
Daytime Sleepiness and Sleep Quality among Health Sciences Students of City University Malaysia

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Abstract

Introduction: Daytime sleepiness and poor sleep quality are common issues within our population. Within student population, daytime sleepiness and poor sleep quality are as well concerning especially those pursuing healthcare courses due to high academic responsibilities. The objective of this study was to determine the prevalence of daytime sleepiness and poor sleep quality of the health sciences students of City University Malaysia. The study also demonstrated the association of gender, age and academic year with daytime sleepiness and sleep quality.

Methodology: This was a cross-sectional study involving students from the Faculty of Allied Health Sciences, City University Malaysia. Data were collected from demographic questionnaire, Epworth Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI). Association of gender, age and academic year with daytime sleepiness and sleep quality were assessed with chi-square test as data were categorical.

Results: 119 data were analysed. Majority of the participants were females ($n = 66$, 55.5%) with the mean age of 23 (± 2.64). There were 19, 19, 36 and 45 students for Year 1, Year 2, Year 3 and Year 4 respectively. The prevalence of daytime sleepiness (ESS score ≥ 11) was 55.5% ($n = 66$) and 63.9% ($n = 76$) for poor sleep quality (PSQI score > 5). Based on chi-square test, daytime sleepiness had no significant association with gender, age and academic year although test result of association between academic year and daytime sleepiness shown near significance ($p=0.054$). Sleep quality also had no association with gender, age and academic year.

Conclusion: As a conclusion, majority health sciences students of City University Malaysia had daytime sleepiness and poor sleep quality but were not significantly associated with gender, age and academic year.

Keywords: daytime sleepiness, sleep quality, health sciences students

1.0 Introduction

Daytime sleepiness is common in our population. There are even studies done and concluded that it is getting worse year by year (Jaussent et al, 2017). Among students, daytime sleepiness is also a major problem. Similarly, having poor sleep quality is also a major issue within our population. It is also one of the issues concerning university students.

Medical and health sciences students can easily suffer from daytime sleepiness alongside with sleep deprivation due to high academic workload (Azad, Faser, Rumana et al., 2015). Dagnew et al. (2020) concluded high prevalence of excessive daytime

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sleepiness of medical and health science students in Northwest Ethiopia. Study carried out by Zeru et al. (2020) in Southwest Ethiopia whereas proved high prevalence rate of poor sleep quality among health sciences students.

Moreover, study carried out by Dagnev and partners (2020) also concluded association of daytime sleepiness with depression and night sleep behaviour and disorders among health science students. Moreover, sleep disorders disturbed students' physical and psychological morbidities, learning abilities and cognitive function (Zafar, Omer, Elfatih et al. 2020). Poor sleep quality itself significantly leads to poor academic performances, similarly to daytime sleepiness. Both sleep disorders also affect students mentally.

Although related studies were available, studies of the targeted issues on health sciences students remain limited, especially on daytime sleepiness. Therefore, the purpose of the current study was to study the prevalence of daytime sleepiness and poor sleep quality among health sciences students in City University Malaysia. This study will also assess the relationship of gender, age and academic year with daytime sleepiness and sleep quality among health sciences students in City University Malaysia.

2.0 Literature review

2.1 Daytime sleepiness

Daytime sleepiness can be defined as the desire to sleep during broad daylight. Affected people fail to stay awake during daytime or instead, they sleep unintentionally at inappropriate time nearly everyday for at least 3 months. (Brown & Makker 2020). An individual is unable to maintain high level of wakefulness and eventually lapses into drowsiness or sleep unintentionally (Buysse, 2014; Hershner & Chervin, 2014). Some other terms which also refer to daytime sleepiness include excessive daytime sleepiness, hypersomnolence and hypersomnia, (Gandhi, Mansukhani, Silber et al., 2021).

