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A Comprehensive Observational Study On Primary Dysmenorrhea: Prevalence, Symptomatology, Impact on Performance and Paradigm of Self-Care Among Undergraduate Students at a Tertiary Care Medical School

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ABSTRACT

Aims: Primary Dysmenorrhoea (PD) is among the most common gynaecological disorders, impairing quality of life, academic performance, and productivity. Despite its burden, this problem remains underreported and inadequately managed in many populations. This study aims at scrutinizing the prevalence, determinants, management practices, and health-seeking behaviour of primary dysmenorrhoea, and to evaluate the utility of a novel multidimensional pain scale.

Method and Materials: A cross-sectional study was conducted among 428 women of reproductive age. Data were corrected through demographic variables, menstrual characteristics, family history, psychosocial stress, and management strategies. Pain severity was measured using both conventional tools and a new scaling system.

Findings: The prevalence of primary dysmenorrhoea was 71.26%. Menstrual duration >5 days and passage of clots significantly increased the risk of PD (OR >3). Family history and psychosocial stress were strong predictors, with the latter being more pronounced in severe (grade 3) cases of PD. Self-care measures such as hot water bags, fenugreek, and exercise were widely adopted but provided only partial relief in the patient subset. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), particularly mefenamic acid and dicyclomine, were the most common medications used by the study bracket, though side effects were noted. Only 15.4% of the participants sought formal medical care for the above dyscrasia. The novel pain scale offered a more comprehensive assessment, capturing both subjective experience and functional impairment.

Conclusion: Primary Dysmenorrhoea is highly prevalent and multifactorial. The newly introduced pain scale may represent a first-of-its-kind approach, with potential to refine diagnosis, guide therapy, and advance future research.

Keywords: Primary Dysmenorrhoea, Prevalence, Risk Factors, NSAIDs, Self-care, Pain Scale

Introduction

Dysmenorrhea, denoting painful menstruation, represents one of the most ubiquitous yet underestimated gynecological morbidity among woman of reproductive age. The pain characteristically emanates from the lower abdomen, frequently radiating to the lumbar region, flanks or thighs, and is often accompanied by constitutional symptoms including nausea, fatigue, and headache [1]. Despite its benign nature, dysmenorrhea exerts a disproportionate toll on physical comfort, emotional well-being, and functional capacity, culminating in impaired academic engagement and reduced occupational productivity. Clinically dysmenorrhea is stratified into primary and secondary forms [1,2]. Primary Dysmenorrhea (PD) occurs in the absence of discernible pelvic pathology, whereas secondary dysmenorrhea is attributed to structural or inflammatory gynecological disorders such as endometriosis, adenomyosis or pelvic inflammatory disease [1,2]. The pathophysiological substrate of PD is profoundly attributed to exaggerated endometrial prostaglandin synthesis, particularly prostaglandin F2∝ (PGF2∝) during the late luteal phase, resulting in uterine hyper contractility, episodic ischemia, and heightened nociceptive sensitivity. The

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therapeutic efficacy of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in PD lends robust support to this mechanism [2].

Globally, PD is recognized as a highly prevalent gynecological disorder affecting an estimated 45% to 95% of women of reproductive age, reflecting variations in population characteristics, diagnostic criteria and reporting practices [3]. The burden is particularly pronounced among adolescents and young adults, where prevalence often exceeds 70%. From a public health perspective, dysmenorrhoea accounts for approximately 600 million lost work hours annually and an estimated economic burden surpassing two billion U.S. dollars worldwide [4]. Within the Indian context, the prevalence remains comparably high, ranging between 50 and 87 percent, with several studies indicating that more than two-thirds of young women experience moderate to severe pain during menstruation [5,6]. The variability in prevalence across different regions of India may be attributed to socio-cultural diversity, nutritional status, and disparities in health-seeking behaviour. Moreover, demographic, physiological, and psychosocial determinants including early menarche, prolonged menstrual flow, low body mass index, sedentary lifestyle, and psychological stress have been shown to exacerbate the severity and frequency of symptoms.

