Malaysian Journal of Medical Research, 9(4), 13-21
https://doi.org/10.31674/mjmr.2025.v09i04.002

MJMR
Malaysian Journal of Medical Research

Malaysian Journal of Medical Research

Online ISSN: 2550-1607

www.mjmr.com.my

Original Article

Analysis of Menorrhagia and Its Effect on Students Lebak Regency Banten Al-Kanza Modern Islamic Boarding School and Life Quality

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Abstract

Introduction: One menstrual condition that can affect the learning activities and quality of life of female students in Islamic boarding schools is menorrhagia. Limited access to health services and poor time management in Islamic boarding schools are important issues to be studied. **Objectives:** To analyze the risk factors that contribute to the occurrence of menorrhagia and to analyze the effect of menorrhagia on quality of life and learning activities. **Methods:** This study used a case-control design with a 1:2 ratio, where the case group consisted of 22 female students experiencing menorrhagia, while the control group consisted of 44 female students not experiencing menorrhagia. The first hypothesis in this study was that there is a relationship between age at menarche, sleep quality, family history, stress levels, and physical activity with the occurrence of menorrhagia. The second hypothesis is that menorrhagia has a significant impact on physical, social, and emotional conditions, class attendance, and learning concentration. Results: This study found that stress, poor sleep quality, and genetic factors are significantly associated with the occurrence of menorrhagia. Stress increases the likelihood of menorrhagia by 17.5 times, while poor sleep quality increases the likelihood by 8.79 times. **Results:** This study found that stress, poor sleep quality, and genetic factors are significantly associated with the occurrence of menorrhagia. Stress increases the likelihood of menorrhagia by 17.5 times, while poor sleep quality increases the likelihood by 8.79 times. Menorrhagia has a significant impact on quality of life and learning activities, with social aspects being the most influential. **Conclusions:** For healthcare professionals, it is recommended to provide education on the importance of sleep quality. It is suggested that boarding schools adjust study schedules to avoid late-night sessions.

Keywords: *Learning Activities; Menorrhagia; Quality of Life*

Introduction

Adolescents experience a transitional phase marked by significant physical and emotional changes, including menstruation in adolescent girls. Menstruation is the process of endometrial desquamation that occurs periodically, approximately 14 days after ovulation (Ilham *et al*., 2022). The menstrual cycle in adolescents generally ranges from 21 to 45 days, but it is often irregular due to the immaturity of the hypothalamic-pituitary-ovarian axis, which can lead to anovulation (Costlow, 2020). Various factors may influence this cycle and contribute to menstrual disorders such as menorrhagia (Rafique & Al-Sheikh, 2018). Menorrhagia, or heavy menstrual bleeding, is a significant issue that affects the quality of life of women worldwide. Approximately 20–30% of women experience abnormal uterine bleeding each year, making it one of the leading causes of gynecological visits (Marabi *et al*., 2024). The prevalence of

Received: 25th May 2025; Revised version received on: 2nd September 2025; Accepted: 15th September 2025

menorrhagia in Iran reaches 19.2%, with a global annual rate of 53 per 1,000 women (Fakhri *et al*., 2023). In Indonesia, this condition is also common, affecting both adolescent girls and middle-aged women, with about 40% of middle-aged women experiencing menorrhagia (Jalilah & Prapitasari, 2021). Menorrhagia is defined as menstruation with regular intervals but excessive bleeding (>80 ml) or lasting more than seven days (Fakhri *et al*., 2023). In adolescents, the primary cause of menorrhagia is anovulation due to hormonal imbalance, which may be influenced by body mass index (BMI), extreme physical activity, stress, and lifestyle (Hutner *et al*., 2021). About 20% of menorrhagia cases are caused by bleeding disorders, with 33% of hospitalized adolescents diagnosed with this condition (Costlow, 2020). Other risk factors include hormonal disorders, uterine tissue growths, ovarian dysfunction, genetic abnormalities, medication side effects, contraceptive devices, and cancer (Jalilah & Prapitasari, 2021). Lifestyle factors such as obesity, alcohol consumption, smoking, and stress can affect the female hormonal system through the hypothalamus, pituitary gland, and ovaries (Choi *et al*., 2021). Demographic factors such as age, ethnicity, family history, and socioeconomic status also play a role in menstrual irregularities (Widodo, 2025). Sleep quality and duration are associated with menstrual cycle patterns, as found in studies involving medical students and adolescent girls in Korea (Jeong *et al*., 2023). Stress is a major cause of menstrual irregularities, including menorrhagia, with a significant impact on women's reproductive health (Lestari & Putri, 2025). Menorrhagia hurts quality of life, including bodily pain, impaired social functioning, and mental health issues (Fitri *et al*., 2024). Excessive blood loss can lead to iron-deficiency anemia, resulting in fatigue and reduced cognitive function (Costlow, 2020). Its effects extend to economic burdens, such as increased use of healthcare services, reduced work productivity, and lower school attendance. If left untreated, menorrhagia increases the risk of morbidity due to iron deficiency, highlighting the need for appropriate interventions to improve women's quality of life (Fakhri *et al*., 2023). Adolescent girls, aged 12–17, undergo significant physical, emotional, and psychological changes as they transition into adulthood (Jalilah & Prapitasari, 2021). Effectively addressing menorrhagia is crucial for their physical, mental, and social well-being (Costlow, 2020). Santri putri are female students who study at Islamic boarding schools, institutions that integrate religious and general education in a dormitory system. In Indonesia, there are 38,485 boarding schools, with Banten province hosting 6,433 of them and 454,239 students. In Lebak Regency alone, there are around 1,600 boarding schools, most of which are traditional (salafiyah) schools. The demanding daily routines of female students, ranging from religious activities to academic study, often lead to insufficient rest and increased anxiety, which can contribute to menstrual disorders such as menorrhagia.

