■ **Original Research Article**

Prevalence of, and Risk Factors for Dysmenorrhea among Female Medical Students at the University of Ibadan, Nigeria

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ABSTRACTS

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Aim: This study investigates the prevalence and factors associated with dysmenorrhea among medical students at the University of Ibadan, Nigeria. **Settings and Design:** A cross-sectional study was conducted among female medical students that were regularly menstruating. **Methods and Material:** A structured questionnaire validated by expert independent observers was used for data collection. Information collected included socio-demographic characteristics, pattern of menstruation including dysmenorrhea, and related reproductive health explanatory variables. **Statistical analysis used:** The association between dysmenorrhea and selected explanatory variables status was assessed with the chi-square test. Poisson regression with robust variance was used to examine the significant factors that affect the prevalence of dysmenorrhea. **Results:** In total, 171 female medical students participated. Majority 163 (96.45%) of participants reported having lower abdomen pain during menstruation. There was a statistically significant difference in the average monthly allowance between participants with and without a history of dysmenorrhea (p<.001). A higher percentage of participants 99 (61.88%) with a history of dysmenorrhea stated that a family member had experienced cyclical pain. Participants who were unsatisfied with their relationship with their parents had 1.04 (95% CI 1.01 - 1.08) times more likely to experience dysmenorrhea than participants who felt satisfied with their parents. **Conclusion:** There is a high prevalence of dysmenorrhea amongst medical students with those having an increased average monthly allowance and feeling satisfied with their parents at a decreased risk.

Keywords: Dysmenorrhea, Menstruation, Pain, Female Medical Student, Nigeria

Introduction

During a woman's reproductive life, menstruation is often a universal and normal occurrence. Menstruation is a cyclical shedding of blood and mucosal tissue from the uterine lining through the vagina every month. This process is initiated by a fall in progesterone levels and

serves as an indication that conception has not taken place. The onset of menstruation is described as menarche, usually occurs around 12 to 13 years.[1] Menarche's onset is marked by a variety of abnormalities. In various Western populations, post-menarchial irregularity was reported by 43 to 62% of girls during the first year of menstruation, and in some cases, it continued for 3 to 5 years. [1-4] Menstrual disorder can become a serious gynecological complaint in adolescence and adulthood particularly when it becomes persistent and it sometimes disrupts routine activities such as missing exercise and outdoor events. [5] Menstrual disorders could be a disorder of cycle length, a disorder of flow, or both. Examples of such disorders include oligomenorrhea (light, irregular, or delayed menstruation), menorrhagia (excessive or prolonged flow), dysmenorrhea (painful menstruation), Pre-menstrual Syndrome (PMS) and amenorrhea (lack of menstruation).

Generally, dysmenorrhea affects 50% to 90% of the general population making it one of the most commonly reported menstruation disorders in adolescent girls and adult women. [6] A study reported that women older than 20 years tend to have higher prevalences of dysmenorrhea than those of younger age.[7] Dysmenorrhea is characterized by a cramping sensation that occurs in the lower abdomen or pelvic discomfort that generally radiates to the back or thighs. It is sometimes accompanied by other symptoms, such as headache, breast tenderness, anxiety, vomiting, and anorexia, all of which occur shortly before or during the period of menstruation.[8] Dysmenorrhea could be primary or secondary. Primary dysmenorrhea has no evident pathological pelvic illnesses and has been present since the commencement of menarche. Young females and adolescents are most likely to experience it. [9] On the other hand, secondary dysmenorrhea describes painful menstruation brought on by a known pelvic pathology, such as a pelvic inflammatory disease, adenomyosis, or fibroid. [10]

Although dysmenorrhea is not a life-threatening condition, it negatively affects the quality of life for women.[11] There are reports of a strong association between dysmenorrhea and mental health manifestations.[12] The intellectual, social, and emotional well-being may be greatly compromised in women complaining of persistent dysmenorrhea.[13] For example, a study showed that 10 to 15% of women experienced monthly menstrual pain that makes the completion of normal daily home, work, or school duties difficult. [13]

Several studies on risk factors associated with dysmenorrhea have reported mixed results[7]. Most studies conducted among college students consistently showed an earlier age at menarche as a risk factor for dysmenorrhea, perhaps, this could be a result of hormonal imbalance in the hypothalamus-pituitary-ovarian axis. [14-17] Other associated risk factors include having a positive family history of dysmenorrhea, [18,19] having a longer menstrual cycle, [17,19] and older age at getting pregnant or delivering a child.[20] Studies that assessed the role of smoking, alcohol consumption, coffee intake, and risk of dysmenorrhea had contradictory findings.[7] For example, some studies showed smokers having a higher risk of dysmenorrhea[18,21,22] while other studies did not find any association with smoking history. [15, 19, 23]

