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students in Indonesia: a cross-

life, mental health and academic

BMJ Open Association between primary dysmenorrhoea on quality of life, mental health and academic performance among medical students in Indonesia: a cross-sectional study

Herbert Situmorang ^(D), ^{1,2} Reynardi Larope Sutanto ^(D), ³ Kevin Tioa ^(D), ³ Rivaldo Rivaldo 💿

ABSTRACT

Objectives To investigate the association between primary dysmenorrhoea and quality of life, mental health and academic performance among medical students in Indonesia.

Design A cross-sectional study using an online survey was conducted among Indonesian medical students. Primary dysmenorrhoea occurrence and severity, as well as their associations with quality of life, mental health and academic performance, were assessed using validated questionnaires. The associations of dysmenorrhoea occurrence and severity were analysed alongside other potential independent variables, including age, region, stage of study and parental income. Statistical analyses included χ^2 tests, t-tests and multiple regression models to adjust for confounders (p<0.05).

Setting and participants Indonesia (June–July 2021: n=630 medical students).

Outcomes The primary outcomes were quality of life. mental health and academic performance, assessed as dependent variables. Quality of life was measured using the Quality of Life Scale, mental health was assessed through depression and stress scores from the Depression Anxiety Stress Scales-42; and academic performance was evaluated through concentration and activity disruption, absenteeism and cum laude grade point average (GPA). The independent variables were primary dysmenorrhoea occurrence and severity, categorised as mild or moderateto-severe using the Verbal Multidimensional Scoring System.

Results Primary dysmenorrhoea was significantly associated with reduced quality of life, mental health challenges and academic disruptions. Students with dysmenorrhoea had significantly lower Quality of Life scores (-1.82, 95% CI: -2.63 to -1.02; p<0.001), with moderate-to-severe pain linked to an even more significant reduction (-2.09, 95% CI: -2.54 to -1.63; p<0.001). Dysmenorrhoea occurrence was significantly associated with depression (OR 2.16, 95% CI: 1.23 to 3.81; p=0.007), while severity was associated with both depression (OR 2.07, 95% CI: 1.47 to 2.92; p<0.001) and stress (OR 1.82, 95% CI: 1.26 to 2.62; p<0.001). Dysmenorrhoea occurrence and severity significantly

 medical students in ctional study

 e Sutanto (● ,³ Kevin Tjoa (● ,³)

 STEENGTHS AND LIMITATIONS OF THIS STUDY

 ⇒ Primary dysmenorrhoea is significantly associated with the quality of life, mental health and academic performance of Indonesian medical students.

 ⇒ Multiple binary logistic regression analysis enables the control of potential confounders, such as age, region, stage of study and parental income.

 ⇒ The reliance on self-reported data may introduce bias due to possible variations among participants' perceptions of dysmenorrhoea severity.

 ⇒ The results might not be generalisable beyond this specific population of Indonesian medical students.

 disrupted concentration (OR 12.92, 95% Cl: 6.14 to 27.22; p<0.001 and OR 7.24, 95% Cl: 4.68 to 11.19; p<0.001, respectively), activities (OR 34.95, 95% Cl: 4.77 to 256.16; p<0.001 and OR 7.24, 95% Cl: 4.63 to 10.36; p<0.001). and absenteeism (OR 12.10, 95% Cl: 1.65 to 88.83; p=0.014 and OR 5.65, 95% Cl: 3.32 to 9.63; p<0.001). Conclusions Primary dysmenorrhoea is significantly associated with the quality of life, mental health and academic performance of medical students in Indonesia. Addressing its implications can enhance student well-being and academic outcomes.

