

# SLEEP QUALITY AND MIGRAINE STATUS AMONG UNDERGRADUATE STUDENTS IN A LARGE URBAN UNIVERSITY THAILAND

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## ABSTRACT:

**Background:** Migraine is a specific chronic headache which involved sleep process and chronobiologic patterns in regulation of sleep and headache. Therefore, current study investigated whether migraine headache could affect sleep quality among undergraduate students.

**Methods:** A cross-sectional study was used to study the undergraduate students at a large public university in Bangkok, Thailand (N=317). A self-administer questionnaire was ascertained general demographics. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep habits and quality. The criteria established by The International Headache Society (ICHD-II) were used to assess migraine status. Chi-square tests and multivariate logistic regression models were used to identify statistically significant associations.

**Results:** Sleep quality components were not statistically associated with migraine status among undergraduate students. With those not statistical association, poor sleep quality was tended to increase a 1.299 times risk of migraine (AOR = 1.299; 95% CI 0.329-5.131). Less sleep duration than 6 hours was suggested to increase 1.35-fold odds of migraine students (AOR = 1.352; 95% CI 0.519-3.523). Longer sleep latency than 15 min had a 1.277-fold increased odds of migraine (AOR = 1.277; 95% CI 0.523-3.116) although statistical significant was not achieved.

**Conclusion:** Migraineur students had more poor sleep than non-migraineur students but not significant. These findings emphasize the requirement to educate students on the importance of sleep and policy makers to take action to improve the quality of headache care and access to treatment in Chulalongkorn University.

**Keywords:** Migraine; Sleep quality; Undergraduate students; Thailand

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## INTRODUCTION

Migraine ranked among the world's leading causes of years lived with disability by the World Health organization. Migraine is an unusual prevalent neurological disease, affecting 38 million males, females, and children in the United State and 1 billion worldwide [1]. Migraine is generally manifest by episodic headache which is more than just head pain and it is a biological disorder of the brain. The pain of a migraine headache is a common

neurological problem symptom which is often described as an intense pulsing, throbbing pain in one area of head, which is more prominent in the temporal area and lasts from 4 to 72 hours [2] and it is typically accompanied by vomiting, nausea, hypersensitivity to either light, sound or smell, photophobia and phonophobia [3]. Migraine is a specific chronic headache influencing more than 10% of the world's population [4] which involved sleep process and chronobiologic patterns in regulation of sleep and headache [5]. It usually begins in childhoods, adolescences or young adulthood especially in women which may be due

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to hormonal changes [6]. The prevalence of migraine varies as a function of age. Migraine is a disorder that is most prevalent between the ages of 25 and 55 in US [7]. In Thailand, the migraine prevalence is about 29.1% compared with 11.7% in the United States [8]. Several data on epidemiology of migraine among undergraduate student are available in developed and developing countries. In developing countries, especially in Thailand few data are available.

Sleep disturbance and migraine are common complaints among worldwide population, influenced 5-15% and 10-30% of the worldwide population [9]. The association between sleep disturbance and migraine has been reported in clinic-based and population-based studies. Some study in United States found there was a significant association between migraine and sleep disturbance, migraineurs had an increased risk of having sleep disturbance (OR=2.5) compared to non-migraineurs [10]. Moreover, individuals with disturbance had a higher risk of having migraine (OR=1.5–1.7) compared to individuals without sleep disturbance [11]. The research has described the migraine headache which is impacted on sleep disorders 53.6% in children and adolescents [12]. Thai college students reveal the high prevalence estimates of poor sleep quality about 48.7% for female students and 46.8% for male students [13]. The medical students study in India shown a percentage of sleep disturbances in undergraduate students were higher than intern according to stress of study load. Sleep patterns are influenced by age, gender, living conditions, exercise and workload [14].

However, no research has comprehensively evaluated the burden of poor sleep quality among undergraduate students with the migraine history. Therefore, current study will be investigated whether migraine headache could affect sleep quality among undergraduate students in Chulalongkorn University.

