

Original Research Article

Association of premenstrual syndrome with BMI and dietary pattern among young adults

Ganavi K. N.¹, Ragavi M.^{2*}

¹Department of Geriatrics, JSS Academy of Higher Education and Research (JSSAHER), Mysore, Karnataka India

²Department of Nutrition and Dietetics, Old hospital building, JSSAHER, Agrahara, Mysore, Karnataka India

Received: 09 July 2025

Revised: 04 October 2025

Accepted: 05 October 2025

*Correspondence:

Dr. Ragavi M.,
E-mail: ragavi@jssuni.edu.in

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Premenstrual syndrome (PMS) is a group of symptoms faced by 43% of Indian women, which simultaneously affects their daily activity and interferes with their quality of life.

Methods: A cross-sectional study were conducted among young adult women of age 18-26 years. 115 young adults were screened for premenstrual syndrome. Demographic data, anthropometric measures, food patterns, and lifestyle information were collected using a semi-structured questionnaire. The premenstrual syndrome score was evaluated using Padmavathi et al premenstrual syndrome measurement tool. Nutrition counselling was provided for the participants with PMS. The relation between BMI and PMS was established using regression analysis. Paired t-test was used to check the effectiveness of the nutrition counselling by assessing the difference in PMS score.

Results: The mean age group of the participants in the study was 22.9. Out of 115 participants, 40% had PMS. Among, which 43% of the participants experience severe symptoms. The mean BMI of the participants was 22.4 kg/m². The mean percent nutrient adequacy of the participants with PMS was 90.13%. The regression model indicated there was a significant relation between BMI and PMS score, with p value <0.05. There was a significant difference in PMS score before and after the nutritional counselling, denoting the effectiveness of nutritional counselling in improving the premenstrual syndrome (p<0.005).

Conclusions: This study showed that BMI plays a major role in PMS symptoms. Proper nutrition counselling can be effective in reducing PMS Symptoms.

Keywords: Alcohol, Anthropometry, Dietary habits, Lifestyle, Premenstrual syndrome, Smoking

INTRODUCTION

Premenstrual syndrome (PMS) a group of symptoms that occur in girls, typically between ovulation and menses, specifically in the luteal phase. In luteal phase the physical, behavioral, and emotional symptoms, occurs repeatedly till the start of the menstrual phase. The most typical PMS symptoms include irritability, depression, anxiety, changes in eating and sleep patterns, nausea, vomiting, weight gain, water retention, headaches, breast enlargement and increased sensitivity, exhaustion, acne, and diarrhea.¹⁻³ These symptoms are a common cause of

worry for women of reproductive age and can negatively impact their quality of life, relationships, work productivity, and social activities.¹

Millions of young women have PMS, which is extremely prevalent. According to epidemiological data, 75% of women in reproductive age experience some PMS symptoms, with 3% to 8% of those women reporting particularly severe symptoms. According to a study on the prevalence of PMS in various nations worldwide, 47.8% of the women were suffering from PMS.^{3,4} Estimates of PMS prevalence in India have ranged from 14.3% to 74.4%.⁵

Premenstrual syndrome pathophysiology is not fully understood, but it is predicted as multifactorial, which includes imbalances in hormones and neurotransmitters, and genetic susceptibility.⁶

Nutritional status and PMS.

Studies have shown that dietary habits and nutrient intake are closely associated with PMS symptoms.⁷ A well-balanced diet with at least 5-7 food groups like whole grains, pulses, fish, fruits, vegetables, and nuts and seeds will help in reducing the PMS symptoms. And micronutrients like vitamins and minerals such as calcium, iron, and zinc have been found to have a protective effect against PMS.⁷ Conversely, consumption of refined sugar, fast food, sweetened drinks, alcohol, and chocolates is linked to increased severity of PMS symptoms.