 MUNDOUCTION

 Dysmenorrhoea is a condition characterised by recurring lower abdominal pain associated with uterine contractions during menstrue

by recurring lower abdominal pain associated with uterine contractions during menstruation.¹² It is the most common gynaecological problem among women across all age ranges and races worldwide. A meta-analysis estimates that 71.1% of all women experience dysmenorrhoea, irrespective of the economic status of their country of origin.^{3 4} Based on its pathophysiology, dysmenorrhoea

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C Author(s) (or their

BMJ Group ¹Reproductive Health Division, Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

²Reproductive Health Division, Department of Obstetrics and Gynecology, dr. Cipto Mangunkusumo General Hospital, Jakarta, Indonesia ³Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

Correspondence to

Dr Herbert Situmorang; datadrherbert@gmail.com is divided into two types: primary dysmenorrhoea, where there is no identifiable underlying organic disease and secondary dysmenorrhoea, which is caused by other identifiable diseases. Primary dysmenorrhoea is particularly prevalent among young females, often starting within 6 to 24 months after menarche. The pain often follows a clear cyclic pattern, being most intense on the first day of menstruation and lasting up to 72 hours.²⁵ Despite its high prevalence, primary dysmenorrhoea is often inadequately managed, as many women perceive it as a normal part of menstruation and hesitate to seek medical advice due to social taboos and embarrassment. This stigma and reluctance to seek proper care for menstrual issues, hinders early detection of underlying diseases and the diagnosis of secondary dysmenorrhoea, which further complicates differentiation between primary and secondary dysmenorrhoea, particularly in settings with limited diagnostic resources.²

Dysmenorrhoea has well-documented consequences throughout a woman's life. A study involving 21573 women found that dysmenorrhoea significantly contributes to absenteeism from school or university (20.1%), reduced concentration and academic performance during episodes (40.6%) and decreased participation in school activities (29.6%).³ Moreover, it creates a notable disparity in healthcare burdens, where women with either primary (2.2 times) or secondary dysmenorrhoea (2.9 times) incurring higher healthcare service costs compared with the general female population." Another study also mentioned the higher prevalence of depression, anxiety and stress-related disorders among women with dysmenorrhoea.⁸ Primary dysmenorrhoea, in particular, raises the likelihood of major depressive disorder by over 70%.⁹ Despite these extensive findings, public awareness of dysmenorrhea, either primary or secondary, remains relatively low.

Part of the reason behind the limited public awareness surrounding dysmenorrhoea may be the absence of large-scale, comprehensive research highlighting its burden in low- and middle-income countries, particularly in Indonesia. While studies from countries such as India, Malaysia, Iran and Nigeria have provided some insights into the issue, these investigations have been limited in scale and regional in focus.³ Comprehensive national data on the associations between dysmenorrhoea, especially primary dysmenorrhoea, due to its common prevalence and disruptions to the daily lives of many women are urgently needed to inform stakeholders and raise public awareness about this condition.

Medical students were chosen as the study population because they represent younger, productive-aged women, a demographic where disruptions to daily life caused by dysmenorrhoea can significantly impact academic performance and future career prospects. This group is also most affected by primary dysmenorrhoea, which tends to be most prevalent during adolescence and early adulthood.^{2 3} Additionally, their medical background allows for more accurate self-reporting of symptoms, potentially

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improving the quality of data collection. Furthermore, our focus aligns with similar studies¹⁰⁻¹³ conducted in other countries, enabling more direct comparisons between studies. Finally, involving medical students in dysmenorrhoea research might enhance their awareness of the condition as prospective physicians.

This study aims to investigate the associations between primary dysmenorrhoea and quality of life, mental health and academic performance among medical students across Indonesia.

METHODS

As part of the research project 'Primary Dysmenorrhoea: copyright, Prevalence, Perception, Behaviour and Quality of Life among Medical Students in Indonesia' conducted by the Faculty of Medicine, Universitas Indonesia, this study aimed to investigate the association between primary dysmenorrhoea and quality of life, mental health and academic performance among medical students in Indonesia. The research protocol was approved by the Faculty of Medicine, Universitas Indonesia and the Cipto Mangunkusumo National General Hospital Health uses related to Research Ethics Committee in accordance with good clinical practice and the Declaration of Helsinki (Reference No. 344/UN2.F1/ETIK/PPM.00.02/2021).

