ has been described in Table 20.2.

Criteria for diagnosis of impaired glucose tolerance and diabetes with 75 g oral glucose (WHO)³⁷ has been described in Table 20.3.

International Association of Diabetes and Pregnancy Study Groups (IADPSG) (75 g oral glucose) (mg/dL): Diagnosis of GDM is made when one or more threshold values are met or exceeded (Table 20.4).

Flowchart 20.2: The recommendations of the ADA and IADPSG in 2011 for diabetes in pregnancy.

(HbA1c: glycosylated hemoglobin;⁴¹⁻⁴⁷ FPG: fasting plasma glucose; RPG: random plasma glucose; OGTT: oral glucose tolerance test; DM: diabetes mellitus; GDM: gestational diabetes mellitus)

DIABETES IN PREGNANCY SOCIETIES OF INDIA (DIPSI)

One step diagnostic procedure for all pregnant females (*universal screening*) in antenatal clinic with 75 g oral glucose irrespective of her fasting status or timing of previous meal. A venous plasma glucose level of greater than 140 mg/dL, 2 hr later is diagnosed as GDM. This is both a screening as well as diagnostic procedure; and is approved by the Ministry of Health, Govt. of India and also recommended by World Health Organization (WHO).

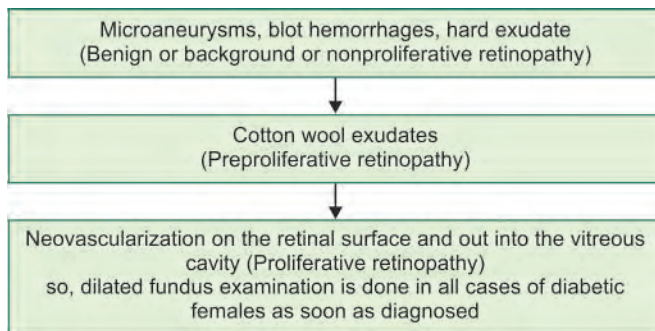
The recommendations of the American Diabetes Association (ADA) and International Association of Diabetes and Pregnancy Study Groups (IADPSG) in 2011 for diabetes in pregnancy was combined and algorithm⁴⁰ was proposed which is specified in Flowchart 20.2.

MATERNAL AND FETAL EFFECTS⁴⁸

Maternal Effects

During Pregnancy

Preeclampsia: One of the most severe complication of GDM; occurs in 10% of patients with GDM. Factors asso-

Flowchart 20.3: Pathophysiology in diabetic retinopathy.

ciated with increased risk; younger age, nulliparous, and obese.

Diabetic Nephropathy:⁴⁹ Stages of development—

- ✦ Microalbuminuria: 30–300 mg/24 hr
- ✦ Macroalbuminuria: More than 300 mg/24 hr
- ✦ End stage disease.

Nephropathy increases potential risk of fetal growth restriction, pre-eclampsia, preterm birth, chronic hypertension and maternal morbidity.

Diabetic Retinopathy (Flowchart 20.3):

- ✦ The first and the most common visible lesions are small microaneurysms.
- ✦ Nonproliferative stage managed by good glycemic control. But proliferative stage needs panretinal photocoagulation.
- ✦ Diabetic retinopathy is not a contraindication of vaginal delivery (NICE 2008). But in cases of untreated proliferative stage, labor causes increased intraocular pressure leading to intravitreal hemorrhage (rupture of fragile vessels); so caesarean section is done.
- ✦ Ophthalmic follow-up for at least 6 months after delivery is recommended in cases of preproliferative retinopathy.

Diabetic Neuropathy: Uncommon but a form of peripheral symmetrical sensorimotor diabetic neuropathy called *Diabetic Gastropathy*, is associated with high risk of morbidity and poor perinatal outcomes. It causes nausea and vomiting, nutritional problems, poor glycemic control. Treatment with metoclopramide and H₂ receptor antagonists, sometimes, helps.

Diabetic Ketoacidosis: It may develop in hyperemesis gravidarum, diarrheal disease, febrile illnesses, b-mimetics drugs given for tocolysis, corticosteroids given for inducing fetal lung maturity.

Diabetic ketoacidosis (DKA) results from an insulin deficiency combined with excess in glucagon (counter

regulatory hormone) resulting in gluconeogenesis and ketone body formation (β -hydroxybutyrate \gg acetoacetate).

Pregnant females develop ketoacidosis at lower glucose thresholds than nonpregnant females.

Protocol recommended by the American College of Obstetrician and Gynecologists (2012) for management of diabetic ketoacidosis during pregnancy:

- ✦ **Laboratory assessment:** Arterial blood gas analysis at 1 or 2 hr interval to document degree of acidosis (measure glucose, ketones and electrolyte levels).
- ✦ **Insulin:** In low dose (intravenous)
 - Loading dose: 0.2–0.4 U/kg
 - Maintenance dose: 2–10 U/hr.
- ✦ **Fluids:** Isotonic sodium chloride
 - Total replacement in first 12 hr of 4–6 L
 - One liter in first hour; 500–1000 mL/hr for 2–4 hr
 - 250 mL/hr until 80% replaced.
- ✦ **Glucose:** Begin 5% dextrose in normal saline when glucose plasma levels reaches 250 mg/dL (14 mmol/L).
- ✦ **Potassium:** If initially normal or reduced, an infusion rate up to 15–20 mEq/hr may be required. If elevated, wait until levels decrease into the normal range, then add to intravenous solution in a concentration of 20–30 mEq/L.
- ✦ **Bicarbonate:** Add 1 ampule (44 mEq) to 1 L of 0.45 normal saline, if pH is <7.1.

Infections: Common are Candida vulvovaginitis, urinary and respiratory tract infections.

During Labor

- ✦ Prolonged labor due to big baby
- ✦ Shoulder dystocia
- ✦ Perineal injuries
- ✦ Postpartum hemorrhage
- ✦ Increased incidence of caesarean section.

Puerperium

- ✦ Puerperal sepsis
- ✦ Lactational failure.

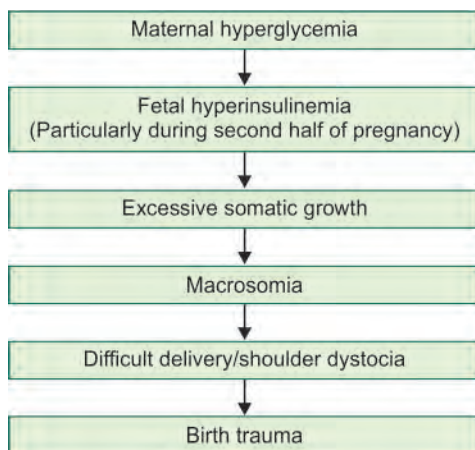
Fetal and Neonatal Effects⁵⁰

Fetal Macrosomia^{51,52}

Birth weight greater than 4 kg (>90th percentile). Macrosomic baby looks plethoric (due to polycythemia), with plumpy face, buried eyes and excessive buccal fat.

Pedersen hypothesis has been discussed in Flowchart 20.4).

Factors implicated in macrosomia: Insulin like growth factor (Luo and coworkers, 2012), C-peptide, epidermal growth factor, fibroblast growth factor, platelet-derived

Flowchart 20.4: Pedersen hypothesis.

growth factor, leptin and adiponectin (Grissa, 2011; Loukovaara, 2004; Mazaki-Tovi, 2005).

Fetal Anomalies

Unlike in overt diabetes, rates of fetal anomalies do not appear to be substantially increased (Sheffield, 2002)

Hydramnios

Amniotic fluid index (AFI) greater than 24 cm (fetal hyperglycemia causes polyuria leading to hydramnios).

Fetal Death

- ✦ Fasting hyperglycemia >105 mg/dL, increased risk of fetal death during the final 4–8 weeks [ADA(2003)]
- ✦ Other causes includes chronic hypoxia, placental villus edema impairing nutrient transfer.

Chemical Imbalances

- ✦ Fetal hypoglycemia (due to maternal hypoglycemia) can cause sudden intrauterine fetal death.
- ✦ Neonatal hypocalcemia (due to delayed postnatal parathyroid hormone regulation) and hypomagnesemia (due to longstanding diabetic nephropathy in mother leading to loss of magnesium from maternal kidney and hence less availability of Mg^{2+} for the fetus) occur within 72 hr of birth.
- ✦ Neonatal hyperbilirubinemia with risk increased due to preterm delivery, and relative immaturity of hepatic bilirubin conjugation and excretion.

Neonatal Hypoglycemia

- ✦ Neonatal hyperinsulinemia and removal of the exogenous glucose source (maternal) at the time of

delivery may provoke hypoglycemia within minutes of birth.

- ✦ Cornblath and associates (2000) established threshold of 35 mg/dL in term neonates.

Respiratory Distress Syndrome

There is increased risk of respiratory distress syndrome due to surfactant deficiency, which is due to increased risk of preterm delivery in such mothers especially in uncontrolled blood sugar levels in the mother, and also due to late maturation of type 2 alveolar cells, and also fetal hyperinsulinaemia antagonize the action of cortisol causing blunted production of surfactant.

Long Term Sequela

Increased risk of obesity, type 2 diabetes, cardiovascular disease and impaired cognitive and motor function.

MANAGEMENT⁵³⁻⁶²

Pharmacological methods are usually recommended if diet modification does not consistently maintain the fasting plasma glucose levels <95 mg/dL or the 2 hr postprandial plasma glucose <120 mg/dL (ACOG 2013).

The Fifth International Workshop Conference recommended that fasting glucose levels be kept <95 mg/dL (Metzger, 2007).

Diabetic Diet

The ADA recommends individualized nutritional counseling based on height and weight (Bantle, 2008). On average, this includes a daily caloric intake of 30–35 kcal/kg.

- ✦ ACOG 2013 suggests that carbohydrate intake be limited to 40% of total calories. The remaining calories are apportioned to give 20% as protein and 40% as fat.
- ✦ ADA 2003; obese women with body mass index (BMI) >30 kg/m² should have 30% calorie restriction (approximately 25 kcal/kg/day).
- ✦ Monitoring done by weekly assessment of ketonuria, which have been linked with impaired psychomotor development in offspring (Rizzo, 1995; Scholre, 2012).

Exercise

- ✦ Physical activity during pregnancy reduces the risk of gestational diabetes (Dempsy et al, 2004).
- ✦ Resistance exercise decreases the need for insulin therapy in overweight women with GDM (Brankston et al, 2004).
- ✦ ACOG 2013 recommends moderate exercise as part of treatment in women with GDM.

Table 20.5: Self-monitored capillary blood glucose goals.

Specimen	Level (mg/dL)
Fasting	≤95
Premeal	≤100
1 hr postprandial	≤140
2 hr postprandial	≤120
Between 02:00 am to 06:00 am	≥60
Mean (average)	100
HbA1c	≤6%

Table 20.6: Action profile of commonly used insulins.

Insulin type	Onset	Peak (hour)	Duration (hour)
Short acting (SC)			
Lispro	<15 min	0.5–1.5	3–4
Glulisine	<15 min	0.5–1.5	3–4
Aspart	<15 min	0.5–1.5	3–4
Regular	30–60 min	2–3	4–6
Long acting (LC)			
Detemir	1–4 hr	minimal	Up to 24
Glargine	1–4 hr	minimal	Up to 24
NPH	1–4 hr	6–10	10–16

(NPH: neutral protamine hagedorn)

Glucose Monitoring

ACOG 2013 recommends four times daily glucose monitoring per day, fasting and either 1 or 2 hour after each meal. Self-monitored capillary blood glucose goals have been described in Table 20.5.

Insulin

ACOG 2013 recommends that insulin be considered in females with persistently increased 1 hr postprandial glucose level of greater than 140 mg/dL or 2 hr one greater than 120 mg/dL and insulin is started with atypical dose of 0.7–1 unit/kg/day in divided doses.

Action profile of commonly used insulins is shown in Table 20.6. Insulin management during labor and delivery:

- ✦ Usual dose of intermediate acting insulin is given at bedtime.
- ✦ Morning dose of insulin is withheld.
- ✦ Intravenous infusion of normal saline is begun.
- ✦ Once active labor begins or glucose levels decreases to <70 mg/dL, the infusion is changed from saline to 5% dextrose and delivered at a rate of 100–150 mL/hr (2.5 mg/kg/min) to achieve a glucose level of approximately 100 mg/dL.

- ✦ Glucose levels are checked hourly using a bedside meter allowing for adjustment in the insulin or glucose infusion rate.
- ✦ Regular (short-acting) insulin is administered by intravenous infusion at a rate of 1.25 U/hr, if glucose levels exceed 100 mg/dL.

Oral Hypoglycemic Agents

Both Glyburide and Metformin are appropriate, as is insulin, for first line glycemic control in women with GDM (ACOG 2013).

Obstetrical Management

- ✦ ACOG 2013 endorses fetal surveillance in women with GDM.
- ✦ Daily fetal movement recording (DFMR) is very important especially in the third trimester.
- ✦ Insulin treated females are admitted after 34 weeks and fetal heart rate monitoring is done three times each week.
- ✦ Women with gestational diabetes and adequate glycemic controls are managed conservatively.
- ✦ Delivery is planned for 38 weeks.
- ✦ Elective labor induction to prevent shoulder dystocia compared with spontaneous labor remains controversial
- ✦ Caesarean delivery at or near term done if macrosomic baby, and in women with advanced diabetes, especially those with vascular disease.
- ✦ Two IV lines must be secured during delivery.

Postpartum Evaluation

In GDM, the need for insulin after delivery reduces. It can be stopped if the glucose levels are within normal limits.

- ✦ Once the patient resumes full diet by third day after caesarean, a fasting and postprandial glucose level done for deciding subsequent therapy.
- ✦ Evaluation done at least every 3 years in women with a history of gestational diabetes but normal postpartum glucose screening (ADA 2011).
- ✦ ACOG 2013 recommends either fasting glucose or 75 g 2 hour OGTT for the diagnosis of overt diabetes.
- ✦ Prolonged antibiotics must be given especially in cases of complicated cesarean or instrumental delivery.
- ✦ GDM patients are also at risk for cardiovascular complications associated with dyslipidemia, hypertension, and abdominal obesity; the metabolic syndrome. Akinci and Associates (2009) reported that fasting glucose levels ≥ 100 mg/dL in the index OGTT was an independent predictor of the metabolic syndrome.

Table 20.7: Fifth International Workshop-Conference: Metabolic assessments recommended after pregnancy with gestational diabetes.

Time	Test	Purpose
Post-delivery (1–3 days)	Fasting or random plasma glucose	Detect persistent, overt diabetes
Early postpartum (6–12 weeks)	75 g, 2-hour OGTT	Postpartum classification of glucose metabolism
1 year postpartum	75 g, 2-hour OGTT	Assess glucose metabolism
Annually	Fasting plasma glucose	Assess glucose metabolism
Triannually	75 g, 2-hour OGTT	Assess glucose metabolism
Prepregnancy	75 g, 2-hour OGTT	Classify glucose metabolism

- ✦ Women with GDM have excessive cardiovascular disease by 10 years. Fifth International Workshop-Conference: Metabolic assessments recommended after pregnancy with gestational diabetes are described in Table 20.7.