## MATERIALS AND METHODS

### Study area and study population

A cross-sectional study was used to study the undergraduate students at Chulalongkorn University in Bangkok, Thailand in February 2017. This study consisted of 317 randomly selected participants who studied at Chulalongkorn University. Only Bachelor's Degree students of Chulalongkorn University enrolled in academic year 2016 and can speak and read Thai were eligible for inclusion.

### Data collection

A self-administer questionnaire was designed. The questionnaire was ascertained general demographics, quality of life, sleep quality, depression and sleep quality. World Health Organization quality of life questionnaire in Thai version (WHOQOL- BREF) was utilized to assess an individual's perception of their position in life in the context of culture and the value systems in which they live and in relation to their goals, expectations, standards and concerns [15]. The Thai Patient Health Questionnaire (PHQ-9) assessed to diagnoses of depressive in primary care [16].

Sleep quality was assessed using the validated Thai Pittsburgh Sleep Quality Index (PSQI) to assess sleep habits and quality [17]. Components of PSQI consists of seven sleep components including duration of sleep, sleep disturbance, sleep latency, sleep efficiency, use of sleep medicine, daytime dysfunction and overall sleep quality. Overall sleep quality was classified into 2 levels using global score, a global score greater than 5 were classified as poor sleepers. Those with a score of 5 or less were classified as good sleepers.

The criteria established by The International Headache Society (ICHD-II) were used to assess migraine status [18]. It was defined by at least five lifetime headache attacks (criterion A) lasting 4–72 hours (criterion B), with at least two of the qualifying pain characteristics [unilateral location (criterion C1), pulsating quality (criterion C2), moderate or severe pain intensity (criterion C3), aggravation by routine physical exertion (criterion C4)]; at least one of the associated symptoms [nausea and/or vomiting (criterion D1), photo/phonophobia (criterion D2)]; and not attributable to another central nervous system disorder or head trauma (criterion E) [19].

### Statistical analysis

SPSS version 22 was performed all statistical analysis in this study. Normality of continuous variable was tested by Kolmogorov–Smirnov. General demographic were accessed using mean ( $\pm$ standard deviation) for continuous variables and counts and percentages for categorical variable. For skewed data, median was reported. Chi-square and Fisher's exact test were utilized for testing association of categorical data. Continuous variables were tested for difference against migraine status using student t-test and Mann–Whitney U test (skewed data). Multivariate analysis was performed using binary logistic regression. Unadjusted model

**Table 1** General demographics of undergraduate students

General demographics	Migraine		p-value
	No	Yes	
	(n = 293)	(n = 24)	
	n (%)	n (%)	
<b>Age</b> (median; years)	20	20	0.99 <sup>a</sup>
<b>Gender</b>			
Female	218 (74.7)	20 (83.3)	0.34 <sup>b</sup>
Male	74 (25.3)	4 (16.7)	
<b>BMI</b> (median; kg/m <sup>2</sup> )	20.56	20.73	0.17 <sup>a</sup>
<b>Faculty</b>			
Health	141 (48.1)	14 (58.3)	0.34 <sup>c</sup>
Non-health	152 (51.9)	10 (41.7)	
<b>GPA</b> (median; score )	3.06	3.04	0.36 <sup>a</sup>
<b>History of migraine in family</b>			
No	234 (79.9)	18 (75.0)	0.57 <sup>c</sup>
Yes	59 (20.1)	6 (25.0)	
<b>Exercise</b>			
1 time per week	173 (59.0)	14 (58.3)	0.91 <sup>b</sup>
Twice a week	80 (27.3)	6 (25.0)	
≥ 3 times per week	40 (13.7)	4 (16.7)	
<b>Smoking status</b>			
No	283 (96.6)	23 (95.8)	0.85 <sup>b</sup>
Yes	10 (3.4)	1 (4.2)	
<b>Alcohol consumption</b>			
No	234 (79.9)	17 (70.8)	0.30 <sup>c</sup>
Yes	59 (20.1)	7 (29.2)	
<b>Caffeine consumption</b>			
No	116 (39.6)	8 (33.3)	0.55 <sup>c</sup>
Yes	177 (60.4)	16 (66.7)	
<b>Medical problem</b>			
No	227 (77.5)	17 (70.8)	0.46 <sup>c</sup>
Yes	66 (22.5)	7 (29.2)	
<b>Health status</b>			
Good	150 (51.2)	5 (20.8)	<0.001 <sup>c</sup>
Fair	131 (44.7)	12 (50.0)	
Poor	12 (4.1)	7 (29.2)	

