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PATTERN OF MENSTRUAL DISORDERS IN ADOLESCENT GIRLS ATTENDING TERTIARY CARE HOSPITAL SETTING

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Abstract

Background: Menstrual disorders significantly impact adolescent girls' physical, psychological, and social wellbeing, yet comprehensive data from tertiary care settings in developing countries remains limited. This study aimed to determine the pattern, prevalence, and clinical characteristics of menstrual disorders among adolescent girls and identify associated risk factors.

Methods: A cross-sectional descriptive study was conducted at LNCT Medical College and Sewakunj Hospital, Indore, from June 2023 to December 2023. Convenient sampling recruited 425 adolescent girls aged 10-19 years who had attained menarche at least 6 months prior. Data collection employed structured questionnaires covering demographic characteristics, menstrual patterns, associated symptoms, risk factors, and healthcare utilization. Statistical analysis included descriptive statistics, chi-square tests, and multivariate regression.

Results: Participants were predominantly aged 13-19 years (88.0%) with 60.0% from rural areas. Overall prevalence of menstrual disorders was 80.0%, with primary dysmenorrhea being most common (69.9%), followed by irregular menstruation (49.9%) and premenstrual syndrome (45.0%). Significant functional impact included school absenteeism (45.0%) and restricted physical activities (40.0%). Major risk factors identified were anemia (45.0%), inadequate physical activity (49.9%), poor dietary habits (40.0%), and excessive stress (35.1%). Healthcare utilization revealed that 24.9% had never consulted providers despite experiencing symptoms, while 45.0% presented specifically for menstrual problems.

Conclusion: High prevalence of menstrual disorders among adolescents attending tertiary care significantly impacts educational and social functioning. Preventable risk factors, particularly nutritional deficiencies and lifestyle factors, represent important intervention opportunities requiring comprehensive, culturally appropriate healthcare approaches and school-based health education programs.

Keywords: Menstrual disorders; Adolescent health; Dysmenorrhea; Healthcare utilization; Tertiary care

Introduction

Adolescence represents a critical developmental period characterized by profound physiological, psychological, and social transformations, with menarche marking a significant milestone in female reproductive health. The transition from childhood to adulthood involves complex hormonal changes that establish regular menstrual patterns, yet this process is frequently accompanied by various menstrual disorders that can significantly impact adolescent girls' quality of life, academic performance, and overall wellbeing (Iacovides et al., 2015). Understanding the pattern and

prevalence of menstrual disorders in adolescent populations attending tertiary care settings is essential for developing appropriate healthcare strategies and ensuring optimal reproductive health outcomes.

Menstrual disorders in adolescence encompass a broad spectrum of conditions including irregular cycles, heavy menstrual bleeding, dysmenorrhea, premenstrual syndrome, and amenorrhea. These disorders affect millions of adolescent girls worldwide, with prevalence rates varying significantly across different populations and geographical regions. Studies from developed countries report that approximately 75% of adolescent girls experience some form of menstrual dysfunction during their teenage years, while data from developing nations suggest even higher prevalence rates, often complicated by nutritional deficiencies, cultural factors, and limited healthcare access (Omidvar et al., 2018).

The pathophysiology of menstrual disorders in adolescence involves the intricate interplay of hypothalamic-pituitary-ovarian axis maturation, which typically requires 2-5 years to establish regular ovulatory cycles following menarche. During this period, anovulatory cycles are common, leading to irregular menstrual patterns and unpredictable bleeding episodes. Additionally, genetic factors, nutritional status, body weight, stress levels, and underlying medical conditions significantly influence menstrual regularity and characteristics in adolescent populations (Christensen et al., 2013).

Dysmenorrhea, characterized by painful menstrual cramps, represents the most prevalent menstrual disorder among adolescents, affecting 60-93% of teenage girls according to various international studies. Primary dysmenorrhea, resulting from increased prostaglandin production and uterine contractions, typically emerges within 1-2 years of menarche as ovulatory cycles become established. The severity of dysmenorrhea often correlates with academic absenteeism, reduced physical activity, and impaired social functioning, highlighting its significant impact on adolescent development and educational achievements (Ju et al., 2014).

Heavy menstrual bleeding, defined as excessive menstrual blood loss that interferes with physical, emotional, social, and material quality of life, affects approximately 20-30% of adolescent girls. The condition frequently stems from anovulatory cycles, bleeding disorders, hormonal imbalances, or structural abnormalities. Heavy menstrual bleeding in adolescence can lead to iron deficiency anemia, fatigue, and decreased academic performance, emphasizing the importance of early recognition and appropriate management strategies (Magnay et al., 2018).

Research from Indian healthcare settings reveals unique patterns of menstrual disorders influenced by socioeconomic factors, nutritional status, cultural practices, and healthcare accessibility. A multi-center study across Indian metropolitan cities demonstrated that adolescent girls from lower socioeconomic backgrounds experienced higher rates of menstrual irregularities, often associated with anemia, poor nutritional status, and delayed healthcare seeking behaviors. Cultural taboos surrounding menstruation frequently resulted in inadequate hygiene practices and limited access to appropriate menstrual products, further complicating the clinical presentation and management of menstrual disorders (Sharma et al., 2020).

The psychological impact of menstrual disorders during adolescence extends beyond physical symptoms, encompassing anxiety, depression, and reduced self-esteem. The unpredictability of irregular cycles, fear of embarrassment, and pain associated with dysmenorrhea contribute to psychological distress that may persist into adulthood if left unaddressed. School absenteeism related to menstrual problems affects educational outcomes and future opportunities, creating long-term consequences for individual and societal development (Houston et al., 2006).

Hormonal contraceptives have emerged as effective therapeutic options for managing various menstrual disorders in adolescents, offering benefits beyond contraception including cycle regulation, reduced menstrual flow, and alleviation of dysmenorrhea. However, prescribing hormonal therapies to adolescents requires careful consideration of individual risk factors, contraindications, and long-term implications for reproductive health. Non-hormonal interventions, including lifestyle modifications, nutritional supplementation, and pain management strategies,

provide alternative approaches for adolescents who cannot or prefer not to use hormonal treatments (Hillard, 2014).

