Section: Community Medicine

Original Research Article

MENSTRUAL DISORDERS AND THEIR ASSOCIATION WITH NUTRITIONAL STATUS AMONG RURAL ADOLESCENT GIRLS: A SCHOOL-BASED CROSS-SECTIONAL STUDY IN NORTHERN INDIA

Vinay[1], Manisha Kumari[2], Adhya Dubey[3], Parth[3]

[1]*Assistant Professor, Department of Community Medicine, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India*
[2]*Professor, Department of Anesthesia, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India*
[3]*Post graduate student, Department of Community Medicine, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India*

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Corresponding Author:
Dr. Vinay,
Assistant Professor, Department of Community Medicine, Pandit Bhagwat Dayal Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India
Email: vinayphogat2018@gmail.com

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ABSTRACT

Background: Menstrual disorders are frequently encountered during this period and can negatively influence quality of life, academic performance and emotional wellbeing. The present study was conducted to estimate the prevalence of menstrual problems among rural adolescent girls and to examine their association with BMI.

Materials and Methods: Study was conducted among 500 adolescent school girls aged 13–19 years studying in government and private senior secondary schools in rural Haryana. Data regarding menstrual characteristics, menstrual symptoms and school absenteeism were collected using a pre-tested semi-structured interview schedule. Anthropometric measurements were obtained using standard procedures and age-specific BMI categories were determined.

Results: Among the study participants, dysmenorrhoea was reported by nearly two-thirds of the girls. Approximately one-fourth of participants reported missing school during menstruation, with menstrual pain being the most common reason for absenteeism. Significant associations were observed between BMI and dysmenorrhoea, severity of pain and prolonged intermenstrual interval. Premenstrual symptoms were reported by a substantial proportion of adolescent girls, with pelvic pain and lower backache being the most frequent complaints.

Conclusion: Menstrual problems are still prevalent among rural adolescent girls and are significantly associated with nutritional status. Early identification of menstrual disorders, menstrual health education and promotion of healthy lifestyle practices may improve adolescent reproductive health and reduce school absenteeism.

Keywords: Adolescent girls, menstrual disorders, dysmenorrhoea, body mass index, menstrual health, school absenteeism.

INTRODUCTION

Adolescence represents a crucial transitional phase between childhood and adulthood, characterised by rapid somatic growth, endocrine maturation and psychosocial development. Menstruation is a significant physiological milestone during this period, reflecting the maturation of the hypothalamic–pituitary–ovarian axis. However, menstrual disturbances are frequently encountered among adolescent girls and may adversely affect their daily activities, academic performance and psychological well-being.

Menstrual disorders, including dysmenorrhoea, irregular cycles, abnormal bleeding duration and premenstrual symptoms, constitute important reproductive health concerns during adolescence.[1,2] Dysmenorrhoea, in particular, is a major contributor to recurrent school absenteeism.[3] These concerns are often exacerbated in resource-constrained settings

by inadequate awareness, sociocultural taboos, poor menstrual hygiene practices and limited access to reproductive health information.

Nutritional status plays a pivotal role in maintaining menstrual and reproductive health.[4] Both undernutrition and obesity may disrupt hormonal homeostasis, ovulatory function and menstrual cyclicity. Previous studies have demonstrated associations between abnormal body mass index and menstrual disturbances, including oligomenorrhoea, severe dysmenorrhoea and abnormal bleeding patterns.[5,6]

Despite growing recognition of adolescent reproductive health, evidence concerning menstrual disorders and their nutritional correlates among rural adolescent girls in northern India remains limited, warranting further epidemiological investigation. Therefore, the present study was undertaken to assess the pattern of menstrual problems among adolescent school girls and to evaluate their association with body mass index.

MATERIALS AND METHODS

Study design and setting: A school-based analytical cross-sectional study was conducted among adolescent girls aged 13–19 years enrolled in classes VIII to XII in selected government and private senior secondary schools located in rural areas of Rohtak district, Haryana, India. The study was undertaken from April 2019 to January 2020.

