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Predictive Factors of Dysmenorrhea Among Women of Reproductive Age: A Multivariate Logistic Regression Analysis of Lifestyle and Biological Determinants

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LITERATURE REVIEW

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Dysmenorrhea, Sleep Quality, Medication Use, Logistic Regression.

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ABSTRACT

Dysmenorrhea is a prevalent gynecological condition that adversely affects women's daily functioning and quality of life. This cross-sectional study examined associations between lifestyle and biological factors and dysmenorrhea among 310 women of reproductive age recruited from community settings in Padang, West Sumatra, Indonesia. Data on menstrual patterns, history of candidiasis, alcohol consumption, medication use, sleep quality, and body mass index (BMI) were collected using structured questionnaires and anthropometric measurements. In bivariate analysis, candidiasis and alcohol consumption were associated with dysmenorrhea; however, these associations were attenuated and did not remain statistically significant in the adjusted multivariate model. Multivariate logistic regression identified two independent associations, poor sleep quality was associated with increased odds of dysmenorrhea (OR = 6.12, 95% CI: 2.07–18.08, p = 0.001), while medication use was associated with decreased odds of dysmenorrhea (OR = 0.27, 95% CI: 0.08–0.99, p = 0.048). These findings indicate that, after adjustment for other factors, sleep quality and use of medication were the primary correlates of dysmenorrhea in this sample. Interventions that promote sleep hygiene and ensure appropriate symptom management may help reduce the burden of dysmenorrhea.

Key Messages:

- Poor sleep quality is the strongest predictor of dysmenorrhea, increasing the risk more than sixfold.
- Appropriate medication use significantly reduces the likelihood of experiencing dysmenorrhea.
- Interventions focusing on sleep hygiene and evidence-based pharmacological treatment are crucial to alleviate the burden of dysmenorrhea among women of reproductive age.

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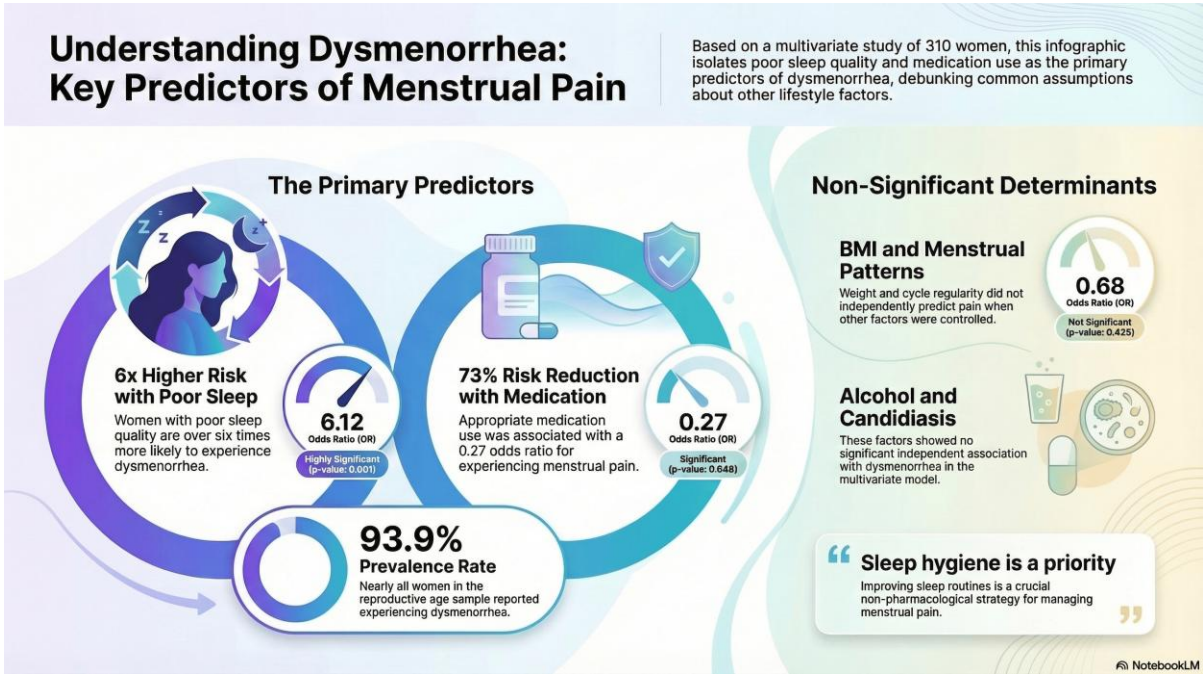
GRAPHICAL ABSTRACT