Recurrent Gestational Diabetes

More common in obese females. So, loss of at least 2 BMI units was associated with a lower risk of gestational diabetes in women who were overweight or obese in the first pregnancy.

Contraception

- ✦ Barrier methods are ideal
- ✦ Low dose hormonal contraceptives are safe in women with recent gestational diabetes
- ✦ Combined oral pills may be best avoided
- ✦ Intrauterine devices may predispose to infection but they are good alternatives in women with comorbid obesity, hypertension, or dyslipidemia
- ✦ Tubal ligation should be done with caution. Vasectomy should be preferred.

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Breastfeeding

Kumkum Mehrotra, Awantika



■ PROTECTING, PROMOTING, AND SUPPORTING BREASTFEEDING IN INDIA

Only 42% mothers initiate breastfeeding within first hour of birth. Only 50% children are exclusively breastfed for the first 6 months. 20% of newborn deaths can be reduced by promoting and educating on a war basis. Such children are 11 times less likely to die from diarrhea and 15 times less likely to die from pneumonia. Breastfeeding saves additional 20,000 maternal deaths annually from breast cancer.

India has achieved substantial gains in improving mortality rates:¹

- ✦ Under-five mortality rate at 43 per 10,000
- ✦ Infant mortality rate (IMR) at 34 per 10,000
- ✦ Neonatal mortality rate (NMR) at 25 per 10,000
- ✦ Early NMR at 19 per 10,000

About 68% of IMR is constituted of NMR and more than 50% of IMR is due to early neonatal mortality highlighting the urgency for early preventive action.

Breastfeeding Saves Lives and Protects Health and Contributes to Social and Economic Outcomes

- ✦ Protection against type 2 diabetes and obesity
- ✦ Higher cognitive functioning, improved academic performance, and increased productivity and earning as an adult

- ✦ Improves human capital investment and reduces health care expenditure
- ✦ It is the first inoculation against death and disease which is a *missed opportunity*.

Why Early Initiation?

Success in breastfeeding is not the sole responsibility of the parturient, but a collective societal responsibility.¹

Breastfeeding is Exquisitely Personalized Medicine at a Critical Moment

Evidence indicates that 22% of all newborn deaths can be averted, if initiation of breastfeeding within 1 hour of birth becomes a universal practice.

What can Doctors and Healthcare Providers do?

- ✦ During antenatal care (ANC) visits counsel, encourage, and prepare pregnant mothers
- ✦ Regular training of staff from time to time
- ✦ Provide skilled support and counseling to help mothers sustain breastfeeding even after cesarean delivery
- ✦ Create mother and baby friendly environment
- ✦ Inform mothers and their family members the hazards of improper use of infant milk substitutes (IMS), feeders, and infant foods
- ✦ Effective implementation of IMS Act.¹
- ✦ Collaborate with Indian Academy of Pediatrics (IAP), Indian Medical Association (IMA), and Indian Association of Preventive and Social Medicine (IAPSM)
- ✦ Disseminate information on Mamta TV.

Adbhut Matrutva Sessions

Role of Good Quality Antenatal Care Regarding Maternal Nutrition

About 50% of pregnant women are anemic. About 42.2% of women enter pregnancy as underweight. And about 53%

of all women aged 15–49 years are anemic. About 22.9% of women are underweight. About 45% of adolescent girls are underweight.

Adequate maternal nutrition emphasizes first 1,000 days, from the time of conception to 2 years of age. Maternal malnutrition is the key contributor to low birth weight (LBW) or small for gestational age (SGA) or fetal growth restriction (FGR) babies. It could be due to mother's own childhood malnutrition and short stature.

Educate and emphasis on iron and folic acid (IFA) and Ca consumption.¹

■ DEFINITION OF BREASTFEEDING

Breastfeeding is defined as to enable mothers to establish and sustain exclusive breastfeeding for 6 months. World Health Organization (WHO) and United Nations International Children's Emergency Fund (UNICEF) recommend initiation within first hour of birth. Exclusive breastfeeding is when the infant receives only breast milk without any additional food or drink not even water.¹

■ ANATOMY OF BREAST (FIG. 21.1)

Breast is a modified sweat gland. It consists of around 15 ductal systems. Each draining around 40 lobules. Each lobule consisting around 60 acini, which empty into small terminal ducts. Terminal ducts drain into larger collecting ducts which open into lactiferous sinus beneath the nipple. Nipple has around six duct openings and each opening drains a separate lobular system.

■ PHYSIOLOGY OF BREAST

Terminal ducts and the acini are the most sensitive to ovarian hormones and prolactin (PRL). Breast epithelial cells proliferate in luteal phase of the menstrual cycle, and if there is no conception, they undergo programmed cell death at the end of luteal phase when estrogen, progesterone, and PRL decline. This is the reason of water retention in extracellular fluid (ECF), which causes premenstrual tenderness in breasts.

■ PHYSIOLOGY OF MILK PRODUCTION

Skin covering the nipple contains many nerve endings which get triggered and hormones are released. PRL acts on the glands while oxytocin helps release. The more let-down reflex is triggered the more is the production. A well-trained breast ensures more milk production. Even when the baby gets delatched breast goes on working. Whatever the baby drinks get automatically restored.

Oxytocin reflex is *stimulated* by positive thoughts, baby's sound, baby's sight, and confidence. It is *inhibited* by stress, worry, pain, and doubt.

Prolactin reflex is *stimulated* as early as the baby is put to breast. Also depends on as long as the baby suckles and how well is the skin-to-skin bonding. PRL reflex is *inhibited* by formula feeds, medications, and sore nipples.

Breast milk changes throughout the feed. Early in the feed fat content is low. In midfeed, fat content increases. Finishing one breast is beneficial as the second breast has higher fat content now.²

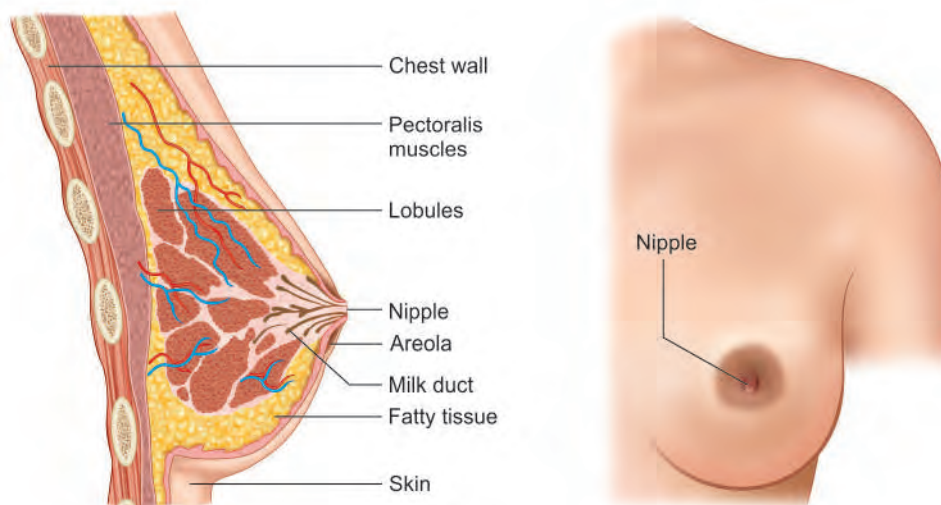


Fig. 21.1: Anatomy of breast.

HUMAN MILK COMPOSITION

Mature human milk contains 3–5% fat, 8–9% protein, 6.9–7.2% carbohydrate calculated as lactose, and 0.2% minerals. Its energy content is 60–75 kcal/100 mL. Protein content is markedly higher and carbohydrate content lower in colostrums, than in mature milk. Race age parity or diets do not greatly affect milk composition. Principal milk proteins are casein homologous to bovine beta-casein, alpha-lactalbumin, lactoferrin, immunoglobulin A (IgA), lysozyme, and serum albumin. Essential amino acids (AAs) closely resemble those required for the infant. The principal sugar is lactose but 30 or more oligosaccharides all containing terminal Gal (beta1–4)Glc and ranging from 3 to 14 saccharine units per molecule are also present. These may amount in aggregate to as much as 1 g/100 mL in mature milk and 2.5 g/100 mL in colostrums.²

Some of the AA may function to control intestinal flora because of their ability to promote growth of certain lactobacilli strains. Human milk fat has high contents of palmitic and oleic acids, which are heavily concentrated in the 2 position, and 1, 3 positions of triglycerides, respectively. Fatty acids correlate with diet. Phospholipids are phosphatidylethanolamine, phosphatidylcholine, serine, inositol, and sphingomyelin, amounting to total 75 mg/100 mL. Principal mineral contents are Na, K, Ca, Mg, P, and Cl. Calcium is 25–35 mg/100 mL. Phosphorus 13–16 mg/100 mL. Fe, Cu, and Zn vary. About 25% of total nitrogen of human milk represents nonprotein compounds including urea, uric acid, creatine, and a large number of AA including glutamic acid and taurine. All vitamins except vitamin K are found in significant concentrations.²

CAUSES OF LOW MILK PRODUCTION

- ✦ *Anything that delays breastfeeding:*
 - Neonatal intensive care unit (NICU) admission
 - Poor latching
 - Tongue tie
 - Sleepy baby
 - Jaundice by birth
 - Mastitis
 - Scheduled or timed feeding instead of giving on demand
 - Formula feeds (IMS)
 - Pacifiers and dummies
 - Smoking, drinking and addictions of mother
 - Gestational diabetes
 - Hypothyroidism
 - Polycystic ovary syndrome (PCOS)
 - Antihypertensive medications

- Combined oral contraceptive (COC) pills
- Infertility treated pregnancy³
- ✦ *How to increase production of milk:*
 - Ensure good diet
 - Health supplements
 - Plenty of room temperature water
 - Herbal and pharmacological remedies (in pharmacological section).

BREASTFEEDING BENEFITS

Benefits for the Babies

- ✦ Contains all essential nutrients
- ✦ Satisfies thirst
- ✦ Helps in development of all body organs especially neural, liver, immune system, and blood
- ✦ Helps jaw development
- ✦ Helps resist infections, disease even later in life
- ✦ Reduces risk of obesity.

Benefits for Mothers

- ✦ Reduces risk of hemorrhage
- ✦ Reduces risk of breast and ovarian Ca
- ✦ Convenient and cheap
- ✦ Can soothe the baby
- ✦ Creates bonding
- ✦ Lactational amenorrhea method (LAM) for contraception.³

Getting Started

Within first hour of birth. The first milk is colostrum, which is rich in proteins and antibodies. Mature milk replaces the colostrums in 48–72 hours.

Lactating

Sit upright, unwrap, and nose should be at the level of nipple. Bring baby to the breast and not the breast to the baby. Nipple should be aimed towards baby's palate. Baby's chin should be tucked into the breast. Nose should only be touching the breast skin. More of areola to be visible above the baby's upper lip. There should be no clicking noise during sucking.

How Often?

8–12 times a day in the first week of birth. Have at least five wet disposable nappies. Have 2–6 runny bowel movements till 6 weeks of life. Gaining weight and growing as expected. Baby is alert when awake and reasonably contented.

Sore Nipples

It is a very disgusting state. Emollients, cocoa butter, and lanolin cream is beneficial.

■ PHARMACOLOGY

Effects of Medications

Once upon a time, breastfeeding was 100% up to 12 months. Baby's daily milk requirement is 150 mL/kg/day. The pH of milk is 7.2 which is slightly acidic than maternal plasma 7.4, so it attracts oxycodone and caffeine. These drugs become ionized and get trapped in milk. Harmful effects are:

- ✦ Altered liver function tests (LFTs)
- ✦ Reduced platelet count
- ✦ Sudden infant death syndrome (SIDS)
- ✦ Deep pigmentation of teeth by tetracyclines.

Commonly used drugs are mostly safe. There is a big difference between the placental barrier and breast barrier. Placenta lets the drug enter while breast acts as a barrier.⁴

Factors Affecting Passage of Drugs

- ✦ Passive diffusion
- ✦ Unbound drugs to proteins in plasma diffuse readily
- ✦ Molecule size
- ✦ Cross membrane in ionized form
- ✦ Lipid solubility
- ✦ Codeine, morphine causing central nervous system (CNS) effect.⁵

Factors Risking Adverse Effects

- ✦ Time of feeding just after medication
- ✦ Preterm babies having lower immunity
- ✦ Oral bioavailability
- ✦ Volume of breast milk
- ✦ Infant dose.⁵

Toxic Drugs

- ✦ *Cytotoxic drugs*: Cyclophosphamide, cyclosporine, methotrexate, and doxorubicin
- ✦ Cocaine, heroin, and marijuana
- ✦ *Radioactive compounds*: Copper and Iodine
- ✦ Antianxiety, antidepressants, and antipsychotics
- ✦ Metronidazole, metoclopramide, and chloramphenicol

- ✦ Atenolol, acebutolol, bromocriptine, aspirin, ergotamine, lithium, phenindione, phenobarbitone, and primidone.⁴

Points to Remember

- ✦ Less than 1% medication appears in breast milk
- ✦ Most common ones are safe
- ✦ Drugs safe in pregnancy are all the safer in lactation period
- ✦ Those which are not absorbed orally, like heparin, insulin, lyapina (LA), and local creams are safe
- ✦ Estrogens suppress milk production so only progestin-only pills (POPs) can be prescribed and not COCs.

Stimulants for Breast Milk

- ✦ Domperidone
- ✦ Metoclopramide
- ✦ Dopamine receptor blockers
- ✦ Remember antiemetic have some extrapyramidal symptoms such as hypotonicity and postpartum blues
- ✦ *Natural*: Fenugreek, herbal teas, coconut milk, and dry coconut
- ✦ *Nonpharmacological methods*: Support, positioning, and latching.

Antibiotics and other Drugs which are Safe in Breast Abscess

- ✦ Amoxicillin plus clavulanic acid
- ✦ Diclofenac
- ✦ Trypsin and chymotrypsin
- ✦ Bromelaine
- ✦ Serratiopeptidase.

Differential Diagnosis of Postpartum Fever

Lower urinary tract infection (UTI): Antibiotics, alkalizers, and urinary antispasmodics

Malarial fevers: Chloroquine, primaquine, doxycycline, and clindamycin are safe, if given for short durations. Also diarrheas, viral, and fungal infections.

Contraceptives

- ✦ Progestin-only pills (desogestrel)
- ✦ Depot medroxyprogesterone acetate (DMPA)
- ✦ Levonorgestrel-releasing intrauterine device (LNG-IUD)
- ✦ Lactational amenorrhea method.

