

NUTRITION EDUCATION IMPROVES KNOWLEDGE, ATTITUDES, AND PRACTICES IN EMERGING ADULT WOMEN AT RISK FOR PCOS: A PROSPECTIVE INTERVENTION STUDY

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ABSTRACT

Polycystic ovary syndrome (PCOS) affects emerging adult women, with early lifestyle interventions critical for risk mitigation. This prospective study evaluated a 12-week nutrition education program on knowledge, attitudes, and practices (KAP) among 57 at-risk women (aged 18-21) from a cohort of 231, screened via modified Rotterdam criteria. Baseline revealed menstrual irregularity (10.4%), clinical signs (43.7%), central adiposity (BMI 23.6 ± 2.9 kg/m², WHR 0.85 ± 0.05), and borderline metabolic markers. Post-intervention, KAP scores rose significantly: knowledge 36.32 ± 21.01 to 85.09 ± 8.88 , attitudes 86.63 ± 4.47 to 98.42 ± 2.47 , practices 70.70 ± 20.07 to 97.54 ± 6.62 ($p < 0.01$). Findings affirm structured education enhances PCOS self-management in young Indian women, supporting guideline-recommended lifestyle-first approaches.

Keywords: PCOS, nutrition education, knowledge attitudes practices, lifestyle intervention

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INTRODUCTION

Polycystic ovary syndrome (PCOS) is a common endocrine condition in reproductive-aged females and is characterized by a heterogeneous clinical presentation that often begins in adolescence and early adulthood. Widely used diagnostic frameworks, including the modified Rotterdam criteria, define PCOS by the presence of any two of three features—ovulatory dysfunction (e.g., oligo-anovulation), clinical or biochemical hyperandrogenism, and polycystic ovarian morphology—after exclusion of related disorders. Beyond reproductive manifestations, PCOS is strongly linked with metabolic risk factors and long-term cardiometabolic consequences, making early prevention-oriented care particularly important in younger age groups [1]. International evidence-based guidance emphasizes that lifestyle management is a core component of PCOS care, recommending healthy eating and physical activity (alone or combined with behavioral strategies) for improving metabolic health, central adiposity, and lipid profile, and for supporting weight management across the PCOS spectrum. Importantly, the guideline highlights that in adolescents and at key life stages, the priority may be prevention of excess weight gain and establishment of sustainable healthy behaviors, rather than focusing only on short-term weight loss [2]. However, translating these recommendations into routine practice can be challenging, particularly where knowledge gaps, misconceptions, low perceived control, and unsupportive social norms reduce adherence to

lifestyle advice [3]. Structured nutrition education interventions can address these barriers by improving health literacy and reshaping determinants of behavior such as attitudes, perceived behavioral control, and intention to adopt healthier dietary patterns. Evidence from intervention research in adolescents and young adults with PCOS shows that theory-informed educational programs can significantly improve nutrition-related knowledge and psychosocial constructs and translate into healthier eating behaviors over follow-up [4]. Despite growing interest, there remains a need for context-specific, culturally relevant education strategies for emerging adult women, particularly in settings where diet patterns, physical inactivity, and early metabolic risk commonly coexist [5]. Therefore, this prospective intervention study evaluates whether a structured nutrition education program can improve knowledge, attitudes, and practices (KAP) related to PCOS risk reduction among emerging adult women, generating practical evidence to strengthen lifestyle-focused PCOS prevention and early management.

METHODOLOGY

Study Design

This prospective intervention study employed a pre-post design to assess the impact of a structured nutrition education program on knowledge, attitudes, and practices (KAP) related to PCOS risk among emerging adult women. Participants were screened for PCOS risk using modified Rotterdam criteria, focusing on oligo-anovulation,

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hyperandrogenism, and clinical symptoms, with follow-up evaluations at baseline and post-intervention (after 3 months).

Participants and Setting

A cohort of 231 emerging adult women (aged 18-21 years, mean 18.9 ± 1.4 years) from an urban Indian academic institution was recruited via purposive sampling. Inclusion criteria encompassed late adolescence/early adulthood, self-reported menstrual irregularities or clinical signs (e.g., acne, hirsutism in 43.7%), and high-risk status ($n=57$) confirmed by anthropometric (BMI >23 kg/m², waist >80 cm) and biochemical markers (elevated insulin, testosterone). Exclusion involved diagnosed comorbidities or pregnancy. Ethical approval was obtained from the institutional review board.

Intervention

The 12-week program delivered bi-weekly sessions (group and individual) on PCOS pathophysiology, balanced diets (emphasizing fiber-rich vegetables/fruits, reduced fried/sugary foods), meal regularity (anti-breakfast skipping), and physical activity (moderate-vigorous, ≥ 150 min/week). A novel nutrient-dense cookie supplement (high in horse gram, bajra; organoleptically scored 25-27/27) supported adherence. Sessions used interactive modules, demonstrations, and KAP questionnaires adapted from validated tools.

Data Collection and Analysis

KAP was measured via structured questionnaires (pre/post), alongside anthropometrics (BMI, WHR), biochemistry (FBS, insulin, lipids), and dietary logs. Statistical analysis utilized paired t-tests, chi-square for significance ($p < 0.05$), and SPSS v.25. Post-intervention improvements in KAP scores, menstrual regularity, and metabolic parameters were primary outcomes.

