

Does sleep quality influence primary dysmenorrhea? : A literature review

Riris Putricia Vedo Refa Simbolon * and Ivon Diah Wittiarika

Midwifery Education Program, Faculty of Medicine, Airlangga University, Surabaya, Indonesia.

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Abstract

Introduction: Primary dysmenorrhea refers to discomfort or cramps in the lower abdomen that occur before or during the menstrual cycle without any previously identified medical conditions. This type of dysmenorrhea is typically seen in teenagers and young adults, whereas secondary dysmenorrhea tends to occur more frequently in adults. Worldwide, a significant number of women, between 50-90%, report experiencing dysmenorrhea. Untreated dysmenorrhea can lead to lasting consequences, such as the development of polycystic ovary syndrome and endometriosis. Previous research shows that poor sleep quality can influence the incidence of primary dysmenorrhea in adolescent girls. More research is needed to understand better how these factors impact on the incidence of primary dysmenorrhea.

Method: This study is a literature review, drawing from sources in Google Scholar, PUBMED, and Science Direct, focusing on research published between 2019 and 2024. The study included only original research articles in English or Indonesian with all the required components.

Result and Discussion: From the literature search, 10 studies were obtained that met the inclusion criteria. All studies show a relationship between sleep quality and the incidence of primary dysmenorrhea.

Conclusion: According to reviews, sleep quality is associated with the incidence of dysmenorrhea in adolescent girls. Poor sleep quality increases the risk of primary dysmenorrhea.

Keywords: Sleep Quality; Poor Sleep Quality; Good Sleep Quality; Primary Dysmenorrhea; Adolescent Girl

1. Introduction

Dysmenorrhea is a complaint in most gynecological consultations common among adolescent girls and women of childbearing age (WUS). Dysmenorrhea begins to occur 24 hours before it occurs menstruation up to 24-36 hours (12). Dysmenorrhea it is divided into two types, namely primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is pain or cramps in the lower abdomen before or during menstruation without any pathology identified previously. Meanwhile, secondary dysmenorrhea is menstrual pain due to previously identified anatomical or pelvic pathology. Primary dysmenorrhea is usually common in the adolescent and young adults, while secondary dysmenorrhea is common in the group adulthood (10).

Globally, the incidence of dysmenorrhea is very large, namely 50-90% women experience dysmenorrhea (2). Data in America shows the number is the same 85% of women experience dysmenorrhea, in Italy 84.1%, and in Australia as much as 80% (1). Prevalence of dysmenorrhea in Indonesia itself shows that 64.25% of women experience it dysmenorrhea with 60-75% of young women experiencing it primary dysmenorrhea (6). The degree of pain felt is not the same for every adolescent girl. If dysmenorrhea is not treated, it will cause long-term impacts namely triggering polycystic ovary syndrome and endometriosis.

* Corresponding author: Riris Putricia Vedo Refa Simbolon

There are various risk factors that can cause dysmenorrhea primary. Wang (24) shows that sleep quality is directly related significantly with the incidence of primary dysmenorrhea. Disturbed sleep contribute directly to causing hyperalgesia (increased sensitivity to pain) (22). The National Sleep Foundation provides recommended the ideal sleep for adolescent is 8-10 hours. Poor sleep quality is associated with the incidence of pain. Sleep reduction of up to 4 hours may improve prostaglandins as pain mediators and bioavailable agents inflammatory agents such as Interleukin-6 (IL-6) and Tumor Necrosis Factor Alpha (TNF α). This second agent is a pain trigger significant, including pain during menstruation (7). Poor sleep quality also affects the decline serotonin levels in the body which increases anxiety, depression and sensitivity to pain (17).

This study aims to further investigate about the relationship between sleep quality with the incidence of primary dysmenorrhea in adolescent girls. The aim of this review is to increase the knowledge of health professionals, especially midwives and increase the knowledge of adolescent girls and parents they can carry out prevention to reduce the risk of primary dysmenorrhea.