A preliminary study conducted at Pondok Pesantren Modern Al-Kanza (June 2024) revealed that menorrhagia has a significant impact on female students. Physically, they experienced fatigue, pain, and weaknesses that interfered with their learning and religious activities. Socially, discomfort caused by frequent pad changes and the risk of leakage reduced their self-confidence and increased feelings of isolation. Emotionally, the condition worsened anxiety and decreased motivation to study.

Out of 75 female students (santri) interviewed, 15% experienced menorrhagia, with 4 students referred to a community health center and 2 others diagnosed with moderate anemia at a hospital. These findings indicate that adolescent menorrhagia can affect their health, learning, concentration, and overall quality of life. Therefore, this study aims to identify the risk factors of menorrhagia and its impact on the quality of life and learning activities of santri at Pondok Pesantren Modern Al-Kanza.

Methodology

This study used a case-control design with a ratio of 1:2. The case group consisted of 22 female students who experienced menorrhagia, while the control group consisted of 44 female students who did not experience menorrhagia. The population in this study were all female students who lived at the Al Kanza Modern Islamic Boarding School from November 2024 to January 2025. The inclusion criteria were female students who experienced menorrhagia, aged between 12 and 17 years and willing to be respondents. Measurement of stage I by weighing the sanitary napkins used every day during the menstrual period, then calculating the total volume of bleeding in milliliters (ml) after menstruation was complete. Measurement of stage 2 using the WHOQOL BREF instrument which had been modified and tested for validity and reliability. Validity and reliability tests were carried out at the Al Marjan Islamic

Boarding School with 22 respondents selected purposively, validity tests using Pearson correlation analysis showed that all questionnaire items were valid (correlation value ≥ 0.3, $p < 0.05$). Reliability test using Cronbach's Alpha method produced values: physical impact 0.791, social impact 0.785, emotional impact 0.800, class attendance 0.786, and learning concentration 0.801, all of which are above the threshold of 0.7. The collected data were then statistically analyzed using chi-square tests and logistic regression.

Ethical Consideration

The research obtained ethical clearance from the Human Research Ethics Committee of Al Kanza Modern Islamic Boarding School, Indonesia, with reference number: 05/e-KEPK/FIKES/I/2025 on 2025.

Results

Table 1: Frequency Distribution of Respondent Characteristics

Variable	Category	Cases (Menorrhagia)		Control (No Voice)	
		n= 22	%	n= 44	%
Age Respondents	13	4	6	12	18
	14	9	14	14	21
	15	5	8	9	14
	16	4	6	9	14
Grade	7	2	9	13	29
	8	6	27	6	13
	9	6	27	9	20
	10	6	27	9	20
	11	2	9	7	15
Body Weight	Skinny	0	0	0	0
	Slim	1	5	0	0
	Normal	9	41	25	57
	Fat	11	50	19	43
	Obesity	1	5	0	0
Menstrual cycle length	Less than 21 days	0	0	0	0
	21- 35 days	22	100	44	100
	More than 35 days	0	0	0	0
Age at menarche	≥12 years	11	50	10	23
	<12 years	11	50	34	77
Family history	Yes	13	59	5	11
	No	9	41	39	89
Stress Level	Stress	14	64	4	9
	Normal	8	36	40	91
Physical Activity	Low	19	86	42	95
	Moderate	3	13	2	5
Sleep Quality	Bad	17	77	10	23
	Good	5	22	34	7

