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COMPREHENSIVE MANAGEMENT OF PCOS: ROLE OF LIFESTYLE MODIFICATIONS AND SUPPLEMENTATION

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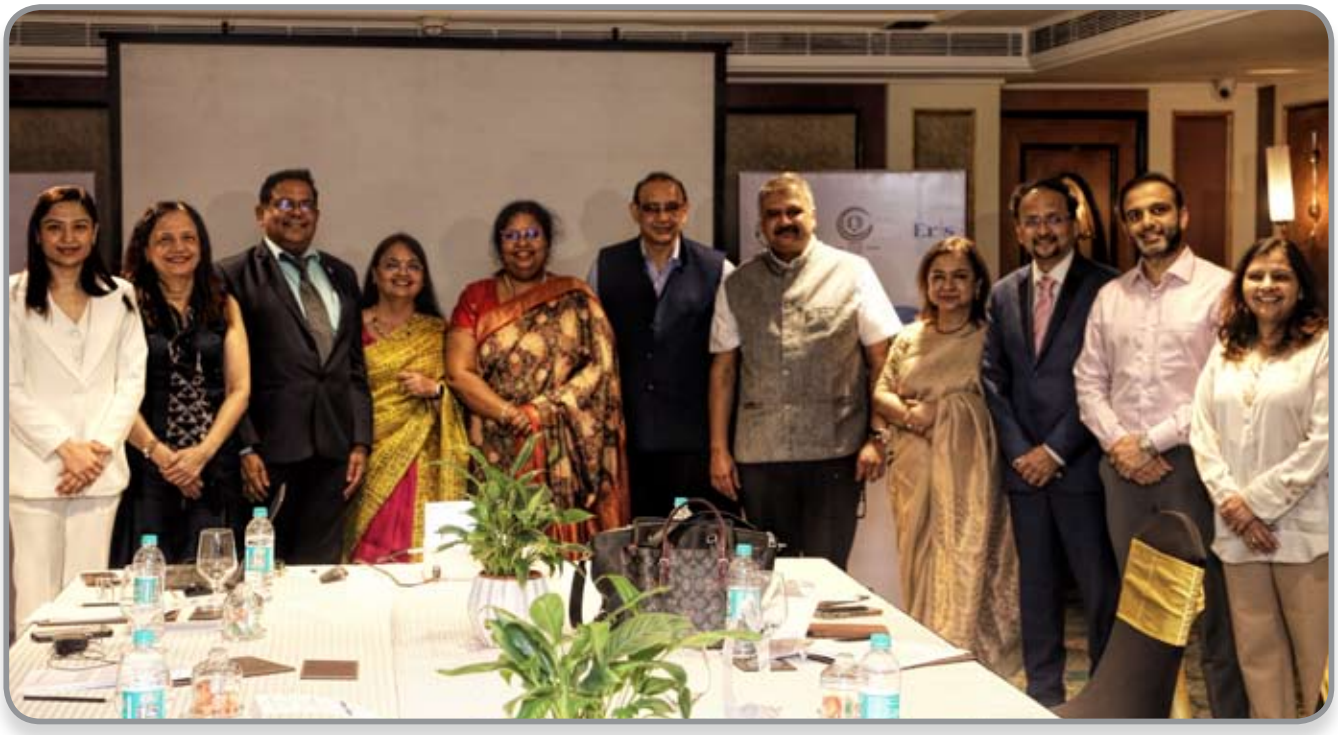

From left to right: Dr. Aditi Tandon,Dr. Sudha Tandon, Dr. Niranjan Chavan , Dr. Sunita Chandra, Dr. S. Shantha Kumari, Dr. Sanjay Kalra, Dr. Jaydeep Tank, Dr. Neelam Ohri, Dr. Chaitanya Ganapule, Dr. Kunal Doshi, Dr. Priti Jindal

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Practice points

Comprehensive management of PCOS: Role of lifestyle modifications and supplementation

