

Prevalence, Severity, and Functional Impairment of Premenstrual Syndrome Among Late Reproductive-Age Women in Rural Karnataka: A Cross-Sectional Study

Shivani Manjrekar^{1*}, Sandeep Patil²

¹Department of Community Medicine, USM-KLE International Medical Programme, Belagavi, Karnataka, India

²Department of Psychiatry, JN Medical College, Belagavi, Karnataka, India

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ABSTRACT

Background: Evidence on the burden of premenstrual syndrome (PMS) among late reproductive-age rural women in India is limited. To estimate PMS prevalence and severity, describe symptom and functional-impairment patterns, and examine associated predictors.

Materials and methods: A cross-sectional study was conducted among women aged 35-45 years attending the outpatient department of a rural health training centre from January to June 2022 (n=270). The Premenstrual Symptoms Screening Tool (PSST) was forward-back-translated into Kannada and administered with demographic, menstrual, and behavioural variables.

Results: PMS was reported by 90.0%; 62.2% had moderate-severe PMS (95% CI 56.3-67.8), 4.4% had severe PMS, and 27.8% had mild/sub-threshold PMS. Fatigue/lack of energy (98.4%), physical symptoms (95.9%), and difficulty concentrating (82.7%) were the most common symptoms. Functional impairment most often affected college/work productivity (84.0% moderate; 100.0% severe) and relationships with family (82.7% moderate). Significant predictors included regular cycles, earlier menarche, family history, lower physical activity, frequent sweet intake, and oral-contraceptive use (protective) (p<0.05).

Conclusion: PMS burden and functional impairment are substantial. Routine screening and primary-care counselling are warranted along with the primordial need for increased awareness.

Keywords: Menstruation, Hygiene, Knowledge, Attitude, Practices, Reproductive Age

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***Correspondence:** Shivani Manjrekar (Email: shivanimanjrekar@rediffmail.com)

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INTRODUCTION

Menstruation is a normal physiological phenomenon in the life of most women, which signifies an important transition to womanhood. Approximately 26 per cent of the global population falls under the female reproductive age group. Menstruation though a monthly affair is overshadowed with its allied health worriment, Pre-Menstrual Syndrome (PMS) being one of them.¹

PMS refers to a combination of emotional and physical symptoms that occur cyclically post ovulation and resolve once the menses set in.² Earlier noted as an insubstantial disease, it is now estimated that 50-80% of women experience some form of PMS symptoms, with 3-8% of them having disabling affective symptoms which may lead to considerable weakening of their quality of life.³ Further, worsening of symptoms is seen in women in their late 30s or 40s⁴, resulting in a negative impact on their health status which in turn has unfavorable reverberations on the family as well. Occurrence of PMS exhibits a wide spectrum of presentation, which includes easy fatigability, fluctuations in mood, sulkiness, food cravings, sore breasts and feeling of despair. These symptoms exhibit a spectrum of varying intensity, ranging from slightly noticeable to intense symptoms which may cause marked functional impairment.⁵

PMS diagnosis is established by the indicative standards set by the American College of Obstetricians and Gynaecologists (ACOG), or from the Diagnostic and Statistical Manual - fifth edition (DSM-5) of the American Psychiatric Association (APA) or by the Premenstrual Symptoms Screening Tool (PSST), which are validated tools utilized globally and having shown wide applicability across diverse populations.⁶ The ACOG criteria looks for occurrence of at least one affective indicator (e.g., nervousness/irritability, furious upsurges, misperceptions, unhappiness, fearfulness or social retraction) and one bodily symptom (e.g., abdominal bloating, breast soreness or engorgement, headache, joint or muscle aches or increase in weight) is a requisite for diagnosis of PMS, while the APA criteria diagnosis is based on presence of somatic symptoms. The PSST is a 19 item self-reporting questionnaire addressing 3 domains. The duration and periodicity of the symptoms is also an important parameter in the diagnosis of PMS.⁷

According to the Sample Registration System Statistical Report 2020⁸, 59.7% of females fall under the reproductive age bracket (15-49 years), of which approximately 68% reside in rural areas. Majority of these rural women suffer not only from economic poverty but also from paucity of information, thus making them more vulnerable when coupled with monthly health indisposition.⁹ Though many studies^{5,6,10} have been carried out among adolescents and urban women population, very few studies have been undertaken in rural areas among women aged

above 35 years of age, the age from which worsening of PMS symptoms is known. Hence this study was undertaken to (1) estimate prevalence and severity of PMS; (2) describe symptom patterns; (3) quantify functional impairment; and (4) examine predictors among late reproductive-age rural women.