Study design and participants

text This study employed a cross-sectional design. Data were collected using an online questionnaire via Google Forms (docs.google.com/forms) from 17 June to 31 July 2021. The survey link was distributed through social media platforms (eg, WhatsApp, Instagram and LINE) and shared within medical student organisations. Representatives Ξ from all 89 medical schools in Indonesia, including both public and private institutions, were contacted and asked ≥ to distribute the survey to their peers. While the exact number of students who received the survey is unknown, 676 responses were collected and 630 valid responses ß were included in the analysis. The inclusion criteria were female medical students who consented, menstruated, were of Indonesian nationality, resided in Indonesia at the time of answering the survey and had no previous pelvic pathology diagnosis. Consent to participate was obtained by answering a yes-no question on the first page of the online form.

We acknowledge that aspects such as school type (public Bvs private) and geographic location may represent potential confounding factors. However, our sample reflects 8 the national distribution of medical schools across Indonesia. The minimum sample size was established using the online Raosoft, Inc. (Seattle, WA) sample size calculator.¹⁴ We used a prior study to estimate the population of female undergraduate medical students in Indonesia (± 31250) ¹⁵ The calculation assumed a 5% margin of error, a 95% confidence level and a response distribution of 50% to maximise variability. Using these parameters, the minimum required sample size was determined to be

380 participants. Ultimately, 676 responses were collected, with 630 valid responses included in the analysis.

Measurement tool and data management

Participants' academic performance—including concentration and activity disruption, absenteeism and *cum laude* grade point average (GPA) ($\geq 3.50/4.00$)—was measured using a validated questionnaire in Bahasa Indonesia, employed in a similar yet small-scale research on dysemenorrhoea among Jakartan students by Derdameisya and Affandi (2014).¹⁶ We also adapted their translation of Quality of Life Scale¹⁷ to measure participants' quality of life, as well as the Verbal Multidimensional Scoring System¹⁸ to assess the severity of dysmenorrhoea. Severity was then categorised into dichotomous pain levels of mild and moderate-to-severe. Mental health conditions were measured using the Damanik Bahasa Indonesia translation of the Depression Anxiety Stress Scales-42¹⁹ and included the conditions of depression and stress. We also gathered sociodemographic information on age, body mass index, region of domicile, stage of study and parental income, as well as information on participants' menstrual history, including age of menarche, cycle regularity and length and menstrual duration (table 1).

Statistical analysis

Responses from Google Forms were imported into MS Excel for Office 365 (Microsoft Corporation, Redmond, WA) for data cleaning and coding. The data cleaning process involved the following steps: First, incomplete responses were identified and excluded (eg, participants who did not complete the questionnaire). Next, duplicate entries were checked and removed to ensure that each participant was represented only once. Finally, categorical variables were reviewed for consistency (eg, ensuring uniformity in coding for demographic categories), and

Table 1 Sociodemographic	and menstrual status		
Variable		Frequency	Percentage (%)
Age	Less than 20	212	33.65
	20-24	418	66.35
BMI	Less than 18.5	111	17.62
	18.5-23.4	326	51.75
	23.5-25	87	13.81
	25-29.9	75	11.90
	More than 30	31	4.92
Region	Java	364	57.78
	Outside Java	266	42.22
Stage of study	Preclinical	541	85.87
	Clinical	89	14.13
Parental income	≤IDR 1 000 000	15	2.38
	IDR 1 000 000-5 000 000	131	20.79
	IDR 5000000-10000000	182	28.89
	IDR 10000000-15000000	104	16.51
	≥IDR 15000000	198	31.43
Age of menarche	9-11	168	26.67
	12-14	422	66.98
	15-17	40	6.35
Cycle regularity	Regular	519	82.38
	Irregular	111	17.62
Cycle length	Normal (21-35 days)	426	67.62
	Abnormal (<21 or >35 days)	204	32.38
Menstrual duration	Normal (<7 days)	508	80.63
	Abnormal (≥8 days)	122	19.37
Dysmenorrhoea status	Without dysmenorrhoea	55	8.73
	Mild dysmenorrhoea	274	43.49
	Moderate to severe dysmenorrhoea	301	47.78
IDP Indonesian Puniah			

IDR, Indonesian Rupiah.