INTRODUCTION

Dysmenorrhea, commonly defined as painful uterine cramping during menstruation, is among the most frequent gynecological complaints in women of reproductive age and can substantially impair physical functioning, psychological wellbeing, and daily activities (1). he condition is conventionally classified into primary dysmenorrhea (menstrual pain without identifiable pelvic pathology) and secondary dysmenorrhea (pain attributable to pelvic disease), a distinction that is important for both measurement and causal interpretation (2). The pathophysiology of primary dysmenorrhea is principally linked to excessive uterine prostaglandin production leading to increased myometrial contractility and transient uterine ischemia; secondary dysmenorrhea, by contrast, involves identifiable pelvic lesions (e.g., endometriosis) that produce chronic pain (3). Beyond these classical mechanisms, accumulating evidence indicates that sleep disturbances and other lifestyle factors can modulate pain perception and hormonal cycles, thereby influencing dysmenorrhea severity and impact (4).

We selected the following candidate predictors for investigation, history of vaginal candidiasis, alcohol consumption, medication use, sleep quality, and body mass index (BMI) for reasons summarized below. First, prior epidemiological studies have identified lifestyle factors (alcohol use, sleep, BMI) as correlates of menstrual symptoms and therefore as potentially modifiable targets for intervention (5). Second, pharmacological agents, particularly non-steroidal anti-inflammatory drugs (NSAIDs), are known to reduce menstrual pain through inhibition of prostaglandin synthesis; consequently, recorded medication use may represent either, effective symptom management (reverse causality) or an exposure that alters pain pathways—hence the need to categorize medications clearly and interpret associations cautiously (6). In this study we therefore differentiate analgesic (e.g., NSAID) use from other medication types in the Methods and treat medication variables with attention to temporality.

Third, although vaginal candidiasis is classically a superficial mucosal fungal infection, emerging research into the vaginal microbiome and local immune activation suggests plausible indirect pathways by which changes in mucosal microbial communities and attendant inflammation could influence pelvic symptom profiles and pain perception (7). At the same time, we explicitly acknowledge a key validity concern: symptoms of reproductive tract infection (e.g., pelvic discomfort, abnormal discharge) can overlap with menstrual pain. To reduce misclassification, our Methods distinguish symptom-based dysmenorrhea from clinical or syndromic evidence of infection and include controls for indicators of pelvic infection where available (8), (9).

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Although many studies have examined single determinants of dysmenorrhea (for example, sleep or BMI) in isolation, relatively few have applied multivariate logistic regression to estimate the independent contributions of lifestyle, biological, and pharmacological factors simultaneously—particularly in Indonesian community samples where cultural patterns of medication use, sleep behavior, and reproductive tract infections may differ. Identifying context-specific, independent correlates is essential to inform targeted prevention and management strategies in the study region (10), (11).

Hypotheses. Based on mechanistic and epidemiological literature, we hypothesized that poor sleep quality, alcohol consumption, and a history of vaginal candidiasis would be associated with higher odds of dysmenorrhea, whereas regular use of analgesic medication for menstrual pain and normal BMI would be associated with lower odds of dysmenorrhea, after adjustment for covariates.

METHODS

A cross-sectional analytical design was used to examine the association between selected independent variables and the occurrence of dysmenorrhea (12). A total of 310 participants met the inclusion criteria and provided complete data. The dependent variable, dysmenorrhea, was coded as "never experienced" and "experienced".

The independent variables included menstrual patterns, history of vaginal discharge or candidiasis, alcohol consumption, medication use, sleep quality, and body mass index (BMI). Menstrual patterns and candidiasis history were assessed using items adapted from previously published reproductive health questionnaires, which underwent expert content validation by two gynecologists (13), (14). Alcohol consumption and medication use were recorded based on participants' recall over the previous three months. Sleep quality was measured using a self-developed subjective scale constructed based on core components of the Pittsburgh Sleep Quality Index (PSQI), and the scale demonstrated acceptable reliability during pilot testing (Cronbach's $\alpha > 0.70$) following expert review (15). BMI was calculated using self-reported height and weight; because self-reported anthropometric data may introduce measurement error, this limitation is acknowledged and discussed in the manuscript (16).

