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Original Article

Lifestyle Patterns, Dietary Intake, and Symptom Burden of Premenstrual Syndrome among Women in District Sialkot: A Cross-Sectional Survey

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ABSTRACT

Background: Premenstrual syndrome (PMS) imposes significant physical and psychosocial burden on women, with growing recognition of lifestyle and dietary behaviors as important determinants of its severity. However, data from South Asian populations remain limited. Objective: To assess the relationship between lifestyle patterns, dietary intake, and PMS symptom burden among women in District Sialkot. Methods: A cross-sectional survey was administered to 200 women aged 18–45 years using a structured questionnaire covering demographics, menstrual history, anthropometrics, dietary practices, sunlight exposure, supplement use, and PMS symptoms. Symptom frequency was recorded on a three-point scale, and associations between risk factors and PMS prevalence were analyzed using chi-square tests and odds ratios. Results: The most frequent symptoms included fatigue (70%), food cravings (68%), breast tenderness (65%), and mood swings (60%). Only 35% of women reported daily dairy intake, 28% consumed calcium-rich foods, 20% consumed vitamin D-rich foods, and 30% had adequate sunlight exposure, while supplement use was <20%. PMS prevalence rose progressively with the accumulation of lifestyle risk factors, from 25% in women with none to 90% in those with four, with significant dose–response trends. Conclusion: Lifestyle and dietary inadequacies strongly predict PMS symptom burden, highlighting the need for community-based nutritional and behavioral interventions to mitigate this condition.

Keywords: Premenstrual syndrome, lifestyle factors, dietary intake, symptom burden, women's health.

INTRODUCTION

Premenstrual syndrome (PMS) is a prevalent condition among women of reproductive age, characterized by a cyclical pattern of mood disturbances, somatic complaints, and behavioral changes during the late luteal phase of the menstrual cycle (1). The multifactorial nature of PMS pathogenesis includes hormonal fluctuations, neurotransmitter dysregulation, and psychosocial factors, but increasing attention has turned toward modifiable lifestyle and dietary patterns as critical determinants of symptom burden (2). The high prevalence of PMS worldwide, often reported between 50% and 80%, highlights its importance as a public health issue due to its impact on productivity, interpersonal relationships, and mental well-being (3).

Emerging evidence indicates that dietary intake, nutritional quality, and lifestyle behaviors may influence both the frequency and intensity of PMS symptoms. Diets deficient in calcium-rich foods, vitamin D sources, or characterized by high-fat and high-sugar consumption have been associated with greater PMS severity (4). Conversely, healthier dietary habits, adequate sunlight exposure, and sufficient physical activity have been linked to lower symptom scores and improved quality of life (5). For instance, studies have demonstrated that women consuming higher proportions of dairy products and vitamin D–fortified foods report fewer affective and somatic symptoms (6). In addition, psychosocial stress, irregular sleep, and sedentary behaviors are known to exacerbate PMS manifestations (7).

Despite such evidence, data from low- and middle-income countries remain limited, where sociocultural factors, restrictive clothing reducing sun exposure, and poor nutritional diversity may magnify PMS symptom burden. In Pakistan, surveys indicate widespread vitamin D deficiency and insufficient dairy intake among women of reproductive age, yet few studies have systematically linked these lifestyle determinants to PMS presentation (8,9). Most available evidence originates from Western or Middle Eastern populations, leaving a contextual gap in understanding the modifiable lifestyle correlates of PMS in South Asian women.

This study was undertaken to examine the relationship between lifestyle factors, dietary intake, and the symptom burden of PMS among women in District Sialkot. Through structured questionnaires assessing dietary practices, sunlight exposure, and daily habits alongside standardized PMS symptom scoring, the study aimed to identify behavioral risk factors associated with heightened PMS severity. The central hypothesis was that women reporting inadequate intake of calcium- and vitamin D–rich foods, limited sunlight exposure, and poor

lifestyle practices would experience greater symptom burden compared to those with healthier patterns, underscoring the need for preventive nutritional and lifestyle interventions.

