Sleep Quality and its Daytime Effects among University Students in the United Arab Emirates

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Received: 2 August 2023

Accepted: 3 December 2023

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DOI 10.5001/omj.2024.61

Abstract

Objective: Sleep plays a vital role in healthy development and affects an individual's physical and mental well-being. Under the social and academic pressures of university life, students are especially susceptible to sleep deprivation and sleep disorders. The aim of the study was to determine the irregularity in the sleep schedule among university students in the UAE and determine its correlation with poor sleep quality, daytime sleepiness, and fatigue.

Methods: This observational cross-sectional survey was conducted among 557 undergraduate students at Ajman University, UAE, during the academic year 2022-23. Data was collected electronically from the participants. The instruments for data collection comprised of sleep schedule questionnaire, Pittsburgh Sleep Quality Index (PSQI), Epworth sleepiness scale (ESS), and Fatigue Severity Scale (FSS). Data was analysed by SPSS-21 using Chi-square analysis, Mann-Whitney U test, Wilcoxon rank sum, and Spearman's correlation.

Results: The survey revealed that 57.2% of the population had highly irregular bedtime frequency. The mean global PSQI score for all participants was 8.9 ± 3.11 indicating a poor sleep quality among students. There was a positive correlation between the irregular bedtime frequency and the global PSQI score ($r=.311$, $p<.01$). The majority (70.8%) of the participants had a total high Fatigue Severity Scale score (≥ 36), indicating agreement with being fatigued. The scores of female participants (41.02±10.56) was significantly higher than that of the male participants (38.55±11.05) ($U=27812.0$, $p=0.006$). Around 53% of the participants had Epworth sleepiness scale scores indicating excessive daytime sleepiness. There was also a significant correlation between the irregular bedtime frequency and the Epworth sleepiness scale score of the participants ($r=.113$, $p=.009$).

Conclusions: The students at Ajman University have a high prevalence of sleep irregularity. This, in turn, is affecting their sleep quality and causing excessive daytime sleepiness. The students, especially the females, are suffering from fatigue which may affect their normal functionality. Given the importance of a consistent sleep schedule and its effect, it is crucial to encourage students to establish more regular sleep patterns and improve sleep habits, to promote their productivity and general well-being.

Keywords: Fatigue, sleep quality, daytime sleepiness, irregular bedtime, university students

Introduction

There is a growing recognition that sleep plays a vital role in healthy development and overall physical as well as mental well-being of an individual. It is recommended by American Academy of Sleep Medicine that adults should sleep regularly for 7 hours or more every night to promote optimal health.[1]

Sleep plays a major role in recovery from the fatigue of being awake and in energy conservation. Hormones released during sleep help in repairing and building muscles and growth of bones.[2] Sleep also appears to be important for neural development, cognitive functioning, mental health, and cardiovascular and metabolic function.[1]

The process of sleep is regulated by a complex interaction with the circadian system. Both the intrinsic circadian rhythm and the sleep-wakefulness cycle are affected by a variety of biological factors, environmental factors, physical activity types and levels, and regularity of bedtime. By having a regular sleep schedule, one can strengthen their circadian rhythm of sleep.[3] Conversely, since external factors such as artificial light, behaviour, and drugs can impact the circadian rhythm, they can also affect sleep duration and quality, leading to sleep disorders in people.[4]

Sleep disorders is the term used to refer to conditions that affect sleep quality, timing, and duration of sleep, usually resulting in impaired function and daytime distress.[3] Furthermore, inadequate sleep has been associated with impaired attention, alertness, and memory.[5] It also leads to fatigue, depression, and poor academic performance. In addition, excessive daytime sleepiness is another significant consequence and is also a major cause of concern in patients with sleep disorders.[6] Not to mention, chronic sleep deprivation with habitual short sleep duration could contribute to increased likelihood of obesity, diabetes, hypertension, cardiovascular disease, and all-cause mortality.[7,8]

When it comes to the social and academic pressures of university life, students are especially susceptible to sleep deprivation and disturbances.[9] Rapid lifestyle and behavioural changes can lead to poor sleep patterns in college students. Young adults typically tend to be "night owls", where they sleep late on weekdays and catch-up on the sleep during weekend. Irregular sleep schedules, excessive use of electronic devices during bedtime, and heavy consumption of caffeine, energy drinks or alcohol are some of the behaviours displayed by university students that are determinantal to their normal sleep.[10]