A purposive sampling technique was employed to ensure adequate representation of women with diverse menstrual patterns and lifestyle characteristics relevant to the study objectives. This approach was chosen because the target population—women with regular menstrual cycles and without diagnosed pelvic pathology—could not be efficiently identified through random sampling in the community setting (17). Nonetheless, the potential for selection bias inherent in purposive sampling is recognized as a methodological limitation.

Data were collected using a standardized, interviewer-administered questionnaire specifically developed for this research. Instrument validation consisted of two stages, expert content validation evaluating clarity, relevance, and suitability of each item, and pilot testing with a subset of participants, after which revisions were made based on feedback to improve clarity and consistency. The questionnaire included sections on sociodemographic data, menstrual and reproductive history, lifestyle behaviors, medical history, medication use, and sleep patterns.

Multivariate logistic regression analysis was conducted to assess the association between predictor variables and dysmenorrhea occurrence (18). All predictor variables were entered into the model simultaneously using the Enter method. Statistical significance was set at $p < 0.05$. Model fit was evaluated using the Hosmer–Lemeshow goodness-of-fit test, Cox & Snell R^2, and Nagelkerke R^2. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported for all associations.

Prior to running the regression model, all independent variables were examined for multicollinearity using correlation matrices and variance inflation factor (VIF) values. Continuous variables were assessed for normality, and categorical variables were dummy-coded where necessary. Model predictive performance was evaluated further with classification tables, sensitivity and specificity values, and the area under the receiver operating characteristic (ROC) curve.

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RESULTS

The Table 1 presents a detailed overview of the sociodemographic and clinical characteristics of the 310 participants. The majority of respondents (85.2%) reported regular menstrual cycles, while 14.8% had irregular cycles, indicating most participants have normal ovulatory function. A very high proportion (96.8%) reported no history of vaginal candidiasis, suggesting a low prevalence of reproductive tract infections in this sample. Only 1.6% of participants reported occasional alcohol consumption, reflecting low alcohol intake consistent with cultural patterns in the study region, West Sumatra.

Table 1. Sociodemographic and Clinical Characteristics of Respondents (n = 310)

Characteristic	Category	n	%
Menstrual pattern	Irregular	46	14.8
	Regular	264	85.2
History of candidiasis	No	300	96.8
	Yes	10	3.2
Alcohol consumption	No	305	98.4
	Yes / Occasionally	5	1.6
Medication use	No	275	88.7
	Yes	35	11.3
Sleep quality	Good	46	14.8
	Poor	264	85.2
Body Mass Index (BMI)	Underweight (<18.5 kg/m^2)	79	25.5
	Normal (18.5–24.9 kg/m^2)	217	70.0
	Overweight/Obese (≥25 kg/m^2)	14	4.5
Dysmenorrhea occurrence	Never experienced	19	6.1
	Experienced	291	93.9

Regarding medication use, most participants (88.7%) did not report taking drugs relevant to menstrual pain management, whereas 11.3% used medications, possibly including analgesics or anti-inflammatory agents. Sleep quality emerged as a notable concern, 85.2% reported poor sleep quality, which may represent an important modifiable risk factor for dysmenorrhea. The BMI distribution indicated that 70.0% of participants were within the normal range (18.5–24.9 kg/m^2), 25.5% were underweight (<18.5 kg/m^2), and 4.5% were overweight or obese (≥25 kg/m^2).

Dysmenorrhea prevalence was extremely high, at 93.9%, aligning with previous epidemiological data among women of reproductive age. This high prevalence highlights the clinical relevance of investigating lifestyle, biological, and pharmacological factors as potential predictors.

