Sleep Quality and Daytime Sleepiness among Nursing Students in One of Private Healthcare University Settings in Malaysia

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Abstract

Sleep has an essential role in our life. It is one of the components of Henderson's 14 basic human needs. Poor sleeping habit could lead to diverse of issues. Previous studies show that poor sleep is common in undergraduate students and medical students in Malaysia. However, sleep quality among nursing students has not been studied. Thus, this study was conducted to verify the daytime sleepiness and sleep quality among nursing students in one of the private University settings in Malaysia.

Using a convenience sampling method, the study was conducted among 211 undergraduate nursing students. An online self-administered questionnaire was used to carry out the survey. The Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index were used to identify daytime sleepiness and verify the sleep quality, respectively. Data analysis was done using Statistical Analysis Package for Social Sciences version 20.0.

The findings revealed that overall, 40% (n = 74) were having daytime sleepiness and 73.5% (n = 136) were classified as poor sleeper. This study showed that sleep quality has no correlation with daytime sleepiness (p > 0.05).

Almost half of the students had daytime sleepiness and sleep quality among undergraduate nursing students in this study was significantly poor. Hence, intervention is needed to increase the awareness and knowledge of nursing students regarding good sleeping habits and issues related to poor sleep quality.

Keywords: Sleep; Sleep Habits; Daytime Sleepiness; Sleep Quality; Insufficient Sleep; Nursing Students

Introduction

Potter, Perry, Stockert and Hall (2013) defined sleep as a cyclical physiological process that alternates with a more extended period of wakefulness. Proper rest and sleep are as crucial to health as good nutrition and adequate exercise. Sleep is the best form of rest for the human body after being tired from daily activities. The sleep-wake cycle is important as it influences and regulates physiological function and behavioral responses. Failure to maintain the usual sleep-wake cycle negatively impacts an individual's overall health. There are six

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major sleep disorders classified by the American Academy of Sleep Medicine [1]. The sleep disorders include insomnia, sleep-related breathing disorders, central disorders of hyper-somnolence, circadian rhythm sleep-wake disorders, parasomnias, and sleep-related movement disorders. Sleep disorders are common in the United States of America [2]. In Malaysia, nine out of ten citizens suffer from one or more sleep problems, while only 43% of them aware of having sleep problems [3].

Sleep quality is the strongest predictor of well-being among undergraduate college students [4]. According to Lemma., *et al.* [5] students were among the high-risk groups being affected by a sleep disorder. This is because they were facing new challenges, such as being responsible for self, new schedules, unfamiliar environment, social obligations as well as academic stress when entering college life. College students, in particular, experience the pressing need to work and maintain social lives while balancing extensive class and study time [6]. A study by Luo., *et al.* [7] showed that Chinese medical students generally understood sleep disorders to be an essential problem, but they knew little about actual sleep disorders. Mixed-method research by Gellerstedt., *et al.* [8] reveals that knowledge about sleep and patients' sleep among nursing students are insufficient and limited. Therefore, we can conclude that students' understandings and awareness are still lacking when it comes to sleep. Another study findings revealed that some students used to stay up before examination, which leads to sleep-deprivation [9]. They believe this action may help them to score in their examination. This is inconsistent with the purpose of sleep. Besides restoring the biological process and conserves energy, sleep is also necessary for brain restoration, which appears to be important for cognitive restoration. This cognitive restoration is associated with changes in cerebral blood flow, increased cortical activity, increased oxygen consumption, and epinephrine release, which assists with memory storage and learning. Cognitive competencies such as consolidation and encoding of memories are necessary, especially in medical education, because medical students need to retain a substantial amount of factual knowledge within a short period [10]. Due to the evolution of technology, the trends of using gadgets before sleep had been increasing enormously. People check on messages, social media, listening to music, and watching videos as they believed that it would help drive them to fall asleep. Another study by Gradisar., *et al.* [11] found that American that engaging with technology use in the hour before bed are more likely to had difficulties falling asleep and had an unrefreshing sleep, especially in younger age. The use of technology devices before bed may cause a person to be wide awake instead of feeling sleepy due to suppress the release of melatonin - a sleep-inducing hormone - and make it difficult to fall asleep.

Poor sleep quality has been reported in 63.2% of Portugal nursing students, 84.31% Italy nursing students, and 56.1% Turkey nursing students [12-14]. This showed that poor sleep quality was relatively higher among nursing students. Students with poor sleep quality are more likely to report physical illness, higher levels of stress, and the use of medications or recreational drugs to help with staying awake or falling asleep [15]. Nursing students with poor sleep quality have been found to more likely to experience daytime sleepiness [16]. A person with excessive daytime sleepiness will be having difficulty in maintaining an alert awake state and is usually accompanied by a rapid entrance into sleep when in an idle state.