Postpartum Blues

Can be treated with selective serotonin reuptake inhibitor (SSRI)/tricyclic antidepressants (TCAs)/valproic acid. Very small amounts in milk have been measured.⁵

SPECIAL CASES

- ✦ *Following are safe:*
 - Antitubercular treatment (ATT)
 - Epileptic treatment
 - Anticoagulants
 - Antihypertensive
 - Antiasthmatics
 - H₂ receptor antagonists
 - Antiretroviral (ARV) drugs
- ✦ *Unsafe:*
 - Pyrazinamide
 - Ethionamide
 - Capreomycin
- ✦ *Safe antiepileptics:*
 - Carbamazepine
 - Infant monitoring is required with the following
 - ✦ Valproic acid, phenytoin, phenobarbitone, and primidone
- ✦ *Safer drugs (miscellaneous):*
 - Anticoagulants
 - Dioxin
 - Most Antihypertensive
 - Angiotensin-converting enzyme (ACE) inhibitors
 - Antiretroviral drugs
 - Drugs for gastric disorders
 - Antiallergics.
- ✦ *Pathological alerts:*
 - Any serious or blood-tinged discharge alerts evaluation. Mostly (88%) are benign intraductal papillomas, fibroadenosis, prolactinemia, and infections. Drugs such as oral contraceptive pills (OCPs), TCA, dopamine antagonist, trauma, stress, pituitary adenomas, and tuberculosis.
 - Rest 12% could be carcinomatous.
 - Milky oozing is physiological while bloody, creamy, sticky, greenish, brownish or grey-colored, serous, and serosanguinous are other pathological types.
 - Colostrum can last up to 2 years postpartum.
 - Investigation modalities are sonography, mammography, galactography, and magnetic resonance imaging (MRI).

INDIA'S INFANT MILK SUBSTITUTES, FEEDING BOTTLES, AND INFANT FOODS (REGULATION OF PRODUCTION, SUPPLY, AND DISTRIBUTION) ACT

- ✦ In 1992, India adopted IMS Act and amended in 2003. Restrictions include:
 - Advertising and promotion of IMS, feeding bottles or infant foods
 - Unauthorized labeling of products, including complementary foods, such as use of images of mothers and children or words that imply superiority to breast milk
 - Sponsorships, gifts, fellowships, and financial benefits to healthcare providers and their associations
- ✦ Violations of the IMS Act should be referred to the District Civil Surgeon or District Magistrate.¹

CONCLUSION

- ✦ Breastfeeding is associated with nutritional, emotional, immunological, and social benefit. Select drug with relatively short half-life.
- ✦ Feed infant just before medication.
- ✦ Reassure that drug will return in bloodstream once plasma concentration falls.
- ✦ It is almost always possible for mothers to continue nursing.
- ✦ Drinking and smoking is absolutely contraindicated.
- ✦ Avoid addictions of cocaine, heroin, and lysergic acid diethylamide (LSD) dust.
- ✦ High consumption of tea/coffee causes disturbed sleep patterns.
- ✦ Coexisting mental health disorders need to be treated, but vigilance of the infant is must.

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■ INTRODUCTION

A post natal period begins immediately after birth of child. Puerperium is commonly known as first 6 weeks following child birth. Most maternal and newborn deaths occur during post natal period because of neglect.

During the postnatal period either by normal or by cesarean. It is divided in two phases:

1. *First phase:* 6–12 hours of birth points to be looked for are as follows:
 - i. *Postpartum bleeding:* To watch whether uterus has become globular and firm. Uterine massage is a big help for uterus to contract.
 - ii. *Episiotomy:* Stitches to be looked for pain swelling redness and likewise treatment with good vaginal care and hygiene.
 - ◆ Vitals: Pulse, BP, respiration.
 - iii. *Infant care:* Immediately after birth, APGAR score is evaluated:
 - ◆ Appearance
 - ◆ Pulse
 - ◆ Grimace
 - ◆ Activity
 - ◆ Respiration.

Early skin to skin contact is initiated for baby and mother; and baby is put on mothers' breasts like Kangaroo care. This practice gives warmth to baby and initiates feeding.

2. *Second stage postpartum:* It is for 2–6 weeks post birth. Women undergoing caesarean section, mobility to be increased so that chances of deep vein thrombosis and hypercoagulability reduces.

Postpartum urinary incontinence is experienced by some women. Patient has to be taught perineal exercises to overcome this.

Lochia: It is discharge from uterus after delivery which changes its color from bright red to brownish in 4–6 weeks' time.

Adult diaper and sanitary pads are to be used and changed frequently.

Look for secondary postpartum hemorrhoids if color of lochia, becomes fresh.

Hemorrhoids and constipation in this period is very common.

Newborn needs frequent feeds for which help by relatives or health visitors is needed.

■ PSYCHOLOGICAL PROBLEMS

- ✦ Postpartum depression
- ✦ It can affect both sex of parents. Early detection and early treatment is required.

■ DELAYED POSTPARTUM PERIOD

- ✦ Lasts up to 6 months
- ✦ Muscles and connective tissue return more or less to normal prepregnancy levels
- ✦ During this period because of infant regular sleep pattern mother also gets time to sleep and her general condition improves, and her normal sexual activity can start.

■ DIET DURING POSTNATAL PERIOD

- ✦ Women needs to maintain balanced diet with iron, folic acid. Supplementations should also continue for 3 months after birth
- ✦ Should drink sufficient water
- ✦ Nutritional counselling
- ✦ Advise women to eat healthy food like meat, fish, seeds, oils, fruits cereals, beans, cheese and milk
- ✦ Mothers to be counselled that this food is nutritionally healthy and will not harm breast fed baby
- ✦ Taboos for food are to be talked over or avoid hard physical work.

■ POSTPARTUM DANGER SIGNS FOR THE WOMEN

- ✦ Vaginal bleeding changed color to red
- ✦ Fits and convulsions
- ✦ Fast breathing

- ✦ Fever
- ✦ Weakness
- ✦ Severe headache, blurring of vision
- ✦ Calf pain redness and swelling
- ✦ Swollen red or tender breasts
- ✦ Problem in urination
- ✦ Infection or increased pain in perineum
- ✦ Infection in the area of wound
- ✦ Smelly discharge pervaginum
- ✦ Severe depression or suicidal tendency.

■ GETTING BACK IN SHAPE: BY YOGA, WARM OIL MASSAGES, BY DIET AND NUTRITION

- ✦ Exercises
- ✦ Belly binding.

■ POSTPARTUM CATCH UP VACCINATIONS

1. Hepatitis B: Getting back in shape
2. Influenza: Exercise, belly binding
3. Cervical cancer vaccine

Any other: Warm massages

Diet and nutrition.

■ DANGER SIGNS FOR NEWBORN

- ✦ Difficulty in breathing
- ✦ Fits, convulsion
- ✦ Increased temperature

- ✦ Not feeding properly, rigors
- ✦ Yellow palms and soles
- ✦ Diarrhea excessive vomiting
- ✦ Ulcers or thrust within the mouth.

■ DIET IN POSTPARTUM

Daily requirement of postpartum female:

- ✦ High zinc: 11–12 mg/day
- ✦ Proteins: 75 gm/day
- ✦ Calcium: 1000 mg/day
- ✦ Vitamin C: 120 mg/day.

Those all can be taken from:

- ✦ Liquids: Water 2–3 L/day
- ✦ Milk
- ✦ Fruit juices.

Leafy green vegetables:

Spinach, Broccoli, Indian gourd, Bottle gourd, Carrots, Dark leafy vegetables.

Whole grain cereals:

Almonds, fenugreek seeds, cumin seeds, sesame seeds.

High protein:

- ✦ Milk, cheese, yogurt, meat, fish, egg, beans
- ✦ Take prenatal medicines or iron/calcium.

Foods to be avoided:

- ✦ Limit junk food
- ✦ Alcohol
- ✦ Caffeine
- ✦ Swordfish, Shark, Tilefish.

Contraceptions to be Used After Child Birth

Manpreet Sharma

■ INTRODUCTION

These are following methods which can be used after child birth:

- ✦ Breastfeeding
- ✦ *Intrauterine device:*
 - Immediate postnatal
 - After 6 weeks of birth
- ✦ Birth control implants
- ✦ Injections
- ✦ Hormonal methods
- ✦ Barrier methods
- ✦ *Permanent methods:*
 - Vasectomy (Male)
 - Tubal ligation (Female).

■ BREASTFEEDING

If one is giving exclusive breastfeeding and is having lactational amenorrhea, then this method works as a contraception but certain times it is not a sure-shot contraception and fertility may be resumed without ones knowledge. Following are method, which are safe during feeding.

■ INTRAUTERINE DEVICE

Intrauterine device (IUD) is a small T-shaped device that healthcare professional can insert in uterus cavity.

Types of Intrauterine Device

- ✦ For immediate postpartum use:
 - After normal delivery
 - After LSCS.
- ✦ Hormone releasing IUDs:
 - It releases small amount of hormones (progestin) into uterus and can be approved for 3.5 year of use.
- ✦ *Copper-releasing IUDs:*
 - It releases small amount of copper into uterus and is approved for (according to make of IUDs).

- ✦ 3 years
- ✦ 5 years
- ✦ 10 years.

Risks of IUDs

- ✦ Intrauterine device may come out of uterus its own if not applied properly.
- ✦ Irregular bleeding per vaginum—sometimes this occurs for first 3 months of application. This usually decrease as the time advances.
- ✦ Intermenstrual pains.

Benefits of IUDs

Intrauterine devices are safe with intercourse and day-to-day life.

■ CONTRACEPTIVE SKIN IMPLANTS

It is a small plastic rod which is:

- ✦ Inserted under the skin, inside of upper arm.
- ✦ It slowly releases hormone progesterone to stop ovulation.
- ✦ It is 99.95% effective.

Side Effects

- ✦ May give rise to scanty bleeding
- ✦ Amenorrhea and unpredictable bleeding
- ✦ Mood swings, headache, acne
- ✦ Minor weight gain.

■ VAGINAL RING

- ✦ It works same way as combined pill.
- ✦ It is not recommended, if one is exclusively breastfeeding a child under 6 weeks.
- ✦ It can reduce supply of milk.
- ✦ Ring is inserted high in vagina for 3 weeks, and then is removed for 1 week to have regular periods.
- ✦ It is 99.7% effective, if used properly.

BIRTH CONTROL INJECTIONS

- ✦ It contains depot medroxyprogesterone acetate, commonly known as depot medroxyprogesterone acetate (DMPA).
- ✦ It also prevents ovulation.
- ✦ It can be given every 3 months after vaginal or cesarean delivery.
- ✦ It is given intramuscular (IM), either in arm or buttock.

Side Effects

- ✦ May give irregular bleeding per vaginum (PV)
- ✦ Amenorrhea
- ✦ Slight weight gain
- ✦ Headache.

PROGESTIN ONLY PILLS

- ✦ These pills contain only progestin.
- ✦ It has to be taken everyday at same time.

Advantages

It does not interfere with sex and reduces bleeding.

Side Effects

- ✦ Headaches
- ✦ Nausea
- ✦ Breast tenderness.

Contraindications

Breast cancer.

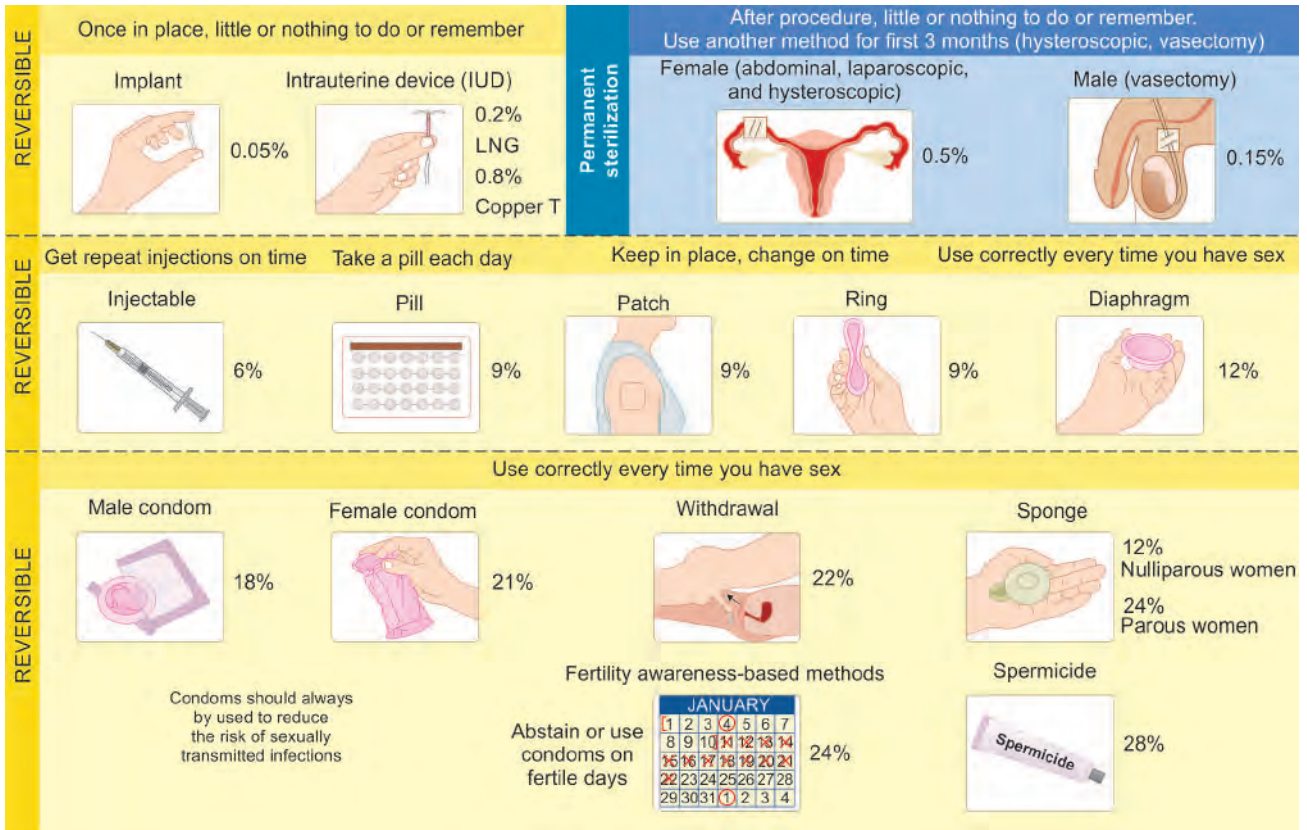
BARRIER METHODS

It includes:

- ✦ Spermicide
- ✦ Male and female condoms
- ✦ The diaphragm
- ✦ Cervical cap
- ✦ It should be started after 6 weeks of child birth.