The purpose of this study was to screen university students studying in Ajman University, United Arab Emirates to (1) determine the irregularity in sleep schedule (2) Determine the prevalence of poor sleep quality, daytime sleepiness, and fatigue (3) estimate the correlation between (1) and (2)

Methods

This cross-sectional survey was conducted among undergraduate students in Ajman university, UAE, during the academic year 2022–2023. As per studies on poor sleep quality prevalence range is 35-75%. With an expected prevalence of 50% minimum sample in this study was estimated be 384. A total of 557 students who provided consent were administered a questionnaire.

Questionnaires were administered electronically using Microsoft office forms during the academic year except during the midterm and final weeks when stress and anxiety is usually heightened. The survey link was sent by email individually to all the people comprising the study population followed by a reminder email after 2 weeks.

The survey included 5 parts, the socio-demographic data (4 items), the sleep/bedtime frequency (1 item), the Pittsburgh Sleep Quality Index (PSQI) (7 components), Epworth Sleepiness Scale (ESS) (8 items), and the Fatigue Severity Scale (FSS) (9 items).

The Pittsburgh Sleep Quality Index (PSQI) questionnaire assesses qualitative and quantitative data to assess sleep quality a 1-month period. The PQSI global score interpretation helps in assessing the sleep problems and their severity.[11]

The Epworth sleepiness scale (ESS) is a self-administered survey that doctors frequently use to evaluate daytime sleepiness. There are eight questions in the ESS. Your results indicate how prone you are to fall asleep in ordinary conditions in your daily life. The higher your score, the sleepier you are during the day (0-24).[12]

The Fatigue Severity Scale (FSS) is a nine-item Likert scale used to assess the severity of fatigue and its impact on certain life activities.[13]

Data was collected from 557 students, of which only 96.4% (n=537) who completed the survey and provided consent were included in the study. All completed data with consent were gathered in Microsoft Excel (2013) and analysed in IBM SPSS Version 21. The descriptive statistics for all questions, and the mean and standard deviation for the PSQI, ESS, and FSS were calculated. Chi-square analysis, Mann-Whitney U test, Wilcoxon rank sum and Spearman's correlation were conducted to analyse any association between irregular bedtime frequency and PSQI, ESS, and FSS across different demographic backgrounds and sleep practices. Due to insufficient sample size, academic year 6 and academic programs except for Bachelor of Dental Surgery, MBBS, and Bachelor of Science in Engineering were excluded from the chi-square and ANOVA analysis conducted to study the variables differences across these groups. The data from all academic years and programs were combined for all other analyses.

The study was approved by the Research Ethics Committee, Ajman University (No. M-F-H-12-Sep).

Results

The 537 participants belonged to different academic programs and varied in their level in the program. The majority of the participants were females (65.7%, n=353) and studying in Bachelor of Dental Surgery program (49.3%, n=265). Table 1 shows the complete demographic data and Figure 1 shows the age distribution of the participants.

Table 1: Demographic Data.

Sociodemographic characteristics	n (%)
Gender	
Female	353 (65.7)
Male	184 (34.3)
Total	537 (100)
Academic Program	
Bachelor of Architecture/Interior Design	11 (2)
Bachelor of Dental Surgery	265 (49.3)
Bachelor of Education	4 (0.7)
Bachelor of Law	4 (0.7)
Bachelor of Mass Communication	3 (0.6)
Bachelor of Medicine and Bachelor of Surgery	109 (20.3)
Bachelor of Pharmacy	47 (8.8)
Bachelor of Science in Engineering	62 (11.5)
Bachelor of Finance/Management/Marketing	33 (6.1)
Year of Study	
First Year	92 (17.1)
Second Year	159 (29.6)

Third Year	60 (11.2)
Fourth Year	110 (20.5)
Fifth Year	110 (20.5)
Sixth Year	6 (1.1)