<sup>a</sup>Mann–Whitney U test; <sup>b</sup>Fisher’s exact test; <sup>c</sup>Chi-square test

was fit to estimate odd ratios (ORs) and 95% confident interval. Adjusted model also performed using selected variables which had significant value less than 0.2 in bivariate analysis. All reported *p*-values are two-sided and defined as significant at 5% level.

### Ethical consideration

Ethical approval to conduct this study was sought from Ethics Review Committee of Chulalongkorn University (COA No. 029/2560).

## RESULTS

### Migraine prevalence, quality of life and depression

Table 1 reports general demographics of

undergraduate students. Of 317 participants, 24 (7.6%) met ICHD-II criteria for migraine. Female with migraine and without migraine were 20 (83.3%) and 218 (74.7%) students. Male with migraine and without migraine were 4 (16.7%) and 74 (25.3%) students. The migraineurs studied in related health faculties and non- related health faculties were 14 (58.3%) and 141 (48.1%) students. The median of body mass index of participants with migraine and without migraine were 20.73 and 20.56 kg/m<sup>2</sup>. The migraineurs and non migraineurs were 17 (70.8%) and 234 (79.9%) reported no alcohol consumption. The health status of migraineurs were defined as good, fair and poor that the result of good, fair and poor were 5 (20.8%), 12 (50.0%) and

**Table 2** Depression and quality of life among undergraduate students

	Migraine		<i>p</i> -value
	No (N = 293)	Yes (N = 24)	
<b>Quality of life</b> (mean, SD)			
Physical	22.57 (3.65)	22.38 (4.59)	0.089 <sup>a</sup>
Psychological	20.99 (3.37)	20.71 (3.87)	0.339 <sup>a</sup>
Social relationship	10.92 (2.09)	10.65 (2.44)	0.891 <sup>a</sup>
Environment	27.66 (4.58)	25.96 (5.34)	0.697 <sup>a</sup>
Overall	89.02 (12.62)	85.79 (16.06)	0.170 <sup>a</sup>
<b>Depression</b> (n, %)			
None (0-4)	91 (31.1)	8 (33.3)	0.157 <sup>b</sup>
Mild depression (5-9)	116 (39.6)	6 (25.0)	
Moderate (10-14)	53 (18.1)	4 (16.7)	
Moderate severity (15-19)	27 (9.2)	4 (16.7)	
Severe depression ( $\geq 20$ )	6 (2.0)	2 (8.3)	

<sup>a</sup> Student T-test, <sup>b</sup> Fisher's exact test

**Table 3** Pittsburgh sleep quality index components according to migraine

Pittsburgh sleep quality index (PSQI)	Migraine		<i>p</i> -value
	No (N = 293)	Yes (N = 24)	
<b>Sleep duration</b> (median; hrs)	6	6	0.790 <sup>a</sup>
<b>Sleep latency</b> (median; minutes)	15	15	0.909 <sup>a</sup>
<b>Sleep efficiency</b> (%)			
Less than 65%	23 (7.8)	2 (8.3)	0.690 <sup>c</sup>
65-74%	33 (11.3)	3 (12.5)	
75-84%	66 (22.5)	3 (12.5)	
More than 85%	171 (58.4)	16 (66.7)	
<b>Sleep medicine during past month</b>			
Never	45 (15.4)	4 (16.7)	0.237 <sup>b</sup>
Less than once a week	170 (58.0)	10 (41.7)	
More than or equal to once a week	78 (26.6)	10 (41.7)	
<b>Overall sleep quality</b>			
Good	57 (19.5)	3 (12.5)	0.589 <sup>c</sup>
Poor	236 (80.5)	21 (87.5)	