Limited studies are documenting the prevalence of sleep quality and daytime sleepiness among nursing students in Malaysia. Therefore, in this study, we would like to verify daytime sleepiness and sleep quality among nursing students in Malaysia. Our primary objective was to identify the prevalence of daytime sleepiness and followed with characterize the level of sleep quality among nursing students. Our third objectives were to determine association between daytime sleepiness and sleep quality. Our final objective was to determine the differences in sleep quality and daytime sleepiness between years of study.

Materials and Methods

This was a quantitative cross-sectional study design, conducted in one of the private healthcare University institutions in Malaysia. The study used convenience sampling method and involved the students of Diploma nursing at all levels of study. Data collection was carried out in May 2020. A total of 211 respondents were selected in this survey based on Krejcie and Morgan [17]. Sample of nursing students aged 18 and over was selected. Out of them, 185 responded, giving the response rate of 87.7%. While the remaining students were unable to participate due to limited internet access.

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Each respondent was asked to complete a self-administered online survey involving three parts; socio-demographic data, Epworth Sleepiness Scale (ESS), and Pittsburgh Sleep Quality Index (PQSI) were used as research instruments.

Part A is socio-demographic characteristics include age, gender, academic year and race.

Part B, Epworth Sleepiness Scale used to measure daytime sleepiness was adopted from Johns [18]. This scale was first introduced to 180 adults to measure their general level of daytime sleepiness with 150 of the participants were having a range of sleep disorders in Epworth Hospital in Melbourne, Australia. The eight items scale asked the respondents to self-evaluate their tendency to doze off in eight daily situations through four-point Likert scale which includes four grades about the chance to doze, 0 = would never doze; 1 = slight chance of dozing; 2 = moderate chance of dozing; 3 = high chance of dozing. The score range from 0 to 24, where score 11 or higher indicates to have daytime sleepiness. ESS has an internal consistency of 0.88 [19]. In the Malay version validation, the instrument presented an Alpha of 0.73 [20]. In this study, Cronbach's alpha is 0.79. An additional question ("Attending a lecture in the afternoon") with the same scoring was added in the questionnaire.

Part C, Pittsburgh Sleep Quality Index, adopted from Buysse., *et al*. [21] was used to measure sleep quality and sleep disorder in the last one month. The index comprised of 19 items, which are combined to form 7 component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each component was scored between 0 to 3 points yielding a global score range from 0 to 21, with a score higher than five was abnormal and indicated poor sleep quality. The PSQI has an overall reliability coefficient (Cronbach's alpha) and internal consistency of 0.83 for its seven (7) components [21]. There is a score of greater than five on the PQSI, which has been shown to the diagnostic sensitivity of 89.6% and specificity of 86.5% when distinguishing between the poor sleeper and good sleeper. In this study, Cronbach's alpha for reliability analysis was 0.68. In a study conducted among Indian University students, the instruments presented an Alpha of 0.736 [22].

Data obtained was analyzed by using IBM statistical Package Social Sciences (SPSS) version 20. Descriptive analysis was used to determine the frequency, percentage, mean, and standard deviation of daytime sleepiness and sleep Quality among nursing students. For inferential analysis, the analysis would identify the association between daytime sleepiness and sleep quality among nursing students. The association between daytime sleepiness and sleep quality on socio-demographic were determined. Chi-square test and Fisher's exact test, where applicable, was done for categorical data. All levels of significance were set at a standard p-value of 0.05.

This study was approved by Research Management Centre (RMC) of the university affiliation and researchers promised to observe the stated ethical considerations in the Declaration of Helsinki. Data collection was completed as an online survey by using Google form due to the outbreak of COVID-19. An invitation email was sent out to notify the respondents of the study, which included a link to access the survey directly. The potential respondents were provided with a section in the relation regarding explanation on the purpose of the study, that information collected would remain anonymous, that participation was voluntary, and that there was no penalty for withdrawal of the involvement in the study. The respondents' completion and return of the questionnaire indicated voluntary consent to participate in this research study. The survey remained open for a total of 3 weeks.