2. Material and methods

This study used a literature review methodology to explore the relationship between sleep quality and the incidence of primary dysmenorrhea. A total of 10 articles were selected based on certain inclusion and exclusion criteria. The research question formulated using the PICO framework is: "What is the relationship between sleep quality and the incidence of primary dysmenorrhea?". Literature inclusion criteria were as follows: studies that focused on the correlation between sleep quality and primary dysmenorrhea, articles published in English or Indonesian, full text availability, and open access. Exclusion criteria included non-research studies, intervention-based studies, qualitative research, and systematic reviews. Selected articles were required to present original research findings that directly address the relationship between sleep quality and the incidence of primary dysmenorrhea. The articles included in this review were published between 2019 and 2024, to ensure their relevance to recent developments in the field. To collect articles, searches were conducted in several leading databases, including Google Scholar, PUBMED, and Science Direct. Key words used in the search process include "sleep quality", "primary dysmenorrhea", and "correlation". Each article is analyzed descriptively with a focus on critical aspects such as author and year of publication, research location, research design and methods, article characteristics. research participants, and a brief summary of the research findings. This descriptive analysis aims to synthesize the evidence clearly and systematically to answer the research question effectively.

3. Results

Ten articles— five in English and five in Indonesia —have been reviewed and analyzed as follows.

Table 1 Results of Review of 10 Articles

No.	Author	Research Title	Location	Method	Subject	Result
1	Hamzekhani <i>et al.</i> , (2019)	The Relation Between Sleep Quality and Primary Dysmenorrhea Students University of Medical Sciences Shahroud	Shahroud University of Medical Sciences	Analytic cross-sectional study	300 student's from the University of Medical Sciences Shahroud	Among the students who experienced dysmenorrhea, 30.7% suffered from intense dysmenorrhea and 65.45% suffered from mild to moderate dysmenorrhea. The average sleep quality score using the Pittsburgh Sleep Quality Index (PSQI) was 9.91, indicating the majority of participants had poor sleep quality (82.7%). The results of one-way ANOVA indicate which

						groups categorized in the intense menstrual pain group had more poor sleep quality scores compared to others group.
2	Polat and Mucuk (2021)	The Relationship Between Dysmenorrhea and Sleep Quality.	Private university in Kayseri City Center	Cross-sectional study	250 female university students	Most respondents (82.4%) experience dysmenorrhea. 82% female students with dysmenorrhea experience poor sleep quality. This study showed there was a correlation between the PSQI and dysmenorrhea severity and as the severity of dysmenorrhea increased, sleep quality decreased ($\rho = 0.303$; p -value = <0.001).
3	Jeong <i>et al.</i> , (2023)	Effects of Sleep Pattern, Duration, and Quality on Premenstrual Syndrome and Primary Dysmenorrhea in Korean High School Girls	High schools in Goyang City and Paju City of Gyeonggido in South Korea	Cross-sectional study	549 adolescent girls in the 1 st to 3 rd year of high school	After controlling for other risk factors, the effect of bedtime and wake-up time disappeared, while sleep quality still affected dysmenorrhea. This study showed that among components of sleep quality, poor subjective sleep quality, longer sleep latency, frequent sleep disturbance, more daytime dysfunction, and frequent use of sleeping medications worsened dysmenorrhea.
4	Nadia <i>et al.</i> , (2024)	Relationship Between Menstrual Pain (Dysmenorrhea) and Quality of Life Sleep in Adolescent Girls at SMA Negeri 1 School West Daha, Hulu Sungai Selatan Regency	SMAN 1 Daha Barat Kab. Hulu Sungai Selatan	Cross-sectional study	50 female students of SMAN 1 Daha Barat Kab. Hulu Sungai Selatan	Most respondents experienced moderate dysmenorrhea (54,0%) and most respondent experienced poor sleep quality (68,0%). Chi-square test shows that there was a relationship between menstrual pain (dysmenorrhea) with sleep quality in adolescent girls at SMAN 1 Daha Barat Kab. Hulu Sungai Selatan, (p -value = 0.004).
5	Yuliani <i>et al.</i> , (2023)	Correlation of Nutritional Status and Sleep Quality with	Campus 1 of Aisyiyah University Bandung	Cross-sectional study	107 students of Midwifery Program, Faculty of	Most respondents had poor sleep quality (86.9%), and most respondents had primary