Based on Table 1, the results of the univariate analysis showed that the age of 13 years in the case there were 4 people, the age of 14 years there were 9 people, the age of 15 years there were 5 people and the age of 16 years there were 4 people. For the control group, the age of 13 years there were 12 people, the age of 14 years there were 14 people, the age of 15 years there was 1 person, and the age of 16 years there were 9 people. At the class level, the category of class 7 in the case there were 2 children, class 8 there were 6 people, class 9 there were 6 people, class 10 there were 6 people, class 11 there were 2 people. For the control group, in class 7 there were 13 people, in class 8 there were 6 people, in class 9 there were 9 people, in class 10 there were 9 people, in class 11 there were 7 people. The weight of all respondents is in the normal weight category according to age, for 100% cases it is normal, and so is for 100% controls it is normal. The duration of menstruation for the 100% control group is in the 21-35 day range and so is for the 100% control group in the 21-35 day range. In the case

group, the age of menarche ≥12 years there are 11 people, and the age <12 years there are 11 people. In the control group, the age of menarche ≥12 years there are 10 people, the age <12 years there are 34 people. Family history with mothers with menorrhagia in the case group who have mothers with a history of menorrhagia, there are 13 people, 9 people who do not have a family history. In the control group, there is a history of mothers with menorrhagia, there are 5 people, and 39 people who do not have a family history in the low activity category case group there were 19 people, moderate physical activity 3 people. In the low activity control group there were 42 people, and moderate activity 2 people. In the stress category case group, there were 14 and normally there were 8 people. In the stress category control group, there were 4 people and normal there were 40 people. Sleep quality in the poor sleep quality group there were 17 people, good sleep quality there were 5 people. While in the poor sleep quality control group there were 10 people, and good sleep quality there were 34 people.

Table 2: Results of Phase I Research Results of Bivariate Analysis of Chi Square Test

Variable	Categories	Cases (Menorrhagia)		Control (NoVoice)		P-value	Odd Ratio
		n=22	%	n=44	%		
Menarche age	≥12 Year	11	50.0	10	22.7	0.025	0.292
	<12 Year	11	50.0	34	77.3		
Stress	Yes	14	63.6	4	9.1	0.000	17.500
	No	8	36.4	40	90.9		
Family history	Yes	13	59.1	5	11.4	0.000	11.267
	No	9	40.9	39	88.6		
Physical Activity	Low	19	86.4	42	95.5	0.188	0.302
	Medium	3	13.6	2	4.5		
Sleep Quality	Bad	17	77.3	10	22.7	0.000	11.560
	Good	5	22.7	34	7.3		

Based on Table 2 factors such as family history, stress levels, sleep quality are risk factors for menorrhagia, while age at menarche is a protective factor for menorrhagia in adolescents, and physical activity is not significantly associated with menorrhagia.

Table 3: Results of Phase I Research Multivariate Analysis

Variable	Sig	Exb (B)	Description
Menarce age	0.234	0.355	There is no relationship between menarche age and the incidence of menorrhagia
Family History	0.044	6.325	There is a relationship between family history and the incidence of menorrhagia. Adolescents with a family history of menorrhagia have an effect of 6.325 times greater than adolescents without a history of menorrhagia.
Stress Level	0.003	6.804	There is a relationship between stress level and the incidence of menorrhagia. Adolescents with severe stress levels have an effect of 6.804 times greater than adolescents with mild stress levels.
Physical Activity	0.135	11.789	There is no relationship between physical activity and the incidence of menorrhagia.
Sleep Quality	0.019	8.579	There is a relationship between sleep quality and the incidence of menorrhagia. Adolescents with poor sleep quality have an effect of 8.579 times greater than adolescents with good sleep quality.

The results of the analysis using the Kruskal-Walli's test showed significant differences in several factors related to the incidence of menorrhagia in adolescents. Factors such as age of menarche, family history, stress levels, and sleep quality had significant differences between the case and control groups, so they can be considered as factors related to the incidence of menorrhagia. However, physical activity did not show significant differences, so it is not considered to be directly related to the incidence of menorrhagia in adolescents (Table 3).