METHODOLOGY

A cross-sectional study was conducted from January to June 2023 among women attending the outpatient department of a Rural Health Training Centre affiliated with a private medical college. Women aged 35 years of age (age at which majority Indian women have completed their family)¹¹ to 45 years of age (average age for menopause in Indian women)¹² with normal menses were included in the study considering their free will for participation. Exclusion criteria were pregnancy, lactation, gynecological disorders, hormonal treatment, chronic psychiatric illness, and stress experienced outside the perimenstrual window. A total of 298 outpatient attendees were screened; 28 refused participation (refusal rate 9.4%). The final sample comprised 270 women.

Data was collected individually using preformed questionnaire which consisted of two sections. The first section included participant information on their socio-demographic profile, menstrual history and factors (e.g., physical activity, salt intake, and sweet food intake, adequacy of sleep and use of oral contraception) which may be associated with PMS. Physical activity was said to be adequate if it involved at least 150 minutes of moderate-intensity activity per week.¹³ Adequacy of sleep was established with the participant having at least 6 hours of sleep daily.¹⁴ Consumption of salt was said to be high if the participant opted for pickles, papads or extra table salt for any of the meals on more than 3 days a week. Same was for the consumption of sweet foods. Stress has different meaning for different people under different condition. Hence presence of stress was assessed subjectively, as being present if the individual was emotionally and mentally distressed due to any situation excluding the week prior and post menstrual cycle.¹⁵

The second section made use of Premenstrual Symptom Screening Tool (PSST) to assess our area of interest. This tool is made up of 14 items reflecting premenstrual symptoms and 5 items revealing functional impairment on a four-point Likert scale. The participants needed to rate these symptoms based on their experience at least a week before their menses to few days after the onset of menses, over the past 12 months duration for most of the cycles. The severity was graded using the PSST scoring system.¹⁶ This proforma was chosen as studies have shown that PSST predicts the severity and impact of premenstrual symptoms to a satisfactorily accurate level.^{7,17} It being a useful screening tool, acts as a pre-

amble for further assessment. The PSST was forward-back-translated into Kannada by three bilingual experts (an obstetrician-gynecologist, a public-health specialist, and a language expert). The version was pilot tested for clarity.

Using $n = Z^2 p(1-p)/d^2$ with $p=19.3\%$, $d=0.05$, $Z=1.96$ (for 95% CI), required sample size was 240; 270 participants were enrolled. Data entry was double-checked, and 10% of records were randomly cross-verified. Prevalence with 95% confidence intervals was calculated. Group comparisons used suitable statistical tests. A statistical significance was set at $p < 0.05$. Ethical approval was obtained, and written informed consent was collected. Trial registration: not applicable.

RESULTS

Based on the inclusion criteria, 270 women were enrolled in the study. As per the PSST scoring criteria, 168 (62.2%) women of our sample suffered from moderate to severe PMS, 27 (10%) of them didn't suffer from any pre-menstrual symptoms, while the residual 75 (27.8%) women experienced sub-maximal symptoms usually designated as "normal" or mild PMS [Table 1].

Majority of the participants (72.9%) fell under the age bracket of 35 to 40 years. Table 2 shows the analysis of predominant predictors of PMS. More than half, 199 (73.7%) of the women had regular menstrual cycle, of which 191 (96%) suffered from PMS. Family history of PMS was found to be present among 67.1% women having premenstrual syn-

drome. For age of menarche, an average of 13.2 ± 1.21 years was recorded. Nearly one third of the participants (30.4%) experienced early menarche, that is before their 12th birthday, while more than half (63%) of the women with PMS attained menarche between 12 to 15 years of age. Though oral contraception was practiced as a method of family planning among 14.1% participants, only 6.2% women with PMS used oral contraceptives. Inadequacy of physical activity was seen among 62.1% of participants who complained of PMS, while sleep was found to be adequate in majority (78.6%) of them. Although more than half (65.2%) of the study participants expressed being stressed, individuals with PMS also recorded higher frequency of stress (68.3%). The number was higher among the PMS group, when consumption of sweet foods (67.1%) was considered, while salt intake was seen in less than one-third (30.5%). On further analysis, significant association ($p < 0.05$) was found between presence of premenstrual syndrome and the following predictors - regularity of menstrual cycle, family history of PMS, age at menarche, use of oral contraception, adequacy of physical activity and frequent consumption of sweet foods.