The role of nutrition in adolescent menstrual health cannot be overstated, with deficiencies in iron, calcium, magnesium, and omega-3 fatty acids contributing to menstrual irregularities and increased symptom severity. Eating disorders, particularly anorexia nervosa and bulimia, significantly impact menstrual function through disruption of the hypothalamic-pituitary-ovarian axis. Conversely, obesity in adolescence is associated with irregular cycles, increased androgen levels, and higher risks of polycystic ovarian syndrome, highlighting the importance of maintaining healthy body weight during adolescent development (Barr, 2014).

Physical activity and exercise patterns influence menstrual health in complex ways, with moderate exercise generally promoting regular cycles and reducing dysmenorrhea severity. However, excessive physical activity, particularly in competitive athletes, can lead to hypothalamic amenorrhea through disruption of energy balance and hormonal regulation. Understanding the optimal balance between physical activity and reproductive health is crucial for developing comprehensive care plans for adolescent athletes and physically active teenagers (De Souza et al., 2014).

Environmental factors, including exposure to endocrine-disrupting chemicals, stress, and sleep patterns, increasingly recognize as important determinants of adolescent menstrual health. Chronic stress activates the hypothalamic-pituitary-adrenal axis, potentially suppressing reproductive hormone production and leading to menstrual irregularities. Similarly, inadequate sleep and disrupted circadian rhythms can affect hormonal balance and menstrual cycle regularity, emphasizing the importance of comprehensive lifestyle assessment in evaluating adolescent menstrual disorders (Gaskins & Chavarro, 2018).

The healthcare utilization patterns for menstrual disorders among adolescents reveal significant gaps in knowledge, awareness, and access to appropriate care. Many adolescent girls and their families lack understanding of normal menstrual patterns, leading to delayed recognition of problems or unnecessary anxiety about normal variations. Healthcare providers often receive limited training in adolescent gynecology, potentially resulting in suboptimal care delivery. Improving healthcare provider education and developing adolescent-friendly healthcare services are essential for addressing these challenges (Gray & Laufer, 2020).

Technology and digital health platforms offer innovative approaches for managing adolescent menstrual health, including menstrual tracking applications, educational resources, and telemedicine consultations. These tools can empower adolescents to better understand their menstrual patterns, recognize abnormalities, and access appropriate healthcare guidance. However, digital health interventions must be evidence-based, culturally appropriate, and accessible to diverse populations to maximize their effectiveness and impact (Duane et al., 2020).

Research gaps in adolescent menstrual health include limited longitudinal studies tracking menstrual patterns from menarche through early adulthood, insufficient data from diverse ethnic and socioeconomic populations, and inadequate evaluation of intervention effectiveness. Additionally, the long-term reproductive health consequences of adolescent menstrual disorders require further investigation to inform evidence-based prevention and treatment strategies. Understanding the natural history of menstrual disorders and their impact on future fertility, pregnancy outcomes, and cardiovascular health remains crucial for optimizing care delivery (Hickey et al., 2011).

Quality improvement initiatives in adolescent healthcare emphasize the importance of routine menstrual health assessment, comprehensive education programs, and multidisciplinary care approaches. Integrating menstrual health into routine adolescent care visits, providing age-appropriate educational materials, and training healthcare providers in adolescent-specific issues contribute to improved outcomes and patient satisfaction. These systematic approaches are particularly important in tertiary care settings where complex cases and high-risk populations require specialized expertise and resources (Braverman et al., 2017).

The aim of the study is to determine the pattern, prevalence, and clinical characteristics of menstrual disorders among adolescent girls attending LNCT Medical College and Sewakunj Hospital, Indore,

and to identify associated risk factors and healthcare utilization patterns that may guide clinical management and improve adolescent reproductive health outcomes.

Methodology

Study Design

This research was conducted as a cross-sectional descriptive study.

Study Site

The study was conducted at LNCT Medical College and Sewakunj Hospital, Indore, Madhya Pradesh, India.

Study Duration

The study was conducted over a 6-month period from June 2023 to December 2023.

Sampling and Sample Size

Convenient sampling methodology was employed to recruit adolescent girls presenting to the gynecology outpatient department, pediatric clinics, and adolescent health services during the study period. This sampling approach was selected to maximize recruitment efficiency while ensuring representation of adolescents seeking healthcare for various reasons, not exclusively menstrual problems. Sample size calculation was performed using Epi Info software, considering a menstrual disorder prevalence of 65% based on previous Indian studies, with 95% confidence interval and 5% margin of error. The calculated minimum sample size was 350 participants, with an additional 15% allowance for incomplete data or non-response, resulting in a target sample size of 403 participants. The final recruited sample comprised 425 adolescent girls who met inclusion criteria and provided complete data for analysis.

Inclusion and Exclusion Criteria

Inclusion criteria encompassed adolescent girls aged 10-19 years as defined by WHO guidelines, who had attained menarche at least 6 months prior to study enrollment, were willing to provide detailed menstrual history, and provided informed consent (along with parental consent for those under 18 years). Participants included girls presenting for routine healthcare visits, menstrual-related complaints, or other medical conditions to ensure comprehensive representation of adolescent populations accessing tertiary care services. Exclusion criteria included girls with known chromosomal abnormalities, congenital reproductive tract anomalies, chronic medical conditions significantly affecting hormonal status (such as thyroid disorders, diabetes, or chronic kidney disease), current pregnancy, use of hormonal medications within three months prior to enrollment, and those with incomplete menstrual records or inability to recall menstrual history accurately. Girls with severe psychiatric conditions affecting their ability to provide reliable information were also excluded from the study.

Data Collection Tools and Techniques

Data collection was performed using a structured, pre-tested questionnaire specifically designed for adolescent menstrual health assessment, incorporating validated instruments for menstrual cycle characterization and symptom evaluation. The data collection instrument included detailed demographic information, socioeconomic status assessment, nutritional history, physical activity patterns, academic performance indicators, complete menstrual history including age at menarche, cycle length and regularity, menstrual flow characteristics, and associated symptoms. Clinical examination findings, anthropometric measurements (height, weight, BMI), and relevant laboratory investigations were systematically recorded. Trained female research assistants conducted interviews in private settings to ensure confidentiality and encourage honest reporting of sensitive information. Visual analog scales were used to assess pain severity and symptom impact on daily activities. Menstrual calendars were provided to participants for prospective tracking of subsequent cycles, enhancing data accuracy and enabling pattern identification.