<sup>a</sup> Mann Whitney U; <sup>b</sup> Chi-square; <sup>c</sup> Fisher's Exact Test

7 (29.2%) respectively. There was statistically significant difference between non migraineurs students and migraineurs students with health status ( $p$ -value<0.001).

Table 2 showed the mean score of physical domain of non migraineurs students and migraineurs students were 22.57 and 22.38 respectively. Psychological domain, total score is 30 in this study found the mean score of psychological domain of non migraineurs students and migraineurs students were 20.99 and 20.71. Overall of quality of life by raw score, mean score of quality of life in non migraineurs students and migraineurs students were 89.02 and 85.79. Statistical significant differences between in non migraineurs students and migraineurs

students was not achieved across domains of WHOQOL. Most of migraineurs students were categorized into none depression, however most non- migraineurs students had mild depression. 8.3% of migraine students reported severe depression while only 2% of non-migraine student reported severe depression. Association between migraine status and depression was not achieved statistical significant among undergraduate students in this study.

#### Sleep habits/patterns and migraine

Table 3 summarizes sleep quality index components according to migraine. The most of non-migraineur students 171 (58.4%) and migraineur students 16 (66.7%) classified as high sleep efficiency

**Table 4** Odds ratios (OR) and 95% confidence intervals (CI) of sleep quality in relation migraine status among undergraduate students

Sleep quality components	Odds ratio (unadjusted)	95%CI		Odds ratio (Multivariate adjusted*)	95%CI	
		Lower	Upper		Lower	Upper
Overall sleep quality						
Good sleep (PSQI<5)	1.00 (Reference)			1.00 (Reference)		
Poor sleep (PSQI≥5)	1.691	0.487	5.865	1.299	0.329	5.131
Sleep duration						
More than or equal to 6 hours	1.00 (Reference)	-	-	1.00 (Reference)	-	-
Less than 6 hours	0.869	0.36	2.098	1.352	0.519	3.523
Sleep Latency						
Less than or equal to 15 min	1.00 (Reference)	-	-	1.00 (Reference)	-	-
More than 15 min	1.121	0.486	2.586	1.277	0.523	3.116
Sleep efficiency						
More than or equal to 75%	1.00 (Reference)	-	-	1.00 (Reference)	-	-
Less than 75%	1.114	0.399	3.111	1.08	0.367	3.179
Sleeping pill						
Not use	1.00 (Reference)	-	-	1.00 (Reference)	-	-
Use	1.566	0.555	4.423	1.591	0.51	4.962

\*Adjusted for BMI, health status, depression and quality of life

(≥85%). The most of non-migraineur students 170 (58%) reported using sleep medicine less than once a week as same as migraineur students 10 (41.7%). However, among migraineur used sleep medicine more than non-migraineur students. The overall of sleep quality by score, in this study found 236 (80.5%) and 21 (87.5%) students in non-migraineur students and migraineur students were classified as poor sleep quality. Thus, migraineur students had more poor sleep than non-migraineur students but not significant.

Table 4 shows the odds ratio (OR) and adjusted odds ratio (AOR) for the sleep quality components across migraine. In multivariable adjusted model, all sleep quality components were not statistically associated with migraine status among undergraduate students. However, less sleep duration than 6 hours was increased 1.35-fold odds of migraine students (AOR =1.352; 95% CI 0.519-3.523). Longer sleep latency than 15 min had a 1.277-fold increased odds of migraine (AOR =1.277; 95% CI 0.523-3.116). Considering on sleep efficiency, students who had less sleep efficiency than 75% showed a higher risk of migraine than non-migraineur (AOR =1.08; 95% CI 0.367-3.179). Poor sleep quality was increased a 1.299 times risk of migraine (AOR = 1.299; 95% CI 0.329-5.131) although statistical significant was not achieved.