A study conducted by Erbil and Değirmenci found that female students with PMS had higher total energy intake.⁸ Contradictorily, another study, reported no significant differences in total energy intake between women with PMS and controls.⁹ However, both studies agree that the composition of the diet plays a crucial role in PMS symptoms. Maintaining a balanced diet and ensuring adequate intake of essential nutrients can help manage PMS symptoms. Studies have shown that a western-mixed dietary pattern and a high-salt-high-sugar dietary pattern are directly correlated with PMS severity. Additionally, a higher intake of meats and fast foods was observed in participants with PMS symptoms, while the intake of carbohydrate sources was significantly lower compared to participants without symptoms. These findings highlight the importance of nutrition in managing PMS and suggest that dietary interventions could be an effective strategy for symptom relief.^{10,11}

A study conducted by Bertone-Johnson et al, showed that BMI play a crucial role in the severity of the PMS symptoms. As the BMI Increases, the risk of PMS gets increased. And also, some of the symptoms like swelling of extremities, abdominal cramp and Back ache were influenced by BMI.¹²

Objective

This study aimed to find an association between nutritional status, dietary intake, and premenstrual syndrome among young adults.

METHODS

Aim and objective

This study aimed to find a relationship between nutritional status, dietary intake and premenstrual syndrome and to provide nutritional counseling for young adults with premenstrual syndrome. The objective of the study was to assess the prevalence of premenstrual

syndrome among young adults using Padmavathi et al premenstrual syndrome screening tool and find a relation between nutritional status, dietary intake and premenstrual syndrome.² The nutritional status of the Participants was assessed using anthropometric measurements and dietary intake. The anthropometric measurements include height, weight and BMI. The dietary intake was collected using 24-hour dietary recall and food frequency questionnaires. Nutritional counseling was provided after the assessment.

Study design

A descriptive cross-sectional study was designed to assess the prevalence premenstrual syndrome among young adults of age 18-26 years. 115 participants were recruited using random sampling technique. The study was conducted during April 2023 to June 2023, over a period of 3 months in Karnataka, India. Ethical clearance was obtained from institutional ethics committee of JSS Medical College, Mysuru (IEC registration number: ECR/387/Inst/KA/2013/RR-19). Informed consent was obtained from the participants before the start of the study. The study methods, study objectives were also discussed before the start of the study. The participants were also noted that the participation could be made voluntary and withdrawn at any time and that privacy will be protected and the data collected would be kept confidential.

Study eligibility

Inclusion criteria

Young adults aged between 18-26 years were included in the study

Exclusion criteria

Young adults below 18 years and above 26 years were excluded.

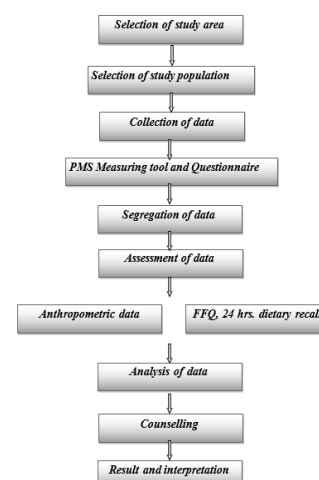


Figure 1: Phase of the study.

Tools of data collection

A systematic well-framed semi structured questionnaire was used to collect demographic data and anthropometric data. A 24-hour recall and food frequency questionnaire were used to collect food and nutrition-related information. The Padmavati et al, PMS scoring questionnaire was used to collect the PMS-related information. Weight was measured using platform beam balance. The Participants were made to stand on the center of the platform after ensuring zero adjustment of the scale. The shoes be removed and with minimum clothing and weight is recorded in terms of kg. Height was measured using measuring tape. BMI was estimated with height and weight. The data was analyzed. Depending on the severity of the PMS symptoms, counselling was given to modify the lifestyle habits, dietary habits, and to engage in physical activity on a regular basis. Participants were suggested to take balanced and home-cooked food. Participants were also informed to avoid eating processed food and fast foods

and restrain from alcohol and smoking. Participants were advised to involve in at least 30 minutes of exercise or Yoga on a regular basis.

RESULTS

The nutrient intake assessment of PMS participants, in relation to the Indian RDA (2024), found that their average energy intake (1623 ± 261 kcal) was below the required 2130 kcal, fulfilling approximately 76% of the need. Carbohydrate (159 ± 34 gm/day) and protein (51 ± 10 gm/day) intake was nearly at the level of the RDA (160 gm/day and 55 g/day, respectively), with an adequacy of 93-99%. Conversely, consumption of fat (62 ± 13 gm/day) was in excess of the recommended 45 gm/day, representing 141% RDA, and reflects an imbalance of diet. Such increased consumption of fat would likely worsen PMS symptoms of bloating, hormonal imbalances and irritability, and highlights the necessity of dietary interventions to accomplish improved nutritional balance.^{12,13}

Table 1: RDA and mean intake.