Study population and eligibility criteria: The study included adolescent girls willing to participate, whose parents or guardians provided written informed consent. Students who remained absent despite repeated school visits or declined participation were excluded.

Sample size and sampling technique: The sample size was estimated using prevalence figures for dysmenorrhoea reported in previous studies, with an additional allowance for non-response, yielding a final sample of 500 participants. A multistage random sampling technique was employed. Government and private senior secondary schools were randomly selected from the study area, followed by the selection of students from classes VIII to XII through simple random sampling to ensure adequate representation across different classes.

Data collection: Data were collected using a pre-designed and pre-tested semi-structured interview schedule. Individual interviews were conducted in a private setting to ensure confidentiality and facilitate the disclosure of menstrual health-related concerns. Information pertaining to menstrual history, associated symptoms, school absenteeism and menstrual hygiene practices was obtained. Anthropometric measurements, including height and weight, were recorded using standardised procedures, and body mass index (BMI) categories were assigned according to WHO age-specific recommendations.

Statistical analysis: Data were entered into Microsoft Excel and analysed using SPSS version 20. Descriptive statistics, including frequencies and percentages, were used to summarise the study variables. Associations between categorical variables were examined using the chi-square test. Variables demonstrating statistical significance in bivariate analysis were subsequently incorporated into binary logistic regression analysis to identify independent predictors of dysmenorrhoea. Adjusted odds ratios (AORs) with corresponding 95% confidence intervals (CIs) were calculated. Statistical significance was established at a p-value of less than 0.05.

Ethical considerations: Prior permission was obtained from the concerned school authorities. Written informed consent was secured from parents or guardians, and assent was obtained from participating students. Confidentiality and privacy of all participants were maintained throughout the study.

Disclosure statement: The present analysis utilised data from a broader adolescent health survey conducted in rural Haryana; however, the research objectives and outcome variables examined in this manuscript are distinct from those investigated in previously published studies based on the same cohort.

RESULTS

A total of 500 adolescent girls participated in the study. Among them, 386 participants had attained menarche and were included in the analysis related to menstrual characteristics. Most participants belonged to the mid-adolescent age group. The majority of girls reported menstrual duration within the normal range of 2–7 days. However, a considerable proportion experienced menstrual disturbances including dysmenorrhoea and irregular cycles. Dysmenorrhoea emerged as the most commonly reported menstrual complaint and affected nearly two-thirds of menstruating participants. Irregular menstrual cycles were also observed among a substantial proportion of adolescent girls. [Table 1]

Table 1: Distribution of study subjects according to menstrual pattern and problems. (N=386)

Variables	Frequency	Percentage
Dysmenorrhea		
Yes	249	64.5
No	137	35.5
Irregular cycles		
Yes	116	30.1
No	270	69.9

Change of pads		
Once	46	11.9
Twice	235	60.9
Thrice or more	105	27.2
Intermenstrual period		
<21 days	17	4.4
21-35 days	327	84.7
>35 days	42	10.9
Duration of menstruation		
1-2 days	14	3.6
2-7 days	329	85.3
>7 days	43	11.1
Absorbent used during menstrual period	Frequency	Percentage
Cloth	49	12.7
Towel	6	1.6
Sanitary pad	331	85.7
Total	386	100

Sanitary pads were the most commonly used absorbent material during menstruation, although a small proportion of girls continued to use cloth or towel. Approximately one-fourth of participants reported school absenteeism during menstruation. Menstrual pain was identified as the leading reason for missing school, followed by fear of leakage and excessive menstrual bleeding. [Table 2]

Table 2: Distribution of study subjects based on absence from school on menstrual days. (n=386)

Category	Frequency	Percentage
Absence from school on menstrual days (n=386)		
Yes	93	24.1
No	293	75.9
Reasons of absence from school on menstrual days (n= 93)		
Fear of leakage	14	15.1
Excessive bleeding	7	7.5
Dysmenorrhea	72	77.4
Days of absence from school on menstrual days (n= 93)		
One	35	37.6
Two	50	53.8
Three and above	8	8.6