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Abstract

Polycystic ovary syndrome (PCOS) is a common endocrine disorder affecting women of reproductive age. It has a prevalence of up to 13% in women of reproductive age and up to 26% among adolescents. PCOS is closely linked with obesity, particularly in women with a BMI over 30 kg/m^2, which exacerbates insulin resistance (IR) and metabolic complications, further aggravating symptoms. Addressing IR and weight management is critical for alleviating PCOS symptoms and reducing associated risks. This expert consensus highlights the importance of lifestyle interventions—focused on dietary changes, physical activity, and behavior modifications—as first-line treatment. These evidence-based recommendations aim to optimize health outcomes and improve the quality of life for PCOS patients. Developed by a task force of 10 experts, the consensus was reviewed and validated by a broader panel of specialists, providing clinicians with practical guidance for the management of PCOS, particularly among women struggling with obesity and IR.

Keywords: Polycystic ovary syndrome; insulin resistance; lifestyle interventions; quality of life

Intorduction

Polycystic ovary syndrome (PCOS) is a prevalent hormonal disorder affecting 8-13% of women in reproductive age, with up to 70% of cases undiagnosed.[1] In India, PCOS prevalence among adolescents ranges from 2.2% to 26%.[2] This condition impacts reproductive, metabolic, and psychological health from adolescence to post-menopause. Diagnosis follows the European Society for Human Reproduction and Embryology/American Society for Reproductive Medicine (ESHRE/ASRM) criteria requiring two of the following: polycystic ovaries on ultrasound, oligoovulation or anovulation, and biochemical or clinical hyperandrogenism.[3]

PCOS is strongly associated with obesity, particularly prevalent among women with a BMI over 30 kg/m^2, reaching 42.28% in those with a BMI between 30 and 34.9 kg/m^2.[3,4] Obesity exacerbates metabolic issues, such as insulin resistance (IR) and hyperandrogenemia, contributing to PCOS symptoms.[5]

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Effective management of IR and weight is paramount in the treatment of PCOS. Weight management, including prevention of weight gain, weight maintenance, and weight loss is crucial for alleviating PCOS symptoms, reducing the risk of PCOS-associated diseases, and improving overall quality of life. The International Evidence-Based Guideline for PCOS management underscores lifestyle interventions, including dietary modifications, physical activity, weight management, and behavioral changes, as the primary strategy. The focus is on improving diet quality and boosting physical activity levels.[6] These interventions aim to optimize health outcomes and effectively manage the symptoms associated with PCOS.[7]

Scope

The aim is to establish evidence-based practice points for lifestyle interventions in the management of PCOS, providing clinicians with validated strategies to improve patient outcomes and enhance their daily clinical practice.

Methodology

The task force comprised of 10 experts in the field of Obstetrics and Gynaecology. The task force reviewed the existing literature and developed the consensus statement based on published literature, their individual clinical experience, and focused discussion within the task force. The task force members followed a well-defined grading system (Table 1) for the critical appraisal of evidence and grading strength of consensus statements. The consensus statements developed by task force were presented to larger group consisting of eminent experts in the field of Obstetrics and Gynaecology. There was deliberation on each consensus point and later accepted, or deleted. Thus, this document provides much-required insights and useful, practical, and accurate feasible guidance that aids a practicing clinician across the country.

Table 1. Level of evidence and grading strength of recommendations

Level of evidence	Description
Level A	Data derived from multiple randomized trials or meta-analyses or evidence-based clinical practice guidelines
Level B	Data derived from a single randomized trials or large non-randomized trial
Level C	The consensus of experts or small studies, retrospective studies or registries or narrative/literature reviews
Level D	Data derived from Clinical experience
Class of recommendations	
Class I	Evidence and or general agreement that a given treatment or procedure is beneficial, useful or effective. It is recommended
Class IIa	Evidence is in favour of efficacy/usefulness and should be considered
Class IIb	Efficacy/usefulness is less well established, and recommendations may be considered.
Class III	Evidence and or general agreement that a given treatment or procedure is not beneficial, useful or effective and in some cases may cause harm. Not recommended.