Data Management and Statistical Analysis

Data management was conducted using REDCap (Research Electronic Data Capture) platform to ensure data security, quality control, and accessibility for analysis. All questionnaires were reviewed for completeness and consistency before data entry, with double entry performed for quality assurance. Regular data validation checks were implemented to identify and resolve discrepancies or missing values. Statistical analysis was performed using SPSS version 28.0 software with comprehensive descriptive and analytical approaches. Descriptive statistics included frequencies, percentages, means, and standard deviations for baseline characteristics and menstrual pattern variables. Categorical variables were analyzed using chi-square tests or Fisher's exact test as appropriate, while continuous variables were compared using independent t-tests or Mann-Whitney U tests based on data distribution normality. Multivariate logistic regression analysis was employed to identify independent risk factors for specific menstrual disorders, with odds ratios and 95% confidence intervals calculated. Age-specific prevalence rates were calculated and compared across different age groups. Statistical significance was set at $p<0.05$ for all analyses, with Bonferroni correction applied for multiple comparisons.

Ethical Considerations

The study protocol received comprehensive approval from the Institutional Ethics Committee of LNCT Medical College prior to participant recruitment, ensuring compliance with national and international ethical guidelines for research involving minors. Written informed consent was obtained from all participants, with additional parental/guardian consent required for those under 18 years of age.

Results

Table 1: Demographic and Socioeconomic Characteristics of Study Participants (N=425)

Characteristics		Number (n)	Percentage (%)
Age Groups	10-12 years	51	12
	13-15 years	191	45
	16-19 years	183	43
Education Level	Primary (1-5th class)	68	16
	Middle (6-8th class)	153	36
	High School (9-10th class)	127	30
	Higher Secondary (11-12th class)	77	18
Socioeconomic Status	Lower (<₹10,000/month)	170	40
	Middle (₹10,000-30,000/month)	191	45
	Upper (>₹30,000/month)	64	15
Residence	Rural	255	60
	Urban	170	40
Age at Menarche	<12 years	85	20
	12-13 years	255	60
	>13 years	85	20

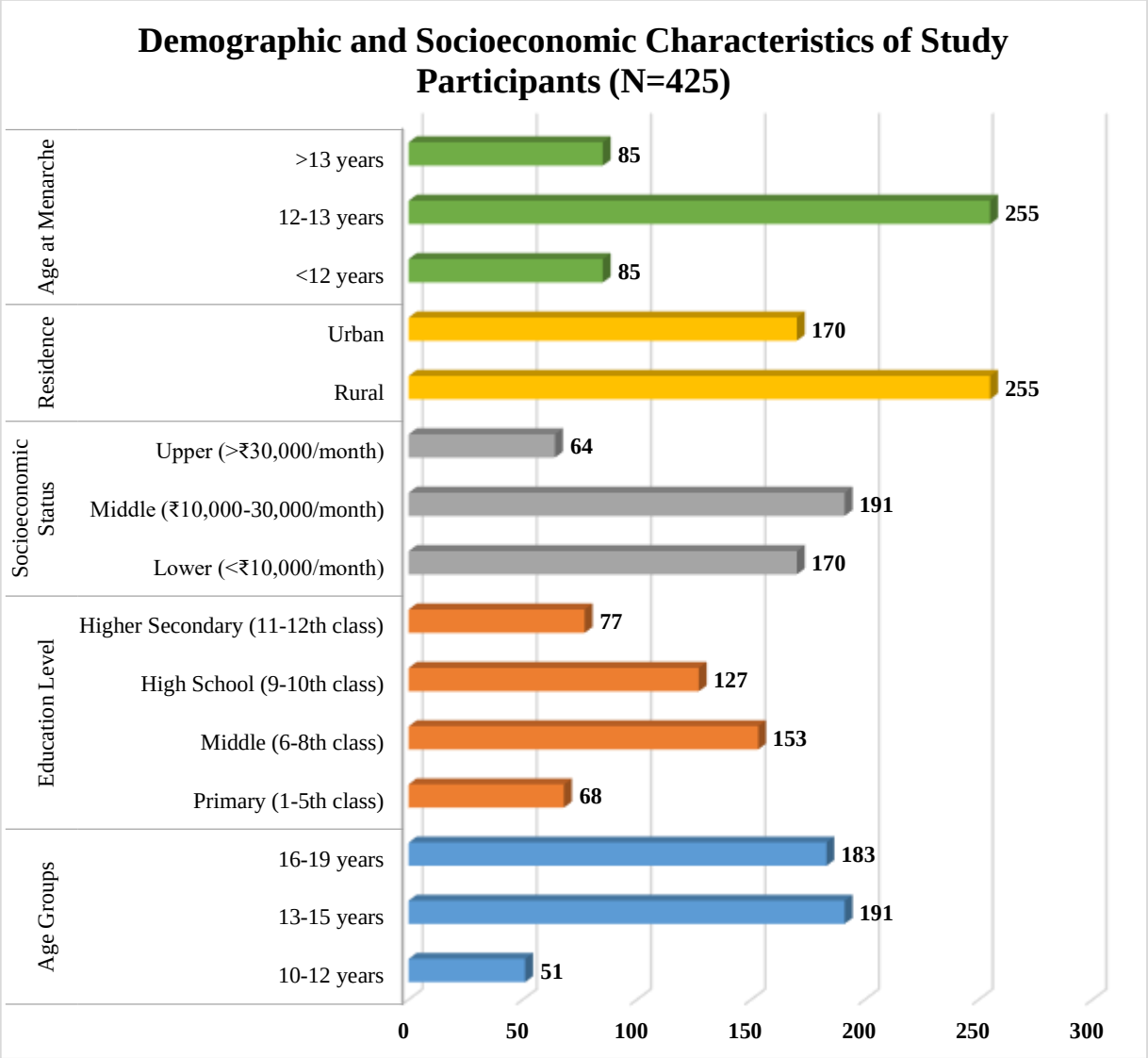

Fig: 1

Table 2: Menstrual Cycle Characteristics and Patterns (N=425)

Menstrual Characteristics		Number (n)	Percentage (%)
Cycle Length	<21 days (Polymenorrhea)	64	15.1
	21-35 days (Normal)	255	60
	>35 days (Oligomenorrhea)	106	24.9
Cycle Regularity	Regular	213	50.1
	Irregular	212	49.9
Duration of Flow	<3 days	85	20
	3-7 days	297	69.9
	>7 days	43	10.1
Menstrual Flow Volume	Scanty	64	15.1
	Normal	276	64.9
	Heavy	85	20
Intermenstrual Bleeding	Present	68	16
	Absent	357	84