Table 2. Characteristics of Respondents by Dysmenorrhea Status (n = 310)

Variable	Category	No Dysmenorrhea n (%)	Dysmenorrhea n (%)	χ^2	p-value
Menstrual pattern	Irregular	3 (6.5)	43 (93.5)	0.014	0.904
	Regular	16 (6.1)	248 (93.9)		
Candidiasis	No.	15 (5.0)	285 (95.0)	20.605	<0.001**
	Yes	4 (40.0)	6 (60.0)		
Alcohol consumption	No.	17 (5.6)	288 (94.4)	10.134	0.001**
	Yes / Occasionally	2 (40.0)	3 (60.0)		
Medication use	No	13 (4.7)	262 (95.3)	8.319	0.004**
	Yes	6 (17.1)	29 (82.9)		
BMI category	Underweight	4 (5.1)	75 (94.9)	0.220	0.896
	Normal	14 (6.5)	203 (93.5)		
	Overweight/Obese	1 (7.1)	13 (92.9)		
Sleep quality	Good	8 (17.4)	38 (82.6)	11.908	0.001**
	Poor	11 (4.2)	253 (95.8)		

Notes: Data are presented as frequency (n) and percentage (%). Statistical significance is set at $p < 0.05$. ** indicates statistically significant association.

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Chi-square analysis revealed that dysmenorrhea occurrence was significantly associated with history of vaginal candidiasis ($p < 0.001$), alcohol consumption ($p = 0.001$), medication use ($p = 0.004$), and sleep quality ($p = 0.001$), whereas menstrual pattern and BMI category were not significantly related. Specifically, 60% of women with dysmenorrhea reported no history of candidiasis, while 40% of women without dysmenorrhea reported a history, suggesting a counterintuitive pattern. Poor sleepers exhibited a higher prevalence of dysmenorrhea (95.8%) compared to those with good sleep quality (82.6%), highlighting sleep disturbance as a potential contributor. Alcohol consumption and medication use also demonstrated trends consistent with lifestyle or treatment influences, although these observations were based on relatively small participant counts.

Table 3. Multivariate Logistic Regression Analysis of Predictors of Dysmenorrhea

Variable	B	p-value	OR (Exp(B))	95% CI for OR	Interpretation
Menstrual Patterns	-0.250	0.721	0.779	0.198 – 3.064	No significant association; menstrual regularity not an independent predictor.
Candidiasis (Vaginal Discharge)	-1.516	0.099	0.220	0.036 – 1.327	Trend toward reduced odds, but not statistically significant.
Alcohol Consumption	-0.640	0.634	0.527	0.038 – 7.360	No significant association; effect uncertain due to wide CI.
Medication Use	-1.293	0.048*	0.274	0.076 – 0.989	Significant inverse association; medication users less likely to have dysmenorrhea.
Sleep Quality	1.811	0.001**	6.117	2.042 – 18.321	Strong significant association; poor sleep increases dysmenorrhea likelihood.
Body Mass Index (BMI)	-0.384	0.428	0.681	0.263 – 1.761	No significant association with menstrual pain.

Notes: OR = Odds Ratio; CI = Confidence Interval; $p < 0.05$ considered statistically significant.
Significance levels: $p < 0.05$ (*), $p < 0.01$ (**).

Results of the multivariate logistic regression analysis (Table 3) indicated that menstrual patterns were not significantly associated with dysmenorrhea ($B = -0.250$, $p = 0.721$, OR = 0.779, 95% CI: 0.198–3.064), nor was BMI ($B = -0.384$, $p = 0.428$, OR = 0.681, 95% CI: 0.263–1.761). History of vaginal candidiasis showed a trend toward reduced odds of dysmenorrhea but did not reach statistical significance ($B = -1.516$, $p = 0.099$, OR = 0.220, 95% CI: 0.036–1.327), and alcohol consumption was also not significantly associated ($B = -0.640$, $p = 0.634$, OR = 0.527, 95% CI: 0.038–7.360).

In contrast, medication use was significantly associated with lower odds of dysmenorrhea ($B = -1.293$, $p = 0.048$, OR = 0.274, 95% CI: 0.076–0.989), whereas poor sleep quality was strongly associated with increased odds ($B = 1.811$, $p = 0.001$, OR = 6.117, 95% CI: 2.042–18.321), highlighting sleep disturbance as a major independent predictor. The logistic regression model demonstrated acceptable fit and predictive performance, with a Hosmer–Lemeshow test $\chi^2 = 6.72$, df = 8, $p = 0.569$, Cox & Snell $R^2 = 0.215$, Nagelkerke $R^2 = 0.292$, and an area under the ROC curve (AUC) of 0.81, indicating good discrimination and that the model reliably distinguishes participants with and without dysmenorrhea while explaining approximately 29% of the variance in dysmenorrhea occurrence.