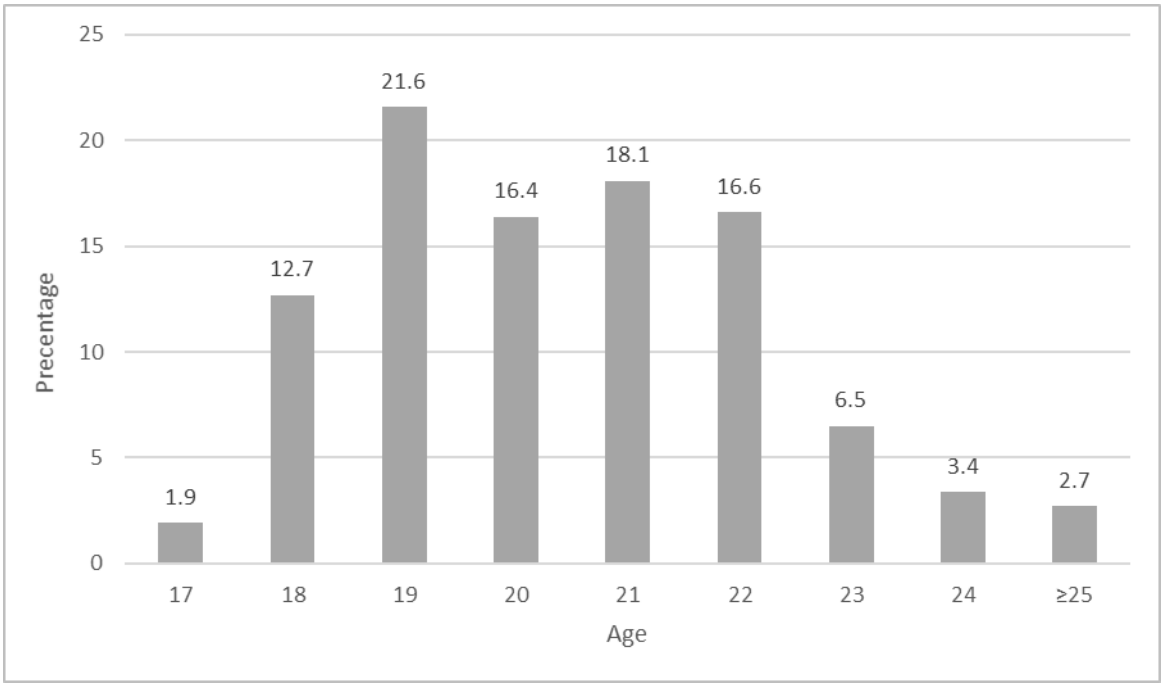

Figure 1: Age Distribution.

On studying the frequency of irregular bedtime, the study revealed 57.2% (n=307) of the participants were in the high-frequency group (> than 3 nights/week), 31.2% (n=170) were in intermediate frequency group, and 11.2% (n=60) were in the low-frequency group. The chi-square analysis showed no significant relationship between irregular bedtime frequency and gender [$x^2(2) = 0.574$, p=.751], year of study [x^2 (8) =13.092, p=0.109], and academic program, [x^2 (4) =7.295, p=0.121].

The PSQI consisted of 19 questions which were grouped into 7 components and scored from 0-3. The combined score of all 7 components yielded the global PSQI score, ranging from 0-21, '0' meaning no difficulty and '21' meaning severe difficulty. The mean global PSQI score for all participants was 8.9 ± 3.11 and the majority (60.3%, n=324) of the participants were in the moderate difficulty range (PSQI Global score = 8-14) [Figure 2].