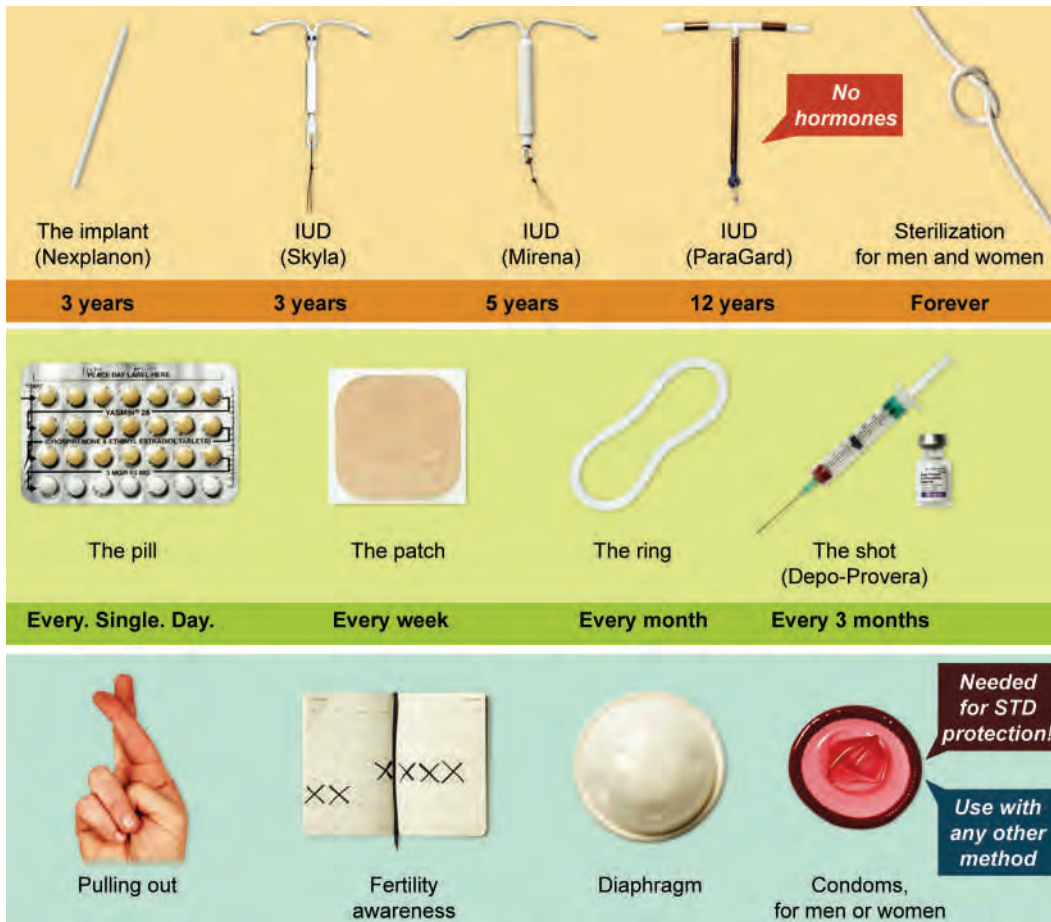
Benefits

- ✦ Barrier method usually protects sexually transmitted diseases.
- ✦ It has no effect on hormones



Effectiveness of contraception methods.

Note: The percentages indicate the number out of every 100 women who experienced an unintended pregnancy within the first year of typical use of each contraceptive method.



Side Effects

- ✦ Sometimes patient can feel itching in vagina, burning in vagina.
- ✦ Allergic to spermicides
- ✦ Can increase the risk of getting human immunodeficiency virus (HIV) from infected person.

NATURAL METHODS OF CONTRACEPTION

- ✦ These are fertility awareness methods
- ✦ Rhythm, cervical mucus observation and basal body temperature.
- ✦ High failure rates are associated with these methods.

Permanent Methods (Sterilization)

For Males: Vasectomy

It takes about 2-4 months for semen to become totally devoid of sperms. So, for prevention of pregnancy, another method of birth control till sperms is not found in semen.

For Females: Tubal Ligation

- ✦ Sterilization in females can be performed immediately after delivery.
- ✦ Interval ligation, whenever required.
These procedures are permanent. If one wants to get reversal of these methods, it is possible but results are not guaranteed.

Save Girl—Educate Girl—Empower Girl

Nisha Sahu, Shashi Khare, Pushpa Pandey, BK Shubhada Neel

*I do not want to be remembered as the girl who was shot.
I want to be remembered as the girl who stood up.*
—Malala Yousafzai

■ INTRODUCTION

Girl is always a blessing, an honor. They are the spirit of nation and pillars of society. With empowerment and the right support, girls can change the world. Many of them are already doing just that across the globe. They are standing up as never before and demanding to be free and contribute to the growth of our society. They are fighting against discrimination and gender inequality which is deeply rooted in our society. Gender discrimination is one of the main impediments to the progress of human race.

Girls like Malala. Girls who have stood up at countless risk and who are requesting us to stand with them. Malala is far from alone in facing terrible danger because of her power as a girl.

Any nation will not progress until both the genders are provided with equal opportunities and it is high time for us to recognize that girls are nobody's property and nobody's victims. Rather girls are the most powerful catalysts for a different world.

■ BARRIERS TO GIRLS' EQUALITY

For a sustainable development of any nation, it is imperative to have gender equality. The main impediments toward gender equality faced by girls are:

- ✦ **Education:** Access to basic education is crucial for anyone to pursue their dreams and become independent. Yet the statistics reveals that across the World, there is a prejudice against girl child in terms of education. Globally, 62 million girls are out of school.
- ✦ **Child marriage:** More than 700 million women in the world today were married before their 18th birthday and one in three of those women was married before age 15. This boils down to the fact that at early age various household responsibilities are bestowed on girls keeping them away to pursue their dreams.

- ✦ **Maternal mortality and reproductive health services:** Maternal mortality is the second leading cause of death, after suicide, for teenage girls particularly aged 15–19 years. An estimated 70,000 adolescent girls die each year from complications during pregnancy or childbirth and every year 2.5 million girls under 16 give birth.
- ✦ **Financial segregation and gender bias:** With limited household income, societal norms in many places ensure that boys get the priority in terms of education, health and nutrition. Subsequently, more than 33% of young women in developing countries are jobless, i.e. out of the formal organized sector.
- ✦ **Decision making:** It is one of the main sources of empowerment for any gender. Girls are often marginalized at all the levels including cultural and institutional. Girls may be uncomfortable expressing themselves, and when they do, they often are not heard or valued.
- ✦ **Trafficking and oppression:** Girls are disproportionately affected, particularly by forced sexual exploitation. Due to lack of education and optimum source of income when girls try to search for better lives they may be deceived or pushed into forced labor or sexual mistreatment.

■ INDIAN SCENARIO

Post-economic liberalization of 1991, India achieved 6–7% average GDP growth annually and became the World's fastest growing economy in the World. Yet gender inequality subsists in Indian Economy in all the sectors of life be it education, health, cultural, economic or political.

Discrimination against the girl child is a very grave social problem prevailing in India. The societal and cultural thinking in India encourages preference for male child. Patriarchy is entrenched in the Indian society that even though one may try their hardest to uplift women to the level of men, patriarchy pulls them down.

The girl child's discrimination begins before birth in the form of female feticide. The gender discrimination is reported to have claimed a whopping 50 million female lives. The practice of female feticide is widespread despite it being an illegal activity.

Census of India (2011: provisional data) has revealed the worst child sex ratio (0–6 years) since India got independence. The sex ratio is defined as the ratio of males to females in a population, and is generally expressed per 100 females.

In India, sex ratio is expressed as number of female per 1,000 male. Biologically normal child sex ratio ranges from 102 to 106 male per 100 female, converting the same in Indian terms it is 943–980 females per 1,000 males (World Health Organization, 2011). The current sex ratio as per the census figures as shown in Table 24.1 (provisional population totals, 2011).

This gap is quite large between the anticipated biological child sex ratio and the prevalent sex ratio. This constant drop in child sex ratio is a disturbing figure even government and the independent bodies are taking actions in the form of laws, schemes and awareness campaigns (Fig. 24.1).

No doubt India is putting its best efforts to be a technology superpower, tragically technologies which

enable a series of prenatal investigative tools to categorize and cure any potential birth defects and associated abnormalities, are altered for selectively aborting female fetuses after such prenatal sex determination in spite of a legal regulation banning them.

Techniques such as amniocentesis were introduced in 1975 to identify any genetic abnormalities which wretchedly became a tool for sex determination and a cause for death for the unborn female fetuses. Subsequently, and as a consequence, to both female feticide and infanticide there is a sharply declining sex ratio.

The United Nations report says that about 750,000 girls are aborted every year in India. Abortion rates are increasing in almost 80% in Indian states, mainly Punjab and Haryana. These two states have the most number of abortions annually. This practice is more common among the weaker sections because of pecuniary scarcity and the education and marriage of a daughter is considered a financial problem on their parents.

Female feticide and infanticide are not the only matters with a girl child in India. At every stage of life, she is discriminated and mistreated for education, nutrition, health facilities and living standard. She is pushed to get married before the legally prescribed age depriving her right to be literate and educated. Absence of education results in high fertility rate and aggravates the condition of females in India.

According to the United Nations International Children's Emergency Fund (UNICEF), in 1984 in Mumbai alone 7,999 out of the reported 8,000 abortions that took place were of girls. Girl children are killed shortly after being born when the family comes to know the sex of the child or killed slowly through neglect and rejection. In 1993 in Tamil Nadu, 196 girls died in suspicious circumstances.

Table 24.1: Sex ratio and child sex ratio.

Year	Sex ratio	Child sex ratio
1991	927	945
2001	933	927
2011	940	914

(Source: Census of India, 2011).

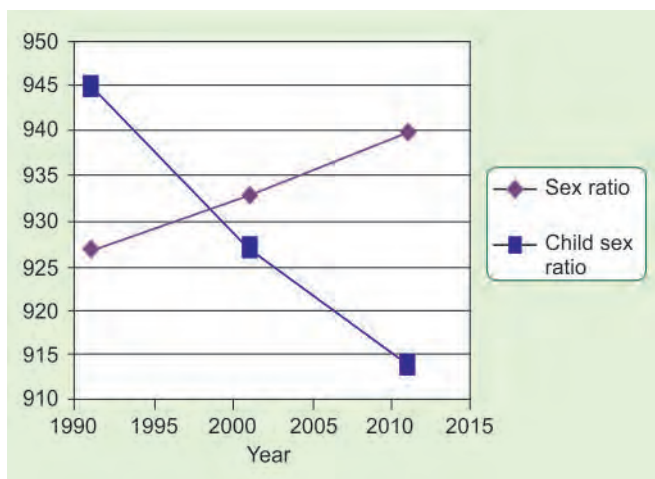


Fig. 24.1: Sex ratio and child sex ratio, India 1990–2011.
(Source: Census of India, 2011).

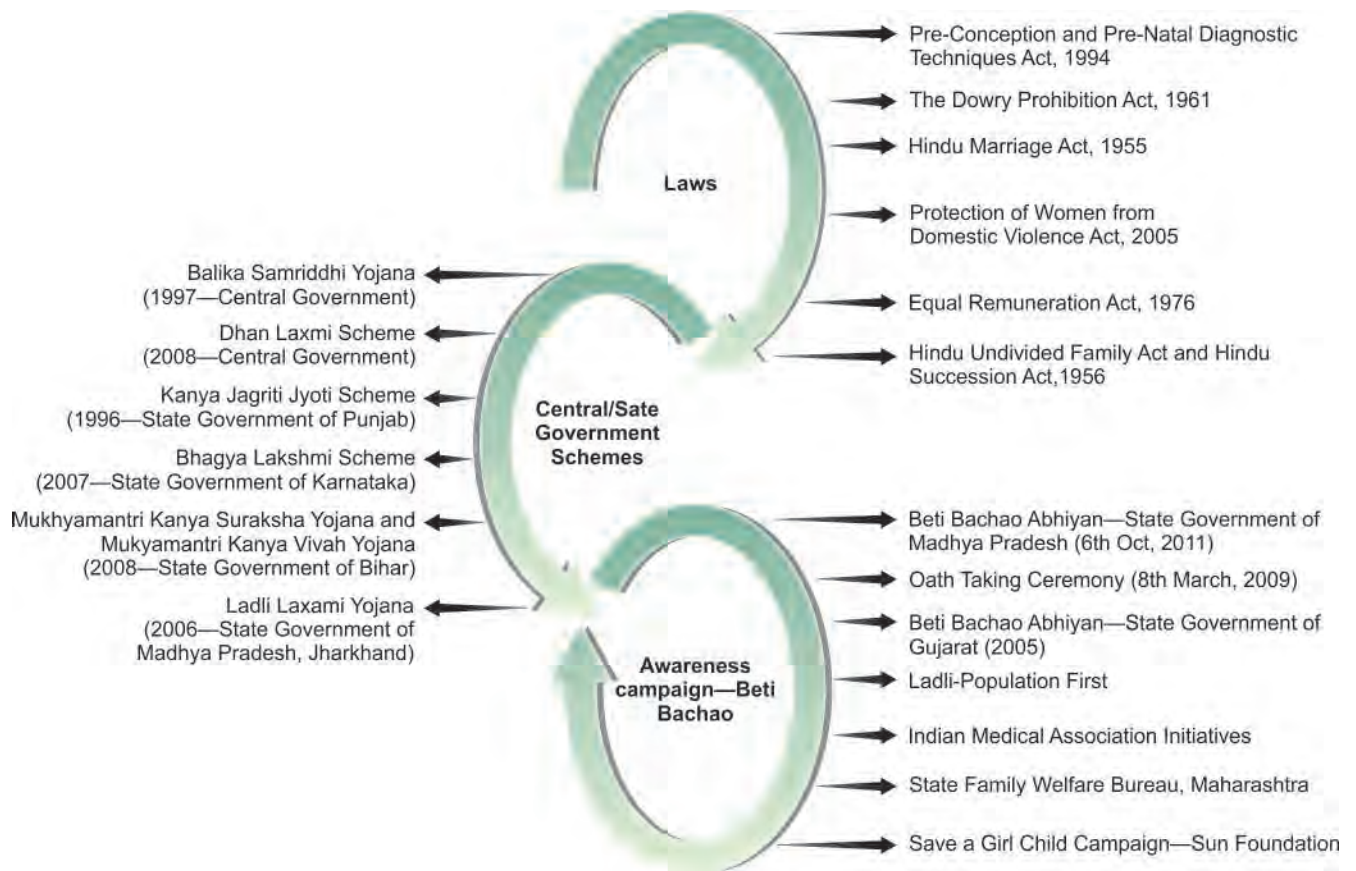
■ EVOLUTION OF THE LAWS AND POLICY

It is said Indian government was one of the first few that took initiatives to the need of saving the girl child. Over the past few periods, the Government has introduced laws for deterrence of female feticide, it has announced special schemes that inspire families to have girl child and it has also undertaken various campaigns such as Save the Girl Child.