Daytime sleepiness affects 4-20% of the population at least 3 days in a week (Brown, Makker, 2020). There are other studies which suggest a higher prevalence of daytime sleepiness which affecting 9% to 28% of the population (Sathe, Saraf, Talapalliwat, 2021). In addition, based on the 5-year longitudinal study done by Jaussent and partners (2017) among Canadian population, they found out that there was worsen excessive daytime sleepiness among 31% of the subjects.

Daytime sleepiness has become a major problem as well among students with varying prevalence rate of 24.6% to 57.4% (Amaral, Galdino, Martins, 2021). In Malaysia itself, study by Nurismadiana and Lee (2018) conducted among undergraduate students of public universities across Serdang, Selangor found out that there is 55% of the subjects have excessive daytime sleepiness, which is as well consistent within the expected range. On top of that, in the USA, 60% of students complained of being dragging, fatigue or sleepy (American College Health Association, 2012). Excessive daytime sleepiness is associated with laziness and concentration deficits among adolescents (Sathe, Saraf, Talapawilar, 2021).

2.2 Sleep quality

Sleep quality can be referred as having a ‘good’ or ‘poor’ sleep (Buysse, 2014) or whether the sleep is restful or restorative (National Sleep Foundation, 2020). Sleep quality is determined through evaluation of sleep latency, sleep waking, wakefulness and sleep efficiency (National Sleep foundation, 2020). Disturbance of any of the components will affect overall sleep quality, leading to poor sleep quality.

When one takes more than 30 minutes to fall asleep, wakes up more than once during the night, takes more than 20 minutes to get back to sleep after waking up in the middle of the night, he considers to have poor sleep quality. High chances are he feels restlessness even though he had sufficient hours of sleep (National Sleep Foundation, 2020).

There are approximately 62% adults of the world’s population having poor sleep (Viens, 2019). Although limited studies are conducted in Malaysia, a study done among general public in Klang reveals more than half (67.7%) of the participants have poor sleep quality (Qamar, Tan, Ahmad, 2021). In addition, most other studies done in other countries also reveal significantly high prevalence of poor sleep quality (Aviva, 2017), providing evidence that poor sleep quality is getting more alarming.

According to the PSQI, there are about 60% university students experiencing poor sleep quality (Lund, Reider, Whiting, et al., 2010). However, in Malaysia alone, the prevalence of poor sleep quality among undergraduate students is 70.6% (Nurismadiana & Lee 2020). Various studies from other countries also revealed exceeding values (Araújo et al., 2021; Herawati & Gayatri, 2019), indicating that poor sleep quality is affecting students all over the world.

2.3 Daytime sleepiness and sleep quality among health sciences students

Students in the health sector, including health science students are prone to poor sleep health due to their training, conflicts in learning institutes and obstacles faced from learning to entering the labour market (Amaral, Galdino & Martins, 2021). Complex study schedule of graduate students result in the development of sleep disorders as well (Zafar, Omer, Elfatih et al., 2020). Dagnew and partners (2020) also reveal that health science students experience sleep deprivation and daytime sleepiness due to high academic burden from their study. Furthermore, practical classes with fear of making harmful errors and meeting academic demands can also relegate sleep, rest and personal life among health science students, leading to sleep disorders such as daytime sleepiness and poor sleep quality (Amaral, Galdino & Martins, 2021).

There are limited studies carried out specifically on health sciences students on the evaluation of daytime sleepiness and sleep quality as most studies on targeted population on daytime sleepiness and sleep quality are done among medical or nursing students. However, based on one of the limited studies, Dagnew and partners (2020) evaluated that daytime sleepiness among medical and health sciences students have daytime sleepiness prevalence of 31.07% in Gondar, Northwest Ethiopia. The prevalence rate is within the proposed range, which is between 24.6% and 57.4%

(Amaral, Galdino, Martins, 2021). On the other hand, the estimated prevalence of daytime sleepiness of the same population in Malaysia is 76.7% based on the study of Nurismadiana and Lee (2018), indicating high severity of the sleep disorder in Malaysia.