Nutrients	RDA female	Mean intake of participants suffering from PMS	% adequacy PMS participants	Mean % adequacy
Energy	2130 kcal	1623 ± 261 kcal	76.20	90.13
Carbohydrates	160 gm/day	159 ± 34 gm/day	99.2	
Protein	55 gm/day	5 ± 10 gm/day	93.32	
Fat	45 gm/day	62 ± 13 gm/day	141.24	

Note: Referred from recommended dietary allowance (Indian) revised (2024).¹³

Table 2: Regression analysis of BMI and symptoms.

Statistic	Mean $\pm$ SD	Multiple R	R square	P value
BMI	22.41 ± 4.7	0.46	0.22	0.0010*
Symptoms score	116 ± 31			

*Significant at 5%

Table 3: Symptoms versus dietary intake.

Variable 1	Variable 2	Mean $\pm$ SD	Correlation (r)	T value	P value
PMS symptoms scores	Calories	1623 ± 261	-0.00308	-0.02041	0.98*
	Carbohydrates	159 ± 34	-0.05385	-0.3572	0.72*
	Protein	51 ± 10	0.106749	0.695731	0.49*
	Fat	62 ± 13	0.00663	0.04297	0.96*

*P value >0.05 not significant at 5%.

Table 4: Paired t-test: before symptoms versus after symptoms.

Statistic	Mean score $\pm$ SD	t-value	P value
Symptoms scores before nutrition counselling	116.56 ± 31.87	5.97	(1.71×10^{-7}) *
Symptoms scores after nutrition counselling	109.97 ± 29.96		

*Significant at 5%

The p value was less than 0.05, confirming the regression was statistically significant at the conventional threshold.

This means there was strong evidence to support a meaningful relation between the BMI and symptoms.¹⁴

Table 3 depicts the correlation between PMS scores and dietary intake. It was found that there was no significant association with PMS scores and dietary intake with $p > 0.05$.

Levels of symptoms before and after counselling

Table 3 depicts that nutrition counselling was effective in improving the PMS symptoms score with $p < 0.05$.

DISCUSSION

The research involved 115 participants with ages ranging from 18 to 26 years. Out of which, 40% ($n=46$) were diagnosed with pre-menstrual syndrome (PMS), which corresponds with aggregated data obtained from a meta-analysis ($n=8,542$) that showed a PMS prevalence of 43%, affirming that PMS is prevalent among young women.¹⁵ The mean height and weight of the participants with PMS were, 57 ± 9 kgs, and 157 ± 13.43 cm. 48% of participants were sedentary, scientific evidence indicates that a sedentary lifestyle is associated with an increased risk of premenstrual syndrome (PMS) and its severity.¹⁶

17.39% of them were diagnosed with PCOD/PCOS. A research discovered that women with PCOS suffered from more severe PMS symptoms than women without PCOS, including heightened physical and psychological symptoms. The interaction between hormonal disturbances, metabolic dysfunction, and psychological elements in PCOS may cause an increased risk and severity of PMS symptoms. Management and treatment of the two conditions require addressing such interconnected elements.¹⁷

Drinking alcohol and smoking were more common among the participants. 36.9% of participants were consuming alcohol and 19.56% of participants were smoking.

43.47% of participants were exercising regularly, whereas 56.52% were inconsistent. Epidemiological research confirms that alcohol intake and Smoking is linked with increased risk and severity of PMS, with the heavier the drinking, the more pronounced symptoms. Regular physical activity has a protective effect, decreasing the prevalence of PMS as well as alleviating physical and psychological symptoms. The cumulative evidence indicates that reducing alcohol consumption and regular exercise can greatly contribute to the management of PMS.¹⁸

32.60% of participants with PMS gained weight during the last three months, and 15.21% had lost weight. Weight gain in PMS Participants may be associated with bloating, water retention, or food cravings in the luteal phase. 30.43% had family history of PMS. Interestingly, these are consistent with available research advocating for either genetic or familial risk for PMS.^{19,20}

Dietary intake

In premenstrual syndrome population the average intake of calorie is less (76.2%) than the recommended dietary allowances (RDA). The percent adequacy of carbohydrates is 99.21%, and protein is 93.32%. The percent adequacy of fat is 41% above the RDA, which indicates the fat intake is higher than RDA. Studies showed that women with increased intake of total fat, majorly saturated fats, are associated with high risk of developing PMS.¹²