Table 4: Univariate Analysis Stage 2

Variable	Category	Cases (Menorrhagia)	Control (No Voice)	Value					
				Menorrhagia			No Voice		
		n=22 (%)	n=44 (%)	Min	Max	Mean	Min	Max	Mean
Physical	Very Poor	0 (0)	0						
	Poor	10 (45)	0 (0)						
	Moderate	12 (54)	1 (2)	25	95	67	60	95	79
	Good	0 (0)	31 (70)						
	Very Good	0 (0)	12(27)						
Social	Very Poor	0 (0)	0 (0)						
	Poor	10 (45)	0 (0)						
	Moderate	12 (54)	29 (66)	29	88	65	58	88	77
	Good	0 (0)	14 (32)						
	Very Good	0 (0)	0 (0)						
Emotional	Very Poor	0 (0)	0 (0)						
	Poor	15 (68)	0 (0)						
	Moderate	7 (32)	0 (0)	30	100	72	80	100	89
	Good	0 (0)	7 (16)						
	Very Good	0 (0)	37 (84)						
Class Attendance	Very Poor	0 (0)	0 (0)						
	Poor	15 (68)	0 (0)						
	Moderate	7 (32)	0 (0)	25	90	68	75	90	82
	Good	0 (0)	22 (50)						
	Very Good	0 (0)	22 (50)						
Learning concentration	Very Poor		1 (5)						
	Poor	10 (45)	0 (0)						
	Moderate	11 (50)	0 (0)	18	93	68	68	81	82
	Good	0 (0)	12 (27)						
	Very Good	0 (0)	32 (73)						

Based on Table 4, most control-group students scored higher than the case group across domains. Specifically, control respondents predominated in the good physical category and very-good emotional, class-attendance, and learning-concentration categories, whereas case respondents clustered in moderate physical and social categories and showed notably poorer emotional status, attendance, and concentration.

Table 5: Bivariate Analysis Stage 2

Variable	Category	Incidence of menorrhagia				Value P	Odd Ratio	Description
		Cases (Menorrhagia)		Control (NoVoice)				
		n=22	%	n=44	%			
Age at menarche	≥12 Years	11	50	10	23	0.025	0.292	The Relationship Between Age at Menarche and the Incidence of Menorrhagia Among Female Islamic Boarding School Students
	<12 Years	11	50	34	77			
Family History	Yes	13	59	5	11	0	11.267	The Relationship Between Family History and the Incidence of Menorrhagia Among Female Islamic Boarding School Students
	No	9	41	39	89			
Stress Levels	Stress	14	64	4	9.1	0	17.5	The Relationship Between Stress Levels and the Incidence of Menorrhagia Among Female Islamic Boarding School Students
	Normal	8	36	40	91			
Physical activity	Low	19	86	42	96	0.188	0.302	The Relationship Between Physical Activity and the Incidence of Menorrhagia Among Female Islamic Boarding School Students
	Medium	3	14	2	4.5			
Sleep Quality	Bad	17	77	10	23	0	11,56	The Relationship Between Sleep Quality and the Incidence of Menorrhagia Among Female Islamic Boarding School Students
	Good	5	23	34	7.3			

Table 5 shows that age at menarche, family history, stress level, and sleep quality are associated with the occurrence of menorrhagia, whereas physical activity is not associated.

Table 6: Multivariate Analysis Stage 2

Variable	Sig	Exb (B)
Age Menarche	0.234	0.355
Family History	0.044	6.325
Stress Levels	0.003	6.804
Physical Activity	0.135	11.789
Sleep Quality	0.019	8.579

Table 6 highlights sleep quality as the most influential factor associated with menorrhagia, with an OR of 8.579. Age at menarche is not associated with the occurrence of menorrhagia. There is a relationship between family history and the incidence of menorrhagia. Adolescents with a family history of menorrhagia have a 6.325 times higher risk compared to those without such history. A significant association exists between stress levels and the occurrence of menorrhagia. Adolescents experiencing more severe stress have a 6.804 times higher likelihood of developing menorrhagia compared to those with mild stress levels. No association was found between physical activity and menorrhagia. A significant association exists between sleep quality and the occurrence of menorrhagia. Adolescents with poor sleep quality are 8.579 times more likely to experience menorrhagia compared to those with good sleep quality.

Table 7: Multivariate Analysis Stage 2

Impact of the variable	Sig.	Exp(B)	95% CI for EXP(B)	
			Lower	Upper
Menorrhagia → Physical	0	210.000	27.553	1.600.571
Menorrhagia → Social	0	441.000	37.792	5.146.076
Menorrhagia → Emotional	0	210.000	27.553	1.600.571
Menorrhagia → Class Attendance	0	133.000	20.510	862.473
Menorrhagia → Learning concentration	0	13.667	3.239	57.663

Table 7 identifies social condition as the most affected domain by menorrhagia, with a highly significant impact (p = 0.000; OR = 441).