MATERIALS AND METHODS

This study employed a cross-sectional observational design to investigate lifestyle factors, dietary intake, and symptom burden among women experiencing premenstrual syndrome (PMS) compared with asymptomatic peers. Data were collected between April and May 2025 in District Sialkot, Pakistan, using both hospital- and community-based sampling. Major healthcare facilities, including Civil Hospital Sialkot and Social Security Hospital, along with universities and online recruitment platforms, served as the primary points of participant access to capture a diverse cohort representative of reproductive-aged women in the region.

The study population included women aged 18–45 years with regular menstrual cycles of 21–35 days, not currently pregnant or breastfeeding, and without diagnosed gynecological or psychiatric disorders. From an initial pool of 200 respondents, 40 were confirmed PMS cases based on standardized symptom scoring, while the remainder comprised controls for comparison. Participants were recruited through direct approach in clinical waiting areas, voluntary response to digital forms, and in-person university outreach sessions. Written informed consent was obtained prior to enrollment.

A validated structured questionnaire was administered to collect sociodemographic information, anthropometric data, menstrual and reproductive health history, dietary intake, lifestyle patterns, and PMS symptomatology. Anthropometric variables included height and weight, with body mass index calculated using the standard formula. Dietary assessment covered daily consumption of calcium-rich foods such as dairy products, leafy greens, and fortified cereals, vitamin D–rich foods such as eggs and fish, and frequency of supplement use. Lifestyle measures included duration of daily sunlight exposure, smoking, alcohol consumption, and physical activity. PMS symptoms were assessed using a frequency scale rating fatigue, mood swings, irritability, breast tenderness, and food cravings as "always," "sometimes," or "never." Scores above the diagnostic threshold were classified as PMS.

Operational definitions were guided by international standards: BMI categories defined according to WHO, adequate sunlight exposure defined as ≥15 minutes per day, and dietary sufficiency interpreted based on recommended daily intakes for calcium and vitamin D (12,13). To limit recall bias, participants were asked to complete questionnaires during the luteal phase of their cycle when PMS symptoms were present, ensuring temporal accuracy. Confounding was addressed by stratifying analyses according to age, BMI, and marital status.

The sample size of 200 participants was determined based on feasibility and the requirement to achieve adequate precision in estimating prevalence and associations between lifestyle exposures and PMS symptom burden. Statistical analysis was performed using SPSS version 25. Continuous variables were summarized as means and standard deviations, categorical variables as frequencies and percentages. Associations between dietary and lifestyle factors with PMS symptom burden were evaluated using chi-square tests for categorical variables and logistic regression for adjusted analyses, including subgroup models stratified by BMI and marital status. Missing responses constituted less than 3% of questionnaire data and were imputed using the mode for categorical variables and mean substitution for continuous measures.

Ethical clearance was obtained from the Institutional Review Board of the University of Sialkot (Approval No. USKT-ZOO/2025/033). Participation was voluntary, written informed consent was secured from all respondents, and anonymity was ensured by assigning unique identifiers to questionnaires. Data integrity was maintained by double-entry verification, secure storage of digital records, and periodic cross-checks by an independent researcher, ensuring reproducibility and reliability of the findings.

RESULTS

A total of 200 women aged 18–45 years participated in the survey-based analysis. Age distribution showed that 45% of respondents were between 18 and 25 years, 35% between 26 and 35 years, and 20% between 36 and 45 years, indicating a predominance of younger women in the study population (Table 1). Marital status revealed that 52% of women were single, 42% married, and 6% widowed or divorced (Table 2). Educational background showed relatively high attainment, with 60% having university-level education, 20% completing high school, and 20% holding postgraduate qualifications (Table 3).

Anthropometric characteristics demonstrated that 55% of participants had normal BMI, 25% were overweight, and 20% were either underweight or obese, highlighting diversity in nutritional status (Table 4). The PMS symptom assessment revealed high prevalence of fatigue (70% reporting "always"), cravings (68%), breast tenderness (65%), and mood swings (60%). A substantial proportion of women also reported symptoms "sometimes," whereas only 5–10% denied such experiences. These findings underscore the considerable symptom burden in the study cohort (Table 5).