Table 1: PMS prevalence among study participants as per the severity grades

PMS Grade	Frequency (%) (n = 270)	95% CI (%)
No PMS	27 (10.0)	6.5 - 13.5
Mild PMS	75 (27.8)	22.7 - 32.9
Moderate PMS	156 (57.8)	51.8 - 63.8
Severe PMS	12 (4.4)	2.0 - 6.8

Table 2: Predictors of Premenstrual Syndrome (PMS) with Crude and Adjusted Odds Ratios

Predictor	Category	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value
Menstrual cycle	Irregular vs. Regular	5.45 (2.22 - 13.35)	4.87 (1.98 - 11.96)	0.0001*
Family history of PMS	Present vs. Absent	16.3 (4.77 - 55.75)	12.7 (3.73 - 43.54)	0.0001*
Age at menarche (years)	<12 vs. 12 - 15	1.51 (0.53 - 4.31)	1.33 (0.45 - 3.95)	0.61
	>15 vs. 12 - 15	0.18 (0.06 - 0.53)	0.29 (0.09 - 0.92)	0.04*
Oral contraception	Yes vs. No	0.01 (0.004 - 0.04)	0.02 (0.005 - 0.07)	0.0001*
Physical activity	Inadequate vs. Adequate	4.69 (1.84 - 11.95)	3.92 (1.44 - 10.64)	0.006*
Stress	Present vs. Absent	4.83 (2.12 - 11.02)	3.77 (1.52 - 9.36)	0.004*

* $p < 0.05$ considered statistically significant

Table 3: Pattern assessment of premenstrual symptomatology

Symptoms	Total Prevalence (%)	Severity of symptoms n (%)			χ^2 -value	p-value
		Mild	Moderate	Severe		
Anger/irritability	195 (80.2)	38 (19.5)	153 (78.4)	4 (2.1)	89.3490	0.0001*
Anxiety/tension	119 (49.0)	42 (35.3)	77 (64.7)	0 (0.0)	13.0080	0.0010*
Tearfulness/increased sensitivity in rejection	166 (68.3)	56 (33.8)	103 (62.0)	7 (4.2)	2.3280	0.3120
Depressed mood	184 (75.7)	62 (33.7)	117 (63.6)	5 (2.7)	9.5820	0.0080*
Decreased interest in work activities	126 (51.9)	35 (27.8)	81 (64.3)	10 (7.9)	5.5720	0.0620
Decreased interest in home activities	149 (61.3)	36 (24.2)	111 (74.5)	2 (1.3)	22.0580	0.0001*
Decreased interest in social activities	102 (42.0)	46 (45.1)	54 (52.9)	2 (2.0)	18.1650	0.0001*
Difficulty concentrating	201 (82.7)	98 (48.7)	99 (49.3)	4 (2.0)	4.7800	0.0920
Fatigue/lack of energy	239 (98.4)	112 (46.9)	116 (48.5)	11 (4.6)	1.8070	0.4050
Over eating/food craving	74 (30.5)	22 (29.7)	52 (70.3)	0 (0.0)	5.9100	0.0520
Insomnia	57 (23.5)	20 (35.1)	37 (64.9)	0 (0.0)	4.1140	0.1280
Hypersomnia	62 (25.5)	21 (33.9)	41 (66.1)	0 (0.0)	4.4030	0.1110
Feeling overwhelmed	66 (27.2)	32 (48.5)	33 (50.0)	1 (1.5)	14.1100	0.0010*
Physical symptoms	233 (95.9)	60 (25.7)	161 (69.1)	12 (5.2)	35.8110	0.0001*