Lifestyle modifications and PCOS: Elucidating the link

Lifestyle changes are key in managing PCOS, particularly in overweight or obese patients. They involve dietary adjustments, increased physical activity, behavioural changes and adherence strategies. These modifications help regulate ovulation, improve menstrual cycles, and enhance pregnancy rates. Lifestyle changes also impact insulin sensitivity, weight management, and hormone balance.[8] Obesity exacerbates PCOS symptoms by increasing androgen levels and disrupting ovulation. Also, obesity is linked to an increased risk of metabolic syndrome, type 2 diabetes, and insulin resistance in women.[9,10] Lifestyle modifications, alone or combined with metformin, effectively reduce insulin resistance and improve hormonal balance.[11,12] They encompass dietary adjustments, exercise, psychological support, sleep optimization, and complementary practices like yoga. Addressing both physical and emotional well-being, lifestyle modifications offer a holistic approach to PCOS management and enhance overall quality of life.[3]

Unlocking the lifestyle modifications in women with PCOS: key features

Weight reduction in PCOS women

Weight management is crucial in PCOS treatment, as it addresses insulin resistance and cardiometabolic issues. Lifestyle changes, like diet adjustments and exercise, can modestly reduce weight, improve ovulation and cardiovascular health. Significant weight loss through sustained dietary changes greatly improves PCOS symptoms.13 International guidelines for PCOS emphasize lifestyle changes for weight management as the primary treatment, regardless of symptom severity. Adhering to a balanced diet and moderate-intensity exercise for 150 to 300 minutes weekly is beneficial.[6]

Clinical evidence

- A Cochrane review analyzing 15 randomized controlled trials (RCTs) with 498 participants showed that lifestyle interventions significantly reduced weight (Mean Deviation [MD] -1.68 kg, 95% Confidence Interval [CI] -2.66 to -0.70, 9 RCTs, N=353, I^2=47%) and BMI (-0.34 kg/m^2, 95% CI -0.68 to -0.01, 12 RCTs, N=434, I^2=0%) in women with PCOS. These interventions also improved reproductive outcomes, including the free androgen index (FAI; MD -1.11, 95% CI -1.96 to -0.26, 6 RCTs, N=204, I^2=71%), testosterone levels, sex hormone-binding globulin (SHBG), and hirsutism. Additionally, metabolic outcomes such as total cholesterol (TC; MD -0.14 mmol/L, 95% CI -0.25 to -0.02, 9 studies, N=331, I^2=0%), low-density lipoprotein cholesterol (LDL-C; MD -0.16 mmol/L, 95% CI -0.29 to -0.03, 9 studies, N=326, I^2=29%), and fasting insulin (FINS; MD -1.42 µU/mL, 95% CI -2.44 to -0.39, 10 studies, N=321, I^2=0%) showed significant improvement with lifestyle modification.[14]
- Some clinical studies showed that lifestyle interventions leading to modest weight loss (2-5% of total body weight) can improve ovulation and menstrual regularity. Furthermore, losing more than 5% of body weight enhances fertility outcomes.[15,16,17]

Role of macronutrients in PCOS women

Various dietary strategies, such as low carbohydrate, low glycaemic index (GI) and low glycaemic load (GL), high protein, and monounsaturated fatty acid (MUFA) enriched diets, can positively affect PCOS features even without weight loss. The 2018 PCOS guidelines recommend tailoring diets to individual needs and preferences.[3]

Carbohydrates

Altering carbohydrate composition, particularly through low glycaemic index / glycaemic load diets is effective in managing PCOS features.

Clinical evidences

- A 2021 systematic review and meta-analysis of ten RCTs with 403 participants showed that low GI/GL diets significantly reduced Homeostatic Model Assessment of Insulin Resistance (HOMA-IR; -0.78; 95% CI: -1.20, -0.37; I^2=86.6%), fasting insulin (FINS) levels (-2.39 µIU/mL; 95% CI: -4.78, 0.00; I^2=76.8%), waist circumference (WC; -2.81 cm; 95% CI: -4.40, -1.23; I^2=53.9%), and total testosterone levels (-0.21 nmol/L; 95% CI: -0.32, -0.09; I^2=8.6%). LGI diets improved glucoregulatory outcomes, lipid profiles, abdominal adiposity, and androgen status, supporting their inclusion in dietary management of PCOS.[18]

