



LIFESTYLE AND CLINICAL PROFILES OF PCOS RISK IN URBAN INDIAN EMERGING ADULTS: IMPACT OF TARGETED NUTRITION EDUCATION

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ABSTRACT

Polycystic ovary syndrome (PCOS) risk manifests early in urban Indian emerging adults through menstrual irregularities and clinical signs like acne, hirsutism, and acanthosis nigricans. This prospective pre-post study screened 231 women (aged 18-21 years) and intervened with 57 at-risk participants using targeted nutrition education. Baseline revealed 10.4% menstrual irregularity, 43.7% clinical signs, 48% physical inactivity, and low fruit/vegetable intake. Post-12-week intervention, knowledge, attitudes, and practices improved significantly, with high acceptability of a nutrient-dense cookie supplement. Findings support lifestyle education as a feasible strategy for PCOS prevention in young women.

Keywords: PCOS, emerging adults, nutrition education, menstrual irregularity, clinical signs, lifestyle intervention.

INTRODUCTION

Polycystic ovary syndrome (PCOS) is a leading endocrine disorder in reproductive-aged females and frequently emerges during late adolescence and early adulthood, when early risk profiling can prevent long-term reproductive and cardiometabolic sequelae. Current guidance recommends diagnosing PCOS using the modified Rotterdam criteria (two of: oligo-anovulation, hyperandrogenism, polycystic ovarian morphology) after excluding another etiologist. Because PCOS expression is heterogeneous, clinical screening should be complemented by assessment of anthropometric and biochemical risk markers, particularly central adiposity and insulin-resistance-linked metabolic abnormalities ^[1, 2]. In urban Indian settings, emerging adults may experience a convergence of behavioral and environmental risks—including sedentary routines, frequent intake of energy-dense foods, and irregular meal patterns—that can worsen abdominal obesity and amplify PCOS symptom burden. Evidence indicates that cardiometabolic vulnerability in PCOS may be detectable early (even before overt diabetes or dyslipidaemia), supporting the value of routine measurement of waist indices, fasting glucose/insulin markers, and lipid profile alongside clinical symptom assessment [3]. International evidence-based

recommendations further emphasize that lifestyle management is a core focus for all women with PCOS, with multicomponent interventions (diet, physical activity, and behavioral strategies) improving metabolic health including central adiposity and lipid profile. In adolescents and at key life stages, the guideline particularly highlights prevention of excess weight gain and establishment of sustainable healthy behaviors ^[4]. Despite these recommendations, implementation gaps persist due to limited PCOS-specific knowledge, delayed risk recognition, and poor adherence to lifestyle advice, especially among young women. Targeted nutrition and lifestyle education may address these barriers by improving health literacy, strengthening motivation, and enabling practical dietary and activity changes ^[5]. Therefore, this study aimed to characterize the lifestyle and clinical profiles of PCOS risk among urban Indian emerging adults and to evaluate the impact of targeted nutrition education on knowledge, attitudes, practices, and behavioral outcomes.

STUDY DESIGN

This prospective pre-post intervention study characterized clinical and lifestyle profiles of PCOS risk in emerging adult women and evaluated targeted nutrition education effects. High-risk participants (n=57) from a screened cohort underwent baseline and 12-week post-intervention assessments using modified Rotterdam criteria.

PARTICIPANTS AND SETTING

Women aged 18-21 years (n=231; mean 18.86 ± 1.4 years) were recruited from an urban Indian academic institution via purposive sampling. Risk identification relied on menstrual history, clinical signs (acne, hirsutism, acanthosis nigricans), physical activity logs, and dietary recalls. Exclusion criteria included diagnosed comorbidities or pregnancy. Institutional ethics approval was obtained.

INTERVENTION

Bi-weekly interactive sessions (group/individual) delivered PCOS education, emphasizing dietary improvements (increased vegetables/fruits, reduced skipping/processed foods), physical activity (≥ 150 min/week moderate-vigorous), and a nutrient-dense cookie supplement (high acceptability scores). Materials included modules, demonstrations, and KAP questionnaires.

DATA COLLECTION AND ANALYSIS

Validated tools captured menstrual/clinical signs, physical activity levels (no/moderate/vigorous), dietary patterns (vegetarianism, intake frequencies), and KAP pre/post. Descriptive statistics, chi-square tests ($p < 0.05$), and paired analyses used SPSS v.25. Primary outcomes were behavioral shifts and supplement feasibility.