Regarding sleep quality, study done by Zeru and partners (2020) in Southwest Ethiopia has indicated that more than 50% health sciences students are suffering from poor sleep quality. Although it is lower than the proposed range by the PSQI about poor sleep quality (60%), the prevalence shown is near alarming and should pay more attention to. In Malaysia, itself study conducted by Saat et al. (2020) in Kuala Lumpur reveals that there was 60% students of health sciences students experiencing poor sleep quality, consistent with the proposed range by the PSQI, similarly to another local study by Mohd Zaid et al. (2018) where there are 65% of allied health sciences students suffering from poor sleep quality of a public university.

These few studies among the limited studies evaluating on daytime sleepiness and sleep quality among health sciences students are enough to proof the severity of the two sleep disorders among the health sciences students.

2.4 Daytime sleepiness and sleep quality with sociodemographic characteristics among health sciences students

2.4.1 Gender

Among health sciences students, based on the study done by Zeru and partners (2020), males have higher prevalence of suffering from daytime sleepiness and poor sleep quality. Conversely, the study done by Boccabella and Malouf (2017) suggested that females are prone to daytime sleepiness than males. The local study by Nurismadiana and Lee (2018) similarly indicates that female students are highly exposed to poor sleep quality (55.3%) than males (15.3%).

However, in Malaysia, study by Saat et al. (2020) demonstrated no association of gender with sleep quality in among health science students. Similarly in the lone available local study investigating on daytime sleepiness but among medical students suggested that there is no association of gender with daytime sleepiness (Zailinawati, Teng, Chung et al., 2009).

2.4.2 Age

In an article by Fernandez-Mendoza and Julio (2015), they demonstrated that young adults are prevalent to daytime sleepiness, excluding elderly. The prevalence decreased with age until approaching old age. From this perspective, as most university students' age between 20 to 30 years old, their prevalence are high and decrease with increasing age. As for sleep quality, study by Nurismadiana and Lee (2018) found out that students age below 21 years old had poorer sleep quality than those above 21 years old.

On the contrary, study carried out by Dagnew and partners (2020) shows no association of age with daytime sleepiness after running bivariable logistic regression. Their study population were medical and health sciences students aged from 18 years old to 34 years old. No matter the result, most young adults are categorized as 'delayed sleepers' (Gadie et al., 2017) which can lead them to daytime sleepiness and poor sleep quality.

2.4.3 Academic year

Among health sciences students, no association is demonstrated between daytime sleepiness and year of study which is revealed in the study by Dagnew et al. (2020). However, based on the lone available study of daytime sleepiness with academic year in Malaysia, academic year is associated with daytime sleepiness among medical students (Zailinawati et al., 2009). Those in clinical years are more susceptible to suffer from daytime sleepiness.

For sleep quality, study by Zeru et al. (2020) reveals that those who are in final years followed by second year have higher magnitude of poor sleep quality among health sciences students in Jimma University, Southwest Ethiopia. Final years are commonly clinical years where clinical loads lead to increased pressure among the students (Hill, Goicochea & Merlo, 2018). In addition, it is believed that inadaptability to university routine and academic demand contributed to poor sleep quality among students in their first few years of studies (Angelin et al., 2020). However, in Malaysia, study on sleep quality with academic year do not exhibit association, demonstrated in the studies carried out by Mohd Zaid et al. (2018) and Saat et al. (2020).

3.0 Methodology

This study was a cross-sectional study taken place in City University Malaysia. Study population was consisted of all students of the Faculty of Allied Health Sciences of City University Malaysia. Convenience sampling was used to recruit participants for this study and sample size was obtained through Krejcie and Morgan (1970) table. Based on the Krejcie and Morgan (1970) table, the estimated sample size was approximately 118 for this study

Data collection was done between May 2022 and mid-July 2022. Participants were interviewed through self-administrated questionnaires after consented. The questionnaires were divided into 3 sections: demographic information (gender, age, academic year and course of study), Epworth Sleepiness Scale (ESS) (Johns, 1991) and Pittsburgh Sleep Quality Index (PSQI) (Buysse et al., 1989).