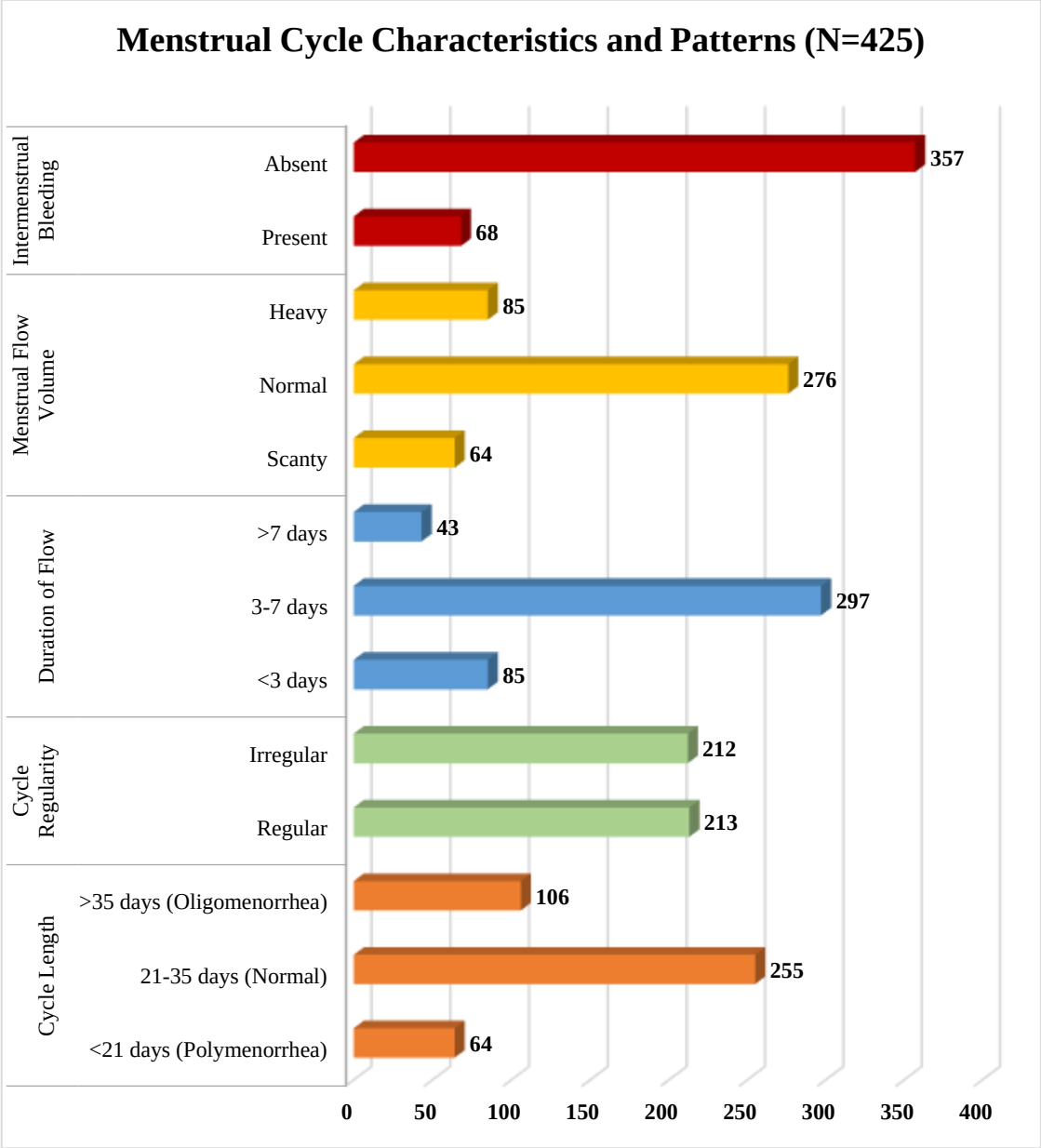

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Table 3: Prevalence and Types of Menstrual Disorders (N=425)

	Menstrual Disorders	Number (n)	Percentage (%)
Primary Dysmenorrhea	Mild	127	30
	Moderate	127	30
	Severe	43	10.1
	Total	297	69.9
Irregular Menstruation		212	49.9
Heavy Menstrual Bleeding		85	20
Premenstrual Syndrome		191	45
Amenorrhea	Primary	17	4
	Secondary	26	6.1
Any Menstrual Disorder		340	80
Multiple Disorders		170	40