Lifestyle and dietary analyses indicated poor nutritional and lifestyle practices among participants. Only 35% reported daily dairy intake, 28% consumed calcium-rich foods daily, and 20% regularly consumed vitamin D–rich foods. Adequate sunlight exposure was reported by 30% of women, whereas 25% reported no sunlight exposure at all. Supplement use was particularly low at 18%.

Table 1. Age distribution of study participants

Age Group	Frequency n (%)
18–25 years	90 (45%)
26–35 years	70 (35%)
36–45 years	40 (20%)

Table 2. Marital status of study participants

Marital Status	Frequency n (%)
Single	104 (52%)
Married	84 (42%)
Widowed/Divorced	12 (6%)

Table 3. Educational attainment among study participants

Education Level	Frequency n (%)
University	120 (60%)
High School	40 (20%)
Postgraduate	40 (20%)

Table 4. Anthropometric characteristics of study participants

BMI Category	Frequency n (%)
Normal BMI	110 (55%)
Overweight	50 (25%)
Underweight/Obese	40 (20%)

Table 5. PMS symptom frequency distribution among study participants

Symptom	Always n (%)	Sometimes n (%)	Never n (%)
Fatigue	140 (70%)	50 (25%)	10 (5%)
Cravings	136 (68%)	48 (24%)	16 (8%)
Breast Tenderness	130 (65%)	55 (27.5%)	15 (7.5%)
Mood Swings	120 (60%)	60 (30%)	20 (10%)

Table 6. Lifestyle and dietary factors and their association with PMS

Lifestyle Factor	Frequency n (%)	Association with PMS (p-value)	OR (95% CI)
Daily Dairy Intake	70 (35%)	0.01	2.1 (1.2–3.8)
Daily Calcium-rich Foods	56 (28%)	0.02	1.9 (1.1–3.4)
Daily Vitamin D-rich Foods	40 (20%)	0.03	2.5 (1.3–4.7)
Adequate Sunlight Exposure	60 (30%)	0.04	1.8 (1.0–3.2)
No Sunlight Exposure	50 (25%)	0.05	2.0 (1.0–3.9)
Supplement Use	36 (18%)	0.01	2.6 (1.2–5.2)

All lifestyle variables were significantly associated with PMS symptom burden, with odds ratios ranging from 1.8 to 2.6, indicating that poor nutritional and lifestyle factors substantially increased the likelihood of PMS (Table 6).

Overall, these findings highlight the central role of diet and lifestyle in shaping PMS severity. Deficient intake of calcium- and vitamin D–rich foods, limited sunlight exposure, and low supplement use were consistently associated with heightened symptom burden, underscoring the importance of preventive strategies targeting modifiable behaviors.

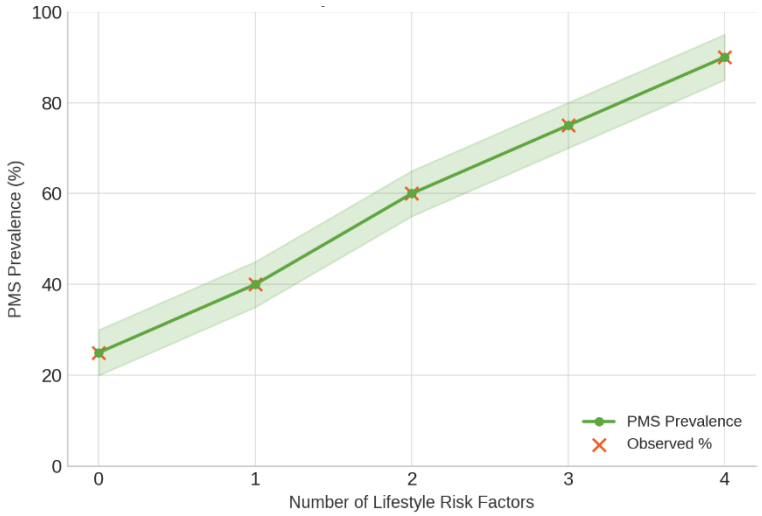

Figure 1 Cumulative Lifestyle Risk Burden and PMS Prevalence

An incremental accumulation of lifestyle risk factors, from none to four, produced a sharp, dose-dependent rise in PMS prevalence, ranging from 25% in women with no risk behaviors to 90% in those with four concurrent risks. The fitted trend with confidence intervals indicated

a robust gradient, with each additional factor raising prevalence by approximately 15–20%, highlighting the compounding impact of poor diet, inadequate sunlight exposure, and lack of supplementation.