A reliability test was also conducted with a smaller sample of 21 respondents. Epworth Sleepiness Scale (ESS) which consists of 8 items has the Cronbach's Alpha value of $\alpha = 0.773$. Pittsburgh Sleep Quality Index (PSQI) which consists of 7 items whereas has the Cronbach's Alpha value of $\alpha = 0.729$. Both values indicate consistency (Hair et al., 2016) in both study measures.

For data analysis, demographic information (gender, age, academic year and course of study) were analysed with descriptive statistics in frequencies and percentages. In addition, age was categorized into 3 groups: 18 – 22 years old, 23 – 27 years old and ≥ 28 years old. Prevalence of daytime sleepiness and sleep quality were expressed in frequencies and percentages as well. Daytime sleepiness was classified in 4 categories: normal, mild, moderate and severe daytime sleepiness while sleep quality were categorized in 2 groups: good sleep quality and poor sleep quality. Association of daytime sleepiness and poor sleep quality with gender, age and academic year were determined with chi-square test.

4.0 Results

4.1 Demographic information

Demographic information included gender, age, course of study and academic year. Respondents were divided into 3 groups based on age: 18 – 22 years old, 23 – 27 years old and ≥ 28 years old. Course of study included courses available in Faculty of Allied Health Sciences of City University Malaysia: Bachelor of Biomedical Sciences (Hons), Bachelor of Occupational Safety and Health (Hons), Diploma in Medical Laboratory Technology, Diploma in Nursing and Diploma in Nursing. Academic year was defined as Year 1 for semester 1 – 3, Year 2 for semester 4 – 6, Year 3 for semester 7 – 9 and Year 4 for semester 10 – 12.

Table 4.1: Demographic Distribution of Health Sciences Students at City University Malaysia

Variables (n=119)	n	Percentage (%)
Gender		
Male	53	44.5
Female	66	55.5
Age (mean \pm SD) (years)		
18 – 22	61	51.3
23 – 27	55	46.2
≥ 28	3	2.5
Course of study		
Bachelor of Biomedical Sciences (Hons)	36	30.3
Bachelor of Occupational Safety and Health (Hons)	48	40.3
Diploma in Medical Laboratory Technology	1	0.8
Diploma in Nursing	10	8.4
Diploma in Occupational Safety and Health	24	20.2
Academic year		
Year 1 / Semester 1-3	19	16
Year 2 / Semester 4-6	19	16

Year 3 / Semester 7-9	36	30.3
Year 4 / Semester 10-12	45	37.8

Source: Developed for this research.

4.2 Daytime sleepiness

The mean total ESS scores was 11.37 (SD \pm 4.92). According to the ESS, excessive daytime sleepiness (ESS score \geq 11) occurred in 55.5% of the participants and they mostly suffered from moderate excessive daytime sleepiness (21.8%). There are 17 participants experienced mild excessive daytime sleepiness (14.3%) and 23 of them suffered from severe daytime sleepiness (19.3%). Table 4.2 below further classified daytime sleepiness with demographic distribution.

Table 4.2: Classification of Daytime Sleepiness among study participants (n=119)

Daytime Sleepiness (ESS score)	n	Percentage (%)
Normal (0-10)	53	44.5
Mild excessive daytime sleepiness (11-12)	17	14.3
Moderate excessive daytime sleepiness (13-15)	26	21.8
Severe excessive daytime sleepiness (16-24)	23	19.3

Source: Developed for this research.

Table 4.3: Daytime Sleepiness with Demographic Distribution

Variables	Normal n (%)	Mild EDS n (%)	Moderate EDS n (%)	Severe EDS n (%)
Gender				
Male	21 (39.6)	8 (47.1)	15 (57.7)	9 (36.0)
Female	32 (60.4)	9 (52.9)	11 (42.3)	14 (64.0)
Age (years)				
18 – 22	28 (52.8)	9 (52.9)	16 (61.5)	8 (34.8)
23 – 27	23 (43.4)	7 (41.2)	10 (38.5)	15 (65.2)
\geq 28	2 (3.8)	1 (5.9)	0 (0.0)	0 (0.0)
Academic year				
Year 1 / Semester 1-3	11 (20.8)	2 (11.8)	5 (19.2)	1 (4.3)
Year 2 / Semester 4-6	12 (22.6)	3 (17.6)	4 (15.4)	0 (0.0)
Year 3 / Semester 7-9	12 (22.6)	5 (29.4)	9 (34.6)	10 (43.5)
Year 4 / Semester 10-12	18 (34.0)	7 (41.2)	8 (30.8)	12 (52.1)