The food frequency profile reveals that the majority of participants with PMS consume cereals (93.48%) and pulses/dhals (71.74%) on a regular basis. However, the frequency of eating foods rich in micronutrients is quite low. Green leafy vegetables are not eaten regularly by 35.88% of the participants, and the other vegetables are eaten daily by only 4.35% and weekly by 47.82% of the participants. Nuts and oil seeds, the key foods for essential fatty acids and magnesium, are eaten monthly by 47.83% of the participant and none of the participants were consuming nuts and oil seeds on daily basis. Studies have highlighted that low intake of these foods potentially could contribute to underconsumption of nutrients that govern hormones and inflammation, both being of relevance for PMS.^{7,21}

Milk and dairy products, a source of calcium that is useful for PMS were eaten daily by 78.26% of the participants. Studies have shown that calcium intake can reduce the majority of psychological and Physical symptoms, yet 21.74% of the participants did not consume milk and dairy products on daily basis.²² There is moderate intake of protein, with meat and eggs consumed by 73% of the participants on weekly basis. Fish the primary sources of omega 3 fatty acids was consumed only on monthly basis by 71.74%. The low consumption of fish could restrict the intake of omega-3 fatty acids, which have anti-inflammatory and mood-stabilizing activities that can be useful in controlling PMS symptoms.²³

One of the key findings is the daily use of a high percentage (78.26%) of caffeine-containing drinks like tea and coffee, which can exacerbate the PMS symptoms like irritability, breast discomfort, and sleep disturbances.²⁴ Junk food is eaten predominantly on a monthly scale (47.83%), and its low nutrient quality could also be a factor in enhancing symptoms.

Overall, the result has shown that, participants with PMS are meeting the requirements of macronutrients, yet fail to meet the requirements of micronutrients which is clearly indicated from the food frequency questionnaire. And excessive caffeine consumption can exacerbate or prolong PMS symptoms. Promoting a more balanced diet with adequate vegetables, nuts, and omega-3 sources and moderation of caffeine would be beneficial in PMS management.^{7,21,24}

Expanding the sample size in future investigations may provide clearer insights and a more comprehensive understanding of how BMI and dietary habits relates to PMS. In addition to BMI including a comprehensive body composition analysis using a non-invasive method will provide a deeper insight of how the symptoms varies with higher body fat percentages.

CONCLUSION

This study shows that the participants who are suffering from PMS were lacking balanced dietary habits and regular physical activity, which can worsen PMS symptoms. It was observed that BMI and premenstrual syndrome among young adults were related. Although the participants were well aware of the fact that their premenstrual syndrome symptoms were due to unhealthy diet preference and their unhealthy lifestyle, they did not opt for any preventive measures. After the adoption of a healthy diet and a healthy lifestyle, such as replacing high-fat, processed food with low-fat, low CHO, and high fiber foods, and including exercise in daily life and quitting alcohol and smoking, has made a noticeable change in the symptoms of premenstrual syndrome.

ACKNOWLEDGEMENTS

Authors would like to thank to department of nutrition and dietetics, JSS AHER, Mysuru.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee of JSS Medical College, Mysuru (IEC registration number: ECR/387/Inst/KA/2013/RR-19)