Despite its omnipresence, dysmenorrhea remains insufficiently recognized and inadequately managed, with many young women relying on self-administered remedies or non-pharmacological strategies rather than seeking professional care. Data characterizing the prevalence, severity, and management of PD within the Indian subcontinent remain scarce. Among undergraduate medical students, unmitigated menstrual pain can markedly compromise concentration, attendance, and academic performance, paradoxically within a cohort presumed to possess heightened health literacy. Given their magnified academic pressures and facile access to over-the-counter medications, medical students represent a pertinent population for examining dysmenorrhea patterns and remedial behaviors. Accordingly, this cross-sectional study aims to elucidate the prevalence and intensity of primary dysmenorrhea, evaluate its impact on daily and academic functioning, and delineate the spectrum of self-care and pharmacological interventions employed for symptomatic relief.

Method and Materials

The observational cross-sectional study was conducted at a tertiary care medical college, Palakkad, Kerala, India for a period of 6 months (August 2023 to January 2024). The research protocol was sanctioned by the institutional ethics committee (IEC/06/37/21). The sample size was calculated using the formula $n = Z^2p(1-p)/d^2$ (Z is the standard normal deviate corresponding to the 95% confidence level (1.96), p is the expected prevalence, and d is the allowable margin of error). Based on an average prevalence of 70% reported in previous studies on PD [1-6] and allowing a 5% margin of error, the minimum required sample size was estimated to be 360 (including an anticipated 10% non-response rate). Participants who gave valid informed consent were enrolled in the above study and the research was performed in accordance with the Helsinki declaration. A total of 428 women voluntarily participated in the study. A structured digital questionnaire capturing details related to menstrual characteristics was completed by the participants.

According inclusion and exclusion criteria, the study was conducted among apparently healthy female students aged between seventeen and twenty-six who were enrolled under the institution and had regular menstrual cycles. Patients with previously known systemic comorbidities and those on regular medications for chronic illnesses were not considered for inclusion. Women who were pregnant, lactating, or on hormonal contraceptives and have undergone previous obstetric and gynecological surgical procedures were also excluded.

Information regarding current age, anthropometric parameters like height and weight was collected. With respect to the above data, BMI was calculated. Details

regarding appreciation of dysmenorrhoea, age at menarche, family history, duration of cycles, excess passage of clothes, stress, home remedies followed, exercise pattern, use of over-the-counter NSAIDs, history of hospitalization and the impact on performance was analyzed using a new scaling system developed for the sole purpose of this study. The Menon–Sandra Grading System (MSGS), a novel classification framework for dysmenorrhea devised by the authors, was employed for multifactorial assessment and participants were categorized into Grade 1 (mild), Grade 2 (moderate), and Grade 3 (severe) based on their symptomatologic profile (Table 1).

Table 1) Menon-Sandra Grading system for Dysmenorrhea

Grade 1 (Mild PD)	• Quite Comfortable or • Effortlessly carry out daily activities or • Pain + No or ≤3 associated symptoms.
Grade 2 (Moderate PD)	• Somewhat Comfortable or • Daily activities become strenuous or • Pain +>3 associated symptoms without absenteeism or requirement for bedrest.
Grade 3 (Severe PD)	• Most preferably have to be in bed or absenteeism from work or class or • Pain + Absenteeism or bedrest.

Data were compiled and stored in Microsoft Excel (Excel 2016, version 16.0). Descriptive statistics were generated to determine frequency distributions. Further analysis was performed using SPSS software (version 11.0; SPSS Inc., Chicago, IL, USA). Comparisons between categorical variables were made using the Chi-square test, while correlations were assessed using Pearson's correlation coefficient (r) and Spearman's rank correlation. A p-value of less than 0.05 was considered statistically significant. For correlation analyses, variables with r values between 0 and +1 were interpreted as having a positive correlation, whereas those with values between 0 and –1 indicated a negative correlation.