Several studies have explored dysmenorrhea across diverse populations, including adolescents and adult women. However, the distinct stressors and rigorous demands inherent in medical education create a unique context for female medical students. Understanding the prevalence and risk factors of dysmenorrhea within this specific group is especially relevant. Exploring these factors within this specific demographic could reveal unique contributors to the development or exacerbation of dysmenorrhea, thereby facilitating the development of tailored interventions and support services. Moreover, insights gained from studying dysmenorrhea among medical students can also inform strategies applicable to the wider female population, both within academic settings and beyond. This study therefore aims to investigate the prevalence of, and risk factors associated with the report of dysmenorrhea among female medical students as a sample of young people in Ibadan. The female medical students were chosen based on our assumption that they would have learnt about the subject in class and fully understood the term dysmenorrhea. Secondly, the female medical students were believed to be able to openly discuss their menstrual health challenges compared to young ladies who might not have had medical training.

SUBJECTS AND METHODS

Study Design

This was a cross-sectional study that was conducted among female medical students at the College of Medicine, University of Ibadan (UI). UI is the premier University in Nigeria, established in 1948 together with the Medical School. A structured questionnaire was administered to the participants to collect the quantitative data.

Study Settings

Data were collected from female medical students (years 1-6) in the College of Medicine, UI.

Inclusion Criteria

Female medical students with a history of regular menstruation

Exclusion Criteria

Any participants with abnormal bleeding, pelvic inflammatory diseases, lower abdominal pain, or pelvic pain due to other causes and those that refused to consent were excluded.

Sampling Technique

The student records at the College of Medicine, University of Ibadan showed that there were 40, 68, 93, 63, 58, 57, and 40 female students at each level from Year 1 to Year 6, making a total of 419 students. There was a set of students delayed by an academic year due to industrial actions by labour unions. A stratified random sampling technique was used to select potential participants to minimize bias and reduce error. Each academic year was taken as a stratum, and a random sample was selected proportionate to the absolute population of female medical students in each year.

Sample Size

The sample size was calculated using a formula for cross-sectional design;

$$n = \frac{Z_\propto{}^2 p(1-p)}{d^2}$$

Where:
n = sample size
$Z_\propto$ = value of z at $\propto$ (level of significance)
p = prevalence of dysmenorrhea from a previous study and
d = precision of the study, set at 5%.
The sample size was 167. Four additional participants were added to the sample size, nevertheless, to account for nonresponse bias making a total of 171.

Study Instrument and Data Collection

A structured questionnaire comprising five sections with closed-ended questions was developed following a review of literature and discussions with Obstetrician and Gynaecologists at the College of Medicine, UI. After the design, another set of independent experts (Obstetricians and Gynaecologists) reviewed the questions before we conducted a pilot among young people in the community. Members of the research team distributed the questionnaire to selected students from the sampling frame of each class and were given a week to complete it and for collection. Students who declined consent were excluded from participation.

Data Management and Analysis

Response Variable: The primary outcome was a history of dysmenorrhea.

Explanatory Variables: The explanatory variables considered include the socio-demographic characteristics, pattern of menstruation, and family history.

The statistical analysis was performed using STATA (StataCorp L.L.C.). Descriptive statistics (mean and standard deviation) and frequency distribution were used to summarize the continuous and categorical variables. The median and interquartile range were used where the continuous variables were not normally distributed. The association between the categorical variables and the status of dysmenorrhea was examined using the chi-square test. The risk ratio was obtained for the study variables on the participants' dysmenorrhea history using Poisson regression with robust variance. Statistical significance was determined using the 95% confidence interval and a p-value of less than or equal to 0.05.

Ethical Consideration

Ethical approval was obtained from the UI/UCH ethics committee with reference number UI/EC/22/0266. Before each participant completed the questionnaire, informed consent was obtained to gain their voluntary participation. An introductory and consent note was attached to the questionnaire, and the participants were encouraged to seek clarification before signing the consent form.

