

ASSOCIATION OF SLEEP HYGIENE AND QUALITY WITH MENSTRUAL HEALTH AMONG YOUNG WOMEN

Sugapriya G¹, Mani MS², Ponneshwer J³, Swapnatai A Meshram⁴, Umamaheswari K⁴, Snekalatha R⁴

Received : 17/03/2023
Received in revised form : 21/04/2023
Accepted : 04/05/2023

Keywords:

Sleep hygiene, Menstrual cycle, Sleep quality, Premenstrual syndrome, Physical activity, Stress.

Corresponding Author:

Dr. Sugapriya G,

Email: sugapriyamani1974@gmail.com

DOI: 10.47009/jamp.2023.5.3.72

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (3); 329-333



¹Associate Professor, Department of Physiology, ESIC Medical College and Hospital, KK Nagar, Chennai, Tamilnadu, India

²Assistant Professor, Department of Paediatrics, Kilpauk medical college, Tamilnadu, India

³Tutor, Department of Physiology, ESIC Medical College and Hospital, KK Nagar, Chennai, Tamilnadu, India

⁴Professor, Department of Physiology, ESIC Medical College and Hospital, KK Nagar, Chennai, Tamilnadu, India

Abstract

Background: Sleep hygiene is a combination of behavioural and environmental suggestions meant to encourage restful sleep. It was first created as a treatment for mild to severe insomnia. Teenagers' irregular sleep patterns may throw off their circadian rhythm, disrupting their female classmates' menstrual cycles. Therefore, this study aimed to determine whether good sleep hygiene and the quality with menstrual health are related. **Materials and Methods:** A pilot research was done with 72 female subjects with menstrual cycle abnormalities. Data were collected from females who participated in the sleep and menstruation research, including a community-based sample of people aged 18 to 25. The participants all questioned about menstrual cycle, flow, length, and premenstrual symptoms. Sleep duration, Insomnia Severity Index score, Pittsburgh Sleep Quality Index score, and Epworth Sleepiness Scale score were all sleep-related predictors. **Result:** The response rate was 68% among the 72 young women who participated, with 62.2% being university students and an average age of 18.03.3 years. Sleep duration was 7.31.7 hours per day, with 10.4% experiencing insomnia. Sleeping 8 and 7 hours per day is linked to premenstrual spasms and worry. Compared to normal sleep, short sleep duration was associated with heavier bleeding (odds ratio=1.46, p=0.026) and greater cycle irregularity (odds ratio=1.24, p 0.021). A higher Pittsburgh Sleep Quality Index score was linked to more irregular sleep cycles (odds ratio=1.03, p=0.021). **Conclusion:** These findings show a link between poor sleep hygiene, short sleep duration, and poor sleep quality with greater bleeding and menstrual cycle irregularity, indicating more research for better treatment choices.

INTRODUCTION

The menstrual cycle is a natural physiological process involving the shedding of progesterational endometrium followed by blood loss regularly and cyclically. The 28-day cycle is a natural aspect of a woman's life since it releases hormones and regenerates the uterine lining.^[1] Menstrual abnormalities are characterised by hyper or hypomenorrhoea, poly and oligomenorrhoea, dysmenorrhoea, amenorrhoea, menorrhagia, and premenstrual syndrome.^[2] The following causes are thought to be responsible for adolescent anomalies and physiological variations: environmental influences, diet, medications, poor sleep hygiene and quality, physical activity, and stress.^[3] Iron

deficiency anaemia is caused by prolonged and severe bleeding during irregular periods.^[4]

Irregular menstrual periods are a common concern, particularly in young females. The relationship between sleep disruptions and the menstrual cycle is difficult to detect, and irregular menstrual symptoms are typical complaints among young women. Women with premenstrual syndrome and dysmenorrhoea experienced significant physical, psychological, social, educational, and occupational disadvantages.^[5] Patients learn about appropriate sleeping practices during sleep hygiene education. They are advised to follow sleep-improvement measures, such as avoiding coffee, exercising frequently, removing noise from the sleeping area, and maintaining a regular sleep schedule.^[6] Most girls do not discuss their gynaecological issues with

their parents. Some young girls are unaware that they have irregular or missed cycles, which may be due to underlying health issues.^[7] It also influences mental health. It is linked to signs of depressive disorders, impacting the quality of life, academic performance, and psychological functioning.^[8]