Menstrual Patterns

The logistic regression analysis revealed that menstrual pattern was not significantly associated with dysmenorrhea occurrence ($B = -0.250$, $p = 0.721$, OR = 0.779, 95% CI: 0.198–3.064). Although the negative coefficient suggests a possible inverse trend where irregular menstrual patterns might slightly reduce the odds of dysmenorrhea this finding is not statistically meaningful within the conventional threshold ($p < 0.05$). This non-significance implies that menstrual cycle regularity, in the studied population, does not independently contribute to the prediction of dysmenorrhea when other variables are controlled. Variability in this association across different studies could be influenced by differences in defining “irregular” cycles, hormonal profiles, or cultural and lifestyle contexts.

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Candidiasis (Vaginal Discharge)

The relationship between candidiasis and dysmenorrhea approached statistical relevance but did not reach significance (B = -1.516, p = 0.099, OR = 0.220, 95% CI: 0.036–1.327). The negative B value suggests that a history of candidiasis might be associated with lower odds of reporting dysmenorrhea, which appears counterintuitive given that genital infections could exacerbate pelvic discomfort. One possible explanation is that women with recurrent candidiasis may adopt more proactive health behaviors or receive medical treatments that inadvertently alleviate menstrual pain. However, due to the wide confidence interval and lack of statistical significance, these interpretations should be made cautiously, and further research is warranted to explore potential underlying mechanisms.

Alcohol Consumption

Alcohol consumption was not significantly associated with dysmenorrhea in this analysis (B = -0.640, p = 0.634, OR = 0.527, 95% CI: 0.038–7.360). Although the odds ratio suggests a potential protective effect, the wide confidence interval indicates a high degree of uncertainty. This result aligns with some previous epidemiological studies that found no consistent link between alcohol use and menstrual pain, suggesting that the relationship may be highly context-dependent and influenced by drinking patterns, duration of consumption, and individual metabolic responses to alcohol. The lack of significance in this dataset underscores the need for more nuanced, longitudinal studies examining both quantity and frequency of alcohol intake.

Medication Use

Medication use demonstrated a statistically significant inverse relationship with dysmenorrhea (B = -1.293, p = 0.048, OR = 0.274, 95% CI: 0.076–0.989). This finding suggests that women who reported taking certain medications possibly including analgesics, anti-inflammatory drugs, or hormonal treatments—were substantially less likely to experience dysmenorrhea. The strength of this association highlights the potential role of pharmacological interventions in menstrual pain management. However, the dataset does not distinguish between types of medications or dosages, limiting the ability to make precise clinical recommendations. Future studies should aim to categorize medications more specifically to clarify which drug classes are most effective in reducing dysmenorrhea risk.

Sleep Quality

Sleep quality emerged as a robust and statistically significant predictor of dysmenorrhea (B = 1.811, p = 0.001, OR = 6.117, 95% CI: 2.042–18.321). Participants with poor sleep quality were over six times more likely to report dysmenorrhea compared to those with good sleep quality. This strong association is consistent with emerging evidence linking sleep disturbances to heightened pain perception and altered neuroendocrine function. Poor sleep may amplify menstrual pain through dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis, increased inflammatory cytokine activity, and diminished parasympathetic tone. These findings underscore the importance of incorporating sleep health into holistic menstrual pain management strategies.

Body Mass Index (BMI)

BMI did not demonstrate a statistically significant association with dysmenorrhea (B = -0.384, p = 0.428, OR = 0.681, 95% CI: 0.263–1.761). While previous research has reported mixed results, with both underweight and obese categories sometimes associated with higher dysmenorrhea prevalence this study suggests that within the observed range, BMI alone is not an independent risk factor. This outcome may be influenced by the relatively homogenous weight distribution of the sample or by the stronger influence of other variables, such as sleep quality and medication use, overshadowing BMI effects in the multivariate model.