Proteins

A high-protein diet effectively reduces androgen, insulin, and dehydroepiandrosterone levels in women with PCOS compared to glucose-rich meals.[3]

Clinical evidences

- In a weight maintenance study, high-protein diets led to greater weight loss maintenance (odds ratio; OR 1.92, 95% CI 1.06-3.45, p=0.03), while LGI diets were associated

with sustained weight loss (OR 2.54, 95% CI 1.38-4.66, p=0.003). High-protein groups gained 2.7 kg less weight compared to low-protein groups (p<0.001), and LGI groups gained 0.48 kg less weight than high-GI groups (p=0.48).[19]

- In a study, researchers compared the psychological effects of low-protein high-carbohydrate (LPHC) and high-protein low-carbohydrate (HPLC) diets in women with PCOS. The HPLC group showed significant improvements in depression (t(13)=3.894, p=0.002) and self-esteem (t(12)=2.350, p=0.037). Enhanced well-being in the HPLC group suggests better long-term compliance and potential effectiveness in treating obesity.[20]

Fats

Fatty acid composition is crucial for managing PCOS-related metabolic disorders, with increased MUFA and polyunsaturated fatty acids (PUFA) intake offering potential benefits. High-fat meals can reduce testosterone levels due to delayed nutrient absorption, while saturated fats elevate inflammatory markers, oxidative stress, insulin resistance, and androgen levels.[3,21] Studies comparing diets rich in walnuts (PUFA) and almonds (MUFA) showed no significant differences in glucoregulatory status, lipids, or androgens, except for a decrease in HbA1c in the walnut group. Increased walnut intake was associated with higher fasting and postprandial glucose levels compared to a control diet rich in oleic acid, suggesting minimal benefit of PUFA over MUFA.[21,22] Further research on canola, olive, and sunflower oils indicated that canola oil may improve lipid profiles and insulin sensitivity more effectively due to its favorable fatty acid composition. Reduced carbohydrate intake was also found to offer better glucoregulatory benefits than increased MUFA intake.[23,24] Lastly, hypocaloric low-fat and low-carbohydrate or low-GI diets both resulted in weight, body fat, and insulin marker reductions, with no significant differences between them.[25,26]

Indian perspective on diet in PCOS

PCOS patients have hormonal imbalances, high blood cholesterol levels, and are generally obese.[27] Indians are also more prone to T2DM, CVD, and sub-inflammation, which are partly attributed to dietary patterns that include high amounts of carbohydrates and saturated fats from vegetables, rice, chapatis, or breads.[28] Therefore, along with exercising enough, following a healthy diet is also crucial. Reports have shown that a healthy diet in Indian women should consist of high fiber and protein (1 g/kg body weight) and a 30% calorie deficit, or 500 to 750 kcal per day (1200 to 1500 kcal per day). A balanced diet combined with regular exercise can boost metabolism, increase insulin sensitivity, and aid weight loss safely.[27]

A study conducted on Indian women has shown that PCOS and healthy women who consumed an Indian vegetarian diet had higher pro-inflammatory (TNF-α, IL-6, IL-1β, hs-CRP and serum resistin) and lower anti-inflammatory (IL-10 and adiponectin) marker levels than their age and BMI-matched healthy non-vegetarian counterparts.[28]

Benefits of dietary patterns for PCOS

In PCOS management, various dietary plans and eating patterns beyond macronutrient adjustments prove effective.[3]

Clinical evidences

- A systematic review and meta-analysis assessed the impact of dietary interventions on IR in women with PCOS. Nineteen RCTs involving 1193 participants were analysed. The pooled data revealed significant improvements: dietary interventions led to a decrease in HOMA-IR (MD=−0.78, 95% CI: −0.92 to −0.65; p<0.00001; I^2=24%) and FINS (MD=−4.24 mIU/L, 95% CI: −5.37 to −3.10 mIU/L; p<0.00001; I^2=80%) compared to other treatments. Furthermore, dietary interventions resulted in reductions in fasting