BMI, body mass index.

Proportion of primary dysmenorrhoea occurrence and severity on areas of life with unadjusted estimates Table 2

		Dysmenorrhoea occurrence			Dysmenorrhoea severity		
		No	Yes		Mild	Moderate to severe	
Affected area of life		N (%)	N (%)	P value	N (%)	N (%)	P value
Quality of life* (Me	ean; SD)	8.89; SD 2.60	7.04; SD 2.94	<0.001†	8.16; SD 2.25	6.03; SD 3.13	<0.001†
Mental health	Stress occurrence	34 (7.80)	402 (92.20)	0.214	174 (43.28)	228 (56.72)	0.001†
	Depression occurrence	23 (6.17)	350 (93.83)	0.006†	142 (40.57)	208 (59.43)	<0.001†
Academic performance	Concentration disruption	9 (2.15)	410 (97.85)	<0.001†	142 (34.63)	268 (65.37)	<0.001†
	Activity disruption	1 (0.45)	220 (99.55)	<0.001†	45 (20.45)	175 (79.55)	<0.001†
	Absenteeism	1 (0.89)	111 (99.11)	0.001†	19 (17.12)	92 (82.88)	<0.001†
	GPA – cum laude	20 (8.62)	212 (91.38)	0.941	104 (49.06)	108 (50.94)	0.606

 χ^2 test was used in analysis, unless otherwise stated.

cum laude GPA > 3.50.

*t-test was used instead of χ^2 .

+Indicating significant p <0.05

GPA, grade point average.

continuous variables were checked for outliers or implausible values using descriptive statistics.

The cleaned dataset was then analysed using STATA V.18.0 (StataCorp LLC, College Station, TX). Dichotomous data were presented as frequencies and proportions, while continuous data were presented as mean ± SD. The associations between independent variablesprimary dysmenorrhoea occurrence and severity-and affected areas of daily life-quality of life, mental health and academic performance—were examined using χ^2 and t-tests, depending on the variable measurement (table 2). Variables with significant p values (<0.05) were then included as dependent variables in multiple linear or logistic regression models, where appropriate (table 3). The independent variables of primary dysmenorrhoea occurrence and severity were assessed in conjunction with

other potential confounders, namely age, region, stage of study and parental income.²⁰

Patient and public involvement

Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

RESULTS

Descriptive attributes of study participants

Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies A total of 676 participants completed the questionnaire, with 630 valid respondents included in the analysis due to incomplete data from 46 participants. Most respondents were in their preclinical years (85.87%) and aged 20 to 24 years (66.35%). A significant proportion resided in

Table 3 Multiple logistic and linear regression analyses with confounder adjusted estimates								
		Dysmenorrhoea occurrence		Dysmenorrhoea severity				
Affected area of life		OR (95% CI)	p value	OR (95% CI)	p value			
Quality of life*		-1.82 (-2.63, 1.02)	<0.001†	-2.09 (-2.54, 1.63)	<0.001†			
Mental health	Stress occurrence			1.82 (1.26, 2.62)	<0.001†			
	Depression occurrence	2.16 (1.23, 3.81)	0.007†	2.07 (1.47, 2.92)	<0.001†			
Academic performance	Concentration disruption	12.92 (6.14, 27.22)	<0.001†	7.24 (4.68, 11.19)	<0.001†			
	Activity disruption	34.95 (4.77, 256.16)	<0.001†	6.92 (4.63, 10.36)	<0.001†			
	Absenteeism	12.10 (1.65, 88.83)	0.014†	5.65 (3.32, 9.63)	<0.001†			

Multiple logistic regression was used in analysis, unless otherwise stated. *linear regression was used instead of logistic regression.

†indicating significant p <0.05.

Java (57.78%), Indonesia's most populous and developed island, which is home to more than half of the national population. Detailed sociodemographic and menstrual characteristics are presented in table 1.