Flowchart 24.1 summarizes the evolution of these initiatives taken by the Government of India and independent bodies for this novel cause.

■ ROLE OF FOGSI

The Federation of Obstetric and Gynaecological Societies of India (FOGSI) as a society has taken action and taking the lead in “Operation *Beti Bachao*”. FOGSI has

Flowchart 24.1: Evolution of the laws and policy—some initiatives taken by the Government of India and independent bodies.

many volunteers, contributors and members for their involvement in education, steering general checkups, vaccination, adoption and fund-raising programs. Many branches of FOGSI are also participating in these activities.

Empowerment of women starting from fetus in womb through holistic health education to every pregnant women (counseling, diet, physical, mental, social health care).

Educational session for healthcare professional—anganwadi, supervisors, auxiliary nurse midwife (ANM) on their meeting, training by lecture, poster presentation.

Girl's schools of that area are empowered through holistic health education by lecture, poster presentation

Involvement of religious, political and female organization of that area with gynecological, radiological association in every program

Nukkad drama, rally, pledge for protection and safety of girl child

Media involvement by articles on “save girl child”.

FOGSI also have FOGSI—Mylan Smriti awards that are given for FOGSI society for special effort and activities addressing issue of saving the girl child.

■ IMPORTANCE OF EDUCATING GIRLS

In the current times, women are contending with men in all domains of life. Today, people not only understand the importance of quality education, but also send their daughters to school. A girls' education can bring about a phenomenal change in the society and everyone is aware of this fact.

However, things remain as it is in several rural parts of India, where people still do not send their daughters to schools due to cultural and pecuniary reasons. While some people think, due to sociocultural thinking, that girls should know nothing apart from household chores, others cannot afford to give their daughters proper education.

Educated girls grow up to become educated women who can play an important role in the development of society be it political, cultural, economic or social sphere. Education not only empowers a grown up girl, but also makes her choose their dreams and become economically independent. This economic independence makes a woman feel self-assured about herself and gives her a sense of achievement. This is in-turn fight against the grave issue of gender inequality.

An educated woman is capable of sharing the burden of men in the different spheres of life. In this age of economic crisis, it is hard for the middle class to make both ends meet. Educated and working women can add to the total income of their family and ensure that her children also learn and educate themselves.

Educated girls can not only advance their own lives but can also enhance the future of the country by giving their children a good upbringing. Education leads to freedom of thought and broadens a woman's outlook. This also makes her aware of her responsibilities and duties.

■ EMPOWER THE GIRL CHILD

It is very important to ensure that every girl child gets quality education. Working with top corporates, save the children has facilitated education across thousands of schools across the country by imparting training in extracurricular activities. The organization has mapped many out-of-school children and encouraged families to send their daughters to school. Many community events are also organized to sensitize families and communities about the relevance of girl child education. Empowerment of the girl child with the help of education will bring about a big change in the country.

■ CONCLUSION

As highlighted above, there is an imperative need to give impetus to the importance of raising public consciousness of the poor conditions some girls face. It is important to educate community members on their responsibilities for the betterment of our future.

There is a need to sensitize the public to the difficulties of early and forced child marriages. Current trends of rapidly decreasing family average size, preference for male child remaining the same, the female population is showing a downward trend which definitely needs to improve with participation from society as well as government.

Various initiatives are taken by Government, but it raised a question, whether it will be possible with current strategy to raise sex ratio in favor of girl child successfully or do we really need to internalize the process in favor of woman by taking some legislative measures? Just like these, there are many questions which are unanswerable, because the child ratio between 0 year and 6 years lessening day-by-day instead of growing.

Empowerment of girls and gender equality is the need of the hour in every sphere whether it be education, social, political or economic in order to improve the overall status of our society and for a better future for all of us.

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Medicolegal Aspect of Maternity Care

MC Patel

■ INTRODUCTION

Medical profession is the most noble, but dealing with the most complicated science of human life. Obstetrician and gynecologist deals with two patients at a time mother and fetus, so they are more prone to legal issues. Maternal mortality and infant mortality is matter of worry and great concern to obstetrician. As compared to neighbor countries, India is far behind the figure. Of course as compared to past, India has done well to check maternal mortality ratio (MMR) and infant mortality rate (IMR). Of course it is satisfactory, but long way to go yet. We can be quite hopeful to reach target with joint efforts of government, Federation of Obstetric and Gynaecological Societies of India (FOGSI), Indian Medical Association (IMA), social organizations working in field of education and health care, media and other organizations. Illiteracy and poverty is the main cause for the same. Either patient is poor and does not afford proper in time treatment or unaware of facilities available free near by in government set up or any other organizations. To educate them for regular in time proper antenatal care to pick up high-risk pregnancy and to manage accordingly in time and to encourage them for institutional delivery. Thus, antenatal care becomes one of the most effective ways to check MMR and IMR.

In some situations, it is very difficult to reach final diagnosis and etiology behind it. Many a times, patient is brought very late in critical condition, but in any given situation once patient is brought to the hospital, they consider doctor responsible for any outcome because they consider it physiological rather than pathological. Doctor is also under obligation to manage the patient with due reasonable care and skill. In spite of all these limitations, doctor works in emergency 24 hours a day and seven days a week. But expectations of patients and relatives are so high that, in spite of all efforts on part of a doctor, if anything goes wrong or expected result is not achieved it is all likely that doctor may have to face litigations.

■ IGNORANCE OF LAW IS NO EXCUSE

As soon as any act, any law, any ordinance passes in government gazette it is presumed by law that each citizen of India knows law and that is why ignorance of law is never an excuse.

Doctor may have to face litigations either under Consumer Protection Act (CPA) 1986 (amendment 2003) or under *civil* suit or *criminal* case and sometimes simultaneously under both CPA and *criminal* or *civil* and *criminal*. One may has to face litigation in medical council also.

■ PREVENTION IS ALWAYS BETTER THAN CURE

There is no separate law for maternity care. General principles of law apply in any given situations or in any given case in managing any patient including antenatal patient.

There are some situations which becomes potential for litigations. They are alarming situations; one should be vigilant enough not to end up in to litigation.

Alarming Situations

There are certain alarming situations in which one should be alert and vigilant.

- ✦ Missing important investigations to advice during antenatal visit, i.e.
 - Forgot blood grouping—later found to be Rh-negative
 - Forgot to do nuchal translucency/double/triple marker test and baby had Down's syndrome
 - Forgot to do gestational diabetes mellitus (GDM) screening and patient found to be having complications or intrauterine fetal death later
 - Forgot to screen for thalassemia and baby delivered with thalassemia major
 - Forgot to screen for thyroid profile and something goes wrong
 - Forgot to ask for history of allergy

- ✦ Patient or relatives dissatisfaction
- ✦ Asking to take second opinion and one has refused
- ✦ Asking to shift the patient to another hospital and one has refused or delayed
- ✦ Complications or an unexpected result:
 - Failure of procedure/operation
 - Trauma/injury
 - Hemorrhage
 - Infections
 - Complication of anesthesia
- ✦ Tremendous expense against not expected result
- ✦ Death of a young patient
- ✦ Request for medical record and one has refuse
- ✦ Failure of a patient to keep scheduled follow-up and ended into complications.

So, if one is dealing with this situation, should be alert to face litigation.

Prevention is always better than cure.

Here are some tips to follow to avoid litigation:

- ✦ *Proper antenatal care:*
 - Antenatal care is systemic supervision of woman during pregnancy
 - It provides necessary therapeutic interventions and educating pregnant woman about planning of safe delivery, to pick up high-risk factors in time and planning accordingly, manage emergencies during pregnancy, and due intensive management accordingly
 - *Antenatal visits:*
 - ◆ Proper history with age, any symptom, detail menstrual [last menstrual period (LMP)] and detail obstetric history with past deliveries, abortions, mode of delivery, complications, etc.
 - ◆ History of any systemic illness, surgery, hospitalization, etc.
 - ◆ Proper counseling for antenatal visit monthly up to 32 weeks, biweekly after 32 weeks up to 36 weeks, and weekly up to delivery
 - ◆ If any high-risk factor, then frequency of antenatal visit will be more
 - ◆ Proper instructions during every visit
 - *Proper physical examination:*
 - ◆ Systemic examination
 - ◆ Abdominal examinations including fetal heart auscultation when it becomes audible.
 - *Pelvic examination:*
 - ◆ Per speculum and pervaginal examination as per case
 - Investigations

- *Blood:*
 - ◆ Grouping ABO Rh
 - ◆ *Complete blood count (CBC):* Hemoglobin at initial visit and at least once in each trimester. If patient is under treatment for anemia frequency of test for hemoglobin will be more
 - ◆ If anemia, treat meticulously and if any high-risk factor, then frequency of investigations will be more
 - ◆ Venereal disease research laboratory (VDRL)/hepatitis B surface antigen (HBsAg)/human immunodeficiency virus (HIV)
 - ◆ *Sugar:* As per FOGSI guideline or Diabetes in Pregnancy Study Group in India (DIPSI) guideline, fasting blood sugar (FBS) at first visit and glucose challenge test (blood sugar after 1 hour of 50 g glucose irrespective of fasting status) between 24 weeks and 26 weeks
 - ◆ Thyroid profile
 - ◆ Test to rule out thalassemia trait
 - ◆ Specific investigations as per condition
- *Urine examination:*
 - ◆ Routine and microscopy with albumin and sugar
- *Ultrasound examination:*
 - ◆ In early pregnancy to confirm intrauterine/ectopic pregnancy
 - ◆ During 11–13 weeks scan for NT and to rule out congenital malformation
 - ◆ About at 22 weeks for four chamber view of heart, three vessels view and out flow tract, and to rule out other anomalies
 - ◆ During 32–34 weeks for fetal growth parameters, liquor, and placental localization and to rule out accreta, increta or percreta
- *Immunization:*
 - ◆ Two dose of tetanus toxoid injection 0.5 mL/dose deep intramuscular in upper arm at interval of 1 month after first trimester
 - ◆ Second dose at least 1 month before delivery
 - ◆ Prophylactic injection anti-D at 28 weeks in case of Rh-negative patient.
- *Drugs:*
 - ◆ Tablets iron folic acid (100 mg elemental iron and 0.5 mg folic acid) daily till delivery and even in postpartum period also for some period as per case after first trimester
 - ◆ Tablet calcium 1,000 mg daily after first trimester
 - ◆ Other drugs as per case, i.e. GDM, pre-eclampsia, etc.
- *Diet and nutrition:*
 - ◆ Counseling for nutrition and proper diet

- ✦ *Institutional delivery:*
 - Naturally institutional delivery under supervision of trained obstetrician will check MMR and IMR
 - High-risk factors will be picked up at proper time and will be managed properly
 - Emergencies will be taken care accordingly
- ✦ *Identification of high-risk patients and management accordingly in higher centers:* Will reduce morbidity and mortality so less litigations
- ✦ *Take tender care with compassion of your patient during treatment/surgery:* Because those who are open, pleasant, and communicative are much less to be sued, as patients are extremely forgiving of errors made by a friendly and concerned medical attendant
- ✦ *Proper counseling about:*
 - Antenatal visits with follow-up visits
 - Required investigations including HIV testing/ultrasound examination/duel/triple/quadruple markers (as per case)
 - Drugs
 - Nutrition
 - Rest
 - Exercise
 - Lifestyle considerations
 - Period of pregnancy, probable complications, mode of delivery without come, and probable complications
 - Postpartum period and probable complications
 - Newborn care and contraception
 - Available maternity care services
 - Maternity benefits
 - Government scheme related to maternity care
- ✦ *Expert opinion whenever needed:* Help taken from any expert or senior colleague in time always helps not only to the patient but to the treating person if he has to face any litigation. Because efforts to save life of patient are always considered by the court
- ✦ *Take valid consent:* Proper counseling and taking valid consent is also good defense, if one has to face any litigation
- ✦ *Meticulous record/proper documentation:*
 - It reflects efforts taken by treating person to save life of patient. Naturally good record is good defense, poor record is poor defense, and no record is no defense. Thing done, if not recorded means thing not done. Meticulous record is always at your rescue when facing litigation
 - Important bill of purchase of drugs, oxygen cylinder, and emergency instruments, i.e. Ambu bag, ventilator, etc. should be preserved. Bill of refilling of oxygen cylinder is also important document.
- ✦ *Printed protocols:*
 - *Pregnancy profile* to be handed over at first visit. It should be in local language. Signature of patient should be taken. If patient does not follow the instruction, it becomes contributory negligence which one more good defense in favor of treating person
 - Ensure that you will not miss any high-risk factor
- ✦ *Emergency box:*
 - Should be available round the clock
 - Please check at regular interval about expiry date and update it in time accordingly
- ✦ If you are providing ultrasound services, please get your center registered under Pre-Conception and Pre-Natal Diagnostic Techniques (PCPNDT) Act and strict compliance with the provisions of the Act
- ✦ Please do not issue any certificate in absence of patient or in back date
- ✦ In event of death, if you are not sure of cause of death, please do not issue death certificate. Advise postmortem examination
- ✦ Inform police, if required
- ✦ Comply with the provisions of law
- ✦ Security alert
- ✦ Closed-circuit television (CCTV) coverage at every strategic point
- ✦ Formation of local level rush team/medicolegal cell to have surgical assistance in emergency and assistance in event of sudden death on table, mob violence, and other odd situations and medicolegal consequences
- ✦ Collective responsibility in unusual circumstances. Do not blame each other when treating persons are more than one
- ✦ Proper communication with relative about mishap (special attention)
- ✦ Take medicolegal advice from point one, if required
- ✦ *Identify yourself well in the court:*
 - Tender loving care with compassion is secret of success in any case. Take care of any patient as if she was your family member. Majority of litigations or any legal issues will not occur and if at all occur, will be solved with proper approach.

—Have a litigation free practice.

Preventing Cervical Cancer and STDs

Bhagyalaxmi Nayak, BK Shubhada Neel

■ INTRODUCTION

Cervical cancer is a great public health challenge accounting for 20% of the world's incidence and mortality. It is second only to breast cancer in Indian women, cancer breast becoming the most common in the last few years (GLOBOCAN 2018). New cases detected in our country each year are 96,922 and mortality due to cervical cancer is 60,078—which is a slight decline from the previous years but remains a dismal high as compared to developed countries. One-fourth of the world's cervical cancer patients are in India.

India has a large population of 432.20 million women aged more than 15 years.¹ This group is at an increased risk of developing cervical cancer though the incidence of cervical intraepithelial neoplasia (CIN) in adolescence has seen an increase in the recent past. Though the factors leading to high prevalence of cervical cancer in India are many, they are all known to us and need attention and execution. The high mortality is unfortunately not prevented yet. It is due to mainly lack of awareness about the disease in common men and women and partly due to absence of not so feasible organized screening programs. Here comes the role of human papillomavirus (HPV) vaccination. It is good to know that 58 countries have already included HPV vaccine in their national immunization schedule so that the prevalence of cervical cancer can be brought down. Simultaneously, there is a large unmet need for an organized screening program throughout the country, which cannot be ignored.