RESULTS

A total of 171 medical students participated in the study. The descriptive analyses of participants by their history of dysmenorrhea are shown in Table 1. Six (3.55%) out of 171 participants had never experienced dysmenorrhea, while 163 (96.45%) of them had lower abdomen pain during menstruation. The average age of participants with dysmenorrhea was 22.09±0.18 compared to those without a history of dysmenorrhea (21.80±0.73). Most participants 167 (97.66%) were single and 143 (85.12%) lived on campus. All participants without a history of dysmenorrhea engaged in regular communication and enjoyed a positive relationship with their parents. The

average monthly allowance for participants without a

Table 1: Distribution and Test of Association between Respondent Characteristics and Dysmenorrhea History

Variables	Total n (%)	Dysmenorrhea		p-value
		Yes n (%)	No n (%)	
Demographic Characteristics				
Age [Mean (Sd)]	22.08 (0.18)	22.09 (0.18)	21.80 (0.73)	.778
Academic Level				.869
100L	13 (7.60)	13 (7.98)	0	
200L	18 (10.53)	17 (10.43)	1 (16.67)	
300L	25 (14.62)	25 (15.34)	0	
400L	27 (15.79)	26 (15.95)	1 (16.67)	
500L	41 (23.98)	38 (23.31)	3 (50.0)	
600L	30 (17.54)	27 (16.56)	1 (16.67)	
600BL	17 (9.94)	17 (10.43)	0	
Study program				1.000
Medicine and Surgery	143 (83.63)	136 (83.44)	5 (83.33)	
Dentistry	28 (16.37)	27 (16.56)	1 (16.67)	
Accommodation[1]				1.000
In campus	143 (85.12)	135 (84.38)	6 (100)	
Alone off campus (rented apartment)	19 (11.31)	19 (11.88)	0	
Off-campus with family	6 (168)	6 (3.75)	0	
Religion				1.000
Christianity	153 (89.47)	145 (88.96)	6 (100)	
Islam	18 (10.53)	18 (11.04)	0	
Ethnicity[2]				.122
Yoruba	115 (68.05)	112 (69.14)	2 (33.33)	
Hausa	2 (1.18)	2 (1.23)	0	
Igbo	36 (21.30)	34 (20.99)	2 (33.33)	
Others	16 (9.47)	14 (8.64)	2 (33.33)	
Marital Status				1.000
Single	167 (97.66)	159 (97.55)	6 (100)	
Married	2 (1.17)	2 (1.23)	0	
Separated	2 (1.17)	2 (1.23)	0	
Father Education				.747
Post-graduate	76 (44.44)	73 (44.79)	3 (50.0)	
Tertiary	73 (42.69)	70 (42.94)	2 (33.33)	
Secondary	18 (10.53)	16 (9.82)	1 (16.67)	
Primary	4 (2.34)	4 (2.45)	0	
Mother education[3]				.774
Post-graduate	68 (40.0)	65 (40.12)	3 (50.0)	
Tertiary	77 (45.29)	73 (45.06)	2 (33.33)	
Secondary	20 (11.76)	19 (11.73)	1 (16.67)	
Primary	5 (2.94)	5 (3.09)	0	
Family type[4]				1.000
Nuclear	159 (93.53)	152 (93.25)	6 (100)	
Extended	11 (6.47)	11 (6.75)	0	
Family Structure[5]				1.000
Monogamous	159 (95.21)	151 (94.97)	6 (100)	
Polygamous	8 (4.79)	8 (5.03)	0	
Parent Communication[6]				1.000
Weekly	158 (93.49)	152 (93.25)	6 (100)	
Fortnightly/Monthly	11 (6.51)	11 (6.75)	0	
Parent Relationship[7]				1.000
Satisfied	149 (88.69)	143 (88.27)	6 (100)	
Indifferent	9 (5.36)	9 (5.56)	0	
Unsatisfied	10 (5.95)	10 (6.17)	0	
Parent Divorced				1.000
Yes	23 (13.45)	23 (14.11)	0	
No	148 (86.55)	140 (85.89)	6 (100)	
Source of income for the school[8]				.207
Parent(s)	152 (91.02)	147 (91.30)	5 (83.33)	
Self	5 (2.99)	4 (2.48)	1 (16.67)	
Others	10 (5.99)	10 (6.21)	0	
Monthly Allowance [Mean (Sd)]	29059.21(1531.31)	28006.8 (1331.87)	60000 (23237.9)	<.001
Female Siblings				.350
Yes	123 (71.93)	119 (73.01)	3 (50.0)	
No	48 (28.07)	44 (26.99)	3 (50.0)	
Pattern of Menstruation				
Age at first menstruation [Median (IQR)]	12 (2)	12 (2)	11.5 (1)	.142
Menstrual cycle length [Mean (Sd)] (Duration from the first day of the last menses to the time of the next one)	27.73 (0.41)	27.94 (0.39)	21.4 (4.73)	**.005**
Length of menstruation [Median (IQR)]	5 (1)	5 (1)	4.1 (1)	.698
Use of sanitary or tampons[9]				1.000
Yes	167 (99.40)	160 (99.38)	6 (100)	
No	1 (0.60)	1 (0.62)	0	
Average Sanitary or tampons used [Mean (Sd)]	9.98 (0.37)	10.01 (0.28)	9.33 (1.23)	.733
Periods for the past 3 months[10]				.294
Light	137 (82.04)	133 (82.61)	4 (66.67)	
Heavy	30 (17.96)	28 (17.39)	2 (33.33)	
Family members with cyclical pain experience[11]				1.000
Yes	101 (61.96)	99 (61.88)	1 (50.0)	
No	62 (38.04)	61 (38.13)	1 (50.0)	