		Incidence Primary Dysmenorrhoea in Obstetric Students			Health Sciences, 'Aisyiyah University Bandung	dysmenorrhea with mild pain (86.9%) and moderate pain (35.5%). Spearman rank test shows that there was a relationship between sleep quality and the incidence of primary dysmenorrhea (p-value = 0.001)
6	Richi Delistianti <i>et al.</i> , (2019)	Hubungan Kualitas Tidur dengan Kejadian Dismenore Primer pada Mahasiswi Fakultas Kedokteran Universitas Islam Bandung (The relationship between sleep quality and the incidence of primary dysmenorrhea in students at the Faculty of Medicine, Islamic University of Bandung)	Faculty of Medicine, Bandung Islamic University	Cross-sectional study	106 3 rd year female students from the Faculty of Medicine, Bandung Islamic University	Most of the subjects had poor sleep quality (62%). Most of the subjects suffered moderate primary dysmenorrhea (49%) and primary dysmenorrhea (10%). Chi-square test shows that there was a relationship between poor sleep quality with incidence of moderately primary dysmenorrhea (p-value = 0.008). This study also shows there was a relationship between poor quality with incidence of severe primary dysmenorrhea (p-value = 0.04).
7	Nurfadillah <i>et al.</i> , (2024)	Faktor-faktor yang Berhubungan dengan Kejadian Dismenore Primer pada Mahasiswi Universitas Siliwangi (Factors Associated with the Incidence of Primary Dysmenorrhea in Siliwangi University Students)	Universitas Siliwangi	Case-control study	374 female students consisting of 187 cases and 187 controls.	Chi-square test shows a relationship between sleep quality and the incidence of primary dysmenorrhea in female students and female students who experience poor sleep quality will have a 2.027 times risk of suffering from primary dysmenorrhea when compared to female students who experienced good sleep quality (p-value = 0.001 and OR = 2.207).
8	Hikma <i>et al.</i> , (2021)	Hubungan Siklus Menstruasi, Kualitas Tidur, dan Status Gizi, Terhadap	Islamic Boarding School Sabillurosyad Gasek Malang	Cross-sectional study	75 adolescent girls from middle school, high school and college at the Islamic	23 respondents (30.7%) had good sleep quality, while 52 respondents (69.3%) had poor sleep quality. Spearman's rho test shows a relationship

		Dismenore Primer pada Remaja Putri (Relationship between Menstrual Cycle, Sleep Quality, and Nutritional Status with Primary Dysmenorrhea in Adolescent Girls)			Boarding School Sabillurosyad Gasek Malang	between sleep quality and the incidence of primary dysmenorrhoea (p-value = 0.034).
9	Farahdilla <i>et al.</i> , (2021)	Hubungan Tingkat Kecemasan dan kualitas Tidur Dengan Kejadian Dismenorea Primer pada Mahasiswi Kedokteran (The relationship between anxiety levels and sleep quality with the incidence of primary dysmenorrhea in medical students)	Faculty of Medicine, Mulawarman University	Cross-sectional study	69 medical students from the Faculty of Medicine, Mulawarman University	Most respondents (88%) experience dysmenorrhea and most respondents (69,3%) had poor sleep quality. This research shows there was a relationship between sleep quality and incidence of primary dysmenorrhoea with a value of $p=0.01(p<0.05)$.
10	Lutfiyati and Susanti (2023)	Determinan Faktor yang Berhubungan dengan Kejadian Dismenorea Siswi di SMAN 1 Godean, Sleman, D.I. Yogyakarta (Determinant Factors Associated with the Incident of Dysmenorrhea in Female Students at SMAN 1 Godean, Sleman, D.I. Yogyakarta)	Senior High School 1 Godean, Sleman, D.I. Yogyakarta	Case-control study	84 2 nd grade students of Senior High School 1 Godean, Sleman, D.I. Yogyakarta for the case group and control group	84 adolescent girls with poor sleep quality were more in the dysmenorrhoea group, compared to adolescent girls with sleep quality in the non-dysmenorrhoea group with p-value = 0.008.

4. Discussion

4.1. Correlation Between Sleep Quality and Incidence of Primary Dysmenorrhea

Based on a review of 10 articles, all articles showed a significant relationship between sleep quality and incidence of dysmenorrhea in adolescents. These studies emphasized that poor sleep quality is associated with an increased risk of menstrual pain.

A study conducted at Shahroud University of Medical Sciences using convenience sampling showed that there was a relationship between sleep quality with incidence of primary dysmenorrhea in adolescents. This study shows that poor sleep quality has a major influence on primary dysmenorrhea pain in adolescents (8). This accordance to the theory which explain that sleep is a reversible biological state in which reactions to outside stimuli diminish (4). It alleviates stress, anxiety, and neural strain, aiding a person in regaining energy to enhance focus, adjust to changes, and find pleasure in activities (23). Lack of adequate sleep results in sleepiness, diminished awareness, irritability, difficulty concentrating, lower academic performance, a decline in usual daily functions, and an uptick in errors, along with alterations in neural, behavioral, and physical aspects; it can have detrimental effects on the heart and immune systems (14). So that the study is in line with research by Polat and Mucuk (20), which shows that the more severe the degree of dysmenorrhea pain, the worse the quality of sleep.