Associations between primary dysmenorrhoea and quality of life, mental health and academic performance among Indonesian medical students

Quality of life

Quality of life was found to have a significant association with primary dysmenorrhea occurrence and severity. After adjusting for confounders (table 3), it was found that students with primary dysmenorrhoea had a -1.82 (95% CI: -2.63, -1.02, p<0.001) lowered Quality of Life score compared with students without primary dysmenorrhoea. Moreover, in students with primary dysmenorrhoea, having moderate-to-severe pain was associated with a reduction of -2.09 (95% CI: -2.54, -1.63, p<0.001).

Mental health

Out of all the participants, 373 (59.21%) were found to exhibit symptoms of depression of varying degrees, while stress was found among 436 (69.21%) participants, where it was more predominant (table 2). Multiple logistic regression (table 3) found significant associations of both primary dysmenorrhea occurrence (OR 2.16 (95% CI: 1.23 to 3.81), p=0.007) and severity (OR 2.07 (95% CI: 1.47 to 2.92), p<0.001) with depression. However, only dysmenorrhoea severity was significantly associated with the occurrence of stress (OR 1.82 (95% CI: 1.26 to 2.62), p<0.001).

Academic performance

Four different measures of academic performance were used in our study: disruption of concentration, activities, absenteeism and cum laude GPA. Primary dysmenorrhoea occurrence and severity were found to have significant associations (table 2) with three of the variables—disruption of concentration, activities and absenteeism-with the exception of *cum laude* GPA (p values 0.941 and 0.606, respectively). These associations were also found even after adjusting for confounders (table 3).

DISCUSSION

Our study found evidence that primary dysmenorrhoea is associated with disturbance in the quality of life, mental health and academic performance of medical students. Quality of life was significantly associated with both the presence and severity of primary dysmenorrhoea. Since pain is a disturbing event that causes numerous distractions in daily activities, quality of life impairment is expected. Quality of life comprises several aspects (physical, psychological, social, etc.) and is assessed differently across studies, either qualitatively²¹ or quantitatively, as in our study. We used the Quality of Life scale developed by the American Chronic Pain Association,¹⁷ due to its simplicity (a maximum score of 10 without segmentation

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contribute to serotonin deficits and depressive symptoms.⁹ Finally, social and academic disruptions, such as absenteeism and decreased productivity, could add to the stress and raise the risk for depression.³⁰

Academic performance is another aspect of daily life that is significantly associated with primary dysmenorrhoea. This finding should raise concerns, as class performance may affect grades. Medicine is a stressful and competitive field and losing top positions or receiving lower grades due to disruptive pain can increase stress levels, thus exacerbating the previously discussed associations between primary dysmenorrhoea, mental health and quality of life.³¹ Students' concentration was found to be more disrupted among those with primary dysmenorrhoea, especially with moderate-to-severe pain. Our finding is consistent with results from a systematic review involving 83 studies with more than 36000 participants, which showed that at least 44.2% of participants experienced impaired concentration.³² A previous meta-analysis involving 21000 participants reported a slightly lower percentage of impaired concentration (40.9%).³ Concentration in class is also related to active participation during classes. While many factors contribute to concentration during classes, whether external (lecturer or environmental aspects) or internal (students' conditions), there is a lack of studies specifically addressing menstrual pain in female students.^{12 33} Compared with the significantly higher odds of reduced concentration found in our study, a study in Riyadh found much lower odds.³⁴

Students with primary dysmenorrhoea were also found to experience more disruptions in their school-related activities. This finding is in accordance with a 2005 study that determined 98.6% of women with severe menstrual pain were unable to attend social activities.³⁵ Later studies also found that higher pain severity is associated with impaired social relationships.³⁴ A study in Ethiopia found that 31.7% of college students with primary dysmenorrhoea experienced limitations in going out with friends.¹³ Besides social activities, physical activities were also found to be impaired by primary dysmenorrhoea, according to previous studies. Physical activity and primary dysmenorrhoea are interrelated and complexly influence one another. A study at a university in Iran showed a 1% reduction in the incidence of primary dysmenorrhoea per unit increase in physical activity score.³⁶ Similarly, another study among Ethiopian college students reported that 37.8% experienced limitations in sports participation due to primary dysmenorrhoea.¹³