plasma glucose (FPG; MD=–0.11 mmol/L, 95% CI: –0.17 to –0.04 mmol/L; p=0.002; I^2=0%), body weight (MD=–1.74 kg, 95% CI: –2.42 to –1.05 kg; p<0.00001; I^2=59%), and WC (MD=–3.25 cm, 95% CI: –5.29 to –1.22 cm; p=.002; I^2=41%). These findings indicate that dietary modifications are significantly associated with decreased IR and improved body composition in PCOS patients. The meta-analysis highlighted that the Dietary Approaches to Stop Hypertension (DASH) diet effectively improves insulin sensitivity in women with PCOS. Its nutrient-rich composition, high in fiber and low in saturated fats and sugars, supports glycemic control and long-term cardiovascular health. The diet's low GI and high fiber content help regulate insulin levels and improve IR, promoting better glucose responses. Its overall nutrient density and satiety make it easy to follow, offering both immediate and lasting benefits for PCOS management.[29]

- In 2017, Szczuko et al conducted a three-month study on 24 women with PCOS, focusing on a low-GI diet with five meals a day. The diet improved inflammatory factors, suggesting dietary interventions can aid in managing PCOS-related inflammation.[30]
- In 2019, Shishehgar et al examined the impact of a low-calorie diet on women with and without PCOS. The diet improved anthropometric and metabolic characteristics, menstrual cycles, and hormonal profiles, making it beneficial for managing PCOS.[31]
- In 2020, Kazemi et al compared different diets in 111 women with PCOS. The DASH diet improved ovarian morphology, insulin resistance, and overall metabolic health, suggesting these diets are effective in managing PCOS.[32]

Effectiveness of physical activity in PCOS

Exercise significantly improves insulin responsiveness, body composition, and cardiorespiratory fitness in women with PCOS.[3] The 2018 PCOS guideline recommends ≥150 minutes per week of moderate or ≥75 minutes per week of vigorous intensity exercise for weight gain prevention, and ≥250 minutes per week of moderate or ≥150 minutes per week for weight loss and weight regain prevention. Minimizing sedentary time and including strength training exercises two days per week are also recommended.[6]

Clinical evidences

- A comprehensive study assessed exercise's effectiveness in PCOS management compared to usual care, diet alone, and exercise with diet. Researchers found that exercise significantly improved FINS (MD −2.44 µIU/mL 95% CIs −4.24 to −0.64), HOMA-IR (−0.57 −0.99 to −0.14;), TC (−5.88 mg/dL −9.92 to −1.83), LDL cholesterol (−7.39 mg/dL 9.83 to −4.95;), triglycerides (−4.78 mg/dL −7.52 to −2.05;), VO2 max (3.84 ml/kg/min 2.87 to 4.81), WC (−2.62 cm −4.13 to −1.11), and body fat percentage (−1.39%, −2.61 to −0.18)) compared to usual care. Subgroup analyses indicated that the most significant improvements were observed in obese participants, with aerobic workouts of shorter duration.[33]
- According to several systematic reviews and meta-analysis conducted, it is evident that vigorous aerobic exercise can improve measures of insulin responsiveness and resistance, including HOMA-IR and the insulin sensitivity index; body composition, including WC and BMI; and cardiorespiratory fitness (VO_2max).[34,35,36]

Behavioural interventions for PCOS

Behavioral interventions in PCOS management empower patients to adopt sustainable lifestyle changes through goal setting, self-monitoring, problem solving, and relapse prevention. Tailored approaches yield positive outcomes in weight loss, hormone and lipid levels, menstrual regularity, and

psychological well-being. Considering personality traits' impact on adherence informs future treatment strategies.[3]

Clinical evidence

In an RCT, researchers evaluated the impact of a behavioural modification program on psychological well-being and weight loss success in overweight women with PCOS (n=68). Participants were randomly assigned to either the program or a minimal intervention for 4 months. Results showed that after 4 months, the intervention group reported less anxiety (p=0.035), higher general health (p=0.012), and lower depressed mood (p=0.033). Anxiety and general health tended to differ between groups (p=0.06, respectively), favouring the intervention. Additionally, women achieving ≥5% weight loss at 12 months (n=18) had lower baseline anxiety compared to those who did not (p=0.004). Personality trait analysis revealed that the weight-loss group had higher social desirability (p=0.033) and lower embitterment (p=0.023).[37]