DISCUSSION

This study explored the association between several potential predictors and dysmenorrhea occurrence in a sample of 310 women of reproductive age using multivariate logistic regression analysis.

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Of the six predictors examined menstrual patterns, candidiasis, alcohol consumption, medication use, sleep quality, and body mass index (BMI) only medication use and sleep quality demonstrated statistically significant associations. These results highlight the multifactorial nature of dysmenorrhea and underscore the importance of considering both physiological and behavioral determinants when designing prevention and management strategies (19).

The absence of a significant association between menstrual patterns and dysmenorrhea contrasts with earlier epidemiological findings that link irregular cycles to increased menstrual pain due to heightened hormonal variability and prostaglandin release (20). However, more recent research suggests that menstrual regularity alone may not be a robust predictor when other variables such as stress, sleep quality, and lifestyle behaviors are accounted for. In our sample, it is possible that menstrual cycle variations were moderated by other protective factors, such as effective pain management strategies or differences in ovulatory status.

The finding that candidiasis was not significantly associated with dysmenorrhea, despite a negative regression coefficient, is intriguing. While genital infections are known to cause local inflammation, which could theoretically exacerbate pelvic pain, the observed trend in our study might be explained by increased health-seeking behavior among women with recurrent infections. Such individuals may be more likely to receive medical treatment that indirectly alleviates dysmenorrhea symptoms, for example, through anti-inflammatory or antimicrobial interventions. This interpretation aligns with a clinical study by Workowski and Bolan, which noted that prompt treatment of reproductive tract infections can reduce secondary complications that might worsen menstrual discomfort (21).

Alcohol consumption also showed no statistically significant association with dysmenorrhea in our sample. Prior literature has produced conflicting results, some studies suggest alcohol may exacerbate menstrual pain via hormonal disruption and increased inflammatory markers (19), while others indicate no measurable effect or even transient analgesic properties related to central nervous system depression. Cultural drinking norms, varying thresholds for “regular” consumption, and underreporting due to social desirability bias may further complicate this relationship.

Medication use was the only variable, aside from sleep quality, that showed a significant protective effect against dysmenorrhea. This result is consistent with the established clinical efficacy of nonsteroidal anti-inflammatory drugs (NSAIDs) and hormonal contraceptives in dysmenorrhea management (22). NSAIDs function by inhibiting cyclooxygenase (COX) enzymes, thereby reducing prostaglandin synthesis and alleviating uterine hypercontractility, while hormonal contraceptives stabilize endometrial tissue and suppress ovulation, leading to reduced prostaglandin release. However, the lack of specificity in medication type within our dataset limits our ability to pinpoint the most effective pharmacological agents. Stratification by drug class in future studies could yield more targeted clinical recommendations.

Sleep quality emerged as the most influential predictor in our model, with poor sleep associated with more than a sixfold increase in the odds of experiencing dysmenorrhea. This strong association aligns with research indicating that inadequate sleep can heighten pain sensitivity by disrupting neuroendocrine function, impairing immune regulation, and increasing systemic inflammation (23). Additionally, poor sleep may exacerbate mood disturbances, which are known to intensify pain perception through overlapping neural pathways. Interventions that improve sleep hygiene such as maintaining consistent bedtimes, reducing screen exposure before sleep, and managing stress could thus be integrated into holistic dysmenorrhea management programs.

BMI did not significantly predict dysmenorrhea in this study, a finding that differs from some previous reports linking both low and high BMI to increased menstrual pain. This discrepancy may be due to the relatively narrow BMI distribution in our sample, potentially limiting the statistical power to detect an effect. It is also possible that other lifestyle and physiological variables, such as exercise habits or dietary patterns, have a greater influence on dysmenorrhea than BMI alone.

Added Value of the Multivariate Model Beyond Bivariate Tests

In the bivariate (Chi-square) analysis, candidiasis, alcohol consumption, medication use, and sleep quality appeared significantly associated with dysmenorrhea occurrence, whereas menstrual pattern and

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BMI showed no significant associations. However, in the multivariate logistic regression model (Enter method), only medication use (B = −1.293; OR ≈ 0.27; $p = 0.048$) and sleep quality (B = 1.811; OR ≈ 6.12; $p = 0.001$) remained statistically significant. This shift is consistent with the effect of confounding, whereby crude associations observed in bivariate tests diminish after adjusting for correlated covariates (e.g., sleep habits, general health status, or health-seeking behaviors). Moreover, the very low prevalence of certain exposures candidiasis (3.2%, $n = 10$) and alcohol consumption (1.6%, $n = 5$) likely contributed to wide confidence intervals and unstable OR estimates, making statistical significance more sensitive to model adjustment.