REFERENCES

1. Majeed J, Sharma P, Ajmera P, Dalal K. Menstrual hygiene practices and associated factors among Indian adolescent girls: a meta-analysis. *Reprod Health*. 2022;19:148.
2. Padmavathi P, Sankar R, Kokilavani N, Dhanapal K, Ashok B. Validity and reliability study of premenstrual syndrome scale (PMSS). *Int J Adv Nurs Manag*. 2014;2:4-10.
3. Reid RL, Yen SSC. Premenstrual syndrome. *Am J Obstet Gynecol*. 1981;139:85-104.
4. Naraoka Y, Hosokawa M, Minato-Inokawa S, Sato Y. Severity of menstrual pain is associated with nutritional intake and lifestyle habits. *Healthcare*. 2023;11:1289.
5. Hashim MS, Obaideen AA, Jahrami HA, Radwan H, Hamad HJ, Owais AA, et al. Premenstrual syndrome is associated with dietary and lifestyle behaviors among university students: a cross-sectional study from Sharjah, UAE. *Nutrients*. 2019;11:1939.
6. Rapkin AJ, Winer SA. Premenstrual syndrome and premenstrual dysphoric disorder: quality of life and burden of illness. *Exp Rev Pharmacoecon Outcomes Res*. 2009;9:157-70.
7. Siminiuc R, Țurcanu D. Impact of nutritional diet therapy on premenstrual syndrome. *Front Nutr*. 2023;10:1079417.
8. Erbil N, Mataracı Değirmenci D. The relationship between premenstrual syndrome and dietary habits and nutrient intake: descriptive and analytical cross-sectional study. *Clin Exp Health Sci*. 2024;14:510-6.
9. Quaglia C, Nettore IC, Palatucci G, Franchini F, Ungaro P, Colao A, et al. Association between dietary habits and severity of symptoms in premenstrual syndrome. *Int J Environ Res Public Health*. 2023;20:1717.
10. Seedhom AE, Mohammed ES, Mahfouz EM. Lifestyle factors associated with premenstrual syndrome among El-Minia University students, Egypt. *Int Schol Res Notices*. 2013;2013.
11. Deuster PA, Adera T, South-Paul J. Biological, social, and behavioural factors associated with premenstrual syndrome. *Arch Fam Med*. 1999;8:122-8.
12. Bertone-Johnson ER, Hankinson SE, Willett WC, Johnson SR, Manson JE. Adiposity and the development of premenstrual syndrome. *J Women's Health*. 2010;19:1955-62.
13. National Institute of Nutrition. Dietary guidelines for Indians 2024: recommended daily allowances (RDA). Hyderabad: Indian Council of Medical Research; 2024.
14. Mizgier M, Jarzabek-Bielecka G, Jakubek E, Kedzia W. The relationship between body mass index, body composition and premenstrual syndrome prevalence in girls. *Ginek Pol*. 2019;90:256-61.
15. Dutta A, Sharma A. Prevalence of premenstrual syndrome and premenstrual dysphoric disorder in India: a systematic review and meta-analysis. *Health Promot Perspect*. 2021;11:161-70.
16. Shi Y, Shi M, Liu C, Sui L, Zhao Y, Fan X. Associations with physical activity, sedentary behavior, and premenstrual syndrome among Chinese female college students. *BMC Women Health*. 2023;23:173.
17. Almahareeq M, Hamdan M, Vanoh D, Shawarb N, Herbawi J, Shawar E, et al. Comparison of premenstrual symptoms, psychological well-being, and nutritional status between Palestinian women with and without polycystic ovarian syndrome: a case-control study. *BMC Womens Health*. 2024;24:360.
18. Choi SH, Hamidovic A. Association between smoking and premenstrual syndrome: a meta-analysis. *Front Psychiatr*. 2020;11:575526.
19. van Hooff MH, Voorhorst FJ, Kaptein MB, Hirasig RA, Koppelaar C, Schoemaker J. Polycystic ovaries in adolescents and the relationship with menstrual cycle patterns, luteinizing hormone, androgens, and insulin. *Fertil Steril*. 2000;74:49-58.

20. Dickerson LM, Mazyck PJ, Hunter MH. Premenstrual syndrome. *Am Fam Phys*. 2003;67:1743-52.
21. MoradiFili B, Ghiasvand R, Pourmasoumi M, Feizi A, Shahdadian F, Shahshahan Z. Dietary patterns are associated with premenstrual syndrome: evidence from a case-control study. *Public Health Nutr*. 2020;23:833-42.
22. Thys-Jacobs S. Micronutrients and the premenstrual syndrome: the case for calcium. *J Am Coll Nutr*. 2000;19:220-7.
23. Mohammadi MM, Dehghan Nayeri N, Mashhadi M, Varaei S. Effect of omega-3 fatty acids on premenstrual syndrome: a systematic review and meta-analysis. *J Obstet Gynaecol Res*. 2022;48.
24. Purdue-Smithe AC, Manson JE, Hankinson SE, Bertone-Johnson ER. A prospective study of caffeine and coffee intake and premenstrual syndrome. *Am J Clin Nutr*. 2016;104:499-507.

Cite this article as: Ganavi KN, Ragavi M. Association of premenstrual syndrome with BMI and dietary pattern among young adults. *Int J Community Med Public Health* 2025;12:5047-52.