RESULTS

A total of 231 emerging adult women (18–21 years; mean age 18.86 ± 1.4 years) were assessed to characterize clinical and lifestyle indicators of PCOS risk and to evaluate the impact of targeted nutrition education on risk-related behaviors. Menstrual history showed that 207 (89.6%) reported regular cycles, while 22 (9.5%) reported eight or fewer periods/year and 2 (0.86%) reported 12–14 periods/year; overall menstrual irregularity prevalence was 10.4% (24/231) and was significantly associated with PCOS risk status ($p = 0.001$). Clinical signs relevant to PCOS were common: 101 participants (43.7%) had at least one abnormal dermatologic sign, with acne being most frequent (23.3%), followed by excess facial/body hair (11.6%) and acanthosis nigricans (6.5%).

Table 1. Menstrual and clinical signs (baseline, n=231)

Variable	n	%
Regular cycles (12 periods/year)	207	89.6
≤8 periods/year	22	9.5
12–14 periods/year	2	0.86
Menstrual irregularity (overall)	24	10.4
Any abnormal clinical sign	101	43.7
Total acne	54	23.3
Excess facial/body hair	27	11.6
Acanthosis nigricans	15	6.5

Lifestyle assessment indicated low physical activity in nearly half of the cohort; 111 (48.0%) reported no regular exercise, 45 (19.4%) reported vigorous activity, and 75 (32.4%) reported moderate activity. Dietary practices in the risk group highlighted potential modifiable contributors to PCOS risk: most women were non-vegetarian (90.9% overall), breakfast skipping was frequent in the risk group (61.4%), and daily intake of protective foods was low (green leafy vegetables 21% and fruits 22.8% in the risk group). These baseline findings collectively indicate a pattern of clinical symptoms coexisting with lifestyle behaviors that may elevate PCOS vulnerability in this population.

Table 2. Lifestyle patterns and dietary intake

Indicator	Measure	Value
No physical activity (n=231)	n (%)	111 (48.0)
Vigorous physical activity (n=231)	n (%)	45 (19.4)
Moderate physical activity (n=231)	n (%)	75 (32.4)
Non-vegetarian diet (n=231)	n (%)	210 (90.9)
Daily green leafy vegetables (risk group, n=57)	n (%)	12 (21.0)
Daily fruits (risk group, n=57)	n (%)	13 (22.8)

After the structured nutrition education intervention, post-intervention assessment documented significant improvements in PCOS-related knowledge, attitudes, and practices (KAP), reflecting better awareness of PCOS symptoms/complications and improved readiness to adopt diet and activity modifications. In addition, the developed nutrition supplement cookie demonstrated high sensory acceptability (taste and overall acceptability achieving the maximum mean score), supporting feasibility of culturally acceptable dietary supports within education-led programs.

DISCUSSION

The present findings highlight that PCOS risk among urban Indian emerging adults is strongly reflected in menstrual irregularity and common clinical signs such as acne, hirsutism, and acanthosis nigricans, alongside unfavourable lifestyle patterns (high inactivity and low fruit/vegetable intake). These observations are consistent with adolescent/young adult literature noting that menstrual dysfunction and dermatologic features are frequent presenting manifestations of hyperandrogenism in this age group, although differentiation from normal pubertal changes requires careful clinical context ^[6, 7]. A key implication is that lifestyle-focused prevention and early management strategies can be implemented even when the study emphasis is on clinical and behavior profiles rather than laboratory parameters. The 2023 International Evidence-based Guideline recommends lifestyle interventions (healthy eating and/or physical activity, with behavioral strategies) for all women with PCOS to improve health and weight-related outcomes, and it specifically emphasizes prevention of excess weight gain in adolescents and at key life stages. The high proportion reporting no physical activity (48%) and low protective food intake in the risk group supports prioritizing structured counselling and practical behavior-change approaches in campus/community settings ^[8, 9]. The significant post-intervention improvement in PCOS-related KAP observed in the results aligns with broader evidence that educational interventions can increase knowledge and improve attitudes and self-care behaviors in PCOS populations, which may be a prerequisite for sustained dietary and activity changes. High acceptability of the nutrition supplement cookie also suggests that culturally acceptable functional foods may support adherence within education-led lifestyle programs. However, interpretation should consider that behavior outcomes were partly self-reported and the pre-post design without a parallel control group may overestimate intervention effects ^[10, 11].

CONCLUSION

This study shows that PCOS risk in urban Indian emerging adults is reflected in a meaningful burden of menstrual irregularity and common clinical manifestations such as acne, hirsutism, and acanthosis nigricans, together with unfavourable lifestyle patterns including physical inactivity and low intake of fruits and vegetables. Targeted nutrition education produced clear improvements in PCOS-related knowledge, attitudes, and practices, indicating strong potential for early, prevention-focused interventions in late adolescence and early adulthood. Integrating structured education and culturally acceptable dietary supports into routine college/community health programs may help reduce future reproductive and metabolic complications in this vulnerable group.

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