Discussion

Age at menarche serves as a protective factor against menorrhagia (OR = 0.292; p = 0.025). However, logistic regression analysis did not find a significant relationship (p > 0.05). Early menarche (<12 years) is associated with hormonal imbalance and anovulatory cycles, which increase the risk of menorrhagia (Ezenyeaku *et al*., 2021).

Low socioeconomic factors influence age at menarche through limited nutrition and access to reproductive health education, contributing to menstrual disorders (Agyei-Sarpong, 2025).

According to Ghare Naz *et al*. (2022) a family history of menorrhagia is a significant risk factor for menorrhagia in adolescents, where adolescents who have a family history of menorrhagia are 6.325 times more likely to experience it compared to those who do not have this history (Lubis, 2024).

Stress is a major risk factor for menorrhagia in adolescents (OR = 17.500; p = 0.000), with stressed adolescents being 6.804 times more likely to experience menorrhagia compared to those without stress (p = 0.003). Stress triggers the release of cortisol, which can disrupt the balance of reproductive hormones and the menstrual cycle (Mykolayivna *et al*., 2023). High perceived stress (HPS) was identified in 39% of the students. A significant positive correlation was found between HPS and menstrual problems. Students with HPS had 4 times, 2 times, and 2.8 times increased odd ratios for experiencing amenorrhea, dysmenorrhea, and premenstrual syndrome (Rafique & Al-Sheikh, 2018). In the boarding school environment, factors such as adapting to a new environment, academic pressure, and the feeling of being forced to stay at the boarding school contribute to stress, which impacts the hormonal balance and menstruation of the students. Strategies such as stress management education,

enhanced psychological support, and adjusting study schedules to achieve a better balance are needed to reduce the risk of menorrhagia and improve reproductive health among the students.

Physical activity does not have a significant relationship with menorrhagia (p = 0.188; OR = 0.302), as confirmed by logistic regression analysis (p = 0.135). The majority of respondents in this study had low levels of physical activity in both groups, so no significant differences were found to affect hormonal balance. Heavy physical activity is known to disrupt the menstrual cycle however, in this study, the students' physical activity was generally light and routine, such as short walks between classrooms, the mosque, and the dormitory.

Sleep quality is significantly associated with menorrhagia (p = 0.000; OR = 11.560). Logistic regression analysis supports this finding (p = 0.019), indicating that adolescents with poor sleep quality are 8.579 times more likely to experience menorrhagia compared to those with good sleep quality. Sleep plays a role in hormone regulation, including melatonin, which affects estrogen production (Azzura *et al*., 2023). Sleep disturbances can increase estrogen levels, leading to menstrual disorders (Miyamoto & Shibuya, 2024). Poor sleep quality is correlated with more intense menstrual pain and severe premenstrual symptoms (Kiss *et al*., 2024). In the boarding school, students have limited sleep time due to their intense study and worship activities, reducing both the duration and quality of sleep. This sleep pattern contributes to hormonal disturbances, which may trigger menorrhagia. Interventions such as stress management and education on the importance of sufficient sleep are necessary to maintain hormonal balance and reproductive health.

Menorrhagia has a multidimensional impact on adolescent girls, affecting physical, social, emotional, and academic aspects. In terms of physical health, menorrhagia often causes anemia, fatigue, and headaches, which affect energy levels and quality of life for adolescents (Kocaoz *et al*., 2019). This impact also reduces cognitive function, particularly in verbal learning and memory (Sinaga *et al*., 2017). Academically, menorrhagia disrupts attendance and concentration, negatively impacting academic performance (Sari *et al*., 2022).

Conclusion

This study found that poor sleep quality, high stress levels, and a family history of menorrhagia significantly increase the risk of menorrhagia among female students in the Islamic boarding school. Age at menarche showed a protective effect in the bivariate analysis but was not significant after controlling for other variables. Physical activity did not have a significant effect on the occurrence of menorrhagia. The most influential risk factor was poor sleep quality, followed by stress level and family history.

Menorrhagia has a significant impact on the quality of life and learning activities of female students, with the greatest effect on the social aspect, followed by physical and emotional conditions, class attendance, and learning concentration. These disruptions can hinder students' participation in the learning process.

Conflict of Interest

The authors affirm that they have no conflicting interests.

Acknowledgement

Deepest gratitude is extended to all parties who provided support during this research. Special appreciation is given to Prof. Dr. Retno Widowati, M.Si., and Dr. Triana Indrayani, M.Kes., the supervisors, as well as Kyai Ade Bujhaerimi, M.Pd., and Nyai Idah Faridah from the Al-Kanza Modern Islamic Boarding School for their permission and support throughout the research process.

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