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paracetamol and hot water as pharmacological and non-pharmacological treatment regimens, respectively (Figure 2).

Table 2: Dysmenorrhea History and Lifestyle Changes

Description	Category	Frequency (%)
Description of the pain	My pain does not prevent me from doing my daily activity	103 (63.58)
	My pain is so severe that I cannot do my daily routine without using medication	59 (36.42)
	My pain is so severe that I usually get admitted to the hospital	0
How is the pain related to your menstruation?	It occurs before menstruation starts	46 (29.11)
	It gets worse as menstruation begins	102 (64.56)
	It is the same throughout menstruation	10 (6.33)
How often do you miss school because of your periods?	Never	74 (46.84)
	Rarely	57 (36.08)
	Sometimes	25 (15.82)
	Always	2 (1.27)
What about your period causes you to miss school?	Pain	65 (78.31)
	Heavy Menstruation	7 (8.43)
	Nausea and vomiting	1 (1.20)
	Others	10 (12.05)

with a history of dysmenorrhea. A higher percentage of participants 99 (61.88%) with a history of dysmenorrhea reported a positive family history of dysmenorrhea/cyclical abdominal pain. Menstrual discomfort was reported by two-thirds 111 (67.68%) each month, followed by participants who reported it every three months (Figure 1).

There was no significant association between history of dysmenorrhea and selected categorical characteristics. However, there was a significant difference in the average monthly allowance between participants with and without a history of dysmenorrhea [t (150) = -3.898, p .001]. There was also a significant difference in menstrual cycle length between participants in the two groups [t (160) = 2.840, p = 0.005], with participants with a history of dysmenorrhea having a longer average menstrual cycle length (27.94±0.39) than those without dysmenorrhea (21.4±4.73).

Table 2 displays the participants' lifestyle changes and history of dysmenorrhea. Over a third, 59 (36.42%) of participants rated their pain as severe to prevent them from performing their daily activities without taking medication. The majority 102 (64.56%) reported feeling discomfort at the beginning of menstruation, while 10 (6.33%) reported history of pain throughout the duration of menstruation. Figure 2 shows the pharmacological and non-pharmacological pain relief methods used by the participants. Most of them took

Table 3 shows the Poisson regression with robust variance of factors associated with history of dysmenorrhea. The results of the crude risk ratio showed that participants who communicated with their parents fortnightly or monthly were 1.04 (95% CI 1.01 - 1.07) times more likely to experience dysmenorrhea than those who did not communicate with their parents weekly. Additionally, participants who were unsatisfied with their relationship with their parents were 1.04 (95% CI 1.01 - 1.08) times more likely to experience dysmenorrhea than participants who felt satisfied with their parents. Accommodation, religion, marital status, family structure, parent divorce, and use of sanitary products were other factors associated with history of dysmenorrhea. However, these explanatory factors were not statistically significant after adjusting for other variables in the model.

DISCUSSION

This study showed that dysmenorrhea is highly prevalent among medical students as nearly all participants gave a history of having experienced symptoms suggestive of pain during menstruation. We also found that participants with a history of dysmenorrhea had a longer average menstrual cycle length, a positive family history, and

most used paracetamol and hot water as treatment regimens.