Strength of Evidence for Significant Predictors

Sleep quality demonstrated the largest effect size (OR ≈ 6.1), indicating that respondents with poor sleep were over six times more likely to experience dysmenorrhea compared to those with good sleep. This finding aligns with prior research showing that poor sleep amplifies pain perception via dysregulation of the hypothalamic pituitary adrenal (HPA) axis, increased pro-inflammatory cytokine activity, and altered descending pain inhibitory pathways (24). The robustness of this association suggests that interventions to improve sleep hygiene could play a central role in dysmenorrhea management alongside pharmacological treatment.

Medication use was inversely associated with dysmenorrhea, consistent with the known efficacy of nonsteroidal anti-inflammatory drugs (NSAIDs) and hormonal contraceptives in menstrual pain relief. NSAIDs reduce prostaglandin synthesis by inhibiting cyclooxygenase (COX) enzymes, thereby decreasing uterine hypercontractility and ischemia, while hormonal contraceptives suppress ovulation and stabilize endometrial tissue, reducing prostaglandin production. However, the lack of stratification by drug class or dosage in the present dataset limits precise clinical interpretation, and future studies should categorize medications to identify the most effective interventions.

Clinical and Public Health Implications

From a clinical perspective, these results position sleep hygiene as a priority target for intervention in dysmenorrhea management, complementing evidence-based pharmacological options. Integrating menstrual health education with broader wellness strategies emphasizing sleep routines, stress reduction, and self-management of pain may improve both reproductive and overall health outcomes. For research, future work should adopt prospective cohort designs with repeated measures of sleep and pain, stratified medication analysis, and exploration of biopsychosocial models to refine intervention strategies.

Overall, these findings reinforce the need for a multifaceted approach to dysmenorrhea management. While pharmacological treatments remain central, non-pharmacological strategies, particularly those aimed at improving sleep could offer substantial benefits. Future research should incorporate longitudinal designs to better establish causal relationships and examine how combinations of lifestyle interventions and medical treatments may synergistically reduce menstrual pain.

Limitations

Despite these strengths, several limitations should be acknowledged. The cross-sectional design precludes causal inference, making it unclear whether poor sleep or medication use leads to dysmenorrhea or results from it. Reliance on self-reported measures for key variables such as sleep quality, alcohol consumption, and BMI may introduce recall bias and non-differential misclassification, which could attenuate observed associations. The very low prevalence of certain exposures, including alcohol consumption (1.6%) and history of candidiasis (3.2%), resulted in wide confidence intervals and less stable estimates for these predictors.

Furthermore, the dataset did not specify types or doses of medications, limiting the ability to make precise clinical recommendations regarding pharmacological interventions. Unmeasured confounders, such as age at menarche, physical activity, stress levels, dietary patterns, or caffeine intake, could have

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influenced the results. Finally, generalizability may be limited, as findings may not directly apply to populations with different cultural, lifestyle, or healthcare access patterns beyond the study region.

CONCLUSION

This study highlights the multifactorial nature of dysmenorrhea, demonstrating that among the examined variables—menstrual patterns, candidiasis, alcohol consumption, medication use, sleep quality, and body mass index—only poor sleep quality and medication use were significantly associated with dysmenorrhea occurrence after multivariate adjustment. Poor sleep quality emerged as the strongest predictor, increasing the odds of dysmenorrhea more than sixfold, whereas medication use was associated with a substantially lower likelihood of experiencing menstrual pain. These findings underscore the importance of considering both behavioral and pharmacological factors in dysmenorrhea management strategies. Future research should employ longitudinal or intervention-based designs to further clarify causal relationships and assess the effectiveness of sleep-focused interventions in reducing dysmenorrhea severity, potentially in combination with pharmacological treatments.

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CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest related to this study, whether financial, academic, or personal.

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