* $p < 0.05$, hence statistically significant

Table 4: Assessment of frequency of physical premenstrual symptoms

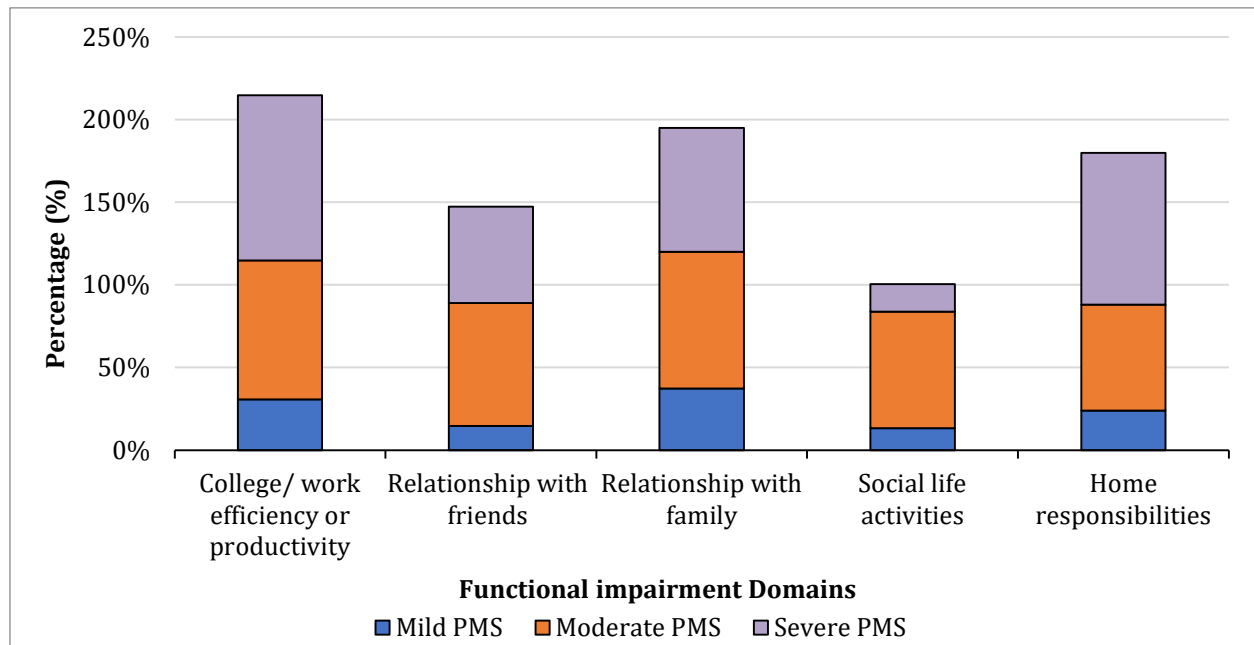
Physical symptom	Total prevalence n (%)	Severity of symptoms n (%)			χ^2 -value	p-value
		Mild	Moderate	Severe		
Headache	111 (47.6)	29 (26.1)	82 (73.9)	0 (0.0)	14.5570	0.0010*
Joint/muscle pain	198 (85.0)	99 (50.0)	88 (44.4)	11 (5.6)	49.8310	0.0001*
Bloating	79 (33.9)	33 (41.8)	37 (46.8)	9 (11.4)	19.8830	0.0001*
Weight gain	66 (28.3)	21 (31.8)	43 (65.2)	2 (3.0)	0.7080	0.7020
Breast tenderness/swelling	172 (73.8)	72 (41.8)	88 (51.2)	12 (7.0)	43.5960	0.0001*

*p<0.05, hence statistically significant

Table 5: Assessment of pattern of functional impairment

Functional impairment	Mild PMS (n = 75) (%)	Moderate PMS (n = 156) (%)	Severe PMS (n = 12) (%)	Mean $\pm$ SD Impairment	Kruskal- Wallis p
College/work efficiency or productivity	23 (30.7)	131 (84.0)	12 (100.0)	2.87 $\pm$ 0.64	0.0001*
Relationship with friends	11 (14.7)	116 (74.4)	7 (58.3)	2.61 $\pm$ 0.71	0.0001*
Relationship with family	28 (37.3)	129 (82.7)	9 (75.0)	2.46 $\pm$ 0.67	0.0001*
Social life activities	10 (13.3)	110 (70.5)	2 (16.7)	2.55 $\pm$ 0.73	0.0001*
Home responsibilities	18 (24.0)	100 (64.1)	11 (91.7)	2.73 $\pm$ 0.69	0.0001*

*p<0.05, hence statistically significant


Figure 1: Stacked bar chart showing functional impairment domains by PMS Severity

On assessment of pattern of premenstrual symptoms [Table 3], the three most common symptoms were found to be fatigue/ lack of energy [98.4%] followed by presence of physical symptoms (95.9%) and difficulty in concentrating (82.7%). The other parts of the symptoms were temperately severe.

On charting and assessing individual physical symptoms [Table 4], joint/muscle pain was the commonest (85.0%) followed by breast tenderness/swelling (73.8%) while only a few (28.3%) experienced weight gain.

The pattern of functional impairment among the study respondents is shown in Table 5. The most common functional impairment in the mild PMS category was in relationship with family (37.3%), while it was college/work efficiency or productivity among the moderate (84.0%) and severe category (100.0%)

and this was found to be statistically significant (p values $\leq$ 0.05).