Sleep has recently received attention for being linked to menstrual cycle abnormalities. Previous research has found a link between poor sleep quality and premenstrual and menstrual periods.^[9] As a result, the current study was carried out to examine the menstrual cycle abnormalities linked with sleep quality to create a database for general knowledge of women on the prevalence of sleep disturbances in menstrual cycle irregularities.

MATERIALS AND METHODS

The pilot study was conducted among 72 individuals, with approval from the ethics committee and verbal and written consent from the patients. The individuals were given the self-structured questionnaire, and completed questionnaires were collected and analysed.

Inclusion Criteria

Aged 18 to 25 years, with irregular menstrual cycles lasting 22-35 days in the last 12 months, unable to work, unable to take the combined oral contraceptive pill, hypothalamus hormones, or antidepressants in the preceding six months, and no mental disease were included. They were also not allowed to have endocrinological problems, such as diabetes, cardiovascular disease, chronic kidney or liver disease, or therapy for premenstrual symptoms.

Exclusion Criteria

Patients prescribed medication for irregularities, pregnancy, lactation or sedatives were excluded.

The Pittsburgh Sleep Quality Index (PSQI), a 19-item questionnaire, was used to assess the quality of chronic sleep during the previous month. The index is divided into seven subscales that evaluate habitual sleep length, nocturnal sleep discomforts, sleep latency, sleep quality, daylight dysfunction, sleep medication use, and sleep performance. Each subscale has a potential value of 0 to 3, while the overall global score ranges from 0 to 21. A score of 5 or above indicates poor sleep quality.

We used a questionnaire containing socio-demographic questions such as age, education or employment, marital status, housing, parental education, physical activity, and preference for a salty-fatty diet to interview all young women with a menstrual cycle for at least one year. Another portion asked about gynaecological histories, such as menarche age, monthly flow days, and menstrual cycle duration. The third part asked about premenstrual symptoms and dysmenorrhea experienced in the past six months. Premenstrual symptoms are physical and mental symptoms that occur 7 to 10 days before menstruation. Spasms, weariness, headache, irritability or agitation, breast

discomfort, GIT disruption, and weight gain were among the symptoms. The fourth component analysed average daily sleep hours and insomnia during the past six months, and insomnia was characterised as trouble falling or staying asleep.

Statistical Analysis

We used the Statistical Package for Social Science (SPSS) software for statistical analysis. The data analysis investigated the connection between monthly irregularity and excellent sleep hygiene using mean percentage. Binary logistic regression analysis was performed to evaluate if sleeping 8 or 7, or 6 h/day was linked with distinct premenstrual symptoms and dysmenorrhea. The regression models included the following factors: gynaecological age (chronological age-age of menarche), residency, educational and vocational status, marriage, parental education, and diet.

RESULTS

The response rate was 68%, with 72 young women participating. The primary causes of the relatively low response rate were a lack of interest in participating and anxiety about sharing personal experiences. The participants' mean age was 18.0 3.3 years, and menarche age was 13.1 1.4 years, gynaecological age was 6.9 3.5 years, menstrual cycle duration was 28.2 6.6 days, menstrual flow days were 5.2 1.2, and 58.7% of them were university students. Only 11.4% of people claimed to have exercised. 10.4% of participants said they had experienced insomnia in the preceding six months and reported sleeping an average of 7.3 1.7 hours a day.

Premenstrual spasm is linked with sleeping more than 8 hours per day and less than 7 hours per day (OR 1.2, 95% CI 1.1-1.3 and OR 1.1, 95% CI 1.1-1.3, respectively), but premenstrual weariness is associated with sleeping less than 6, 2 or 5 hours per day (OR 1.2, 95% CI 1.1-2.1). Sleep patterns were not associated with dysmenorrhea or other premenstrual symptoms.