## DISCUSSION

In this study of prevalence of poor sleep quality

among undergraduate students at Chulalongkorn University in Bangkok, Thailand is reported from total of 317 undergraduate students, 60 (18.9%) were classified as good sleep quality and 257 (81.1%) were classified as poor sleep quality according to Pittsburgh sleep quality index (PSQI). The risk factors increased poor sleep quality were caffeine consumption [20, 21]. Moreover, alcohol consumption and cigarette smoking increased to poor sleep quality [22] reported sex, education, sleep hygiene practice, and perceived adequate sleep in the past month were significant associations with poor sleep quality. Moreover, poor sleep hygiene was suggested as a risk of migraine headache among undergraduate students [23]. The undergraduate students in this study defined as migraineur students 7.6%. The main associated factors were sex and family history of headache [24, 25]. Furthermore, poor sleep hygiene, environmental changes, head movements, and mental stress were risk factor of migraine in undergraduate students [23]. In this study migraineur students (87.5%) had more poor sleep than non-migraineur students (80.5%). In multivariate analysis, migraine was increased risk of poor sleep quality (AOR=1.299; 95% CI 0.329-5.131) but not statistically significant among undergraduate students. Both sleep disturbance and migraine overlap in symptom profiles with other chronic disorders. Several research [26] reported unusual sleep pattern may influence or aggravate migraine symptoms research found sleep complaints

to be prevalent among migraineurs. The large majority of migraineurs reported that sleep was a response to headache, with 85% indicating that they choose to sleep at least occasionally and 75% reporting that they were forced to sleep at least occasionally because of headache [27] found migraine, cluster headache, chronic paroxysmal hemicrania, and hypnic headache disorders which often occur during nocturnal sleep or upon awakening. Several plausible research and compelling biological mechanisms have been suggested underlying the observed association between migraine and sleep disturbances. Some examiners suppose an essential connection is controlled by the hypothalamus-pituitary-adrenal axis (HPA), in which the hypothalamus may not respond efficiently to physiological triggers instigated by sleep disturbances. The hypothalamus sends input to and receives input from the limbic system, retino hypothalamic tract, visceral relay nuclei, and brain stem aminergic nuclei which provide an explanation for the affective, prodromal, and vegetative symptoms, as well as for the visual, gastrointestinal, and autonomic symptoms that are the core features of the migraine syndrome [27]. In addition, given that migraine is primarily understood as a neurovascular condition, hypotheses related to increased sensitivity to vasodilation may explain the link between migraine and sleep disturbances.

Several limitations of this work must be taken into consideration. First, this study used a cross-sectional study design, which limits the affirmation of temporality between migraine and sleep quality. Moreover, essential studies in which sleep quality and quality of life and covariate factors in migraineur and non-migraineur undergraduate students would allow for better understanding of directionality of reported association. Second, in which limiting generalizability of this study to an applicability university student. The classification of migraine status was screened based on International Headache Society Classification (ICHD-II) to determine migraine symptoms. Lastly, self-reported data from undergraduate students in this study were obtained from the questionnaires and therefore may be or biased.

## CONCLUSION

Total of number of 317 undergraduate students who did respond self-administer questionnaire, 257 (81.1%) of undergraduate students were classified as poor sleep quality according to Pittsburgh sleep

quality index (PSQI), 24 (7.6%) of undergraduate students were classified as migraine according to ICHD-II criteria. In this study found there was no association between non-migraineur students and migraineur students with regards to sleep quality. However, migraineur students had more poor sleep than non-migraineur students but not significant. In multivariable adjusted model found poor sleep quality increased risk of migraine among undergraduate students but not statically significant.

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