Psychological aspects in PCOS

Addressing psychological aspects is crucial in PCOS management, as mental health impacts engagement with healthy habits. Cognitive behavioural interventions, including counselling, cognitive behavioural therapy (CBT), and mindfulness, can enhance adherence to lifestyle changes, improving overall management of the condition.[3] Yoga helps in promoting holistic wellbeing of an individual, since it is a form of mind–body intervention that encompasses all the components of lifestyle modification (diet, exercise, and behaviour).[38]

Clinical evidence

A RCT was conducted to assess the impact of CBT on the quality of life and psychological fatigue in women with PCOS (n=74). They were randomized into a CBT group and a control group. Post-intervention analysis revealed significantly higher quality of life scores (MD=33.1) and significantly lower psychological fatigue scores (MD=-54.8) in the CBT group compared to the control group.[39]

A study found that an 8-week mindfulness stress management program significantly reduced stress, depression, and anxiety symptoms in women with PCOS, improving their quality of life.[40]

A Systematic Review and Meta-Analysis conducted to assess the effect of yoga therapy (YT) on health outcomes of women suffering from PCOS showed that YT significantly decreased menstrual irregularity, clinical hyperandrogenism, fasting blood glucose, fasting insulin, and HOMA-IR.[38]

Sleep and PCOS

Sleep disorders are common in PCOS due to hormonal imbalances. This worsens symptoms and metabolic issues. Screening and addressing these disorders are crucial for better management and adherence to lifestyle changes in PCOS.[3]

Sleep disturbances, especially obstructive sleep apnea (OSA), are prevalent in women with PCOS and can worsen the condition. A study showed that OSA was highly prevalent in women with PCOS (56%) compared to 19% of controls. PCOS women with OSA showed higher insulin resistance and glucose intolerance. The severity of OSA predicted increased fasting glucose, insulin levels, and insulin resistance. These results underscore the importance of screening and managing sleep disturbances in women with PCOS due to their impact on metabolic dysfunctions like insulin resistance and type 2 diabetes.[41]

Micronutrients for PCOS

Vitamin supplementation, particularly B-group vitamins, folic acid, vitamin D, vitamin E, and vitamin K, is crucial for managing PCOS. These vitamins help regulate metabolic markers, such as homocysteine levels and insulin resistance, and improve reproductive health parameters like fertility and androgen profiles. [3]

Clinical evidences

- A meta-analysis assessed the impact of folate supplementation on weight and BMI. Subgroup analyses revealed a significant effect of folic acid supplementation on BMI in individuals with high homocysteine levels (≥15 µmol/L) (weighted MD: –0.17 kg/cm2, -0.33 to –0.01, p = 0.03) and in women with PCOS (weighted MD: – 0.30kg/cm^2, -0.54 to –0.06, p = 0.01).[42]
- Guo et al conducted a systematic review and meta-analysis on vitamin D supplementation in women with PCOS. Results showed that FPG level of patients with PCOS significantly decreased after vitamin D supplementation (MD: –0.34, 95% CI: –0.61, –0.07). Subgroup analyses showed that vitamin D supplementation effectively improved insulin resistance in women with PCOS who had baseline serum vitamin D levels below 20 ng/ml, with daily and weekly vitamin D intake lowering fasting insulin (fasting insulin, SMD: –0.40, 95% CI: –0.69, –0.10) and (HOMA-IR, SMD: –0.25, 95% CI: –0.47, –0.02).[43]
- Vitamin-like supplements such as bioflavonoids, carnitine, and alpha-lipoic acid (α-LA) show promise in managing PCOS. Bioflavonoids can improve lipid profiles, L-carnitine may benefit mental health and reduce oxidative stress, and alpha-lipoic acid has the potential to improve insulin resistance, lipid profiles, BMI, and menstrual cyclicity, especially when combined with D-chiro-inositol.[3]
- In a meta-analysis to assess the effects of omega-3 fatty acid versus placebo in women with PCOS. Researchers found that compared to the control group, omega-3 fatty acid may improve HOMA index (WMD -0.80; 95% CI -0.89, - 0.71; p<0.00001), decrease TC and TG level [TC: (WMD -9.43; 95% CI -11.90, - 6.95; p<0.00001); and increase adiponectin level (WMD 1.34; 95% CI 0.51, 2.17; p=0. 002).[44]
- In a meta-analysis of eight RCTs (n=910) examining N-acetylcysteine (NAC) supplementation, researchers reported improved glucose regulation and a greater likelihood of conception and live births in women with PCOS compared with placebo.[45]
- A meta-analysis evaluating the effects of probiotics, prebiotics, and synbiotics on hormonal and inflammatory indices in women with PCOS found that SHBG and NO concentrations significantly increased in the probiotics and synbiotics groups compared to the placebo group. Conversely, FAI and MDA concentrations reduced considerably in the probiotics and synbiotics groups compared to the placebo group.[46]
- Recent systematic reviews and meta-analyses suggest that mineral supplementation is beneficial for managing PCOS. One study found that vitamin D and calcium co-supplementation improved lipid and androgen profiles, follicular health, and menstrual cyclicity in women with PCOS. Another review reported that zinc supplementation, often combined with other nutrients like calcium, vitamin D, and magnesium, improved insulin resistance, lipids, testosterone, FSH, and dehydroepiandrosterone sulfate levels. Additionally, magnesium supplementation has been associated with reduced IR in women with PCOS.[47,48,49,50,51,52]