All of the premenstrual symptoms that were examined had an association with insomnia: spasm (OR 2.3, 95% CI 1.6-2.6), nervousness (OR 2.1, 95% CI 1.7-2.6), fatigue (OR 2.7, 95% CI 2.2-3.4), headache (OR 2.2, 95% CI 2.1-3.2), breast pain (OR 1.7, 95% CI 1.3-2.1), weight gain (OR 2.4, 95% CI 2.0-3.1), and GIT [Table 1].

Dysmenorrhea and Sleep Status

There was no correlation between dysmenorrhea and regular bedtimes ($P=0.060$) or sleep length ($P=0.728$). After adjusting for age, BMI, physical activity, and medication use, binary logistic regression analysis (stepwise screening of independent variables) revealed a positive correlation between dysmenorrhea and bedtime (OR 95%CI = 1:34 [1.14-1.54], $P 0.001$) and sleep quality (OR 95%CI = 1.64 [1.30-2.07], $P 0.001$).

Menstrual Cycle and Sleep Status.

A statistical investigation of the effects of bedtime, bedtime regularity, sleep length, and sleep quality on the menstrual cycle showed that menstrual pain and regularity were substantially correlated with sleep quality.

These relationships remained unchanged even after controlling for conceivable confounding variables including age, physical activity, BMI, and medicines. This was the first study to examine the significance of sleep habits with menstrual volume. The results of the linear regression analysis revealed a significant relationship between menstruation volume and bedtime regularity (B=6.140, P=0.019).

Less menstrual volume in young women may be related to more frequent schedule deviations. Menstrual volume was not significantly correlated with bedtime (P=0.341), sleep length (P=0.083), or sleep quality (P=0.258), respectively. For relationships to be confirmed, further proof is required. Bedtime and dysmenorrhea were shown to be substantially linked with sleep quality by the

binary logistic analysis (OR 95%CI = 1.38 [1.16-1.64], P 0.001 and OR 95%CI = 1.74 [1.40-2.17, P 0:001, respectively). No relationships existed between regular bedtimes (P=0.060), sleep duration (P=0.738), and dysmenorrhea. [Table 2].

Dysmenorrhea and sleep disruption may interact both directly and indirectly. Further research on the physiological mechanisms underlying these associations will help us better understand how to control menstrual symptoms and improve sleep. Our findings demonstrated that there was no statistically significant relationship between the menstrual cycle interval and bedtime (P=0.975), bedtime regularity (P=0.465), sleep length (P=0.192), or sleep quality (P=0.415). However, our results from binary logistic regression analysis (stepwise screening independent variables) suggested that sleep quality was positively associated with menstrual regularity (OR 1295%CI = 1.29 [1.06-1.56], P=0.011), and the association did not change even after controlling for potential confounding factors [Table 3].

Table 1: Patient characteristics of the study

Variable		Complete Sample	Stratified by regularity		
			Very Regular	Mostly Regular	Fairly Regular
Age	Years	23.4 ± 6.3	21.3±5.1	21.8 ± 5.4	22.4 ± 6.7
Education	College	52.73%	55.94%	57.03%	43.09%
	High school	5.49%	5.66%	3.41%	3.41%
BMI	kg m	22.4±6.9	24.7±6.0	22.4 ± 6.4	23.4 ± 9.2
Speed Duration	Normal	50.08%	54.05%	44.49%	46.62%
	Short	42.26%	35.90%	45.57%	40.21%
	Long	5.66%	4.05%	4.95%	4.17%
Insomnia severity	ISI score	10.3 ± 3.1	9.51 ± 3.01	10.41 ± 3.68	10.63 ± 4.74
Sleep Quality	PSQI score	8.10 ± 3.96	7.51 ± 3.61	8.14 ± 3.67	8.46 ± 3.09
Daytime sleepiness	ESS score	7.72 ± 4.30	7.17 ± 4.24	7.63 ± 4.34	7.60 ± 4.08
Sleep hygiene	SHI score	26.7 ± 6.5	25.5±8.5	26.2 ± 8.7	23.1 ± 7.8