Research by Jeong *et al.*, (13) showed that the effect of bedtime and wake-up time disappeared affected to sleep quality even the risk factors have been controlled. This research also showed that the worse quality of sleep, the higher severity and frequency of dysmenorrhea symptoms (CMSS) and menstrual pain (VAS). Among the components of the PSQI questionnaire, the sleep disturbance, sleep latency, and daytime dysfunction components consistently showed a strong association with increased dysmenorrhea symptoms. Meanwhile, the components of sleep duration and sleep efficiency did not have a significant relationship with dysmenorrhea.

Nadia *et al.*, (18) showed that there was a relationship between menstrual pain (dysmenorrhea) with sleep quality in adolescent girls. It is shown that pain is related to sleep quality with the results of Chi-Square bivariate analysis obtained (p -value = 0.004 < 0.05), it is stated that there was a relationship between menstrual pain (dysmenorrhea) and sleep quality. This study is in line with research by Yuliani *et al.*, (25) which used the spearman rho test. She showed that there was a relationship between sleep quality and the incidence of primary dysmenorrhea (p -value = 0.001).

Richi Delistianti *et al.*, (21) reported significant correlation between sleep quality with the incidence of moderately primary dysmenorrhea (p -value = 0.008). This show that incidence of moderately primary dysmenorrhea greater in respondents with poor sleep quality compared with good sleep quality. This study also shows there was a relationship between poor quality with incidence of severe primary dysmenorrhea (p -value = 0.04), this show that incidence of severe primary dysmenorrhea was greater in respondents with poor sleep quality compared to respondents with good sleep quality.

Nurfadillah *et al.*, (19) found a significant correlation between sleep quality and the incidence of primary dysmenorrhea in female students. This research reported that female students who experience poor sleep quality will have a 2.027 times risk of suffering from primary dysmenorrhea when compared to female students who experienced good sleep quality. This is accordance to the theory which explains that poor quality sleep can cause reduced levels serotonin in the body thereby increasing sensitivity to pain, the emergence of anxiety, stress and depression. The body will produce hormones excessive adrenaline, estrogen, progesterone and prostaglandin when stressed (15). The adrenaline hormone causes the body's muscles to tense, including uterine muscles. The hormone estrogen functions to stimulate uterine contractions and prostaglandins cause muscle contractions, causing pain when menstruation, in addition if excessive levels of prostaglandins enter blood circulation, apart from dysmenorrhea, effects such as nausea, vomiting, and diarrhea (3). This condition is because it is good and poor sleep patterns will affect the secretion of various existing hormones in the body (11).

Likewise, research by Hikma *et al.*, (9) explained that there was relationship between sleep quality and the incidence of primary dysmenorrhea (p -value = 0.034). Most respondents had poor sleep quality (69,3%) and most respondents experienced primary dysmenorrhea (88%). This research in line with study conducted by Farahdilla *et al.*, (5) that showed relationship between sleep quality and incidence of primary dysmenorrhea with a value of $p=0.01$ ($p < 0.05$).

In the study by Lutfiyati and Susanti (16) showed that the most dominant variable related to the incidence of primary dysmenorrhea is sleep quality (OR = 3.104), which means that adolescent girls with poor sleep quality will have a 3x

higher risk of experiencing primary dysmenorrhea compared to adolescent girls with good sleep quality. This is accordance to the theory which explains that poor sleep quality can cause negative impacts such as a decrease in serotonin in the body. The reduction of serotonin leads to increased anxiety, depression, and increased sensitivity to pain. Conversely, if a person has good quality sleep, it will bring various positive health benefits. Apart from avoiding disease, good sleep quality can increase the capacity of short-term memory or working memory and can support while studying. (26).

5. Conclusion

A review of ten journal articles demonstrated an association between sleep quality and dysmenorrhea. Adolescents with poor sleep quality are more likely to experience primary dysmenorrhea. However, it is important to realize that sleep quality is not the only factor that influences primary dysmenorrhea. Maintaining and improving sleep quality can be one step to reduce risk dysmenorrhea in adolescents. Health care professionals play an important role in this context. Apart from screening, they can provide education and counselling on how to maintain and improve sleep quality and treat primary dysmenorrhea.

Compliance with ethical standards

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