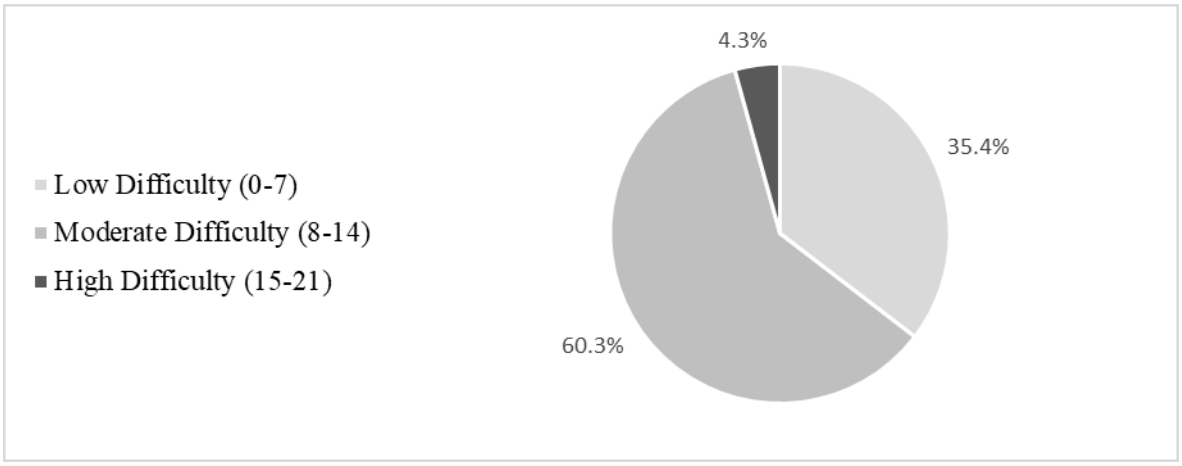

Figure 2: PSQI Global Score.

Less than 7 hours of sleep on average was reported by 67.6% (n=363) of the participants while only 25.5% (n=137) reported having 6-7 hours of sleep on average. Less than 5 hours of sleep was reported in 23.5% of the surveyed population. Further, the majority of the participants reported falling asleep in less than 15 minutes (35.8%, n=192) and 16-30 minutes (35.2%, n=189). The mean, and SD for each of the component in PSQI is given in Table 2.

Table 2: PSQI component scores.

PSQI Component (0-3)	MALES Mean ± SD	FEMALES Mean ± SD	TOTAL Mean ± SD
1. Subjective Sleep Quality	0.35 ±0.787	0.31 ±0.724	0.33 ±0.748
2. Sleep Latency	1.55 ±1.014	1.42 ±1.001	1.47 ±1.006
3. Sleep Duration	1.83 ±0.889	1.93 ±0.826	1.90 ±0.850
4. Habitual Sleep Efficiency	0.80 ±1.205	0.66 ±1.155	0.71 ±1.174
5. Sleep Disturbances	1.31 ±0.564	1.38 ±0.644	1.36 ±0.616
6. Use of Sleep Medication	1.05 ±1.069	1.34 ±1.066	1.23 ±1.075
7. Daytime Dysfunction	1.79 ±0.847	1.94 ±0.770	1.89 ±0.802
Global PSQI Score (0-21)	8.71 ±3.178	9.01 ±3.051	8.90 ±3.098

No significant correlation was found between the average daily sleep time with irregular bedtime frequency ($r=0.001$, $p=0.982$). However, there was a positive correlation between the irregular bedtime frequency and the global PSQI score ($r=.311$, $p<.01$). Further analysis was conducted to study any variations in the component scores across the different demographics. No significant difference was found in the global or component scores across academic years and academic programs. However, significant differences were found across genders in score of components 5,6 and 7 (Table 3).

Table 3: Mann-Whitney U test results for component scores of males and females.

PSQI Component	Mean Rank	U	p

Component 5: sleep disturbances	Male	251.20	29200.00	.028
	Female	278.28		
Component 6: use of sleeping medication	Male	242.42	27583.5	.003
	Female	282.86		
Component 7: daytime dysfunction	Male	245.36	28127.0	.007
	Female	281.32		

A significant positive correlation was observed between irregular bedtime frequency and component 2: sleep latency (r=2.11, p<.01), component 3: sleep duration (r=.333, p<.01), component 5: sleep disturbances (r=.144, p<.01), component 6: use of sleeping medication (r=.205, p<.01), and component 7: daytime dysfunction (r=.338, p<.01). Further, there was a significant negative correlation between irregular bedtime frequency and component 4: habitual sleep efficiency (r=-.141, p<.01).

The FSS gathered data on a 7-point Likert scale for 9 items. The least score of 1 indicated strong disagreement and the highest score of 7 indicated strong agreement. The majority (70.8%, n=380) of the participants had a total FSS score (≥ 36) indicating agreement with being fatigued. The mean of total FFS score for all participants was 40.17±10.7.