Results

Demographic characteristics of the respondents are shown in table 1. Majority of the respondents were between the age group of 19 - 21 years (88.1%). Females were dominant respondents with (n = 168, 90.8%) while male respondents (n = 17, 9.2%). Of the total, 54 (29.2%) respondents were from 1st year, 92 (49.7%) 2nd year and 39 (21.1%) from 3rd year. Majority of the respondents were Malays.

According to table 2, 42.7% of the respondents reported having a moderate while 13.5% reported of high chance of dozing during the afternoon lecture. Overall, 74 (40%) nursing students had daytime sleepiness with ESS score ≥ 11 (Table 2).

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	Variable	Frequency (n)	Percentage (%)
Age	<18	2	1.1
	19 - 21	163	88.1
	22 - 24	19	10.3
	> 25	1	0.5
Gender	Male	17	9.2
	Female	168	90.8
Academic year	First	54	29.2
	Second	92	49.7
	Third	39	21.1
Race	Malay	162	87.6
	Indian	9	4.9
	Chinese	3	1.6
	Others	11	5.9

Table 1: *Socio-demographic profile of the study respondents (n = 185).*

Characteristic	Number (%)
The tendency to doze during a lecture	
Would never doze	17 (9.2)
Slight chance of dozing	64 (34.6)
Moderate chance of dozing	79 (42.7)
High chance of dozing	25 (13.5)
Epworth sleepiness scale	
No daytime sleepiness (ESS < 11)	111 (60.0)
Daytime sleepiness (ESS ≥ 11)	74 (40.0)

Table 2: *Daytime sleepiness.*

As shown in table 3, majority sleep with duration of 5 to 5.9 hours (50.3%), followed by 21.6% had sleep duration of 6 to 6.9 hours, while 15.1% sleep more than 7 hours and 13.0% sleep less than 5 hours. The majority of respondents (92.4%) did not use sleep medication in the past month, and 67% mentioned having sleep efficiency more than 85%. More than half of respondents evaluate their sleep as reasonably good and 14.6% evaluate their sleep as very good. The finding showed that 136 (73.5%) nursing students were "poor sleepers" and 49 (26.5%) were "good sleepers" based on the global PSQI score.

	Variable	Frequency (n)	Percentage (%)
Sleep duration (Mean 6.04 +/- 1.54)	≥ 7	28	15.1
	6 - 6.9	40	21.6
	5 - 5.9	93	50.3
	<5	24	13.0
Sleep latency	< 15 minutes	80	43.2
	16-30 minutes	55	29.7
	31-60 minutes	31	16.8
	> 60 minutes	19	10.3

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Sleep efficiency	> 85%	124	67.0
	75-84%	17	9.2
	65-74%	17	9.2
	< 65%	27	14.6
Sleep disturbances	Not during the past month	3	1.6
	Less than once a week	112	60.5
	Once or twice a week	69	37.3
	Three or more times a week	1	0.5
Subjective sleep quality	Very good	27	14.6
	Fairly good	118	63.8
	Fairly bad	35	18.9
	Very bad	5	2.7
Use of sleep medication to sleep	Not during the past month	171	92.4
	Less than once a week	8	4.3
	Once or twice a week	3	1.6
	Three or more times a week	3	1.6
Daytime dysfunction	Not during the past month	80	43.2
	Less than once a week	78	42.2
	Once or twice a week	24	13.0
	Three or more times a week	3	1.6
Global PSQI (Mean 7.15 +/- 2.93)	Good sleep quality (PSQI ≤ 5)	49	26.5
	Poor sleep quality (PSQI > 5)	136	73.5

Table 3: Distribution of nursing students by sleep quality and sleep components.

Table 4 shows the frequencies of sleep disturbance experienced by the respondent. Among the result, common sleep disturbances reported by respondents that occur more than once a week were unable to sleep within 30 minutes, wake up in the middle of the night or early morning, and feel very hot. Furthermore, 8 respondents (4.32%) reported other reasons for sleep disturbance, which included "cramp," "feeling uncomfortable," and "overthinking".