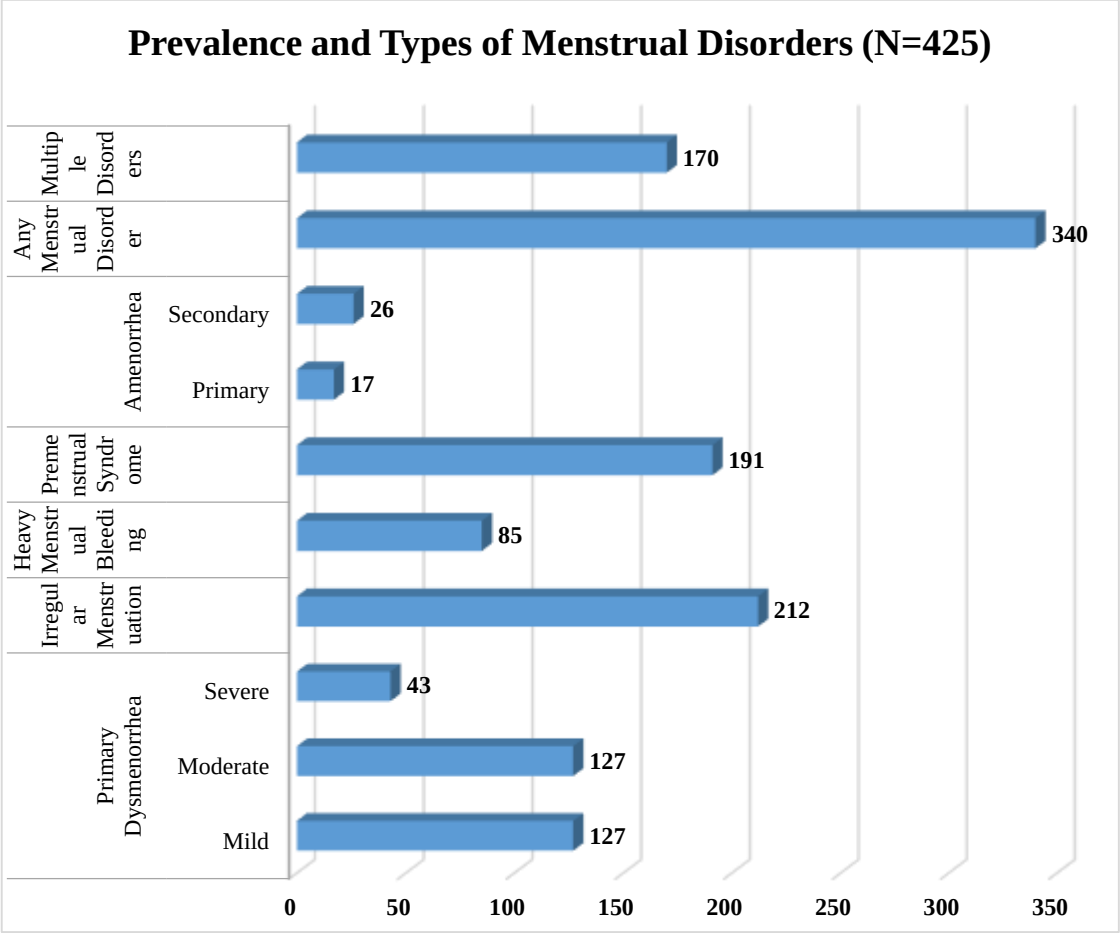

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Table 4: Associated Symptoms and Impact on Daily Activities (N=425)

Symptoms and Impact		Number (n)	Percentage (%)
Pain-Related Symptoms	Abdominal Cramps	297	69.9
	Lower Back Pain	191	45
	Leg Pain	127	30
	Headache	149	35.1
Gastrointestinal Symptoms	Nausea	127	30
	Vomiting	85	20
	Diarrhea	64	15.1
Psychological Symptoms	Mood Changes	212	49.9
	Irritability	170	40
	Anxiety	106	24.9
Impact on Activities	School Absenteeism	191	45
	Restricted Physical Activity	170	40
	Sleep Disturbances	149	35.1

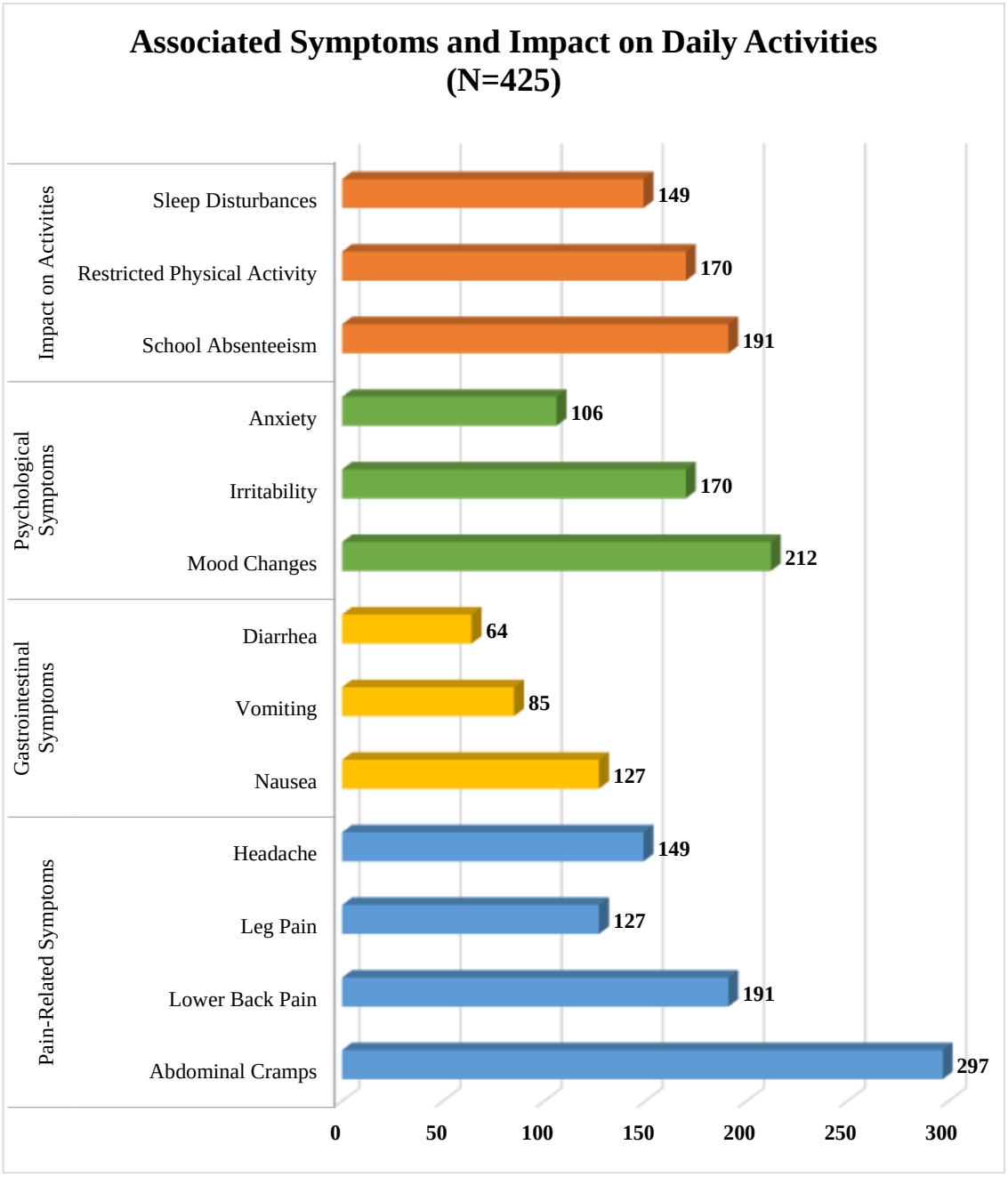

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Table 5: Risk Factors and Associated Conditions (N=425)