The high prevalence of dysmenorrhea observed in this study is similar to studies by Gumanga and

Table 3: Risk Factor Analysis of Dysmenorrhea among Participants Using Poisson Regression

| Variables	Crude RR (95% CI)		Adjusted RR (95% CI)	
Age	1.00 (0.99 – 1.01)		1.00 (0.99 – 1.01)	
Academic Level		.316		.344
Pre-Clinical	1		1	
Clinical	0.97 (0.92 – 1.03)		0.97 (0.91 – 1.03)	
Study program		.995		.367
Medicine and Surgery	1		1	
Dentistry	0.99 (0.92 – 1.08)		1.02 (0.98 – 1.06)	
Accommodation		.015		.775
In campus	1		1	
Alone off campus (rented apartment)	1.04 (0.02 – 1.01)		1.01 (0.98 – 1.040	
Off-campus with family	1.04 (0.02 – 1.01)		1.01 (0.97 – 1.05)	
Religion		.015		.795
Christianity	1		1	
Islam	1.04 (1.01 – 1.08)		0.99 (0.98 – 1.02)	
Ethnicity		.114		.358
Yoruba	1		1	
Hausa	1.02 (0.99 – 1.04)		1	
Igbo	0.96 (0.88 – 1.04)		0.97 (0.92 – 1.02)	
Others	0.89 (0.74 – 1.07)		1.02 (0.99 – 1.04)	
Marital Status		.015		.944
Single	1		1	
Married	1.04 (1.00 – 1.07)		1.00 (0.95 – 1.06)	
Separated	1.04 (1.00 – 1.07)		0.98 (0.84 – 1.14)	
Father Education		.113		.657
Post-graduate	1		1	
Tertiary	1.01 (0.95 – 1.07)		0.99 (0.96 – 1.04)	
Secondary	0.98 (0.86 – 1.11)		0.98 (0.95 – 1.02)	
Primary	1.04 (0.99 – 1.09)		1.02 (0.97 – 1.06)	
Mother education		.113		.557
Post-graduate	1		1	
Tertiary	1.02 (0.96 – 1.09)		0.99 (0.96 – 1.03)	
Secondary	0.99 (0.89 – 1.11)		1.02 (0.98 – 1.07)	
Primary	1.05 (0.99 – 1.10)		1.00 (0.94 – 1.07)	
Family Structure		.015		.230
Monogamous	1		1	
Polygamous	1.04 (1.01 – 1.07)		1.04 (0.98 – 1.10)	
Parent Communication		.015		.373
Weekly	1		1	
Fortnightly or Monthly	1.04 (1.01 – 1.07)		1.02 (0.98 – 1.06)	
Parent Relationship		.015		.459
Satisfied	1		1	
Indifferent	1.04 (1.01 – 1.08)		1.05 (0.97 – 1.13)	
Unsatisfied	1.04 (1.01 – 1.08)		1.01 (0.98 – 1.04)	
Parent Divorced		.015		.720
Yes	1		1	
No	0.96 (0.92 – 0.99)		0.99 (0.97 – 1.02)	
Source of income for school		.051		.407
Parent	1		1	
Self	0.83 (0.53 – 1.29)		1.03 (0.94 – 1.12)	
Others	1.03 (1.00 – 1.06)		1.03 (0.98 – 1.09)	
Monthly Allowance	1		1	
Female Siblings		.315		.564
Yes	1		1	
No	0.96 (0.89 – 1.04)		0.98 (0.93 – 1.04)	
Age at first menstruation	1.01 (0.99 – 1.03)		1.00 (0.99 – 1.01)	
Menstrual cycle length	1.01 (1.00 – 1.02)		1.00 (0.99 – 1.01)	
(Duration from the first day of the last menses to the time of the next one)				
Length of menstruation	1		1.00 (0.95 – 1.05)	
Use of sanitary or tampons		.015		
No	1		1	
Yes	1.04 (1.01 – 1.07)		1	
Average Sanitary or tampons used	1.00 (1 – 1.01)		1.00 (0.99 – 1.01)	
Periods for the past 3 months		.442		.260
Light	1		1	
Heavy	0.96 (0.87 – 1.06)		0.96 (0.90 – 1.03)	
Family members with cyclical pain experience		.746		.242
Yes	1		1	
No	0.99 (0.96 – 1.03)		0.98 (0.96 – 1.01)	
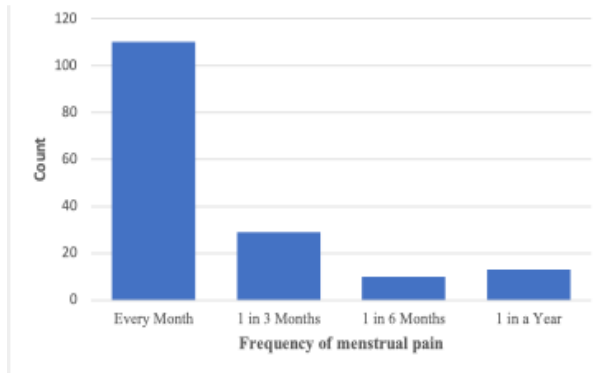
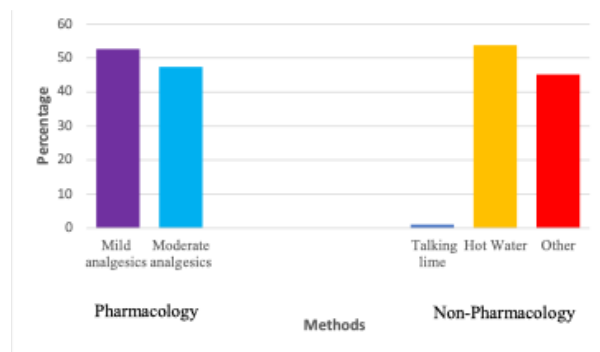Figure 1: Bar Plot of the Frequency of Menstrual Pain