Cervical cancer is a huge health problem in spite of it being an absolutely preventable disease and is an indicator of general health status of females. Though there has been an appreciable decline in the number of new cases and number of deaths due to cervical cancer in India (GLOBOCAN 2018) still there is a long way to go. *Mothers are not dying because of diseases we cannot treat. They are dying because societies have yet to make the decision that their lives are worth saving (Mahmoud F Fathalla).* It is so true for cervical cancer. So let us all

stand up together to prevent the preventable disease and make it a story of the past.

Persistent infection with high-risk HPV has been now proved beyond doubt to be a necessary cause for cervical cancer. HPV vaccines are virus-like particle (VLP) vaccines that protect against infection with HPV. Hence it looks promising to be able to eradicate cervical cancer with the advent of cervical cancer vaccine and making it a part of the universal immunization programme, as has been the case with polio. But implementing HPV vaccination has not been very feasible due to many reasons. Preventing cervical cancer is a great challenge to modern day medicine not because of its nature but for the taboo attached to it and that it being asymptomatic in its precancerous and early invasive stages. Convincing women to take a preventive healthcare checkup in a country like India is a Herculean task. Women education and empowerment are the answer to cervical cancer prevention when they come forward to ask for screening. And that is when we know the sun will rise in the horizon of new India. Being optimistic is the way forward. There has been slow but steady progress in women education, empowerment, and healthcare accessibility and affordability. Cervical cancer has almost become synonymous to low socioeconomic status and resource poor situations.

The problem is not only the high prevalence but also the high mortality due to this disease because majority present late. Every 7 minutes, an Indian woman dies of cervical cancer (WHO, 2010). Survival rate is poor and less than 50% women diagnosed with cervical cancer are able to survive for more than 5 years, because there are no symptoms in the early stages. The reason for such a high mortality due to cervical cancer is late diagnosis. Despite the considerable burden of cervical cancer in India, there are only few meager organized cervical cancer screening programs in the country. Majority of these are done by NGOs and philanthropic organizations. The majority of women are diagnosed only after they become symptomatic or at advanced stages of disease, with poor prognosis.

Screening of asymptomatic women is practically absent, (2.3%). It is estimated that less than 1.5 million smears are opportunistically taken annually. The quality of the smears, the technical expertise to report on the smears, follow-up of the abnormal reports and their treatment is a huge challenge. In recent years, HPV DNA testing is increasingly being used in the private sector, though it is likely that less than 50,000 HPV tests are carried out annually as it is not very economically available. Women in India have very low awareness about cervical cancer and in fact any other sexually transmitted disease (STD) in that matter and its prevention. In a study, nearly half of Indian women (45%) showed that they were worried more about obesity than developing cervical cancer (24%). Similarly a study in Chennai showed that majority of women (69.6%) were not aware of cervical cancer and very few (16.4%) were aware of screening tests available. A recent report by WHO states that low- and middle-income countries, where more than 85% of cervical cancer deaths occur, can particularly benefit from HPV vaccine. HPV vaccine has one of the highest per-person impacts on mortality of all vaccines. In the longer-term, high HPV vaccine coverage will reduce the economic and human costs of cervical cancer treatment. Moreover, in Indian settings, where women have less access to cervical cancer screening the vaccine would be particularly beneficial, though on the long run. Regular cervical cytology examination (Pap smear) for all women who have initiated sexual activity can prevent the occurrence of cervical cancer. The primary aim should be to offer once a lifetime screening for all women around the age of 40 years. It is the coverage of screening that is important to bring about a change in incidence. Political will to do it is the most expectant way forward. Government and private healthcare providers can join in this effort and offer these services. Though cytological examination has been the mainstay for early detection of cervical cancer, its widespread use has not been possible in our country due to paucity of resources, other emerging health issues and lack of manpower and other facilities.

Looking at alternative strategies such as naked eye visual inspection of cervix (down staging), visual inspection with acetic acid (VIA), magnified VIA (VIAM), visual inspection with Lugol's iodine (VILI), cervicography, and HPV DNA testing in detecting cervical cancer and its precursors have to be adopted depending on the socioeconomic settings in which we are working. Regular screening through VIA along with treatment in the same sitting would be the most optimistic way looking at the problem and our resources. However, further referral for treatment may be needed in many cases for which we need to be equipped. Screening without treatment of the lesions fails the purpose of screening. As the age

affected by cervical cancer is decreasing thus a study has suggested that screening should be initiated at 25 years of age. Screening approaches in India and other developing countries can reduce the lifetime risk of cancer by approximately 25–36%.

A national HPV vaccination program appears to be practically possible as compared to screening program in India. The infrastructure and trained personnel for vaccination are already in place at all levels of health service delivery. Policy makers should realize the importance of this vaccine and should seriously consider including HPV vaccine in National Immunization Schedule.

The vaccine is creating a buzz in the private sector. Efforts should be made to increase the awareness about this disease so that the unfelt need of the society can be converted into felt need. A vaccine program cannot be successful without the support and approval of the general public so media should be very responsible. Role of press should be supportive and adverse effects following immunization (AEFI) should not be misreported and blown out of proportion.

At present, cervical cancer prevention depends on various segments—primary prevention and secondary prevention. Primary prevention includes vaccination and screening for detection of precancerous lesions of the cervix and treating them.

Vaccination: The vaccines approved by FDA and now available are the quadrivalent vaccine by Merck called Gardasil, the bivalent vaccine by GSK called Cervarix and the more recently launched nonavalent vaccine Gardasil 9. Gardasil 9 is not available in India right now. Vaccination of children and adolescents today will prevent 90% cervical cancer but the results will show after may be two decades. HPV vaccination, when used judiciously, has the potential to reduce cervical cancer incidence globally by around roughly 90%.² As of now, we have enough evidence to show that protection against the vaccine related HPV types has been found to last for 10 years with Gardasil,² 9 years with Cervarix,³ and 6 years with Gardasil 9.⁴ More than that, the vaccines may also cut down on the costs for screening and subsequent medical care, biopsies, and invasive procedures associated with follow-up from abnormal cervical screening and thus help to reduce healthcare costs and anxieties related to follow-up procedures.⁵ HPV vaccine if administered before the diagnosis of pregnancy, termination of pregnancy is not deemed necessary. However, further doses of vaccine need to be withheld. Vaccination can be safely continued after child birth during lactation.

The Centers for Disease Control and Prevention (CDC) developed recommendations regarding all vaccination,

including HPV vaccination. The current CDC recommendations for vaccination are as follows:⁶

- ✦ All children aged 11 or 12 years should get two HPV vaccine shots 6 to 12 months apart. If the two shots are given less than 5 months apart, a third shot will be needed. There could be future changes in recommendations on dosing.
- ✦ HPV vaccine is recommended for young women up to age 26, and young men up to age 21.
- ✦ Adolescents who get their first dose at age 15 or older need three doses of vaccine given over 6 months. (0, 1, 6 or 0, 2, 6 as the vaccine schedule may be)
- ✦ Persons who have completed a valid series with any HPV vaccine do not need any additional doses.

To curb the menace today screening and treatment of precancerous lesions is the only answer.

■ SCREENING FOR CERVICAL CANCER

Methods Available

- ✦ *Cervical cytology* has been the oldest method of screening and well-organized cytology programs have been very successful to bring down the cervical cancer rates in many countries, the glaring example being British Columbia and Canada. It could be conventional cytology, liquid base cytology (LBC), or more advanced automated Pap smear testing methods (AutoPap and AutoCyte Screen). Nonetheless it is difficult to sustain effective cervical cytology programs in developing countries like ours.
- ✦ *Visual inspection methods:* Visual inspection of the cervix with naked eye [after application of acetic acid (VIA) or Lugol's iodine (VILI)]. The test characteristics have been evaluated in many field studies and sensitivity ranges from 67% to 79% and specificity 49–86%.⁷
- ✦ *HPV-based screening tests:* With the discovery of HPV as a necessary cause of cervical cancer by noble laureate Harald zur Hausen, testing for the presence of HPV as a marker for cervical cancer has emerged as an important screening modality.

There are various methods of testing for HPV: Care HPV, Cervista, Hybrid Capture 2, E6/E7 mRNA, etc. They rely on molecular technologies to detect HPV DNA in cervical or vaginal fluids. Detection rates of high-grade lesions by this method are far better than visual methods and cytology. They can however, complement each other which further improves the pickup rates. Though very sensitive, the specificity of these tests lacks specificity. Hybrid Capture 2 is the most commonly used method of HPV testing. With the availability of simple, affordable, and accurate HPV

tests, it can be used as a primary screening approach in low-resource settings for women who are at least 30 years of age.⁸ Transient HPV infections are picked up as HPV positive in women where no cytological changes have occurred. Managing such women can be challenging. FOGSI GCPR is an extremely useful guiding tool to decide on screening modalities to be followed and also to manage the screen positives according to the resource settings in which we are working. There is, in fact, everything that can be done in every situation.

But looking at the diverse demographic characteristics of Indian population and the large unmet needs of screening, visual methods of cervical screening have emerged successful candidates in resource poor settings. Of these, visual inspection after application of 3–5% acetic acid and visual inspection with Lugol's iodine are the simplest and easily available and affordable. More than that, these can be done by healthcare workers and paramedics. Hence, a large population can be screened and a single visit “screen and treat” will be the most effective method of bringing down the rates of cervical cancer.

Awareness program about the preventable nature of the disease and the preventive measures that are available is again a crucial step that does not get due importance.

Then coming to secondary prevention, this includes early detection which may be in symptomatic or asymptomatic women. This is again a large segment which is missed out because per speculum examination is falling out of practice. Neither the patient nor the healthcare professional appreciate the great importance of doing a perspeculum examination, the great secrets that it reveals which no Hi-Tech Investigation will. Please do not lose the opportunity of doing a perspeculum examination for all women attending any healthcare facility for any problem.

Screen Positive Women

This is a supplement to the screening program that cannot be ignored. Hence developing a support system to convince patients for treatment as close to their homes is a trick that will do it. Hence screen and treat would be good alternative and wisest option in India and accepting the rates of overtreatment is the fine we pay for that.

■ FOGSI RECOMMENDATIONS

- ✦ Human papillomavirus vaccines are licensed for use in females aged 9–45 years; however, the preferred target age group is 9–14 years (Level A).
- ✦ Vaccination in sexually active females may be less effective, but may provide some benefit as exposure to all vaccine types previously is unlikely (Level B).

- ✦ Females aged 15–25 years should be considered for catch-up vaccination program only if resources are available (Level B).
- ✦ Girls aged 9–14 years of age should receive two doses of HPV vaccine at least 6 months apart, although the interval between two doses can be extended to 12–15 months in circumstances where the second dose is not repeated within 6 months (Level A).
- ✦ Catch-up vaccination can be offered to females more than 15 years till 26 years. They should receive three doses, however, the second dose should be given after 1 or 2 months (depending on the vaccine that is used) and third dose after 6 months of the first dose (Level A).
- ✦ Older girls/women who have been sexually active should be counseled regarding reduced efficacy of HPV vaccine and the importance of screening from the age of 25 years. (Level A).
- ✦ Screening of HIV-positive women should start in the first year of diagnosis irrespective of age (Level A).
- ✦ In order to enhance the coverage, ART services should be integrated with cervical screening program (Level B).
- ✦ In good-resource settings screening should be continued as per age recommendation every 3 years up to 65 years (Level A).
- ✦ In limited resource settings, VIA should be done every 3 years up to 50 years (Level B).
- ✦ Vaccination in males is not recommended at present in the Indian setting (Level C).
- ✦ HIV-positive girls should be advised to start HPV vaccination from 9 years to 14 years and should be prescribed three dose schedule (0, 1, 6 months) (Level B).
- ✦ For women aged 25–45 years, the first priority should be given to cervical cancer screening. Cervical cancer screening and HPV vaccination are not mutually exclusive (Level A).

More recently, research is focusing to find innovative and novel systems to produce and deliver newer HPV vaccines and to help overcome shortcomings that have partly restricted the potential benefit of the vaccines in use today.⁹ Requests from various agencies working on cervical cancer to the Government of India to include HPV vaccination in the Universal Immunization Program is under consideration. In few states, it has been taken up at Government level to vaccinate girls: UP, Delhi, and Chandigarh. FOGSI as a huge scientific body started its program of “Screen the mother: Immunize the daughter” (Akshay Jeevan) in Varanasi. The FOGSI GCPR guidelines about HPV vaccination laid down in January 2018 by Dr Neerja Bhatla, the then chairperson of Oncology Committee, FOGSI is uploaded in FOGSI website for everyone’s perusal.

Screening and vaccination have to go hand-in-hand to prevent the menace of cervical cancer. As proud members of FOGSI, it is our onus to spread awareness of cervical cancer and responsibility to screen at least five women per day. Minimum coverage of 70% of the target population by screening at least once in a lifetime along with effective treatment of the precancerous lesions is the only way to bring down the rates of cervical cancer and cervical cancer mortality.¹⁰ Trials in low-resource settings have demonstrated the need for dedicated staff for cancer screening to make any program successful.¹¹

■ PREVENTING SEXUALLY TRANSMITTED DISEASES

The common STDs are syphilis, acquired immunodeficiency syndrome, *Chlamydia*, gonorrhoea, trichomoniasis, HPV infections, hepatitis B, herpes simplex, etc.

Parents should be encouraged to discuss sexuality and contraception that is consistent with the family’s values, attitude, belief, and circumstances. It should start early in life starting to differentiate a good touch from a bad touch. Comprehensive sexual education about STDs in school curriculum does not increase promiscuity. Adolescence is the most vulnerable period and the most effective time to start with tailored counseling. In India there are 243 million adolescents constituting 21% of the total population. Must be specific, culturally sensitive, and nonjudgmental. Counseling and vaccination against hepatitis B and HPV is an important step. Safe and responsible sexual practices should be taught to children by parents. It is always better that they learn from parents than fulfill curiosities from internet or peer group. However, not having sex is the only sure way to prevent STDs. Specific adolescent clinics need to evolve to address the needs of today’s adolescents, tomorrow’s future. Abstinence should be encouraged and in fact channelizing the energy of youth into positive activity in the form of outdoor activities, yoga, and meditation need to be encouraged. Youth empowerment is the key to build the nation. Drug abuse and peer pressure are aggravating factors and need to be discussed. Accept adolescents as they are. They need more care, love, and appreciation. Youth friendly services need more attention that sports lot of confidentiality.

Supportive components of STD control: Leadership and advocacy to ensure an environment supporting STD control and prevention is the need of the day. Programs for STD surveillance and track burden of disease are important. Partners of STD patients need to be traced and screened and treated. Key population such as sex workers, men having sex with men, mentally challenged people, drug addicts, sharing syringes, etc. should be taken into

confidence and given thorough counseling about the do's and don'ts. Encouraging correct and consistent use of condom by male and female should be encouraged and screening asymptomatic persons at risk is the crux. Monogamous relationships should be encouraged.