Management of lean PCOS women

Lean PCOS is the term imparted to a small but significant proportion of patients who present with normal body mass index (BMI; ≤25 kg/M^2) which makes diagnostic workup and therapeutic approach more difficult than that of overweight PCOS. Reports have shown that both lean and overweight women with PCOS have a similar prevalence of acanthosis nigricans (darkening of skin creases), menstrual dysfunction, hirsutism, and endometrial hyperplasia (thickness of endometrium greater than 4 mm).[53]

Even the hormonal profiles were reported to be similar in both PCOS phenotypes, including LH:FSH

ratio, serum LH, progesterone, and testosterone levels. A report has demonstrated insulin resistance to be prevalent in both groups (prevalence of 83.3% and 93.1% in lean and overweight groups, respectively) and it was concluded that IR is inherent in women with PCOS. Hence, various aspects of normal physiology such as lipid, hormonal, and haemorheological profiles are reported to be dysregulated in lean individuals with PCOS relative to BMI-matched controls.53 Management of lean PCOS involves maintaining weight with an elevated calorie count at breakfast and a lower consumption at dinner, supplementing with micronutrients, and resistance exercise as first-line therapies.[54]

Myoinositol has shown to have positive effects on lean women with PCOS. Treatment with myoinositol led to reductions in luteinizing hormone, androgen levels, and high sensitivity C-reactive protein with a role in inflammation and facilitated insulin tolerance. Use of myoinositol may be unsuitable in lean women with PCOS, particularly if insulin resistance is not present.[53]

Lifestyle modifications, restoration of ovulation with the use of pharmacological interventions and even IVF in refractory cases, can provide symptomatic relief and increase chances of successful pregnancy in lean PCOS women. Metformin does not impart any metabolic advantages in lean PCOS and should be used only in women who have glucose intolerance, in combination with letrozole, CC, or gonadotropins.[54]

Enhanced PCOS management: Synergistic effects of Myo-inositol and Metformin

Myo-inositol (MI) is a novel insulin sensitizer developed to treat PCOS-related infertility. It enhances glucose uptake and insulin sensitivity by aiding the synthesis of phosphatidyl inositol 3-kinase, thereby reducing insulin resistance. Studies show that MI effectively reduces hormonal, metabolic, and oxidative abnormalities in PCOS patients by improving insulin resistance. Both metformin and MI, as insulin sensitizers, correct insulin resistance, hormonal imbalances, and lipid profiles, improving menstrual irregularities, hyperandrogenism, and infertility in women with PCOS.[55] Metformin is an insulin sensitizer that improves the chronic inflammatory state of PCOS, enhances ovulation, and metabolic parameters, and reduces infertility. MI acts as insulin sensitizer by serving as second messengers for insulin signaling, benefiting PCOS patients. Due to their different mechanisms of action, combining metformin with MI may have a synergistic effect, potentially allowing for a reduced metformin dose to achieve the same beneficial outcomes.[56]