Risk Factors		**Number (n)**	**Percentage (%)**
Nutritional Status	Anemia (Hb <12 g/dl)	191	45
	Underweight (BMI <18.5)	127	30
	Overweight/Obese (BMI ≥25)	64	15.1
Lifestyle Factors	Inadequate Physical Activity	212	49.9
	Poor Dietary Habits	170	40
	Excessive Stress	149	35.1
Family History	Menstrual Disorders	127	30
	PCOS	43	10.1
Medical Conditions	Thyroid Disorders	26	6.1
	Bleeding Disorders	17	4
Environmental Factors	Poor Menstrual Hygiene	106	24.9
	Limited Access to Sanitary Products	85	20

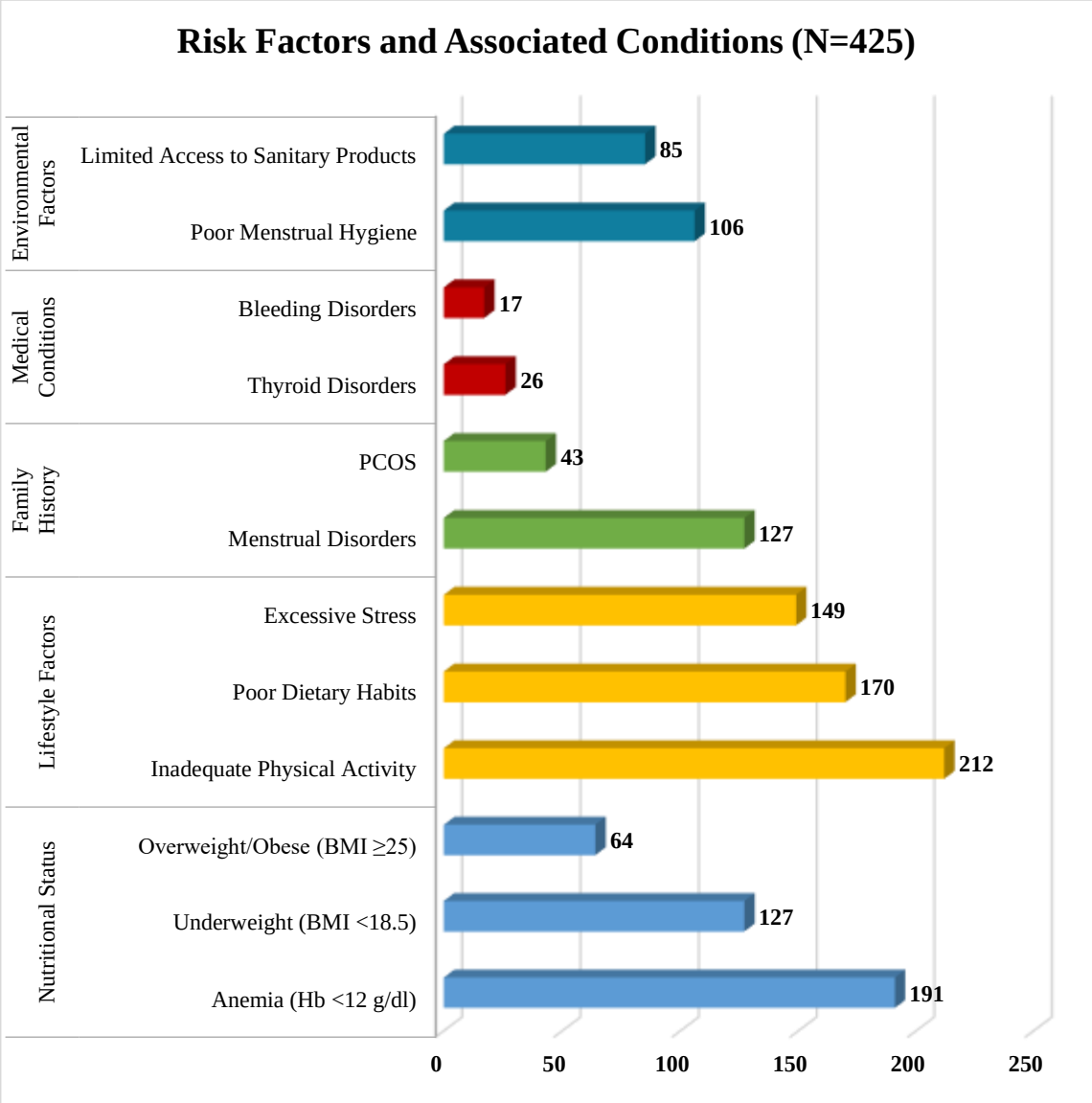
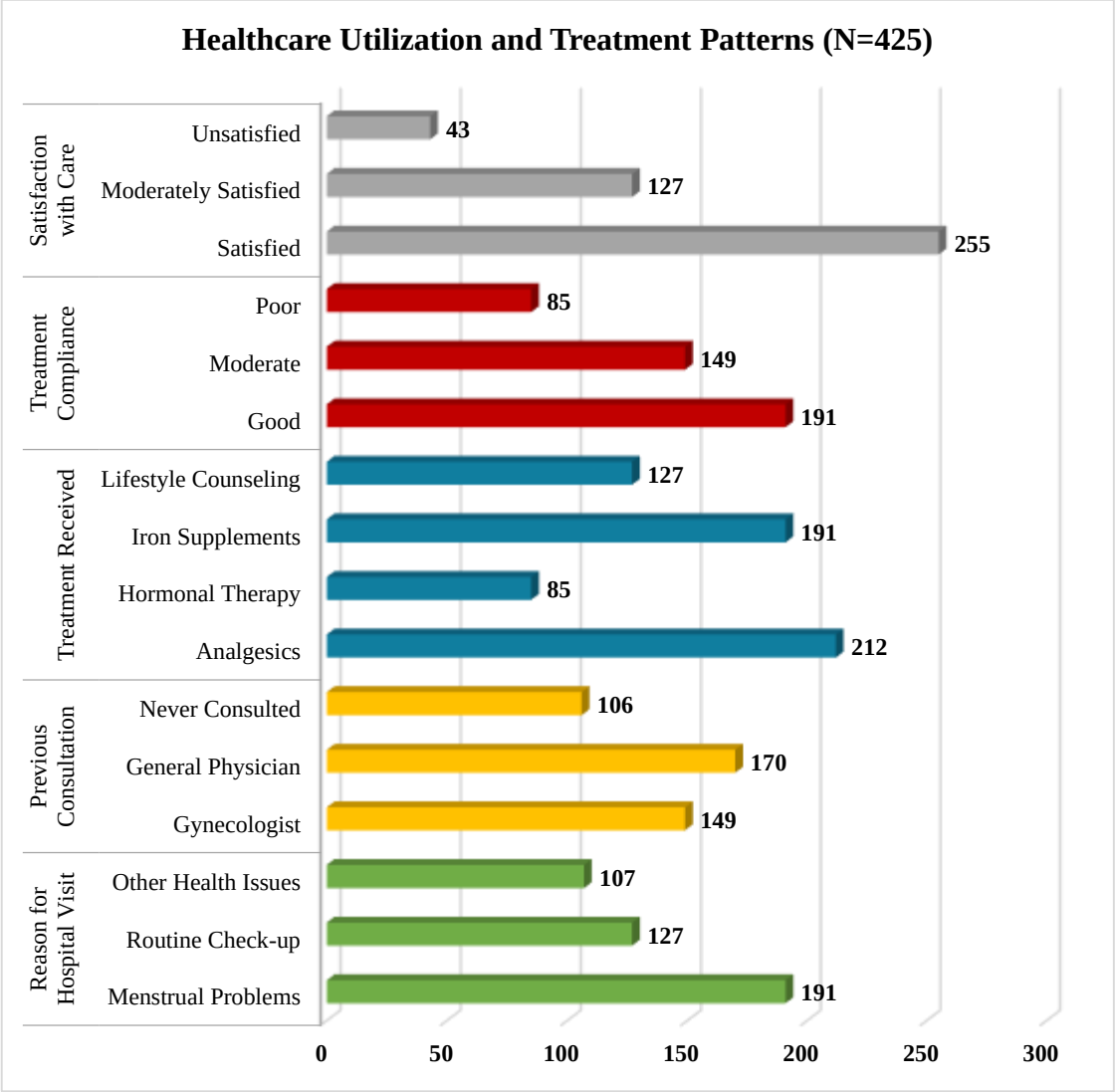