Table 2: Ordinal logistic regression examining relationships between menstrual regularity and sleep hygiene variables

		Age-adjusted				Adjusted*			
		oOR	z	95% CI	p	oOR	z	95% CI	p
Sleep duration	Short	1.426	2.27	(1.053, 1.961)	0.021	1.437	2.13	(1.033, 2.000)	0.031
	Long	1.02	0.04	(0.507, 2.043)	0.953	0.75	0.51	(0.373, 1.581)	0.475
Insomnia severity ISI score		1.031	2.21	(1.004, 1.057)	0.014	1.023	1.77	(0.985, 1.032)	0.071
Sleep quality PSQI score		1.061	3	(1.021, 1.102)	0.003	1.049	2.29	(1.004, 1.091)	0.021
Daytime sleepiness ESS		1.037	2.11	(1.002, 1.075)	0.033	1.01	1.5	(0.993, 1.069)	0.112

Table 3: Ordinal logistic regression examining relationships between menstrual bleeding and sleep hygiene variables

		Age-adjusted				Adjusted*			
		oOR	z	95% CI	p	oOR	z	95% CI	p
Sleep duration	Short	1.694	3.24	(1.231, 2.331)	0.001	1.443	2.23	(1.045, 2.025)	0.024
	Long	1.354	0.85	(0.682, 2.686)	0.365	1.304	0.75	(0.646, 2.616)	0.452
Sleep hygiene score		1.028	2.13	(1.001, 1.054)	0.032	1.017	1.33	(0.891, 1.046)	0.176
Sleep quality PSQI score		1.046	2.35	(1.006, 1.091)	0.016	1.033	1.56	(0.992, 1.077)	0.112
Daytime sleepiness ESS score		1.004	0.31	(0.968, 1.032)	0.722	0.987	0.13	(0.961, 1.032)	0.861

DISCUSSION

The current study was conducted on young females to assess the correlation between irregular menstrual cycles and sleep disturbances. According to our study findings, 56% of participants reported trouble sleeping during menstruation, and 46% suffered from sleep interruptions. The normal physiological functioning of the body depends on adequate quality and amount of sleep. Insufficient sleep impacts mood

and menstrual cycle regularity, which are necessary for female development. The sample is drawn from a cross-sectional study by Kim T et al. investigating the relationship between sleep duration and irregular menstrual cycles in Korean teenagers. They discovered a detrimental connection between irregular menstrual cycles and sleep duration.^[10] Due to the bidirectional relationship between sleep disruption and mental health issues, menstrual issues may impair female sleep and raise the risk of sleep

disturbance. This is because both sleep and menstruation are linked to the hypothalamic-pituitary axis.^[11,12]

According to our study, there is a substantial link between sleeplessness and menstruation symptoms. Premenstrual symptoms and dysmenorrhea were more frequently reported by young women who had sleeplessness. In a different study, Liu Xianchen et al. examined the relationship between early menarche, menstrual issues, and disturbed sleep in Chinese teenage girls. They found that irregular periods and period discomfort appear to be connected to disturbed sleep. That short-term sleep impact of early menarche.^[13]

Menstruating women reported reduced REM sleep in research by Araujo et al., although their REM sleep latency was greater than that of the pain-free group. Variations in the individuals' characteristics could explain these discrepancies. During the experiment, menstrual discomfort had no discernible impact on sleep patterns. Although dysmenorrhea is a painful condition that only lasts a short time but recurs frequently, in this sample, the presence of self-described menstrual pain had no impact on the adult women's sleep patterns.^[14]