An RCT over 6 months enrolled 65 women with PCOS, randomizing 33 to metformin monotherapy (Group A) and 32 to metformin combined with myoinositol (Group B). Compared to metformin alone, there were significant improvements in menstrual cycle regularity and quality of life in the combination therapy group ($p<0.001$). The addition of myoinositol to metformin offers additional benefits in managing menstrual cycle regularity and enhancing the quality of life in women with PCOS.[56]

- In a prospective observational study, researchers found that the combination of MI with metformin resulted in a significantly higher clinical pregnancy rate after six cycles of ovulation compared to MI alone (43.33% vs. 26.67%, $p<0.01$).[57]
- Another prospective observational study was conducted to evaluate the effect of MI and metformin on clinical profile in patients of PCOS. Women were randomized to a combination of MI 600 mg and metformin 500 mg (twice a day) for 3 months for the management of PCOS. Significant improvements were observed in various clinical and hormonal parameters, including menstrual complaints, acne, LH/FSH ratio, serum testosterone, fasting insulin, HOMA index, and insulin sensitivity, with the combined therapy.[58]

Practice points

- The experts opined that all women with PCOS should be advised to adopt healthy lifestyle behaviours, including a balanced diet and regular physical activity to optimize health, enhance quality of life, and manage weight and body composition. (Grade A, level I)
- Weight reduction in overweight PCOS individuals of 2-5% can enhance ovulation and regularize menstrual cycles, as well as more than 5% improve fertility outcomes. (Grade A, level I)
- Low GI diets can improve insulin sensitivity, lower testosterone level and reduce waist circumference and BMI. (Grade A, level I)
- Low GI diets can lower total cholesterol, LDL cholesterol, and triglycerides, and improve cardiometabolic health. (Grade A, level I)
- Diets high in protein may help suppress androgen levels and improve insulin sensitivity. High protein intake is associated with reduced appetite and lower energy intake, facilitating long-term adherence. (Grade B, level I)
- Increased intake of MUFA and PUFA is beneficial for metabolic disorders associated with PCOS. (Grade B, level I)
- Patients with PCOS should adopt specific dietary modification, such as DASH diet- high in fibre, low in saturated fats and GI. (Grade A, level I)
- Low-GI diets can effectively manage PCOS-related symptoms.(Grade B, level I)
- PCOS patients should be advised to engage in at least 150 minutes per week of moderate-intensity exercise or 75 minutes per week of vigorous-intensity exercise to prevent weight gain. (Grade C, Level I)
- For weight loss and prevention of weight regain, increasing physical activity to 250 minutes per week of moderate-intensity or 150 minutes per week of vigorous-intensity is recommended. (Grade A, Level I)
- Supervised aerobic exercise interventions, particularly for overweight or obese patients with PCOS should be implemented. (Grade A, Level I)
- Incorporate structured behavioural modification programs, including goal setting and self-monitoring, for overweight women with PCOS to improve psychological well-being, reduce anxiety and depression, and support sustainable weight loss. (Grade B, level I)
- Tailoring behavioural interventions to individual personality traits can enhance adherence and treatment outcomes, improving PCOS symptoms and long-term health. (Grade B, level I)
- Integrated cognitive behavioral interventions, such as counselling, CBT, and mindfulness, and Yoga into their management plans can be beneficial for patients with PCOS. (Grade B, level I)

Practice points

- Recognizing the importance of addressing mental health concerns in patients with PCOS is essential. (Grade B, level I)
- Routine screening for sleep disorders, especially obstructive sleep apnea (OSA), should be incorporated into the standard evaluation protocol for patients with PCOS. (Grade B, level 1a)
- Vitamin and micronutrient supplementation should be tailored for patients with PCOS based on their specific metabolic and reproductive health needs. (Grade A, level I)
- Metformin in combination with Myoinositol has beneficial effects in the management of PCOS, especially for patients who may require enhanced insulin sensitization and metabolic regulation. (Grade A, level I)

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