There was no significant correlation between the irregular bedtime frequency and the FSS score of the participants (r=.071, p<.102). No significant difference was found in the FSS scores across academic years and academic programs, but it is noteworthy that the score of female participants (41.02±10.56) was significantly higher than that of the male participants (38.55±11.05) (U=27812.0, p=0.006).

The ESS collected data on a 4-point Likert scale, where '0' indicated no chance of dozing, '1' is a slight chance of dozing, '2' is a moderate chance of dozing, and '3' is a high chance of dozing. The ESS item response frequency is shown in figure 3. The ESS scores indicated a majority (40.4%, n=217) of the participants may be excessively sleepy depending on the situation (total score 10-15). 12.5% of the students were excessively sleepy and should seek medical attention. (Figure 4) The mean ESS score for all participants was 10.03±4.5. The response distribution, mean, and SD for each of the item in ESS is given in Table 4.

Table 4: ESS Response Distribution.

Chance of Dozing	Mean ± SD
ESS1: Sitting and reading	1.41 ± 0.930
ESS2: Watching TV	1.49 ± 0.996
ESS3: Sitting inactive in a public place (e.g., a theatre or a meeting)	0.88 ± 0.930
ESS4: As a passenger in a car for an hour without a break	1.51 ± 1.065
ESS5: Lying down to rest in the afternoon when circumstances permit	2.10 ± 0.949
ESS6: Sitting and talking to someone	0.46 ± 0.750
ESS7: Sitting quietly after a lunch without alcohol	1.37 ± 1.009

ESS8: In a car, while stopped for a few minutes in traffic 0.84 ± 1.003

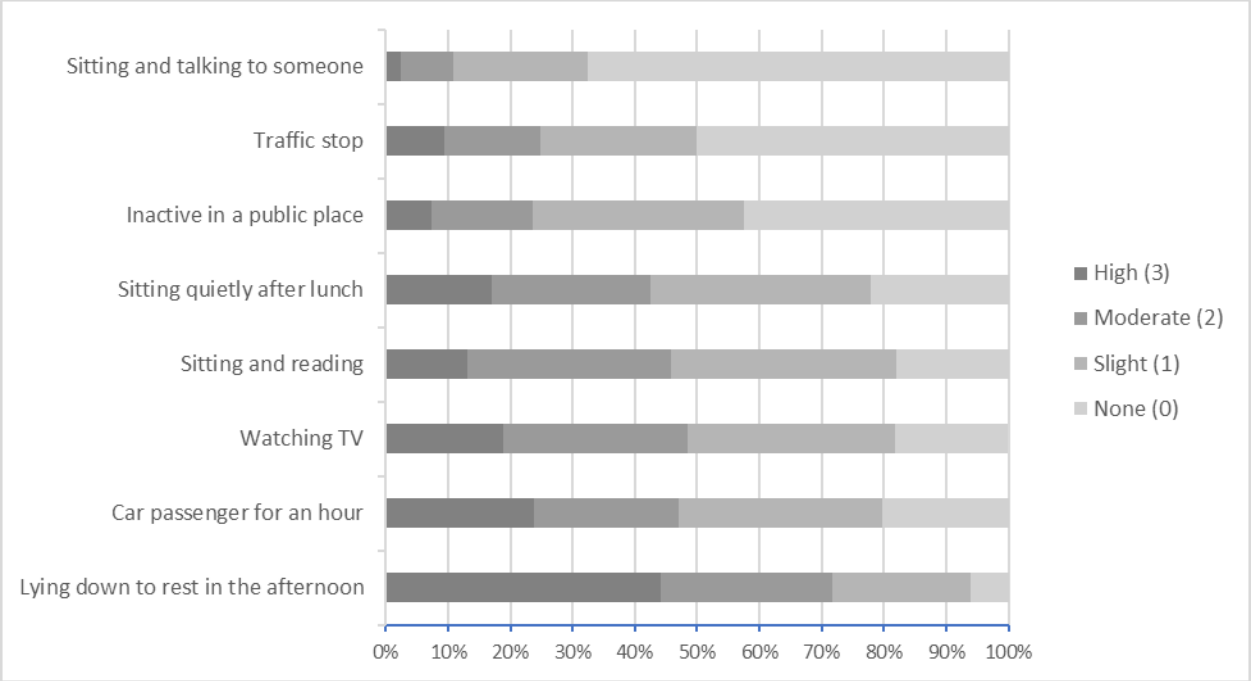

Figure 3: ESS item response frequency.