FOGSI "Adbhut Matrutva Programme" the flagship programme of FOGSI President Dr Jaideep Malhotra has been a great program and with its thrust on overall physical and mental wellbeing of women of India, improvement of nutritional status, improvement of maternal intelligence to handle pregnancy and children safely will go a long way to prevent cervical cancer and STDs in the coming future.

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Pradhan Mantri Surakshit Matritva Abhiyan

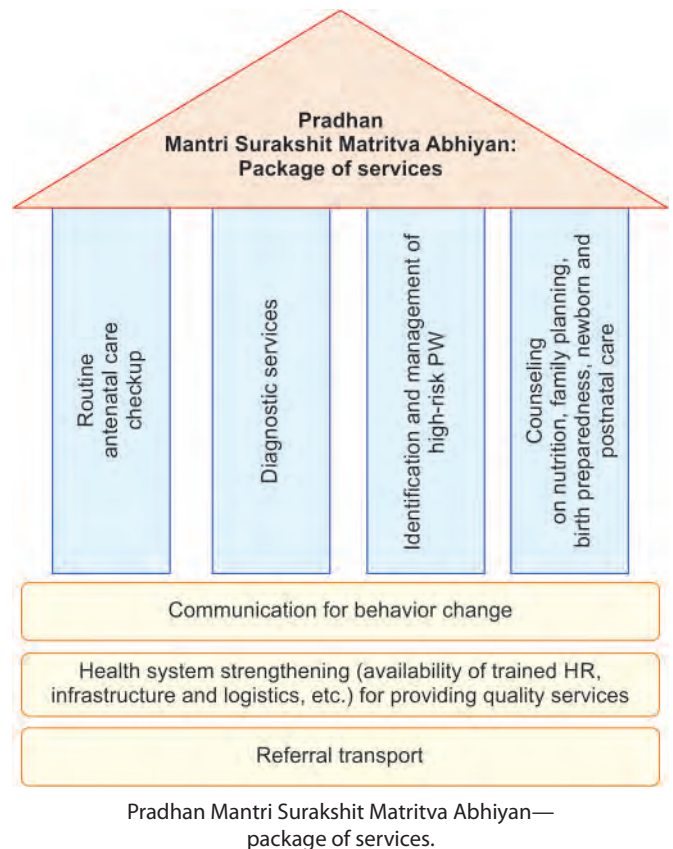
Nisha Sahu, Pushpa Pandey

■ ABOUT PRADHAN MANTRI SURAKSHIT MATRITVA ABHIYAN

- ✦ The Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) has been launched by the Ministry of Health and Family Welfare (MoHFW), Government of India. The program aims to provide assured, comprehensive, and quality antenatal care (ANC), free of cost, universally to all pregnant women on the 9th of every month.
- ✦ The PMSMA guarantees a minimum package of ANC services to women in their second or third trimesters of pregnancy at designated government health facilities.
- ✦ The program follows a systematic approach for engagement with private sector, which includes motivating private practitioners to volunteer for the campaign developing strategies for generating awareness and appealing to the private sector to participate in the Abhiyan at government health facilities.

■ RATIONALE FOR PRADHAN MANTRI SURAKSHIT MATRITVA ABHIYAN

- ✦ Data indicates that maternal mortality ratio (MMR) in India was very high in the year 1990 with 556 women dying during childbirth per hundred thousand live births as compared to the global MMR of 385/lakh live births.
- ✦ As per the Registrar General of India-sample registration system (RGI-SRS) (2011–2013), MMR of India has now declined to 167/lakh live births against a global MMR of 216/lakh live births (2015). India has registered an overall decline in MMR of 70% between 1990 and 2015 in comparison to a global decline of 44%.
- ✦ While India has made considerable progress in the reduction of maternal and infant mortality, every year approximately 44,000 women still die due to pregnancy-related causes and approximately 6.6 lakhs infants die within the first 28 days of life. Many of these



deaths are preventable and many lives can be saved, if quality care is provided to pregnant women during their antenatal period and high-risk factors such as severe anemia, pregnancy-induced hypertension, etc. are detected on time and managed well.

■ GOAL OF THE PRADHAN MANTRI SURAKSHIT MATRITVA ABHIYAN

Pradhan Mantri Surakshit Matritva Abhiyan envisages to improve the quality and coverage of ANC including diagnostics and counseling services as part of the

reproductive maternal neonatal child and adolescent health (RMNCH+A) strategy.

Objectives of Pradhan Mantri Surakshit Matritva Abhiyan

- ✦ Ensure at least one antenatal checkup for all pregnant women in their second or third trimester by a physician or specialist.
- ✦ Improve the quality of care during antenatal visits. This includes ensuring provision of the following services:
 - All applicable diagnostic services
 - Screening for the applicable clinical conditions
 - Appropriate management of any existing clinical condition such as anemia, pregnancy-induced hypertension, gestational diabetes, etc.
 - Appropriate counseling services and proper documentation of services rendered
 - Additional service opportunity to pregnant women who have missed antenatal visits.
- ✦ Identification and line listing of high-risk pregnancies based on obstetric or medical history and existing clinical conditions.
- ✦ Appropriate birth planning and complication readiness for each pregnant woman especially those identified with any risk factor or comorbid condition.
- ✦ Special emphasis on early diagnosis, adequate, and appropriate management of women with malnutrition.
- ✦ Special focus on adolescent and early pregnancies as these pregnancies need extra and specialized care.

KEY FEATURES OF PRADHAN MANTRI SURAKSHIT MATRITVA ABHIYAN

- ✦ The PMSMA is based on the premise that if every pregnant woman in India is examined by a physician and appropriately investigated at least once during the PMSMA, and then appropriately followed-up—the process can result in reduction in the number of maternal and neonatal deaths in our country.
- ✦ Antenatal checkup services would be provided by obstetrician-gynecologist (OB/GYN) specialists or radiologist or physicians with support from private sector doctors to supplement the efforts of the government sector.
- ✦ A minimum package of ANC services (including investigations and drugs) would be provided to the beneficiaries on the 9th day of every month at identified public health facilities like Primary Health Centers (PHCs) or Community Health Centers (CHCs), District Hospitals (DHs) or urban health facilities, etc. in both urban and rural areas in addition to the routine ANC at the health facility or outreach.

Table 27.1: Indicator of condition and risk factor of the pregnant women.

Indicator of high risk	
Sticker color	Condition
Green Sticker	Women with no risk factor detected
Red sticker	Women with high risk pregnancy

- ✦ Using the principles of a single window system, it is envisaged that a minimum package of investigations (including one ultrasound during the second trimester of pregnancy) and medicines such as iron folic acid (IFA) supplements, calcium supplements, etc. would be provided to all pregnant women attending the PMSMA clinics.
- ✦ While the target would reach out to all pregnant women, special efforts would be made to reach out to women who have not registered for ANC (left out or missed ANC) and also those who have registered but not availed ANC services (dropout) as well as high-risk pregnant women.
- ✦ The OB/GYN specialists or radiologist or physicians from private sector would be encouraged to provide voluntary services at public health facilities where government sector practitioners are not available or inadequate.
- ✦ Pregnant women would be given mother and child protection (MCP) cards and safe motherhood booklets.
- ✦ One of the critical components of the Abhiyan is identification and follow-up of high-risk pregnancies. A sticker indicating the condition and risk factor of the pregnant women would be added onto MCP card for each visit (Table 27.1).
- ✦ A National Portal for PMSMA and a Mobile application have been developed to facilitate the engagement of private or voluntary sector.
- ✦ “IPledgeFor9” Achievers Awards have been devised to celebrate individual and team achievements and acknowledge voluntary contributions for PMSMA in states and districts across India.

ROLE OF FOGSI IN PRADHAN MANTRI SURAKSHIT MATRITVA ABHIYAN

Private FOGSI (Federation of Obstetric and Gynecological Societies of India) members support the government doctors to provide ANC services would be provided to pregnant women in their second or third trimesters of at government health facilities.

Dr Jaideep Malhotra, FOGSI President, launched “Adbhut Matrutva Initiative”, on 19th January 2018, at Bhubaneswar in AICOG 61. Adbhut Matrutva

concept based on value of preconception counseling, recommended number of antenatal visits, promote institutional deliveries, and top it up with early initiation of breastfeeding and postpartum contraception.

Adbhut Matrutva means “incredible motherhood”, this noble concept helps to deliver a divine baby from divine mother, to create a beautiful and harmonious world and to make a healthy and happy future generation.

The FOGSI in association with Brahma Kumaris organized many sessions of grand training of trainers in different parts of country. Dr Malhotra appeals to FOGSI members to provide voluntary services at government health facilities in their district and conduct the spiritual part of the program along with PMSMA on the 9th of every month to supplement the efforts of the government doctors. In many districts, FOGSI societies are doing this program regularly along with PMSMA.

The FOGSI members who are volunteering for the Abhiyan would be expected to visit designated government health facilities in their districts and provide free ANC checkups to pregnant women on 9th of every month.

Joining the Campaign

If you are ready to volunteer there are three simple steps for joining the campaign.

1. *Step 1:* Registering your intent to volunteer
 - On portal www.pmsma.nhp.gov.in.
 - By dialing toll free number 18001801104, or
 - By sending an SMS—“PMSMA Name” to 5616115.

However, in the interim period, all those who are willing to provide voluntary services on 9th of every month at neighboring government health facilities are requested to share the following information on the email id—fogsi2007@gmail.com: first name, last name, mobile number, email address, state, and district where you would be volunteering for PMSMA (You can access the States and Districts by visiting FOGSI website, www.fogsi.org).

2. *Step 2:* Deciding the health facility where you would like to volunteer.
3. *Step 3:* Provide feedback or check your contribution.

Recognition for Volunteers by FOGSI Societies

FOGSI values the contribution of volunteers and will be awarding them. Some of these awards are:

- ✦ For volunteers who have served maximum number of patients,
- ✦ For volunteers who have consistently provided services on all PMSMA days, and
- ✦ For volunteers who have served in remote or inaccessible areas.

It is planned that volunteers would be felicitated by Member of Parliament or District Magistrate (DM) at District level and by the Health Minister or State Health Secretary at State level. It is also envisaged that doctors providing exemplary services would be nominated for National level recognitions.

Utilization of social media such as Facebook and Twitter, for recognizing the work of volunteers is a core strategy of the initiative. A virtual “Hall of Fame” is created for recognition of doctors who have consistently performed and achieved the desired benchmarks.

AWARDS AND RECOGNITION BY GOVERNMENT OF INDIA

The PMSMA “*IPledgeFor9*” *Achievers Awards* celebrate individual and team achievements under the PMSMA across India.

Objectives of the PMSMA ‘IPledgeFor 9’ Achievers Awards

The objectives of the awards are two-fold:

1. *Objective 1:* Identify and recognize excellence in PMSMA performance at various levels.
2. *Objective 2:* Identify and recognize exemplary public, private, and voluntary sector contribution to PMSMA.

Public and Social Recognition

Team, individual, and organizational contribution are publicly recognized through awards’ ceremonies as well as across virtual platforms, the “*Halls of Fame*”, in national and state health portals and social media.

Certificates for good performance are awarded in public functions at various levels (District, State, and National) awarded by Ministers or Elected Members of the Parliament, Legislative Assembly in the presence of State or District Authorities and Panchayati Raj Institutions with full media coverage of events.

Press release by authorities in the local or State or National media and feature in Radio and TV channels that provides wide public recognition. Photographs of best performing teams, individuals, and organizations are also showcased through the PMSMA portal and social media.

Categories of Awards

There are three broad categories of awards:

1. Team Awards,
2. Individual Awards, and
3. Special Awards.
 - *Team Awards:* Team awards are focused on facilities providing full complement of services and facilities

Table 27.2: District level awards.

Sr. no.	Sub-category	Awardee	Criteria	Number of awards	Verification criteria	Periodicity	Type of awards	Awarded by
1.	Team	Government teams from health-care facilities	Facilities providing full complement of services every month ¹	All facilities who fit the eligibility criteria	Verification by District Quality Assurance Committees (DQACs)	12 months; First set of awards will be in April 2017	<ul style="list-style-type: none"> ♦ Certificates in a public function ♦ Press release by District Authorities in the local media 	MP/MLA with District Collector/District Magistrate & PRI members in presence of local media
2.	Team	Government teams from health-care facilities	Proportion of high-risk pregnancies identified	All facilities who fit the eligibility criteria	<ul style="list-style-type: none"> ♦ Identification of 15–25% high-risk pregnancies ♦ Data source: Monitoring reports submitted by facilities to Districts as per monitoring format² in the first year. Subsequently data available on the RCH portal would be utilized 			
3.	Individual	Private practitioners	Private practitioners volunteering services for all 12 months	All practitioners who fit the eligibility criteria	Data source: PMSMA portal			
4.	Individual	Private practitioners	Private Practitioner providing services to maximum number of pregnant women	Top 3	Data source: PMSMA portal			
5.	Special	Organizations: Professional Associations-IMA & FOGSI, Radiologist Association, Rotary, Lions clubs, NGOs, CBOs, FBOs, etc.	Providing exemplary support for PMSMA ³	All organizations which fit the eligibility criteria	To be decided by District PMSMA Committee			
6.	Special	Any individual serving in hard to reach/tribal areas requiring special recognition	Providing exemplary support for PMSMA (as decided by the District PMSMA Committee)	All individuals which fit the eligibility criteria	To be decided by District PMSMA Committee			

¹Full complement of services including drugs, diagnostic services and necessary equipment's for the same as per annexure 3 operational framework (on site monitoring format)

²District/State PMSMA committees to ensure data validity based on sample checks by District Quality Assurance Committees

³Providing maximum number of volunteers for PMSMA/providing any other support for PMSMA such as transport/logistic/food for pregnant women, etc.

(FBO: faith-based organizations; CBO: community-based organization; MLA: Member of Legislative Assembly; MP: Member of Parliament; NGO: nongovernmental organization; PMSMA: Pradhan Mantri Surakshit Matritva Abhiyan)

(Source: <https://pmsma.nhp.gov.in>).

Table 27.3: State level awards.