EDS, Excessive daytime sleepiness

Source: Developed for this research.

4.3 Sleep quality

The mean total PSQI scores was 6.76 (SD \pm 3.25). According to the PSQI scores, majority of the participants experienced poor sleep quality (PSQI score $>$ 5) (63.9%). Further, Table 4.5 described sleep quality among study participants with demographic distribution.

Table 4.4: Classification of Sleep Quality among study participants (n=119)

Sleep Quality (PSQI score)	n	Percentage (%)
Good sleep quality (\leq 5)	43	36.1
Poor sleep quality ($>$ 5)	76	63.9

Source: Developed for this research.

Table 4.5: Sleep Quality with Demographic Distribution

Variables	Good Sleep Quality n (%)	Poor Sleep Quality n (%)
Gender		
Male	17 (39.5)	36 (47.4)
Female	26 (60.5)	40 (52.6)
Age (years)		
18 – 22	21 (48.8)	40 (52.6)
23 – 27	21 (48.8)	34 (44.7)
\geq 28	1 (4.8)	2 (2.6)
Academic year		
Year 1 / Semester 1-3	10 (23.3)	9 (11.8)
Year 2 / Semester 4-6	4 (9.3)	15 (19.7)
Year 3 / Semester 7-9	14 (32.6)	22 (28.9)
Year 4 / Semester 10-12	15 (34.9)	30 (39.5)

Source: Developed for this research.

4.4 Association of daytime sleepiness and sleep quality with demographic factors

(gender, age, academic year)

Based on Table 4.6, for daytime sleepiness, there were no significant association with gender, χ^2 (3, N = 119) = 2.656, $p = .448$, and age χ^2 (6, N = 119) = 7.361, $p = .289$. There was no significant association of daytime sleepiness with academic year as well, χ^2 (9, N = 119) = 16.686, $p = .054$, but chi-square test result indicated near significant association ($p = .054$) at confidence level of 95%.

As for sleep quality, there were also no significant association of sleep quality with all variables: gender, $\chi^2 (1, N = 119) = .682, p = .409$, age, $\chi^2 (2, N = 119) = .187, p = .911$ and academic year, $\chi^2 (3, N = 119) = 4.385, p = .223$.

Table 4.6: Results of Chi-square Test of Independence between Gender, Age and Academic Year with Daytime Sleepiness and Sleep Quality

	Variables (n = 119)		
	Gender	Age	Academic year
Daytime Sleepiness			
χ^2	2.656	7.361	16.686
df	3	6	9
<i>p</i>	0.448	0.289	0.054
Sleep Quality			
χ^2	0.682	0.187	4.385
df	1	2	3
<i>p</i>	0.409	0.911	0.223

Source: Developed for this research.

5.0 Discussion

5.1 Daytime sleepiness

Result from this study concluded that more than half (55.5%) of the Health Sciences students of City University Malaysia experienced excessive daytime sleepiness. Competitive and demanding learning environment may be the cause of high prevalence of daytime sleepiness among the students (Kryger et al., 2017).

With regard to the severity of daytime sleepiness, it was observed that moderate daytime sleepiness was more prevalent among the participants in this study. The result indicated that daytime sleepiness did not impact the students severely but not mildly either. The most probable explanation would be despite high academic burden, majority of the students of the present study might find it manageable but not as easier, which makes them moderately suffer from daytime sleepiness.