Analysis of BMI and menstrual characteristics demonstrated statistically significant associations between higher BMI and dysmenorrhoea. Participants categorized as overweight or obese were more likely to report severe menstrual pain and prolonged menstrual intervals compared to girls with normal BMI. [Table 3 & 4]

Table 3: Association of age specific BMI with menstrual patterns and problems

Variable	Body Mass Index (BMI)				p-value
	Thinness N (%)	Normal N (%)	Overweight N (%)	Obesity N (%)	
Dysmenorrhoea					
Yes	25 (45.5)	210 (67.1)	9 (75)	5 (83.3)	0.011*
No	30 (54.5)	103 (32.9)	3 (25)	1 (16.7)	
Regularity of Cycle					
Regular	40 (72.7)	218 (69.6)	7 (58.3)	5 (83.3)	0.683
Irregular	15 (27.3)	95 (30.4)	5 (41.7)	1 (16.7)	
Intermenstrual period					
<21 days	2 (3.6)	15(4.8)	0(0)	0(0)	0.036*
21-35 days	53 (96.4)	261 (83.4)	9(75)	4(66.7)	
>35 days	0(0)	37(11.8)	3 (25)	2 (33.3)	
Severity of Pain					
Mild	10 (40)	109 (51.9)	2 (22.2)	1 (20)	<0.001*
Moderate	13 (52)	76 (36.2)	0 (0)	2 (40)	
Severe	2 (8)	25 (11.9)	7 (77.8%)	2 (40)	

[Table 4] demonstrates a statistically significant association between the stage of adolescence and dysmenorrhoea (p=0.026), with the highest prevalence observed during mid-adolescence (69.3%), compared with early (55.4%) and late adolescence (55.7%). The severity of menstrual pain also differed significantly across adolescent stages (p=0.037), with severe pain being more frequent during late adolescence (26.5%) than early (4.9%) and mid-adolescence (14.4%). [Table 4]

Table 4: Association of menstrual patterns and problems with adolescence period

Variable	Adolescence period			p-value
	Early adolescence N (%)	Mid adolescence N (%)	Late adolescence N (%)	
Dysmenorrhoea				
Yes	41 (55.4)	174 (69.3)	34 (55.7)	0.026*
No	33 (44.6)	77 (30.7)	27 (44.3)	

Regularity of Cycle				
Regular	51 (68.9)	173 (68.9)	46 (75.4)	0.598
Irregular	23(31.1)	78 (31.1)	15 (24.6)	
Intermenstrual period				
<21 days	0(0)	15 (6)	2 (3.3)	0.216
21-35 days	66 (89.2)	207 (82.5)	54 (88.5)	
>35 days	8 (10.8)	29 (11.6)	5 (8.2)	
School Absenteeism				
Yes	22 (29.7)	61 (24.3)	10 (16.4)	0.195
No	52 (70.3)	190 (75.7)	51 (83.6)	
Severity of Pain				
Mild	19 (46.3)	85 (48.9)	18 (52.9)	0.037*
Moderate	20 (48.8)	64 (36.8)	7 (20.6)	
Severe	2 (4.9)	25 (14.4)	9 (26.5)	
Medication				
Yes	9 (22)	29 (16.7)	14 (41.2)	0.006*
No	32 (78)	145 (83.3)	20 (58.8)	

The severity of dysmenorrhoea also showed variation across adolescence stages, with severe pain being more frequently reported in late adolescence. Use of medication for menstrual symptoms was more common among older adolescent girls. Premenstrual symptoms were reported by a notable proportion of participants. Pelvic pain, lower backache and leg pain were among the most frequently reported symptoms. [Table 5]

Table 5: Distribution of study participants according to pre-menstrual symptoms (Multiple responses)

PMS symptoms	N (%)
Nausea	23 (5.9)
Vomiting	5 (1.3)
Bloating	2 (0.51)
Pelvic Pain	138 (35.75)
Leg Pain	83 (21.5)
Lower back pain	101 (26.16)
Burning micturition	2 (0.51)
Headache	36 (9.32)
Dizziness	26 (6.73)
Depression	36 (9.32)