The age in the current study is 18.0 3.3 (12–25) years, and the two types of residence are urban (44.8) and rural (55.2). Student in university (46.3) and married (9.8) employees are both their occupations. Illiterate (15.7) and Literate (84.3) according to the father's schooling. Illiterate (25.4) and Literate (74.5) in mother's schooling. Preference for fatty, salty meals (67.6), physical activity (19.4), number of hours spent sleeping every day (mean SD; range: 8.3 1.7 (4–16), and insomnia (47.7; 11.6). Gynaecological age is 6.9 3.5 (0–16) years, while menarche is 13.1 1.4 (9–18) years. Menstrual flow lasts 5.2 1.4 (1–15) days, while the menstrual cycle lasts for 28.2 6.8 (14–90) days. According to sleep duration, odds ratios and confidence intervals for premenstrual and menstrual symptoms were examined. Patients with PMS reported disturbing dreams, awakenings, not waking up, morning fatigue, and increased mental activity at night. The three groups could be reliably differentiated with an overall accuracy of 82%. Premenstrual difficulties sometimes include sleep abnormalities, requiring specialized therapeutic attention and in-depth research.^[15] According to a study by Chen et al., early menarche, an irregular menstrual cycle, and a brief menstrual period are all linked to suicidal behaviour in teenage females.^[16]

According to a study conducted by Lim HS et al., the frequency of soda, coffee, and fried food intake was considerably greater in the group with irregular menstruation. Menstrual abnormalities were linked to an earlier age at menarche, a greater family income, a lack of exercise, and a high degree of stress. In contrast, adequate sleep and a low frequency of dining out were associated with menstrual regularity.^[17] According to Lim AJR et al., women who don't get enough sleep are more likely to develop insulin resistance and menstrual irregularities.

Women may benefit from getting enough sleep to prevent ovulatory dysfunction, potential reproductive issues, and insulin resistance. Short sleep duration was shown to be strongly linked with changes in menstrual cycle length, as opposed to shift work. 15% of women who reported getting less than 6 hours of sleep had short cycles, whereas 35% had extended cycles. Contrarily, just 5% of women who reported sleeping for six hours or more had short cycle durations, while 23% had lengthy cycle.^[18] In another study by Moran et al., women with PCOS may experience circadian rhythm and sleep issues.^[19]

The current study's cross-sectional methodology, however, cannot address the issue of which arose first, sleep disruption or menstruation troubles. Several hormones, including oestrogen, progesterone, prolactin, and growth hormone, control the physical and emotional changes of the menstrual cycle. These hormones govern reproductive activities, circadian rhythm, and sleep. As a result, disruptions in these hormones might cause insomnia and menstrual irregularities. Furthermore, physical inactivity, obesity, stress, and depressive symptoms are all considered significant risk factors for insomnia and menstrual disorders. Furthermore, determining the prevalence of insomnia is beyond the scope of this study.

Limitations

The first drawback is the use of retrospective self-report data in this population-based study, which may be prone to memory bias. Due to the cross-sectional design of this study, the causal relationship should be carefully construed when finding the links among variables. Third, the individuals self-reported menstrual cycle irregularity data, which personal opinions may influence. Linear regression analysis of menstrual blood volume, sleep state, and international and hormone measures must be used to characterise menstrual cycle irregularity in future research. More research was required to develop a questionnaire scale to assess women's menstrual health. Further research is needed to understand the biological and genetic mechanisms relating women's sleep habits to menstrual issues.

CONCLUSION

Menstrual cycles and dysmenorrhea were more prevalent in women with poor sleep quality, mild or severe than in those with excellent sleep quality. Future studies may be able to expand the usefulness of sleep hygiene education and assess its efficacy, which might make it an essential tool for improving sleep in the general population. It is necessary to replicate and expand the study showing how good sleep hygiene aspects affect menstrual health. A replication study must improve the reliability and validity of the results of the current study. Large-scale targeted treatments are necessary for good sleep hygiene and quality.