Findings

The study incorporated 428 female participants out of which 334 were found to be having dysmenorrhea, accounting to 78.03% of the study bracket. Of the 428 participants, 37 women had a previously diagnosed gynecological condition. Among those reporting dysmenorrhea (n = 334), 29 were undergoing treatment for these pre-existing pathologies. Thus 305 women in the above study that is 71.26% women were found to have PD according Table 1 classification. Of the 428 participants, 86 women with no history of gynecological illness or PD were thus designated as the control cohort.

Table 2) Prevalence of primary dysmenorrhea

Variable	Percentage population (%)
Prevalence of Primary Dysmenorrhoea	71.26 (305/428)

Based on anthropometric and Baseline characteristic, the participants had a mean age of 21.84 ± 2.29 years (range: 17-26), with the majority (68.9%) belonging to the 21–26-year age group. The mean BMI was 22.01 ± 3.34 kg/m2 and most participants (77.35%) fell within the normal range 18.5-24.9 kg/m2. The proportions of underweight (10.04%) and overweight (12.61%) individuals were nearly equivalent. Dysmenorrhea was prevalent in 78.03% of the study population. Considering body weight, 72.66% of participants weighed between 45 and 65 kg, while 8.17% weighed below 45 kg and 13.31% exceeded 65 kg. Among these, 25 of 35 women weighing below 45 kg and 31 of 57 having a weight >65 kg reported PD. A weak, non-significant negative correlation was observed between weight and pain intensity (r = –0.071; p>0.05). No statistical significance was noted in the subset with respect to age, BMI, smoking, or alcohol

consumption. The mean age of menarche was 12.76 years (range: 7-16 years). Women with PD exhibited a comparable mean of 12.78 years (range: 7-16 years), whereas the participants without PD reported 12.72 years (range: 7-16 years). Statistical evaluation demonstrated no significant association between the age of menarche and the incidence of primary dysmenorrhea.

The study demonstrated that 73.5% of participants experienced the onset of menstrual pain on the first day of the cycle. A further 14.7% responded that pain began 24 hours prior to the onset of bleeding, while 10.2% experienced the onset of pain on the second or third day. A small proportion (1.6%) expressed ambiguity regarding the exact onset of this variable. Therefore, the data robustly suggests that the first day of menstruation is the most prevalent time for girls to experience menstrual pain. No statistical correlation was observed between the onset of pain and the incidence of primary dysmenorrhea.

Regarding pain duration, 44% of participants experienced pain limited to the first day, while 48.7% reported pain lasting two days frequently extending from day one to two. 12.4% experienced pain for three days. 7.7% endured pain for four to five days and 2.3% had an extended carry on even after menses ceased. No significant association was observed between pain duration and occurrence of PD (Figure 1).

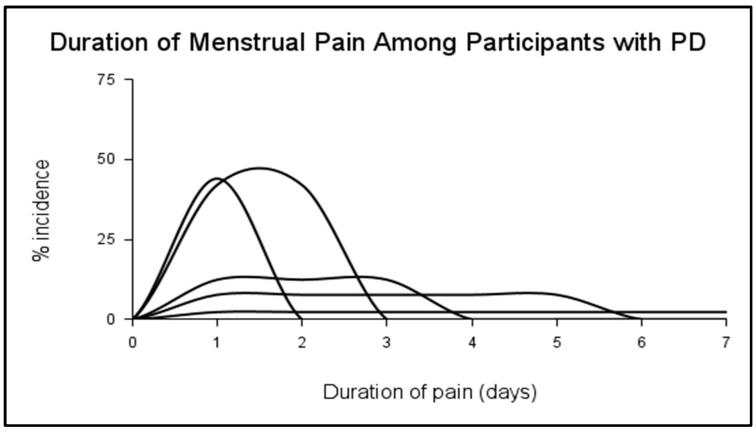

Figure 1) Distribution of pain duration among participants with primary dysmenorrhea, showing the percentage experiencing pain against duration of pain in days.

Primary dysmenorrhea, while frequently associated with abdominal pain, can manifest in various other locations. In this study, apart from abdominal pain, 30.5% of women reported to have experienced pain in the suprapubic region, 28.2% in the flanks, and 22.7% in both the thighs. A noteworthy proportion of females accounting to 29.8% experienced the pain in all the above-mentioned locations. No statistical significance or correlation was observed between the above variables.