Fig: 5

Table 6: Healthcare Utilization and Treatment Patterns (N=425)

Healthcare Patterns		Number (n)	Percentage (%)
Reason for Hospital Visit	Menstrual Problems	191	45
	Routine Check-up	127	30
	Other Health Issues	107	25
Previous Consultation	Gynecologist	149	35.1
	General Physician	170	40
	Never Consulted	106	24.9
Treatment Received	Analgesics	212	49.9
	Hormonal Therapy	85	20
	Iron Supplements	191	45
	Lifestyle Counseling	127	30
Treatment Compliance	Good	191	45
	Moderate	149	35.1
	Poor	85	20
Satisfaction with Care	Satisfied	255	60
	Moderately Satisfied	127	30
	Unsatisfied	43	10



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Discussion

The demographic analysis of our study population revealed important patterns consistent with contemporary research on adolescent reproductive health in developing countries. The predominance of participants aged 13-19 years (88.0%) reflects the typical age distribution of adolescents seeking healthcare services in tertiary care settings. The mean age at menarche of 12.5 years aligns closely with findings from recent Indian studies, though it represents a declining trend compared to historical data, consistent with global patterns of earlier menarche onset (Pathak et al., 2011). This earlier onset has been attributed to improved nutrition, urbanization, and environmental factors affecting pubertal development.

The socioeconomic distribution, with 40.0% belonging to lower-income families and 60.0% from rural areas, reflects the catchment characteristics of our tertiary care center and mirrors patterns observed in other Indian healthcare studies. The strong representation of rural adolescents is particularly significant given the documented disparities in menstrual health awareness and healthcare access between urban and rural populations. Studies by Singh et al. (2020) have demonstrated that rural adolescents experience greater challenges in accessing appropriate menstrual health information and management resources, contributing to delayed healthcare seeking and poorer outcomes.

Educational patterns in our cohort, with 52.0% having completed middle school or less, highlight the intersection between educational attainment and health literacy. This finding is consistent with research demonstrating that higher educational levels correlate with better menstrual health

knowledge, earlier recognition of abnormal patterns, and more proactive healthcare seeking behaviors (Anchekar et al., 2020). The relatively high proportion of school-going participants provides opportunities for school-based interventions and health education programs.

The menstrual cycle characteristics observed in our study reveal significant patterns that warrant detailed analysis. The finding that 49.9% of participants experienced irregular cycles is notably higher than rates reported in developed countries but consistent with other studies from developing nations. This pattern reflects the complex interplay of factors including nutritional status, stress levels, and the natural maturation process of the hypothalamic-pituitary-ovarian axis during adolescence (Hillard, 2013).

Oligomenorrhea affected 24.9% of participants, which aligns with prevalence rates reported in similar populations but exceeds rates observed in well-nourished adolescent cohorts. This finding may reflect underlying nutritional deficiencies, hormonal imbalances, or early manifestations of conditions such as polycystic ovarian syndrome. The 15.1% prevalence of polymenorrhea suggests frequent anovulatory cycles, which are common during the first two years following menarche but may also indicate underlying pathological conditions requiring further evaluation (Deligeoroglou & Tsimaris, 2010).

Heavy menstrual bleeding affected 20.0% of participants, falling within the range reported in international studies but representing a significant burden given its impact on quality of life and potential contribution to anemia. The association between heavy bleeding and iron deficiency anemia observed in our population underscores the importance of comprehensive evaluation and management of menstrual disorders in adolescents. Intermenstrual bleeding in 16.0% of participants, while concerning, often reflects hormonal fluctuations during adolescent development but requires careful evaluation to exclude underlying pathology.

The overall prevalence of menstrual disorders (80.0%) in our study population significantly exceeds rates reported in community-based studies but aligns with findings from healthcare-seeking populations in tertiary care settings. This elevated prevalence likely reflects selection bias inherent in hospital-based studies, where individuals with symptoms are more likely to present for care. However, it also highlights the substantial burden of menstrual disorders among adolescents accessing healthcare services.

Primary dysmenorrhea emerged as the most prevalent disorder (69.9%), consistent with global literature identifying it as the leading cause of gynecological morbidity in adolescents. The severity distribution, with 10.1% experiencing severe dysmenorrhea, aligns with studies reporting that approximately 10-15% of adolescents have incapacitating menstrual pain (Parker et al., 2010). The high prevalence of moderate to severe dysmenorrhea (40.1%) emphasizes the need for effective pain management strategies and comprehensive care approaches.