REFERENCES

1. Casablanca Y. Management of Dysfunctional Uterine Bleeding. *Obstet Gynecol Clin North Am.* 2008; 35: 219-234
2. Hickey M, Balen A. Menstrual disorders in adolescence: investigation and management. *Hum Reprod Update.* 2003; 9:493-504
3. Ekpenyong CE, Davis KJ, Akpan UP, Daniel NE. Academic stress and menstrual disorders among female undergraduates in Uyo, South Eastern Nigeria – the need for health education. *Niger. J. Physiol. Sci.* 2011; 26: 193-98
4. Williams CE, Creighton SM. Menstrual Disorders in Adolescents: Review of Current Practice. *Horm Res Paediatr* 2012;78:135–143
5. Arafa A, Senosy S, Helmy H, Mohamed A (2018) Prevalence and patterns of dysmenorrhea and premenstrual syndrome among Egyptian girls (12–25 years). *Middle East Fertil Soc J* 23:486–490
6. Zarcone VP. Sleep hygiene. In: Kryger MH, Roth T, Dement WC, editors. *Principles and Practice of Sleep Medicine.* 3rd ed. WB Saunders; Philadelphia, PA: 2000. pp. 657–61.
7. Harlow SD, Campbell OMR. Epidemiology of menstrual disorders in developing countries: a systematic review. *BJOG.* 2004; 111:6-16
8. Hoppenbrouwers K, et al. Characteristics of the menstrual cycle in 13-year-old Flemish girls and the impact of menstrual symptoms on social life. *Eur J Pediatr.* 2016; 175: 623-630.
9. Romans SE, Kreindler D, Einstein G, Laredo S, Petrovic MJ, Stanley J. Sleep quality and the menstrual cycle. *Sleep Med* 2015; 16:489–95.
10. Kim T, Nam GE, Han B, Cho SJ, Kim J, Eum DH, et al. Associations of mental health and sleep duration with menstrual cycle irregularity: a population-based study. *Arch Womens Ment Health* 2018; 21:619–26.
11. Buckley TM, Schatzberg AF. On the interactions of the hypothalamic-pituitary-adrenal (HPA) axis and sleep: normal HPA axis activity and circadian rhythm, exemplary sleep disorders. *J Clin Endocrinol Metab.* 2005; 90: 3106– 3114.
12. Buysse DJ, Angst J, Gamma A, Ajdacic V, Eich D, Rossler W. Prevalence, course, and comorbidity of insomnia and depression in young adults. *Sleep.* 2008; 31: 473–480.
13. Liu X, Chen H, Liu Z-Z, Fan F, Jia C-X. Early menarche and menstrual problems are associated with sleep disturbance in a large sample of Chinese adolescent girls. *Sleep* 2017; 40.
14. Araujo P, Hachul H, Santos-Silva R, Bittencourt LRA, Tufik S, Andersen ML. Sleep pattern in women with menstrual pain. *Sleep Med* 2011; 12:1028–30.
15. Mauri M, Reid RL, MacLean AW. Sleep in the premenstrual phase: a self-report study of PMS patients and normal controls. *Acta Psychiatr Scand* 1988; 78:82–6.
16. Chen H, Wang X-T, Bo Q-G, Zhang D-M, Qi Z-B, Liu X, et al. Menarche, menstrual problems and suicidal behavior in Chinese adolescents. *J Affect Disord* 2017; 209:53–8.
17. Lim H-S, Kim T-H, Lee H-H, Park Y-H, Lee B-R, Park Y-J, et al. Fast food consumption alongside socioeconomic status, stress, exercise, and sleep duration are associated with menstrual irregularities in Korean adolescents: Korea National Health and Nutrition Examination Survey 2009-2013. *Asia Pac J Clin Nutr* 2018; 27:1146–54.
18. Lim AJR, Huang Z, Chua SE, Kramer MS, Yong E-L. Sleep duration, exercise, shift work and polycystic ovarian syndrome-related outcomes in a healthy population: A cross-sectional study. *PLoS One* 2016;11: e0167048.
19. Moran LJ, March WA, Whitrow MJ, Giles LC, Davies MJ, Moore VM. Sleep disturbances in a community-based sample of women with polycystic ovary syndrome. *Hum Reprod.* 2015; 30:466–72.