In a cohort of 305 participants shown to have PD, the mean menstrual cycle duration was 28.4 ± 4.6 days. A substantial majority of 88.9% women exhibited cycle lengths within the clinically accepted normal range of 28 to 35 days. Infrequent occurrences of extended cycles (>35 days) were seen in 1.5% and shortened cycles (22 to 27 days) were observed in 9.6%. Very similar patterns were observed in the healthy population. Pearson's correlations and statistical scrutiny portrayed no significance or correlation between the above factors.

Among the 305 women with PD, 39.7% reported prolonged menstrual bleeding lasting>5 days. In contrast, only 18.6% of 86 controls experienced prolonged bleeding (Figure 2). Statistical analysis revealed a significant association between extended menstrual duration and PD ($p<0.05$), with women having bleeding beyond five days being 2.88 (Figure 3) times more susceptible to the above dyscrasia (OR = 2.88).

Regarding family history of primary dysmenorrhea, 227 of 426 individuals reported a strong family history of

dysmenorrhea in their first-degree relatives. Out of the 305 women noted with PD, 162 accounting to 53.11% expressed a history that was noteworthy in their immediate family. Statistical analysis showed a significant correlation between the variables ($p<0.05$). Moreover, meticulous examination showed a 3.92 (Figure 3) times higher probability of PD in women with a positive family history (OR: 3.92).

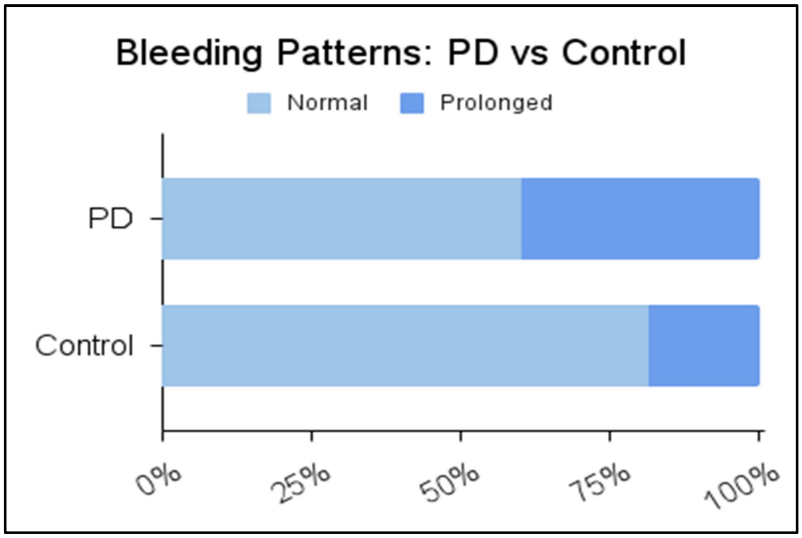

Figure 2) Comparison of bleeding duration between the PD cohort and controls. A higher proportion of prolonged bleeding was observed in the PD group.