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes	32 (17.3%)	50 (27.0%)	62 (33.5%)	41 (22.2%)
b. Wake up in the middle of the night or early morning	34 (18.4%)	52 (28.1%)	58 (31.4%)	41 (22.2%)
c. Have to get up to use the bathroom	44 (23.8%)	68 (36.8%)	50 (27.0%)	23 (12.4%)
d. Cannot breathe comfortably	116 (62.7%)	52 (28.1%)	14 (7.6%)	3 (1.6%)
e. Cough or snore loudly	120 (64.9%)	42 (22.7%)	15 (8.1%)	8 (4.3%)
f. Feel too cold	67 (36.2%)	58 (31.4%)	45 (24.3%)	15 (8.1%)
g. Feel too hot	40 (21.6%)	64 (34.6%)	52 (28.1%)	29 (15.7%)
h. Have bad dreams	63 (34.1%)	57 (30.8%)	53 (28.6%)	12 (6.5%)
i. Have pain	103 (55.7%)	53 (28.6%)	22 (11.9%)	7 (3.8%)
j. Other reason (s)				
Cramp		2 (25%)		
Feeling uncomfortable		2 (25%)	1 (12.5%)	
Overthinking			2 (25%)	1 (12.5%)

Table 4: Frequency of sleep disturbance.

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Chi-Square was used to analyze the relationship between sleep quality and daytime sleepiness. There was no significant association between these variables, as shown in table 5. Regarding the relationship between sleep quality and daytime sleepiness with the year of study, the result showed that there was no significant association between years of study and quality of sleep and daytime sleepiness.

Epworth Sleepiness Score	Global Pittsburgh Sleep Quality Index n (%)		Chi-squared	df	p-value
	Good sleep quality ≤ 5	Poor sleep quality > 5			
No daytime sleepiness score < 11	35 (71.4%)	76 (55.9%)	3.308	1	0.069
Daytime sleepiness score ≥ 11	14 (28.6%)	60 (44.1%)			

Table 5: *The association between daytime sleepiness with sleep quality.*

Years of study	Epworth Sleepiness Score n (%)		Chi-squared	df	p-value
	No daytime sleepiness	Daytime sleepiness			
Year 1	27 (14.6%)	27 (14.6%)	3.561	2	0.169
Year 2	60 (32.4%)	32 (17.3%)			
Year 3	25 (13.5%)	14 (7.6%)			

Table 6: *The association between years of study with daytime sleepiness.*

Years of study	Global Pittsburgh Sleep Quality Index n (%)		Chi-squared	df	p-value
	Good sleep quality	Poor sleep quality			
Year 1	14 (7.6%)	40 (21.6%)	1.110	2	0.574
Year 2	27 (14.6%)	65 (35.1%)			
Year 3	8 (4.3%)	31 (16.8%)			

Table 7: *The association between years of study with sleep quality.*

Discussion

The present study was performed to identify daytime sleepiness and sleep quality among nursing students. As in this study, it was found that our sample consist of 185 nursing students, with majority of students were female, attending the 2nd year, with most students aged between 19 to 21 years and Malays were the predominated races.

The overall prevalence of daytime sleepiness reported by our study was 40%, similar to studies among Indian college students and nursing postgraduates in Rio de Janeiro [23,24]. It was significantly higher among nursing students in Portugal and Saudi Arabia [13,25].

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However, a study by Nurismadiana and Lee [26] reported of much higher prevalence of daytime sleepiness with 55% among undergraduate students. According to Afandi., *et al.* [27] the inability to achieve and sustain awake-ness and alertness during the daytime due to only spending one to two hours a night sleeping can result in the students having a "sleep debt". The impact of excessive daytime sleepiness often results in impaired waking function, poor work or school performance, accidents while driving or using equipment, and behavioral or emotional problems. Excessive daytime sleepiness might also associate with afternoon slump. Half of the students responded with having the tendency to doze in the afternoon lecture. Zailinawati., *et al.* [28] study shows nine out of ten of their students were suffered from afternoon lecture sleepiness. Therefore, they suggest that scheduling lectures in the afternoon are not beneficial. Afternoon slump can be experienced by perceptible plunge in their sharpness, vitality level and ability to concentrate in the afternoon.

The finding of this study showed that undergraduate nursing students suffer from poor sleep quality, with 73.5% out of 185 students. An almost similar result can be found in research conducted by Nurismadiana and Lee [28] with 70.6% of the undergraduate student was classified as poor sleepers. Besides, more than half of respondents evaluate their sleep as good and 14.6% evaluate their sleep as very good. In this matter, we can highlight that more than 50% of the students have low sleep quality during the past month based on PSQI criteria and unaware that they have poor sleep quality. This prevalence of poor sleep quality was relatively higher than a study conducted among nursing students in Turkey, and Portugal but lower in Italy nursing students [12-14].