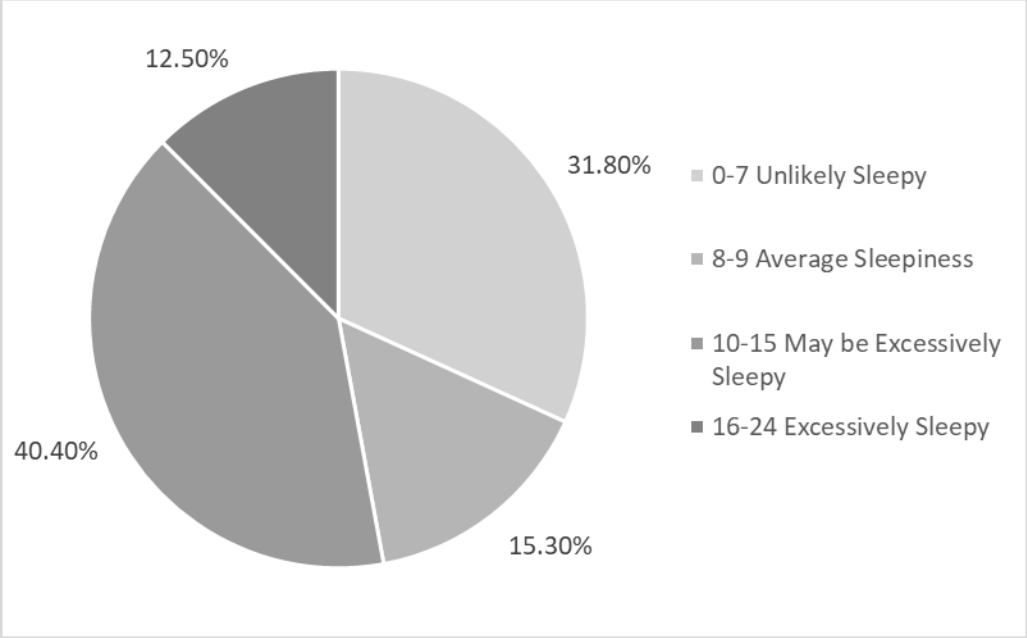

Figure 4: ESS Score Interpretation.

There was no significant difference in the ESS score across the genders, academic years and academic programs. There was a significant correlation between the irregular bedtime frequency and the ESS score of the participants (r=.113, p=.009).

Discussion

The purpose of the present study was to determine the irregularity in sleep schedule among university students and determine its correlation with poor sleep quality, daytime sleepiness, and fatigue. The data suggests a high prevalence of irregular sleep schedules. These findings are compatible with the reports of poor sleep in university students from other countries.[14,15] A systematic review conducted by Feifei Wang and Éva Bíró in 2021 concluded that the average sleep duration of about 40% of university students across 26 countries was 6 hours or less .The common sleep risk factors identified in the student population were grouped under the following domains: lifestyle, social factors, mental health, insufficient sleep education, and physical factors.[9]

The study investigated whether gender was a determining factor in the development of irregular sleep schedules. Participants were asked about the regularity of their sleep schedules, and the data were analysed based on gender, year of study, and academic program. The results indicated no significant relationship between gender and the irregularity of sleep schedules among the students. This finding aligns with previous research conducted in Taiwan on college students, which also found no gender differences in irregular bedtime frequency.[16] Moreover, a similar study conducted on college students in the United States yielded comparable results, further supporting the lack of a significant association between gender and irregular sleep patterns.[17]

A significant correlation was found between irregular sleep schedule and PSQI suggesting that irregular sleep schedules results in poorer sleep quality. A regular sleep schedule and better sleep hygiene improves circadian rhythm thus improving sleep quality.[18] Irregular sleep has also been linked with a reduction in sleep duration among students which may possibly be the major contributing factor towards a poorer sleep quality. As observed in one study, students with frequent irregular sleep schedules had a reduced total sleep time probably due to morning classes which force students to wake up at a fixed time.[16] Though this correlation was not found in our study, we found a positive correlation between the irregular bedtime frequency and the global PSQI score suggesting that irregular sleep schedule has some effect on sleep quality independent of sleep duration.