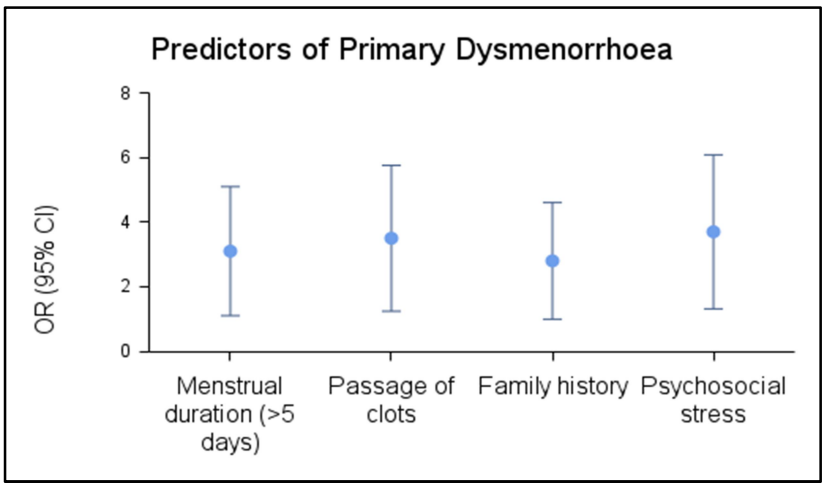

Figure 3) Scatter plot depicting odds ratios (95% CI) for factors associated with primary dysmenorrhoea. Menstrual duration>5 days, passage of clots, family history, and psychosocial stress were significantly correlated with the condition.

According stress and primary dysmenorrhea, 52.46% (n=160) of women with PD experienced an aggravation of symptoms with stress. 31.76% (n=27) in the control group had a similar experience. An aggravation with stress was prominent in patients with grade 3 (MSGS) PD with an increase of 3.57 times in comparison to a 2.37-fold risk elevation considering the whole dysmenorrhea subset (Figure 3). On further analysis a significant correlation was obtained with respect to the above two parameters ($p<0.05$).

The entire cohort diagnosed with primary dysmenorrhea was stratified according to symptomatology using the MSGS into three distinct grades. 37.7% (n=115) came under grade 1, 45.57% (n=139) under grade 2 and 16.72 (n=51) under grade 3 PD (Table 3, Figure 4).

Regarding Self-care strategies, pharmacotherapeutics and medical management, there were shown some

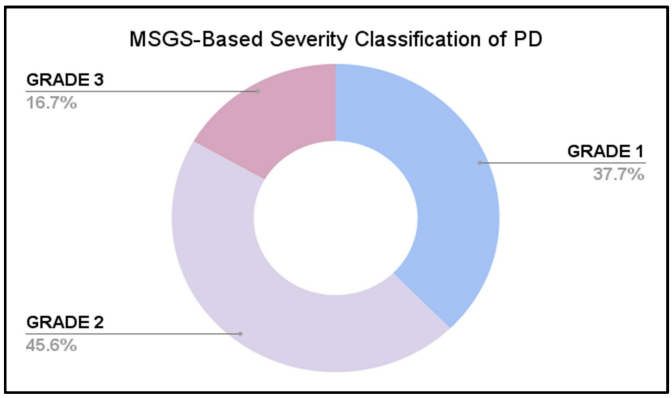

Figure 4) Proportion of participants across Menon–Sandra Grading System (MSGS) showing the distribution of PD severity.

strategies as follows.

In lifestyle modifications and home remedies strategy, among individuals with PD, 45.7% (160/305) regularly used hot water bags, comparable to 52.9% (45/85) in the control group. Hot beverages were consumed by 55.7% of the patient group and 64.7% of controls, while seeds and garlic were used by 57.0% and 57.6%, respectively. Regular physical exercise was practiced by 33.7% of the study cohort and 38.8% of controls, and vitamin supplementation was tried by 16 study participants and 4 controls. Over half (52.7%) of participants used more than one method for pain relief. Statistical analysis indicated that home remedies significantly alleviated PD symptoms ($p<0.05$, Figure 5).

In Pharmacological modality strategy, interestingly, 157 of 305 patients diagnosed with PD, expressed to have taken some sort of over-the-counter pharmacotherapeutic for its mitigation (Figure 5). NSAIDs were the preferred pharmacological choice among participants with PD. Of this more than seventy percent reported to have taken a combination of Mefenamic acid and dicyclomine, followed by acetaminophen (paracetamol). An unremarkable percentage used either ibuprofen, dicyclomine or a combination of mefenamic acid and acetaminophen (Table 3).