Another factor that is highly influenced by primary dysmenorrhoea is absenteeism from university classes. Our study found that 99.11% of Indonesian medical students with primary dysmenorrhoea needed to take at least one day off from medical school because of their condition. This is the highest number of absenteeism compared with previous studies, which was estimated to be 20.1%, as compiled in a meta-analysis by Armour *et al.*³ There are three possible explanations for this phenomenon. First, differences in the questions asked might lead

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This study was conducted in 2021, prior to the adoption of the updated FIGO criteria for normal menstrual cycle length (24-38 days). At the time, the questionnaire used the previously accepted range of 21 to 35 days.³⁸ While this does not affect the study's primary outcomes, it may influence comparability with future studies using the updated criteria. Furthermore, the use of self-reported questionnaires limits the ability to definitively classify respondents with primary or secondary dysmenorrhoea, as further diagnostic methods are required to identify underlying diseases. Many similar studies do not attempt this differentiation, which may make comparisons with their findings more complex. While we excluded participants with previously diagnosed pelvic pathology, it is important to consider that some individuals reporting persistent or severe dysmenorrhoea, even when classified as 'primary,' may harbour previously undiagnosed secondary conditions such as endometriosis. This is particularly relevant because primary dysmenorrhoea is generally expected to improve by the early 20s.⁶ Thus, its persistence among this age group shows the need for greater awareness and thorough evaluation to ensure early diagnosis of potential secondary causes.

Despite these limitations, this study is crucial in raising awareness about primary dysmenorrhoea and its associations with disruptions in daily life. As the first nationwide prevalence study on primary dysmenorrhoea among Indonesian medical students, it highlights a significant gynaecological issue and its considerable burden on this demographic. We recommend further health education initiatives to improve awareness of menstrual health and mitigate its potential impacts. Future research should also investigate the prevalence of undiagnosed secondary dysmenorrhoea within populations reporting primary dysmenorrhoea. Longitudinal studies using more accurate diagnostic measurements could thus provide a clearer understanding of the overlap between these conditions and provide a more comprehensive understanding of dysmenorrhoea in Indonesia. Finally, further studies are also needed to better elucidate the impact of primary dysmenorrhoea among wider populations across the country.

CONCLUSION

Our study highlights the significant associations of primary dysmenorrhoea with quality of life, mental health and academic performance of Indonesian medical students. Despite inherent limitations, such as the cross-sectional design, non-randomised sampling and reliance on selfreported data, our findings show the burden of primary dysmenorrhoea and the need for increased awareness and future research on the topic. By addressing the problem, we can better support medical students and improve their overall well-being and academic outcomes.

X Reynardi Larope Sutanto @reynardisutanto

Contributors HS, RLS, KT and RR contributed to the article. HS conceived the proposal, designed the cross-sectional survey, interpret the analyses and prepared the manuscript. RLS contributed to data collection, performed analyses, assisted with drafting the manuscript and supervised the overall steps of the study. KT contributed to data collection and assisted with drafting the manuscript. RR contributed to data collection and assisted with drafting the manuscript. All authors read and approved the final manuscript. The guarantor of the study is HS; accepts full responsibility for the finished work and the conduct of the study, had access to the data and controlled the decision to publish.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by Ethical approval was obtained from the Health Research Ethics Committee, Faculty of Medicine, Universitas Indonesia and Cipto Mangunkusumo National General Hospital (Ref. No: 344/UN2.F1/ETIK/PPM.00.02/2021). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Data are available on reasonable request. The original raw data analysed are available from the corresponding author and can be presented on reasonable request.

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ORCID iDs

Herbert Situmorang http://orcid.org/0000-0001-7370-5819 Reynardi Larope Sutanto http://orcid.org/0000-0002-8668-2406 Kevin Tjoa http://orcid.org/0000-0001-7967-6182 Rivaldo Rivaldo http://orcid.org/0009-0004-3479-6315

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