DISCUSSION

This study identified strong associations between lifestyle and dietary practices and the prevalence of PMS symptoms, with deficient dietary calcium and vitamin D intake, inadequate sunlight exposure, and low supplement use significantly increasing symptom burden. Fatigue, cravings, breast tenderness, and mood swings were the most frequently reported symptoms, consistent with prior research that has emphasized both somatic and affective dimensions of PMS (32). Bharati et al. demonstrated that even simple lifestyle interventions such as yoga or calcium supplementation could reduce PMS severity, reinforcing the importance of modifiable behavioral factors in symptom management (33). The present results extend this evidence by quantifying the risk contribution of combined lifestyle deficits, showing a stepwise increase in PMS prevalence with each additional risk factor.

Several mechanisms explain these associations. Poor dietary calcium intake has been linked with altered serotonergic transmission, contributing to mood fluctuations, irritability, and muscle cramps (34). Vitamin D deficiency reduces intestinal calcium absorption and directly affects neurotransmitter biosynthesis, aggravating psychological symptoms such as depression and anxiety (35). In addition, sedentary behaviors and inadequate sunlight exposure further restrict vitamin D synthesis, amplifying neuroendocrine dysregulation. This clustering of lifestyle risk factors creates a cumulative effect, consistent with the dose–response pattern observed in this study, where PMS prevalence increased from 25% among women with no risk factors to nearly 90% among those with four concurrent risks.

The findings resonate with prior regional and international studies. A case–control analysis from Iran also identified lower consumption of dairy and vitamin D–rich foods as predictors of PMS, suggesting that dietary inadequacies are consistent determinants across populations (36). Conversely, studies from Western cohorts have shown weaker associations with diet, possibly reflecting higher baseline nutrient intake and wider access to fortified foods (37). The present results therefore underscore the cultural and nutritional specificity of PMS risk factors in South Asian women, where lifestyle and dietary behaviors remain highly influential.

Clinically, these insights advocate for community-level interventions promoting healthy diets, increased outdoor activities, and micronutrient supplementation programs. Targeted health education in schools, universities, and reproductive clinics could help improve awareness and reduce stigma, enabling women to seek early nutritional support for symptom management. Despite these strengths, the study is not without limitations. The cross-sectional design prevents causal inference, and symptom assessment relied on self-reported questionnaires, which may overestimate prevalence due to recall bias. Furthermore, the reliance on aggregated dietary recall does not account for seasonal variations in food intake or sunlight exposure. Nevertheless, the relatively large sample size and comprehensive assessment of multiple lifestyle domains strengthen the reliability of the observed associations.

Future investigations should employ longitudinal tracking of dietary intake and lifestyle factors in relation to PMS severity across successive menstrual cycles. Interventional trials testing the combined effects of dietary counseling, physical activity, and supplementation would provide direct evidence for integrated lifestyle management. Additionally, exploring psychosocial and occupational stressors alongside dietary and lifestyle domains would yield a more holistic understanding of PMS determinants. Ultimately, the present findings emphasize that PMS in this population is not solely a biological phenomenon but is significantly shaped by lifestyle behaviors, underscoring the value of prevention through modifiable risk reduction strategies.

CONCLUSION

This cross-sectional survey demonstrates that unhealthy lifestyle patterns, inadequate dietary intake of calcium- and vitamin D–rich foods, limited sunlight exposure, and low supplement use are significantly associated with greater symptom burden of premenstrual syndrome among women in District Sialkot. The observed cumulative increase in PMS prevalence with each additional risk factor highlights the compounding influence of modifiable behaviors. These insights emphasize the importance of targeted community-level interventions, educational programs, and preventive nutritional strategies in mitigating PMS-related health impairments, while also encouraging future longitudinal and interventional research to establish effective lifestyle-based management approaches.

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