Table 3) Frequency of NSAID Use and reported side effects among participants with PD

Medication Type	n	Percentage (%)	Remarks
Mefenamic acid + Dicyclomine	116	73.88	Most commonly used combination for pain relief
Acetaminophen (Paracetamol)	36	22.92	Used as an alternative over-the-counter analgesic
Ibuprofen/Dicyclomine/Mefenamic acid + Acetaminophen	5	3.20	Least used, reported occasional or sporadic use

Calculating the frequency of use, thirty percent took the tablet once every cycle, usually on day one of their period. Nearly fourteen percent took it more than once every cycle and nearly half the population consumed the drug foreseeing any major event, under spells of psychological stress or in an unprecedented situation. Women on the above medications also complained to have experienced side effects post consumption, with 8 individuals having encountered nausea and vomiting, 12 with gastritis and 2 of the responders reported to have an exaggerated pain in the cycle that succeeded (Table 4).

Table 4) Pattern of Pharmacotherapeutic use among participants with primary dysmenorrhoea

Frequency of use	n	Percentage (%)	Description
Once every cycle (usually Day 1)	47	32.06	Taken only on the first day of menstruation
More than once every cycle	19	13.77	Used repeatedly within the same cycle
Occasional use (before major events, stress, or unexpected pain)	72	52.17	Taken prophylactically or situationally

Acupuncture and Transcutaneous Electric Nerve Stimulation (TENS) were undergone only by a handful of people that is less than 5% of the study cohort.

Regarding outpatient and Inpatient care, taking into consideration the bracket with PD, only 15.41% of the participants (n=47) had undergone a gynaecological evaluation and outpatient consultation for their morbidity. Evaluating the inpatient requirement, a fractional percentage of 2.62 (n=8) underwent the former, of which five were already on OP consults (Figure 5).

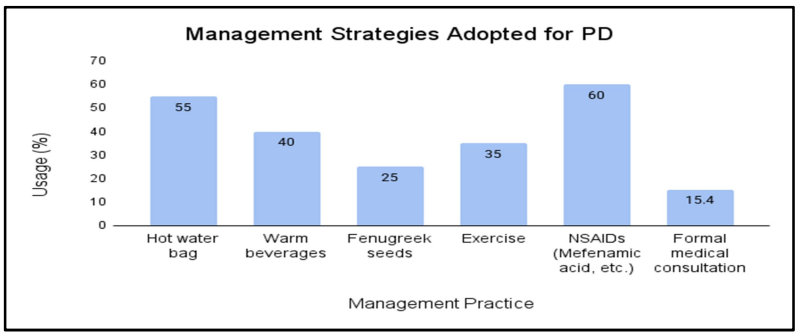

Figure 5) Common management practices among participants with primary dysmenorrhoea, showing predominant use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and home remedies over formal medical consultation.

Discussion

The present study aimed to investigate the This study unveils an alarmingly high prevalence of PD, affecting 71.26% of the study population. The magnitude aligns with global prevalence estimates ranging between 45% and 95%, thereby reaffirming PD as one of the most common gynaecological disorders in adolescents and young women [7,8]. The clinical significance of this finding extends beyond mere prevalence, as PD has consistently been shown to impair academic performance, occupational productivity, and psychosocial well-being, a pattern corroborated by findings from several earlier investigations [4,9].

In the current analysis, demographic and anthropometric determinants including age, body mass index, and age at menarche were not found to be significantly associated with PD. This observation is congruent with earlier studies, which suggest that these variables exert little influence except at extreme values [10,11]. In contrast, prolonged menstrual duration and passage of clots were identified as strong predictors, each associated with approximately three-fold increase in risk of PD. This association is biologically plausible, given that elevated intrauterine Prostaglandin(PG) levels in women with heavy menstrual flow can intensify uterine contractions and ischemia, thereby amplifying pain perception. The findings align closely with earlier studies [12,13]. A positive family history was another strong determinant, with nearly fourfold greater risk observed among women with affected first-degree relatives. Similar findings have been documented previously, indicating hereditary predisposition likely mediated by genetic polymorphisms in prostaglandin metabolism and central pain processing pathways congruent to previous literature [14]. In addition, psychosocial stress was significantly associated with incidence and severity of PD, particularly in women with grade 3 symptoms. Stress is known to potentiate pain through hypothalamic-pituitary-adrenal axis dysregulation, altered cortisol responses, and central sensitization, corroborating the bio-psycho-social model of menstrual pain [15,16].