We found that academic year and program of study had no significant effect on sleep patterns and quality of sleep. A cross-sectional survey of 2,817 university students in Ethiopia reported that females, second year and third year students had significantly higher odds of poor sleep quality.[19] Tsai L-L and Li S-P investigated the effects on the daily sleep patterns in a group of 237 university student sand reported a that though the freshman students had a shorter sleep duration and senior students had longer sleep latency, there was no significant difference in the total sleep quality across the years.[20] The differences in academic programs pursued, variation in social demands and the size of the surveyed population could be the reason for the difference in results across studies .This suggests the need for a more focused investigation into the variations in sleep schedules among different genders and years of study, while considering the potential influence of geographical and cultural factors that may impact the results

The data also suggested that females have poor sleep quality and efficiency compared to males. The usage of sleep medication was more in female than male participants. An increased usage of sleeping medication could have been a result of a worse overall sleep quality and efficiency compared to males. Though it is important to note that there was no significant difference between genders in the global PSQI score or the ESS. A study found out that woman self-medicate on sleeping pills more than males.[21] Greater intrinsic desire to sleep in females is proposed to be the biological basis for gender differences in sleepiness and sleep-wake pattern.[22] Whether there is a correlation between gender and sleep quality is yet to be determined, as one study found a better sleep quality among females than males.[23]

Fatigue Severity Scale was used to assess the fatigue in university students, as it has demonstrated strong content, construct, and criterion validity.[24] However, there was no significant correlation between the irregular bedtime frequency and the FSS score of the participants. One reason could be due to our subjects all being normal, while FSS was originally used to measure fatigue in patients with Multiple Sclerosis and SLE, as well as it's used in other chronic diseases, including rheumatoid arthritis, osteoarthritis, ankylosing spondylitis, psoriatic arthritis, and cancer.[13,25] One research, aimed at validating the use of FSS in healthy subjects and different fatigue-inducing disorders, have found no significant correlation between FSS and normal participants compared to those with diseases associated with fatigue.[26] Although FSS had no correlation with irregular sleep schedule, a significant correlation with gender was

found. Females had a significant higher FSS score than males. Poor sleep is positively correlated with fatigue and higher scores on fatigue assessments.[27] The poor sleep quality in females in our study explains their higher FSS scores.

The ESS scores of our sample that largely comprised of students from health-related colleges indicated that over 50% of the population had excessive daytime sleepiness. The prevalence found in our population was much higher than that observed in India (30.5%), Malaysia (35.5%) and Saudi Arabia (36.6%)[28-30] A higher prevalence was reported from Brazil (54.4%) and Columbia (60.2%).[31,32]

The mean ESS score of 10.03±4.5 in our study was comparable to that reported in a study among medical students in Brazil which showed a score of 10.00 ±3.7.[33] There was a significant correlation between the irregular bedtime frequency and the ESS score of the participants, suggesting that irregular sleep schedules results in decreases the quality of sleep and aggravates daytime sleepiness. The poorer sleep quality can be attributed to the higher levels of stress and greater financial, and academic pressure faced by these students.

Conclusion

Among university students, it was discovered that irregular sleep schedules were quite widespread, regardless of age, gender, and academic program. Females especially were affected, experiencing lower sleep quality, more frequent daytime sleepiness, and increased fatigue. As a result, it is crucial to encourage students to establish more regular sleep patterns and improve sleep habits, to promote their well-being and academic achievement.

Proper sleep hygiene is an important factor in governing sleep quality and is often overlooked by students. The effects of poor sleep among students on cognitive function and health have yet to be measured. The data gathered from this research will serve in guiding further research to measure the effects of poor sleep on students.

Limitation

The study used data from a few colleges and hence does not reflect the whole population of the university. The data was collected through a survey which introduced recall bias and desirability bias which might have influenced the results. The scales used relied a lot on qualitative questions which might have been interpreted differently from participant to participant. Additional data on mobile phone usage and housing situations of the students would have added value to the study. The sampling method used was convenience sampling therefore it introduced non-response and response bias. Being a cross-sectional study, a causal relationship cannot be established.

Acknowledgments

The authors have no conflicts of interest to declare. All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report.

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