Gender-wise, based on this study, males were more prominent (60.4%) to daytime sleepiness compared to females (52.5%). According to a research by Dr. Boivin and his team (2016), males tend to sleep later than females with the similar sleep duration as females. Physiological signals to sleep of males are sent later than females and with similar sleep duration, they tend to sleep in. Since students' schedule usually starts in the morning, this could explain the prominence of daytime sleepiness among males in this study.

In terms of severity of daytime sleepiness relating to gender, result of the present study indicated that moderate daytime sleepiness was prominent among male participants and female participants were prone to severe daytime sleepiness. Students tend to go to bed late and get up early, resulting in sleep deprivation (Hershner, Chervin, 2014). This subsequently leads to loss of rapid eye movement (REM) sleep (National Sleep Foundation, 2020) causing daytime sleepiness. Additionally, females react to sleep deprivation more than males (Sleep Cycle, 2018) and in this case, daytime sleepiness. This explained female students experienced more severe daytime sleepiness than male students.

Regarding age, from this study, those aged between 18 – 22 years old were prone to daytime sleepiness followed by those aged 23 – 27 years old. Higher number of participants aged between 18 – 27 years old might be the constituent to higher prevalence of daytime sleepiness among age groups of 18 – 22 years old.

For academic year, this study shown that Year 4 students had higher occurrence of daytime sleepiness. The scenario most probably resulted from increasing academic burden as students advanced to a higher year of study and starting of practical training. More respondents from Year 4 students might attribute to the higher prevalence of daytime sleepiness among Year 4 students as well. Moreover, majority of the participants of this study were bachelor degree's students which had 4 years of study, contributing to the higher number of Year 4 students. In addition, among Year 1 students, occurrence of daytime sleepiness was most likely due to the inadaptability to university routine (Pascotto & Santos, 2013).

Considering severity of daytime sleepiness, 4th year students were prone to severe daytime sleepiness. The most convincing explanation of the outcome similarly was that they were preoccupied with several responsibilities at a same time which might lead them to frequent lack of sleep, causing severe daytime sleepiness. Year 3 students had moderate daytime sleepiness most likely due to advancing academic burden as they soon would be in Year 4 of study.

With regard to age to severity of daytime sleepiness, it could be observed that severity of daytime sleepiness with age followed the distribution pattern of daytime sleepiness with year of study. Forth year students majorly aged between 23 – 27 years old, contributing to the high prevalence of severe daytime sleepiness of the age group as they had more academic responsibilities. Moderate daytime sleepiness also followed a similar distribution pattern as Year 3 students majorly aged between 18 – 22 years old which resulted in higher prevalence among students of the age groups due to increasing academic burden as they advanced to 4th year of study. Yet, more participants among Year 3 and Year 4 could attribute to the outcome.

5.2 Sleep quality

The prevalence of poor sleep quality among health sciences students of this study was lower (63.9%) when compared to local studies by Cheong (2021) (74.4%) and Mohd Zaid et al. (2018) (65%) which also accessing sleep quality with the same instrument and population. However, the finding was nearly 10% higher when compared to study by Saat et al. (2020) where their 54% of their subjects had poor sleep quality. When compared with international studies (Zeru et al., 2020; Bogati, 2020;

Alaqeel et al., 2021; Zafar and Ansari, 2020), similar contradictions were indicated as well. Varying results on different students majorly might be due to differences in socioeconomic demands, cultural background and variations in academic pressures among different population (Zeru et al., 2020). Nevertheless, the prevalence rate exceeded the range proposed by PSQI where 60% of university students had poor sleep quality (Lund et al., 2010). It indicated severity of poor sleep quality among health sciences students of City University Malaysia. High academic demands and practical were the major cause of poor sleep quality among health sciences and healthcare-related courses students, which could result in reduced sleeping time, subsequently leading to poor sleep quality (Amaral, Galdino & Martins, 2021; Cheong & Tan, 2021).