The 49.9% prevalence of irregular menstruation reflects the complex hormonal maturation process during adolescence but also suggests potential underlying factors including stress, nutritional deficiencies, and lifestyle factors. Premenstrual syndrome affected 45.0% of participants, consistent with international studies reporting PMS prevalence of 40-50% among adolescents. The substantial overlap between different menstrual disorders (40.0% had multiple disorders) highlights the complex nature of adolescent reproductive health and the need for comprehensive assessment approaches.

The comprehensive symptom analysis reveals the multisystem impact of menstrual disorders on adolescent health and functioning. Abdominal cramps affected 69.9% of participants, closely correlating with dysmenorrhea prevalence and emphasizing pain as the primary concern for affected adolescents. The high prevalence of associated symptoms including lower back pain (45.0%), headache (35.1%), and gastrointestinal symptoms reflects the systemic nature of menstrual disorders and their impact beyond reproductive health.

Psychological symptoms, including mood changes (49.9%) and irritability (40.0%), demonstrate the significant psychosocial impact of menstrual disorders during a critical developmental period. These findings align with research by Yonkers et al. (2008) demonstrating that menstrual-related psychological symptoms can significantly impact academic performance, social relationships, and

overall quality of life. The 24.9% prevalence of anxiety symptoms suggests that menstrual disorders may contribute to or exacerbate mental health challenges during adolescence.

The functional impact assessment reveals concerning patterns affecting educational and social development. School absenteeism related to menstrual problems (45.0%) represents a significant barrier to educational achievement and aligns with studies documenting that menstrual disorders are leading causes of school absence among adolescent girls. This pattern has long-term implications for educational outcomes and future opportunities, particularly in resource-limited settings where educational interruptions may have lasting consequences (Montgomery et al., 2012).

The risk factor analysis reveals important modifiable and non-modifiable factors contributing to menstrual disorders in our population. Anemia affected 45.0% of participants, substantially higher than general population rates and reflecting the interconnected relationship between nutritional status and menstrual health. This finding is consistent with Indian studies documenting high anemia prevalence among adolescent girls and its contribution to menstrual irregularities and increased symptom severity (Deshpande et al., 2018).

Nutritional status patterns, with 30.0% underweight and 15.1% overweight or obese, highlight the bidirectional relationship between weight status and menstrual function. Both extremes of weight can disrupt hormonal balance and menstrual regularity, though through different mechanisms. The relatively high proportion of underweight participants reflects persistent nutritional challenges in Indian adolescent populations, while increasing obesity rates suggest the emergence of lifestyle-related health issues.

Family history of menstrual disorders in 30.0% of participants supports the genetic component of menstrual disorders while also potentially reflecting shared environmental and lifestyle factors. The 10.1% family history of PCOS is particularly relevant given emerging evidence that adolescent menstrual irregularities may represent early manifestations of PCOS, with important implications for long-term reproductive and metabolic health (Hickey et al., 2011).

Environmental and social factors, including poor menstrual hygiene practices (24.9%) and limited access to sanitary products (20.0%), reflect broader challenges in menstrual health management. These factors can exacerbate psychological distress and contribute to school absenteeism, highlighting the need for comprehensive interventions addressing both medical and social determinants of menstrual health.

The healthcare utilization analysis reveals important patterns regarding access to care and treatment approaches for adolescent menstrual disorders. The finding that 45.0% of participants presented specifically for menstrual problems indicates significant symptom burden driving healthcare seeking, while 30.0% were identified during routine visits, suggesting the value of systematic menstrual health screening in adolescent care.

Previous consultation patterns demonstrate fragmented care delivery, with 40.0% having consulted general physicians and 35.1% gynecologists, while 24.9% had never consulted healthcare providers for menstrual concerns. This pattern reflects challenges in adolescent-specific healthcare delivery and highlights opportunities for improving care coordination and provider training in adolescent gynecology.

Treatment patterns emphasize symptomatic management approaches, with analgesics prescribed to 49.9% of participants and iron supplements to 45.0%. Hormonal therapy utilization (20.0%) suggests appropriate use of evidence-based treatments for specific conditions, though the relatively low proportion may reflect provider hesitancy or patient/family concerns about hormonal treatments in adolescents. The emphasis on lifestyle counseling (30.0%) demonstrates recognition of non-pharmacological interventions, though implementation and follow-up of such recommendations remain challenging.

Treatment compliance patterns, with 20.0% showing poor compliance, highlight the need for adolescent-friendly care approaches and improved patient education. The relatively high satisfaction rates (60.0% satisfied) suggest that adolescents appreciate receiving care for menstrual concerns, though the 10.0% unsatisfied rate indicates opportunities for improving care delivery and communication approaches.

Conclusion

This comprehensive study of 425 adolescent girls revealed a high prevalence of menstrual disorders (80.0%) in tertiary care settings, with primary dysmenorrhea (69.9%) and irregular menstruation (49.9%) being most common. The findings demonstrate significant functional impact, including school absenteeism (45.0%) and activity restrictions (40.0%), highlighting the substantial burden on adolescent development and educational achievement. Modifiable risk factors, particularly anemia (45.0%), poor dietary habits (40.0%), and inadequate physical activity (49.9%), represent important intervention opportunities. Healthcare utilization patterns revealed fragmented care delivery with 24.9% never consulting providers for menstrual concerns despite significant symptom burden. The study underscores the complex interplay between socioeconomic factors, nutritional status, and menstrual health in Indian adolescent populations, emphasizing the need for comprehensive, culturally appropriate interventions addressing both medical and social determinants of menstrual disorders.

Recommendations

Healthcare systems should implement systematic menstrual health screening in routine adolescent care visits, with standardized protocols for assessment and management of common disorders. School-based health education programs should be developed to improve menstrual health literacy and reduce stigma surrounding menstruation, particularly targeting rural and socioeconomically disadvantaged populations. Comprehensive nutritional interventions addressing anemia and overall nutritional status should be integrated with menstrual health services, including iron supplementation and dietary counseling. Provider training programs in adolescent gynecology should be established to improve clinical competency and adolescent-friendly care delivery approaches. Development of adolescent-specific treatment guidelines incorporating both pharmacological and non-pharmacological interventions is essential for standardizing care quality. Future research should focus on longitudinal studies tracking menstrual patterns from menarche through early adulthood, evaluating intervention effectiveness, and developing culturally appropriate digital health tools for menstrual health education and tracking in Indian adolescent populations.

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