Patterns of management in the study population reflected a combination of pharmacological and non-pharmacological practices. Self-care strategies such as the use of hot water bags, warm beverages, fenugreek seeds, garlic, and exercise were widely adopted, consistent with cultural reliance on accessible and low-cost remedies. These approaches yielded partial relief, suggesting potential benefits of lifestyle-based adjuncts in symptom control [17]. Nevertheless, pharmacological agents, particularly NSAIDs, remained the cornerstone of symptom relief.

The predominant use of mefenamic acid-dicyclomine combination aligns with established guidelines advocating NSAIDs as first-line therapy owing to their cyclooxygenase inhibition and subsequent suppression of PG synthesis [18]. Despite their efficacy, reports of adverse effects such as gastritis and nausea underscore the significance of rational prescribing and patient counselling. Notably, alternative modalities such as acupuncture and TENS were rarely employed, which may reflect both limited accessibility and the inconclusive nature of current evidence regarding their efficacy[19].

Of particular concern is the low proportion of affected women who sought formal medical consultation (15.4%), with an even smaller fraction requiring inpatient management. This highlights a pattern of underutilisation of healthcare services despite considerable symptom burden, suggesting gaps in awareness, access, and health-seeking behaviour. These findings resonate with global reports that many young women normalise dysmenorrhoeal pain and adopt self-medication rather than seeking professional care[20].

An important highlight of the present study is the utilisation of a novel pain scale specifically designed to capture the multidimensional impact of primary dysmenorrhoea. Unlike conventional tools that largely quantify pain intensity, this scale integrates both subjective experience and functional impairment, thereby offering a more comprehensive assessment. To the best of our knowledge, this may represent the first application of such an approach in the evaluation of dysmenorrheal pain, and its adoption could serve as a revelation in improving diagnostic accuracy, tailoring interventions, and advancing comparative research across diverse populations. Future study designs should prioritise prospective cohort designs validated pain scoring systems and quality of life assessment to elucidate causal pathways. Exploration of modifiable lifestyle determinants such as diet, sleep hygiene, physical activity, and stress reduction may broaden preventive strategies and enhance women's reproductive wellbeing.

The present study has certain limitations. The population was not homogenous, with participants drawn from diverse socio-economic backgrounds that may influence symptom perception and management practices. In addition, the reliance on self-reported data and the cross-sectional design restrict the ability to infer causality and may introduce recall bias. Despite these constraints, the findings provide meaningful insights into the multifactorial nature of PD. From a clinical and public-health standpoint, greater emphasis should be placed on awareness and preventive measures through early recognition, timely medical consultation, and informed self-care practices [21]. Developing integrated managing frameworks that combine evidence-based pharmacological therapy with safe, culturally appropriate non-pharmacological interventions could substantially improve outcome and overall quality of life among affected women [22].

Conclusion

The above study elucidates the substantial prevalence of PD and delineates its multifactorial ethology, wherein prolonged menstrual duration, passage of clots, family predisposition, and psychological stress emerge as salient determinants. The predominance of self-management practices and over the counter medications, coupled with limited professional consultation, underscores a critical gap in awareness and healthcare engagement. These insights advocate for targeted health education, proactive screening and community level interventions to foster early recognition and timely medical guidance. Moreover, the introduction of a structured pain assessment framework offers a novel paradigm for the precise upraise of menstrual pain, facilitating more objective evaluation in clinical and research contexts. Collectively the findings accentuate the imperative for an integrated approach melding education, clinical vigilance, and standard assessment thus alleviating disease burden and enhancing reproductive well-being in affected the population.

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Authors' Contribution

All authors assessed all parts of the study. They read and approved the final version of the manuscript.

Conflict of Interest

The results presented in this article have not been published previously in whole or part, except in the abstract format. The authors have nothing additional to disclose beyond the above acknowledgement.

Ethical Permission

This study involving human participants adheres strictly to the ethical principles outlined by the Declaration of Helsinki.

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