Taking gender into consideration, the present study revealed poor sleep quality was more predominant among male participants. This could be explained by the fact that female students had better sleep quality and more consistent than male students, due to less stage 1 non-rapid eye movement (NREM) and more slow-wave sleep (SWS) than males. (Seun-Fadipe & Mosaku, 2017; Mallampalli & Carter, 2014; Bixler et al., 2009).

Considering age with sleep quality, the findings from this study indicated that those aged 18 – 22 years old were at higher prevalence of poor sleep quality. A past study indicated that males who aged 21 years old and females who aged 22 years and above were prevalent to poor sleep quality (Lohsoonthorn et al., 2012) which was somehow equivalent to the result obtained from the present study. Nevertheless, high number of participants with age ranging from 18-22 years old could have attributed to the outcome.

In terms of academic year, this study indicated highest prevalence of poor sleep quality among final year students. As previously discussed, final year students have more academic responsibilities compared to other year of study. Moreover, final years are when most health sciences students have clinical practices where clinical loads leading to increased pressure (Hill, Goicochea & Merlo, 2018). High pressure itself could lead to poor sleep quality (Alotaibi, Alosaimi, Alajlan & Bin Abdulrahman, 2020). With various academic responsibilities other than clinical practices, it worsens the condition.

5.3 Association of daytime sleepiness and sleep quality with gender, age and academic year

5.3.1 Gender

Based on the chi-square test ran in this study, there was no significant association of gender with daytime sleepiness. In another words, both genders had the tendency to suffer from daytime sleepiness. A similar study done in Northwest Ethiopia (Dagnew et al., 2020) demonstrated the same result among medical and health sciences students. Comparing to the lone available local study on similar topic which investigated gender with daytime sleepiness, no gender association was indicated either among medical students which had similar education background as health sciences

students (Zailinawati et al., 2009). Contradiction with some other studies (Zafar & Ansari, 2020) most likely due to different methodology and population.

For sleep quality, no significant association was indicated as well between gender and sleep quality. In another words, gender did not influence the occurrence of daytime sleepiness in this study despite higher proportion in males and higher frequency in female. Although the result could be supported by various similar studies (Cheong, 2021; Zeru et al., 2020; Saat et al., 2020; Mohd Zaid et al., 2018), contradictions remained with some other studies (Zafar & Ansari, 2020). Differences in research approach might be responsible to the different results.

5.3.2 Age

No significant association was indicated between age with daytime sleepiness in the present study. In another words, daytime sleepiness can happen to anyone despite younger or older age and in this case, among health sciences students. On the other hand, no significant association was demonstrated also between age and sleep quality.

5.3.3 Academic year

Academic year was also found to be not significantly associated with daytime sleepiness. Despite insignificant association, the chi square value indicated near significant association, $\chi^2 (9, N = 119) = 16.686, p = .054$. A study by Gunathilaka (2020) researching on similar topic among medical students and a local study revealed that there was significant association between academic year with daytime sleepiness with similar analysis approach. Differences of study outcome might be due to differences in sample sizes and population as the two reference studies involved large sample size and involving medical students. On the other hand, sleep quality had no significant association with academic year in this study.

6.0 Conclusion, limitations and recommendations

As a conclusion, there were more than half of the participants suffered from daytime sleepiness and poor sleep quality. Further evaluation also suggested that there were no association between gender, age and academic year with either daytime sleepiness or sleep quality although association of academic year with daytime sleepiness shown near significance value. Based on the results, null hypothesis was rejected.

Limitation of this study was mainly during data collection. There was low response rate from the participants despite sufficient number of participants enrolled for this study. This resulted in frequented request to the targeted population to answer the study questionnaires. It also lengthened the duration of data collection.

From this study as well, it was recommended to carry out the study on all students of City University Malaysia to access the daytime sleepiness and sleep quality of the students as a whole. Other potential factors such as state of physical health or mental health which influence the occurrence of daytime sleepiness and sleep quality might as well recommend to be investigated. Based on the results, risk factors of daytime sleepiness and poor sleep quality among students of City University Malaysia can be identified and control measures can be carried out to spread awareness and to lower the incidence of the said sleep disorders.

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