Sleep duration result among nursing students shows that most of the students sleep less than 7 hours per night with mean of 6 hours 4 minutes (± 1.54 hours), this was agreed by Benavente., *et al.* [29], Brick., *et al.* [30] and Tien Ngu., *et al.* [31] which finds showed a high prevalence of medical and nursing students sleep less than 7 hours. However, the results contradicted with the National Sleep Foundation report that suggests the average adult needs 7 to 9 hours of sleep each night [32]. We can conclude that majority of students were sleep-deprived. The effects of missing sleep can last for several days, and it takes a longer time for the body to recover. Besides, proper sleep will be enhanced better on memory tasks than those who did not have an adequate sleep. According to the Centers for Disease and Prevention [33], students who have fewer sleep may get attention and behavior problems.

The third objective of this study is to associate sleep quality and daytime sleepiness. No association was found in this study between daytime sleepiness and sleep quality ($p < 0.069$). This result was concurrent with the research done by Sato., *et al.* [34] who reported that daytime sleepiness did not correlate with sleep quality. However, the survey by Nurismadiana and Lee [26] showed an association between daytime sleepiness and sleep quality between undergraduate students, in that the students who are poor sleeper had a higher prevalence of excessive daytime sleepiness than those who are a good sleeper. According to Rocha and De Martino (2010), increased daytime sleepiness, which leads to reducing alertness were caused by poor sleep quality.

Students in Year 2 showed a high prevalence of daytime sleepiness compared to Year 1 and Year 3. Similar findings from the research done by Kaur and Singh [24] showed that Year 2 students reported a high frequency of excessive daytime sleepiness. No association was found in this study between years of research and daytime sleepiness in this study ($p < 0.169$). However, the survey by Kaur and Singh [24] showed an association between years of study and daytime sleepiness. Taher., *et al.* [35] found that daytime sleepiness had an association with Year 1 and Year 4 in their research.

It is found that years of study had no statistical impact on sleep quality on nursing students, and this was agreed with Kamel., *et al.* [25], Silva., *et al.* [13] and Tien Ngu., *et al* [31]. However, in terms of values, second-year students were most likely to be having poor sleep quality rather than first and third-year students. These results go against other studies, who observed that first-year students revealed to exhibit less sleep quality [13,31]. Benavente., *et al.* [29] found that diminish sleep quality correlated students enrolled in the first academic year. The authors believed they need to perform work activities and to spend more time studying in, which contributes to the reduction in sleep quality. It was presumed that later year students might have developed better coping strategies for their study and time management.

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Research showed that the use of electronic gadgets during bedtime results in poor sleep habits that may cause reduce timing of sleep as well as the duration and quality of sleep [36]. This was supported by Hysing., *et al*. [37] that said the use of electronic devices after lights out had shown of causing an increased risk of short sleep duration, long sleep onset latency, and increased sleep deficiency. Using gadgets during bedtime will only allow a person to be more awake and increase their alertness, thus delaying sleep time. REM sleep will be delay causing reduce the amount of REM sleep, which may lead to decrease alertness on the day after. Students might also use excessive time on electronic gadgets, especially smartphones before going to bed. Thus, it extended and spoiled their sleeping hours. Therefore, students should limit themselves from using smartphone before sleep and show more concern on sleep quality and health.

Limitation and Recommendation

There were a few limitations to address in this study. First, we used a cross-sectional study that examined the experiences of students from the nursing program only. Therefore, the results might not represent the perception of all students from other health care professions, as others might show a different outcome. The study was conducted in one of the private institutions in Malaysia. Therefore, it cannot represent the whole nursing student population in Malaysia.

This study was intended to alert nursing students who are also the future of health professionals to adopt a healthy sleep habit to improve the Quality of sleep because studies have shown many downsides of the poor practice of sleep. Since high numbers of students were classified as a poor sleeper, future interventions were needed to overcome this situation. The institution needs to introduce a syllabus or program related to sleep in the nursing program. The students can take part by organizing an event on 'World Sleep Day' within the university or public area. This will not only help to increase awareness regarding sleep to the public but also increase their understandings and knowledge for future use.

Conclusion

More than two-thirds of the subjects were experiencing poor sleep quality. Almost half of the students had daytime sleepiness. A few of the respondents experienced daytime sleepiness which may link with afternoon slump as this may indicate that there was poor alertness in the afternoon classes. Most of the students sleep less than 6 hours per night, and this is against the recommended sleep duration proposed by the National Sleep Foundation. There were no statistical differences found on daytime sleepiness and sleep quality with years of study. However, students in the second year show higher rates than other students. Lastly, in this study, it showed that no significant association was found between daytime sleepiness and sleep quality.

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