Sr. no.	Sub-category	Awardee	Criteria	Number of awards	Verification criteria	Periodicity	Type of awards	Awarded by
1.	Team	Districts	Districts with maximum number of facilities providing full complement of services every month: ¹ <ul style="list-style-type: none"> Overall HPDs 	1–3 Districts depending upon size of State	Based on per verification of DQACs	12 months; First set of awards will be April in 2017	<ul style="list-style-type: none"> Certificates in a public function Press release Feature in FM radio Lunch/Dinner hosted by Health Minister 	Honorable Health Minister in presence of State media
2.	Team	Districts	Districts with maximum proportion of pregnant women reached. ² <ul style="list-style-type: none"> Overall HPDs 	1–3 Districts depending upon size of State	Based on information available in PMSMA Portal			
3.	Team	Districts	Proportion of High Risk Pregnancies Identified	1–3 Districts depending upon size of State	<ul style="list-style-type: none"> Identification of 15–25% high-risk pregnancies Data source: PMSMA Portal³ in the first year. Subsequently data available on the RCH portal would be utilized 			
4.	Individual	Private practitioners	Private practitioner providing services to the maximum number of pregnant women: <ul style="list-style-type: none"> Overall—At District Hospitals/ Medical Colleges Overall—At SDHs and below HPDs—At District Hospitals/ Medical Colleges HPDs—At SDHs and below 	Top 3 from each category	Source: PMSMA portal			
5.	Individual	Private practitioners	Private practitioners volunteering services: <ul style="list-style-type: none"> For all 12 months For at least 8 months in HPDs 	All practitioners who fit the eligibility criteria	Source: PMSMA portal			
6.	Special	Organizations: Professional Associations such as IMA & FOGSI, Radiologists Associations Rotary, Lions clubs, NGOs, CBOs, FBOs, etc.	Providing exemplary support for PMSMA ⁴	All organizations/ individuals which fit the eligibility criteria	As decided by the State PMSMA Committee (Data available in PMSMA portal on number of volunteers by each organization may also be used)			

¹Full complement of services including drugs, diagnostic services and necessary equipment's for the same as per annexure 3 of operational framework (on site monitoring format)

²Total number of pregnant women provided PMSMA services (once) out of total estimated pregnancies (based on information available in portal)

³District/State PMSMA committees to ensure data validity based on sample checks by District Quality Assurance Committees

⁴Providing maximum number of volunteers for PMSMA/providing any other support for PMSMA such as transport/logistic/food for pregnant women, etc. (FBO: faith-based organizations; CBO: community-based organization; DQAC: District Quality Assurance Committee; FOGSI: Federation of Obstetric and Gynecological Societies of India; HPD: health product declaration; IMA: Indian Medical Association; NGO: nongovernmental organization; PMSMA: Pradhan Mantri Surakshit Matritva Abhiyan) (Source: <https://pmsma.nhp.gov.in>).

Table 27.4: National level awards.

Sr. no.	Sub-category	Awardee	Criteria	Number of awards	Verification criteria	Periodicity	Type of awards	Awarded by
1.	Team	States	States where maximum proportion of pregnant women reached ¹ <ul style="list-style-type: none"> Overall HPDs 	Total 12 awards: <ul style="list-style-type: none"> 6 Awards—Overall; 6 Awards—HPDs including: <ul style="list-style-type: none"> Top 2 large high focus States Top 2 non-high focus States Top 1 among NE States Top 1 among UTs 	Data Source: PMSMA Portal	12 months; First set of awards will be in April 2017	<ul style="list-style-type: none"> Certificates in a public function Press release at national level Feature in FM radio/TV Lunch/Dinner hosted by Health Minister 	Union Health Minister in presence of National media
2.	Team	States	Proportion of high-risk pregnancies identified	6 Awards including: <ul style="list-style-type: none"> Top 2 large high focus States Top 2 non-high focus States Top 1 among NE States Top 1 among UTs 	Identification of 15–25% high-risk pregnancies Data source: PMSMA portal supplemented by data validated by the State in the first year. Subsequently data available on the RCH portal would be utilized			
3.	Individual	Private practitioners	Private Practitioner providing services to the maximum number of pregnant women <ul style="list-style-type: none"> Overall—At District Hospital/Medical Colleges Overall – At SDHs and below HPDs – At District Hospitals/Medical Colleges HPDs – At SDHs and below 	Total 12 awards: <ul style="list-style-type: none"> Top 3 individuals in each category across India (3 * 4 = 12) 	Data source: PMSMA portal			

Contd...

Contd....

Sr. no.	Sub-category	Awardee	Criteria	Number of awards	Verification criteria	Periodicity	Type of awards	Awarded by
4.	Individual	Private practitioners	Private practitioners providing exemplary services under PMSMA ²	1 per State/UT	Each State to nominate one practitioner for the National Award			
5.	Special	Organizations: Professional Associations such as IMA & FOGSI, Rotary, Lions clubs, NGOs, CBOs, FBOs, etc.	Providing exemplary support for PMSMA	All organizations which fit the eligibility criteria	As decided by the National PMSMA Committee (Data available in PMSMA portal may also be used)			

¹Total number of pregnant women provided PMSMA services (once) out of total estimated pregnancies (based on information available in portal)

²Providing maximum number of volunteers for PMSMA/providing any other support for PMSMA such as transport/logistic/food for pregnant women, etc.

(FBO: faith-based organizations; CBO: community-based organization; DQAC: District Quality Assurance Committee; FOGSI: Federation of Obstetric and Gynecological Societies of India; HPD: health product declaration; IMA: Indian Medical Association; NGO: nongovernmental organization; PMSMA: Pradhan Mantri Surakshit Matritva Abhiyan)

(Source: <https://pmsma.nhp.gov.in>).

Table 27.5: Virtual awards.

Sr. no.	Who will be featured	Criteria	Who are eligible	Details of virtual recognition	Display period	Periodicity of change	Start date of the virtual recognition	Type of awards	Awarded by
1.	Individuals	Private practitioner volunteering for PMSMA who provide services to maximum number of pregnant women (Based on volunteer credit in PMSMA Portal)	<ul style="list-style-type: none"> ◆ Top 3 individuals in each category at the National level (3 * 4 = 12): <ul style="list-style-type: none"> – Overall–At District Hospitals/ Medical Colleges – Overall–At SDHs and below – In HPDs–At District Hospitals/ Medical Colleges – In HPDs–At SDHs and below ◆ Top 3 individuals in each category at State level (3 * 4 = 12) <ul style="list-style-type: none"> – Overall–At District Hospitals/ Medical Colleges – Overall–At SDHs and below – In HPDs–At District Hospitals/ Medical Colleges – In HPDs–At SDHs and below 	Volunteer details will be featured in the National and State Halls of Fame: <ul style="list-style-type: none"> ◆ Name ◆ Photograph ◆ Details of contribution 	Monthly	Monthly	First month of PMSMA	E-Certificates for contribution	Ministry of Health and Family Welfare, Government of India
2.	Individuals	Private practitioners volunteering services continuously for all months in 3, 6, 9, 12 months	All	Volunteer details will be featured in the National and State Halls of Fame: <ul style="list-style-type: none"> ◆ Name ◆ Photograph ◆ Details of contribution 	Quarterly	Quarterly	End of quarter-1 of PMSMA	E-Certificates for contribution	Ministry of Health and Family Welfare, Government of India
3.	Individuals	Private practitioners providing exemplary services in hard to reach areas	3 per State/UT (as nominated by the State/UT)	Volunteer details will be featured in the National and State Halls of Fame: <ul style="list-style-type: none"> ◆ Name ◆ Photograph 	Quarterly	Quarterly	End of quarter-1 of PMSMA	E-Certificates for contribution	Ministry of Health and Family Welfare, Government of India
4.	All physical awards achievers	As per physical awards criteria	All eligible individuals, teams, organizations	Achievers' details in the National and State Halls of Fame: <ul style="list-style-type: none"> ◆ Names ◆ Photographs ◆ Details of contribution 	Scheduled as per physical awards' timeframes	Scheduled as per physical awards' timeframes	Scheduled as per physical awards' timeframes	E-Certificates for contribution	Ministry of Health and Family Welfare, Government of India

(HPD: health product declaration; UT: union territory).

reaching the maximum proportion of beneficiaries and are aimed for state or district or facility level teams from the Government sector. Team awards for identification of high-risk pregnancies are also included.

- *Individual Awards:* Individual awards recognize consistent contribution overtime as well as significant contribution in terms of maximum beneficiaries reached. These awards have been designed to recognize the contributions of the volunteers from the private sector.
- *Special Awards:* Special awards recognize significant and consistent involvement in special regions including High Priority Districts, hard to reach areas, and tribal areas. Outstanding organizational contributions of professional associations or NGOs or private sector organizations, etc. to PMSMA are also recognized, including thematic contribution for technical support and operations support.

Levels of Award, Frequency, and Timeframe

The awards are proposed at three levels:

1. District level (Table 27.2)
2. State level (Table 27.3)
3. National level (Table 27.4)

Virtual Awards

In all, 37 “Halls of Fame” (one National and 36 State Halls of Fame) are available in the National PMSMA portal to feature best performance virtually. Every month, the photographs of all doctors registering to provide voluntary service are displayed for 24 hours in the PMSMA Portal, after which it is available in the weekly or monthly archive.

Every month, top three individuals providing service to the maximum number of beneficiaries, across the country and every State are featured. Top three performances in

the High Priority Districts are also featured at the National and State “Halls of Fame”. In addition, the top performers are recognized by the Ministry in Tweets. All recipients of physical awards are also featured in the virtual “Halls of Fame” Awards (Table 27.5).

Award for Reduction in MMR under PMSMA “IPLEDGEFOR9” Achievers

On June 30, 2018, Award function was organized by MoHFW, Bill and Melinda Foundation, United Nations Children’s Fund (UNICEF) and United States Agency for International Development (USAID) in New Delhi to honor the achievers.

Awards were given by Shri JP Nadda, Union Minister for Health and Family Welfare. Kerala, Maharashtra, and Tamil Nadu are the states, which received the awards for achieving sustainable development goal for MMR.

Dr Jaideep Malhotra, President, FOGSI, said that *FOGSI is committed to support “PMSMA”. “Private partnership with the Government of India under the vision of Honorable Prime Minister Mr. Narendra Modi achieved a phenomenal results in reducing MMR”, she said.* MMR is defined as the proportion of maternal deaths per 100,000 live births.

India has registered a significant decline in MMR recording a 22% reduction in such deaths since 2013, according to the SRS. PMSMA guarantees a minimum package of ANC services to women in their second and third trimesters of pregnancy at designated Government health facilities.

CONCLUSION

Initial results of this program are motivating and successful. If Government works with same willpower, these steps will prove to be milestones in improving maternal health in India.

Adbhut Matrutva App

Dayanath Mishra, Rashid Rizvi

■ INTRODUCTION

The basic objective of the Adbhut Matrutva App is to make pregnancy a pleasurable experience. All these facilities are available to the patient and doctor on the Adbhut Matrutva mobile/web App to provide complete holistic experience to pregnant women:

- ✦ Clinical care trimester-wise
- ✦ Relevant investigations
- ✦ Yoga and meditation
- ✦ Nutritional guidance
- ✦ Music and aroma therapy
- ✦ Motivational lectures
- ✦ Motivational stories
- ✦ Videos
- ✦ Pregnancy diary
- ✦ Immunization guide
- ✦ Supplementation and medication.

■ SALIENT FEATURES

Health Seeker

- ✦ Ease and convenience in doctor interaction
- ✦ Safe, accessible, and comprehensive medical records
- ✦ Medical record-based interpretation of medical condition
- ✦ Proactive health management
- ✦ Easy and transparent access to health services providers.

Doctors/Medical Establishment

- ✦ Tools for providing better healthcare
- ✦ Statutory compliance
- ✦ Medical reference resources
- ✦ Build relationship with patients and service providers.

Health Service Providers

- ✦ Closer coordination with doctors.

Special Services—Unique to Adbhut Matrutva App

- ✦ Prescription ‘truly’ digitized
- ✦ Investigative reports ‘truly’ digitized
- ✦ Reproduce high quality investigative images in device
- ✦ Important hospitalization record digitized
- ✦ User basic general/medical data self-entered.

Medical Records Easily Retrieval in Various Options

- ✦ Time-wise
- ✦ Treatment-wise
- ✦ Others
- ✦ Graphs/charts across data base for selected parameters
- ✦ Progress of treatment for particular condition
- ✦ Electronic health record (EHR) summary for doctor before he starts consultation
- ✦ Doctor/clinic/hospital compliance for record keeping.

Electronically Entered Prescription

- ✦ Electronic page view same as doctor’s prescription with logo, etc.
- ✦ Electronic page with sections standard in prescriptions
- ✦ Some data will be generated by the App if populated
- ✦ Doctor’s assistant can fill some permitted data from own device
- ✦ Doctor can chose template in sections or use blank space
- ✦ While writing medicines - the app prompts doctor in case of
- ✦ Duplicate medication, under/over dosage
- ✦ Allergy and drug interactions
- ✦ Brand and generic output
- ✦ Prescription instructions in local language
- ✦ Can forward to user’s pharmacy/test centers from doctor’s App.

Strengthening Doctor-Patient Bond

- ✦ Reminder for next appointment
- ✦ Reminder to take critical medicines
- ✦ Reminder for tests and upload report
- ✦ Explaining side effects, safety, efficiency of medicine
- ✦ Conditions not to worry
- ✦ Conditions to contact doctor
- ✦ Periodically checking patient's condition
- ✦ Encourage user for lifestyle change
- ✦ Diet and exercise
- ✦ Motivational articles
- ✦ Links to simple articles related to condition
- ✦ Informing prompted relatives on current medical conditions
- ✦ Wishing user of quick recovery
- ✦ Text platform to share worry with the doctor
- ✦ Multilocation users for online consultation
- ✦ Algorithm for emergency conditions
- ✦ User button for hospitalization from home
- ✦ Resident Medical Officer (RMO) button for doctor contact from hospital
- ✦ Emergency text from diagnostic lab to doctor
- ✦ Emergency text from doctor to patient to contact as soon as possible
- ✦ Doctors-Patient List—active and passive
- ✦ Doctor—prescription—pharmacy—diagnostics loop
- ✦ Doctor—'referred from' and 'referred to' captured
- ✦ Doctor—compliance to statutory rules
- ✦ Reminder
- ✦ Helpline and news
- ✦ Doctor—upcoming events/conference/latest medical news
- ✦ Doctor's resources
- ✦ Exhaustive medical references
- ✦ Legal/statutory/accreditation helplines.





Medical Resources

- ✦ Calculators
- ✦ Protocols
- ✦ Diseases and control articles

- ✦ Drug monographs
- ✦ Procedures
- ✦ Protocol standards.

Small Features with Big Impact

- ✦ Doctor's list of active and passive patients; segment-wise
- ✦ Doctor connected to *patient-pharmacy-diagnostic lab* loop
- ✦ Report on 'referred from' and "referred to" for closure of treatment
- ✦ Upcoming events/conferences/latest medical news/notifications/statutory changes
- ✦ Medicine and tests prescribed report.

It is well said that "God cannot be everywhere and therefore God created mother". Mother is an embodiment of love and care, through this love and care she makes her baby healthy and happy.

Let's join hands together to fulfill the dream of the Almighty to create children who have the personality of purity and divinity to create a healthy World, health E India and a healthy family by joining the Adbhut Matrutva initiative, the brainchild of FOGSI President 2018.

Dr Jaideep Malhotra