RESULTS

Nutrition education produced large improvements in PCOS-related knowledge, attitudes, and lifestyle practices among the 57 women at risk, alongside a clear baseline profile of central adiposity and early metabolic risk markers. Baseline screening of 231 emerging adult women (mean age 18.86 ± 1.4 years) identified 57 at-risk participants for detailed assessment and follow-up. At baseline, menstrual irregularity was present in 10.4% (24/231), and 43.7% showed clinical dermatologic signs such as acne, hirsutism, or acanthosis nigricans. Lifestyle behaviors indicated low physical activity (48% reported no exercise) and suboptimal diet patterns, including frequent breakfast skipping and low fruit/vegetable intake among the risk group.

Anthropometric assessment showed the at-risk group had significantly higher weight, BMI, and central obesity indices compared with the overall cohort, with waist circumference and waist-hip ratio suggesting marked abdominal adiposity.

Biochemical profiling in the at-risk group demonstrated mean fasting glucose and insulin within reference ranges but with some individuals showing elevated values, and lipid parameters indicating borderline cardiometabolic risk in a subset. Total testosterone values were largely within reference range, though elevated levels were observed in some participants, supporting heterogeneity in hyperandrogenaemia among at-risk women.

Table 1. Anthropometric profile (baseline)

Parameter	Total cohort (n=231) Mean $\pm$ SD	At-risk group (n=57) Mean $\pm$ SD	p-value / significance
Weight (kg)	52.9 $\pm$ 9.8	60.7 $\pm$ 7.5	0.000 (Significant)
BMI (kg/m ²)	21.6 $\pm$ 3.6	23.6 $\pm$ 2.9	0.000 (Significant)
Waist-hip ratio	Not available	0.85 $\pm$ 0.05	0.000 (Significant)

Following structured nutrition education, overall KAP scores improved significantly. Mean knowledge increased from 36.32 ± 21.01 to 85.09 ± 8.88 , attitude from 86.63 ± 4.47 to 98.42 ± 2.47 , and practice from 70.70 ± 20.07 to 97.54 ± 6.62 (paired t-test $p < 0.01$ for all). Knowledge items with the greatest gains included awareness of PCOS prevalence (18% to 95%), causes (26% to 88%), treatment (26% to 96%), and links with other conditions (47% to 100%). Correlation analysis suggested stronger alignment between knowledge, attitude, and practice after education, indicating improved translation of understanding into behavior.

Table 2. Biochemical profile of at-risk group (baseline)

Parameter (n=57)	Mean $\pm$ SD	Reference range
Fasting blood sugar (mg/dL)	98.4 $\pm$ 19.7	70–110
Fasting insulin (μ U/mL)	13.04 $\pm$ 6.4	5.0–20.0

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Parameter (n=57)	Mean $\pm$ SD	Reference range
Total testosterone (ng/dL)	30.9 $\pm$ 13.6	8–48
Triglycerides (mg/dL)	173.5 $\pm$ 43.2	<200

DISCUSSION

Nutrition education substantially improved knowledge, attitudes, and practices (KAP) among emerging adult women at risk for PCOS in this study, suggesting that structured counselling can help translate guideline-based lifestyle advice into feasible day-to-day behaviors [6]. The observed post-intervention rise in knowledge (36.32 ± 21.01 to 85.09 ± 8.88) and practice (70.70 ± 20.07 to 97.54 ± 6.62) indicates that young women can rapidly build PCOS-related health literacy when education is delivered in a culturally relevant, interactive format [7]. This is consistent with prior educational intervention research in PCOS showing that theory-based programs can improve nutrition-related knowledge and behavior determinants, which are important proximal drivers of lifestyle adherence [8]. Baseline findings of higher BMI/central adiposity in the at-risk group align with evidence that abdominal obesity and early metabolic vulnerability are common in adolescent and young adult PCOS phenotypes, reinforcing the rationale for early preventive interventions [9]. International evidence-based guidance identifies lifestyle management (healthy eating, physical activity, and behavioral strategies) as first-line care in PCOS, and the current findings support operationalizing these recommendations through targeted education during late adolescence/early adulthood [10]. Although biochemical means were largely within reference ranges, the presence of elevated values in subsets (e.g., glucose, insulin, lipids, testosterone) underscores heterogeneity of risk and the need for early screening plus sustained lifestyle support to prevent progression [11].

CONCLUSION

This prospective intervention study demonstrates that structured nutrition education can markedly improve PCOS-related knowledge, attitudes, and lifestyle practices among emerging adult women at risk. Participants showed substantial gains in awareness of PCOS causes, symptoms, complications, and lifestyle-based prevention, along with improved readiness to adopt healthier dietary patterns and physical activity behaviors. Baseline evidence of higher adiposity and early metabolic risk markers in the at-risk group supports the need for early, prevention-focused programs in late

adolescence and early adulthood. Integrating culturally appropriate education into campus and community settings may strengthen self-management skills and reduce future cardiometabolic and reproductive complications.

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