DISCUSSION

Our study reflects on the prevalence, frequency, severity and predictors of PMS among rural women population. Many women experience an array of somatic and psychological symptoms, which sometimes may limit their functional capability.¹⁷ The findings of the present study showed that 90% of the women suffered from some or the other form of PMS symptoms, which was almost similar to studies done in Kerala (100% had some grade of PMS)¹⁸ and in Uttar Pradesh (the study reported prevalence of PMS to be 65.7%)¹⁹. Majority (57.8%) showed moderate grade PMS, 4.4% suffered from severe PMS which

was consistent with the reported range of 3 to 8%.^{3,20,21}

PMS though not life threatening, can severely compromise functional capacity in some women. Majority cases of PMS can be prevented by some basic lifestyle modifications. Strategies like regular exercise, adequate sleep, stress reduction and consumption of a balanced diet are often enough to limit the symptoms.^{7,22} Analysis of predictors of PMS in our study showed a statistically significant association between presence of PMS and predictors like regularity of menstrual cycle, family history of PMS, age at menarche, use of oral contraception, adequacy of physical activity and frequent consumption of sweet foods. About 73.7% of our study participants had a regular menstrual cycle and the mean age at menarche was around 13 years, which was comparable to a similar study done in Gujarat.⁷ Family history of PMS was reported in 61.5% of our study participants as against 40.3% which was seen in a study done in Puducherry.¹⁰ Either way both the studies had a statistically significant association. Use of oral contraception showed to have a significant protective effect against PMS; this could be endowed to the fact that oral contraceptives are used in regulating menses and also as one of the treatment modalities for PMS, thus bearing a protective effect.^{23,24} Our study also showed that active lifestyle had a significant protective effect on occurrence of PMS, which was comparable to study done in Puducherry¹⁰ and Iran²⁵. 65.2% women had some form of stress as compared to 89% in another study.⁷ This difference could be attributed to the variation in the sample population of the two studies. Another case-control study²⁶, which overcomes the hindrances of cross-sectional study design, also concluded a strong relation between perceived stress and occurrence of PMS. Though enigmatic, this could be due to alteration in hormonal physiology of PMS brought in by stress.

The present study showed that of all the 14 symptoms listed reflecting premenstrual symptoms, fatigue and lack of energy (98.4%) was commonest, followed by physical symptoms (95.9%). This was in line with other studies.^{5,7,17} Joint/muscle pain (85.0%) was the most common physical symptom followed by breast tenderness/swelling (73.8%). This was different as compared to a Bulgarian study²⁷ which showed abdominal bloating to be the most commonly experienced physical symptom. This could be because of the ethnic differences between the two study samples. But our study findings were corroborative with studies done in India.^{5,10} Breast tenderness was least common symptom seen in a study done in Ujjain.²⁸ This difference can be attributed to the parity of the study samples. While our study included parous women, the Ujjain study included nulliparous college students. Parity may cause a change in the hormonal composure of women leading to its impact on breast, causing swelling and tenderness in the pre-menstrual period.

Assessment of patterns of functional impairment in this study revealed evident deficiencies ($\geq 50\%$) across all domains for moderate and severe PMS categories. Particularly, work competency or efficiency was the most common performance limitation among women, while a cent percent reporting it in the severe PMS group. The next prevalent performance limitation was found to be their association with their family, in the moderate PMS category, with a proportion of 82.7%. These findings were found to be coherent with previous research.²⁹ This itself shows how the quality of life of women with PMS can be compromised due to the negative impact of premenstrual symptoms.

Although the study addresses the stated objectives, it comes with certain limitations. Selection bias among OPD attendees may overestimate prevalence. Prospective cycle diaries were not used. PMDD sub-analysis was not conducted. Self-reported exposures may involve recall bias.

CONCLUSION and RECOMMENDATIONS

PMS imposes substantial symptomatic (62.2% in this study) and functional burden among late reproductive-age rural women. Although common, PMS symptoms are often overlooked due to normalization. Presentation includes both physical and psychological symptoms and may interfere with key functional roles during productive years. Early awareness, Routine screening, lifestyle counseling, and early management are recommended. Trained ASHA workers can administer PSST and refer moderate-severe cases to primary health centers for SSRIs and behavioral counseling.

Individual Authors' Contributions: Data collection was carried out by SM, while SP was responsible for data analysis and manuscript writing.

Availability of Data: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declaration of No use of generative AI tool: This article was prepared without the use of generative AI tools for content creation, analysis or data generation. All findings and interpretations are based solely on the authors' independent work and expertise.

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