Figure 2: Dysmenorrhea Pain-Relieving Techniques

Kwame-Aryee, 2012 in Ethiopia and Ghana that reported prevalence rates of 85.4% and 74.4% respectively. [24] The high proportion of dysmenorrhea was also reported in other studies across different geopolitical regions of Nigeria but at a slightly lower level than our study. For example, a study in Anambra, Southeast region found 82.2% of participants reporting dysmenorrhea while another study in Southwest Nigeria found 73% of adolescents with dysmenorrhea. A similar study in Kwara state showed that 71.8% of adolescents had a history of dysmenorrhea. [25] However, two studies among adolescents in Enugu (51.1%) and Kano (42.5%) found relatively lower prevalences of dysmenorrhea. [26,27] The variation in the prevalences of reported dysmenorrhea might be due to differences in the operational definition used, methods of data collection (self-versus interviewer-administered) and age range of study population recruited.

In this study, we observed that participants who did not experienced dysmenorrhea had a higher monthly income than those with history of dysmenorrhea. It is plausible that monthly income could be a maker of the socioeconomic state of participants as some studies have reported this association. [28] This causal relationship will need to be explored using a longitudinal study design. School absenteeism due to dysmenorrhea is another previously reported factor because of its potential to negatively affect their academic performances. In this study, more than a third of participants with dysmenorrhea said their menstrual pain were severe enough to affect their daily activities if they did not use any pain relief medications. Although this study did not assess the previous academic performances of participants in relation to school absenteeism or its effects on other daily activities, the impact of dysmenorrhea could be enormous as students may miss examinations or perform poorly in their academic pursuits. A study by Ezebialu et al. in Nigeria had previously reported an association between severe dysmenorrhea and poor academic performances. [29]

Interestingly, we observed that a significant proportion of participants were using non-pharmaceutical regimens including drinking or bathing with hot water. This strange attitude of medical students requires further exploration to understand the sources of this traditional treatments and their perceived belief about the potency of such treatments. Furthermore, most of the participants used mild analgesics whereas a lot of them described their pain as severe. It is possible that participants might have overrated the severity of their pain or they were self-medicating instead of seeking for medical consultation and prescription from experts.

The interpretation of findings from this study might be limited due to the following reasons. This was a cross-sectional design that made it difficult to define causality on any of the identified risk factors of dysmenorrhea. We limited the sampling to medical students who were in different academic years. It is possible that students in the clinical year might have a better understanding of dysmenorrhea than those in the preclinical year of their study. This analysis did not differentiate between primary and secondary dysmenorrhea and their associated risk factors. Additionally, we utilized self-reported scores to assess the severity of dysmenorrhea pain, rather than a pain score index, due to the absence of standardized dysmenorrhea pain assessment tools. This approach may introduce subjectivity and variability in pain reporting.

CONCLUSION

In conclusion, this study showed a relatively high prevalence of dysmenorrhea amongst medical students compared to previous studies in Nigeria. We described risk factors associated with history of dysmenorrhea and

recommended a future mixed methods design that could explore reasons why people use non-orthodox methods of treatment for dysmenorrhea.

Conflict of Interest: The authors declare that they have no competing interests.

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