Binary logistic regression analysis demonstrated that overweight and obese participants had significantly higher odds of dysmenorrhoea compared to girls with normal BMI. Presence of premenstrual symptoms and irregular menstrual cycles were also independently associated with dysmenorrhoea. [Table 6]

Table 6: Binary logistic regression analysis for predictors of dysmenorrhoea among adolescent girls (n=386)

Variable	Category	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
BMI category	Normal BMI	Reference	—	—
	Thinness	0.46	0.24 – 0.89	0.021*
	Overweight	2.14	1.08 – 4.26	0.029*
	Obesity	3.21	1.12 – 9.18	0.031*
Menstrual cycle regularity	Regular cycles	Reference	—	—
	Irregular cycles	1.67	1.01 – 2.74	0.045*
Intermenstrual interval	21–35 days	Reference	—	—
	<21 days	1.28	0.42 – 3.89	0.661
	>35 days	2.48	1.19 – 5.15	0.015*
Premenstrual symptoms	Absent	Reference	—	—
	Present	2.73	1.59 – 4.69	<0.001*

DISCUSSION

Menstrual disorders represent a substantial yet frequently under-recognised dimension of adolescent reproductive health. The present study revealed a considerable burden of menstrual problems among rural adolescent girls, with dysmenorrhoea emerging as the predominant complaint. The mean age at menarche documented in the present study was broadly consistent with observations reported in studies from other regions of India.[2,3,7] Such variations in the onset of menarche may be attributable to an interplay of nutritional, socioeconomic, genetic and environmental determinants.

Dysmenorrhoea was highly prevalent among the study participants and constituted the principal menstrual complaint associated with school absenteeism.[2,4] Menstrual pain may substantially compromise concentration, physical functioning and active engagement in academic activities. Recurrent school absenteeism attributable to menstrual

discomfort may consequently have adverse implications for educational attainment and psychosocial well-being.

The present study further demonstrated a significant association between nutritional status, as assessed by BMI, and menstrual disturbances.[5,8] Overweight and obese participants exhibited a higher prevalence and greater severity of dysmenorrhoea than their normal-BMI counterparts. Excess adiposity may perturb estrogen metabolism and inflammatory mechanisms, potentially contributing to menstrual dysfunction. An association between elevated BMI and prolonged intermenstrual intervals was also observed. Alterations in hormonal homeostasis, insulin resistance and ovarian function associated with obesity may partly explain these menstrual irregularities.

Premenstrual symptomatology was frequently reported and encompassed pelvic discomfort, lower back pain, headache and affective disturbances.[9] These symptoms may substantially impair routine functioning and diminish the overall quality of life of adolescent girls, underscoring the need for timely recognition and appropriate management.

Although sanitary pad utilisation was predominant among the participants, a proportion continued to rely on cloth as menstrual absorbent material.[10] This finding highlights the continuing need for comprehensive menstrual hygiene education, with particular emphasis on the appropriate selection, maintenance and hygienic use of menstrual absorbents.

Collectively, these findings underscore the importance of integrating menstrual health education into school-based adolescent health programmes. Periodic screening for menstrual disorders, coupled with appropriate counselling on nutritional adequacy, weight management and healthy lifestyle behaviours, may facilitate early identification and management of menstrual health concerns.

Limitations: The study was restricted to school-going adolescent girls in rural areas of a single district, which may limit the generalisability of the findings to other adolescent populations, particularly out-of-school girls and those residing in urban settings. Furthermore, the cross-sectional design precludes the establishment of temporal relationships and causal inferences between nutritional status and menstrual disturbances.

CONCLUSION

Menstrual disorders still constitute a considerable reproductive health burden among rural adolescent girls, with a significant association observed between menstrual disturbances and body mass index. Dysmenorrhoea emerged as a prominent contributor to school absenteeism, highlighting its adverse implications for academic engagement and daily functioning. Strengthening menstrual health literacy, ensuring equitable access to adolescent-responsive reproductive health services and promoting optimal nutritional practices are imperative to mitigate menstrual morbidity and enhance the overall health-related quality of life of adolescents.

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