The Effect of Sleepiness on Quality of Life among Medical Students in the Kingdom of Saudi Arabia (KSA)

Batool Abdullah Alyousef., Fatima Mohammad Al Najim., Ghaida Saeed Al Qahtani., Kawther Ahmed Alfaraj., Norah Abdulrahman Alomar., Mrs.Tarfah Alsabhan., Dr. Bashar Isam Saleem Alzghoul*

Respiratory Care Department, College of Applied Medical Sciences in Jubail, Imam Abdulrahman Bin Saudi Arabia,Faisal University-Dammam, Jubail 35816

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ABSTRACT

Despite the improvement in quality of life (QoL) in adults, sleepiness is one of the most common causes of poor QoL. This problem has negatively affected medical students due to the extended duration of study time, academic overload, and increasing lifestyle demands. Excessive sleepiness in medical students can put them at high risk of depression and anxiety disorders. This study aimed to evaluate the relationship between sleepiness and QoL in medical students and assess the degree of sleepiness and QoL.

A longitudinal correlational design study was conducted in KSA between January and May 2023. A self-administered questionnaire was used, which included demographic data, the Epworth sleepiness scale (ESS), and the WHOQoL-BREF. The total number of respondents was 210. However, 173 respondents completed the survey. A significant negative relationship was found between sleepiness and QoL. In terms of QoL domains, sleepiness had a significant effect only on the environment domain. The majority of the respondents (67.05%) did not exhibit sleepiness, while 32.94% did. The WHOQoL-BREF results showed that most respondents had a good QoL (43.35%), while 4.05% had poor QoL. In the second dataset, the total number of respondents was 196, of whom 166 completed the survey. The majority of the students (60.84%) had no sleepiness issues, while 39.16% did. WHOQoL-BREF results revealed that most of the respondents (51.20%) have a good QoL (n=85), while only 2.41% have a bad QoL (n=4). Our analysis revealed a significant negative relationship between sleepiness and the psychological ($p<0.05$) and physical ($p<0.01$) QoL domains, while other domains were not significant ($p>0.05$). Major changes, like reorganizing academic activities, providing individualized mentoring, and setting aside time for study and leisure, are effective in helping students manage their time.

Keywords: Medical students, Epworth, Sleepiness, Quality of life.

INTRODUCTION

Sleep is a biological and physiological process necessary for a healthy life. Furthermore, reversible conditions are characterized by diminished responsiveness to external stimuli and accompanied by consciousness loss. It is influenced by circadian rhythms, which control changes in the body's mental and physical properties that occur over approximately twenty-four hours. These rhythms are controlled by specific neurons in the brain that respond to hormones, light, and other signals, forming the body's biological clock. This clock helps regulate normal wake and sleep cycles. Therefore, disrupting these cycles can make people feel sleepy [(1)]. However, sleep quality, which is associated with physical and psychological health, has declined due to lifestyle changes, tension, contemporary technology, and environmental disturbances [(2,3)].

Sleepiness

In particular, the transition from school to university involves a critical period due to separation from one's family, the formation of new social relationships, and the acquisition of social obligations and autonomy [(4)]. Undergraduate medical students are a unique group among university students, as they experience a relatively high workload in terms of study hours and assessment, including nighttime work, mental stress, and many

hours spent on social media [4,5]. Furthermore, the fragmentation of the night period is considered the main cause of impaired sleep[6]. This is supported by a previous study conducted in the United Kingdom, which found that 24% of university students reported difficulty falling asleep and slept less than 7 hours per night, while 45% complained that they were unable to wake up properly. These issues resulted in excessive daytime sleepiness (EDS), which is considered to be insufficient sleep and an inability to stay awake without external stimuli [7,8]. EDS can lead to uncontrollable lapses into drowsiness during daily activities, which could lead to life-threatening situations such as road traffic accidents (RTA), making it a considerable public health concern [9].

Moreover, a study conducted in the Hashemite Kingdom of Jordan (HKJ) found that EDS is extremely common among university students, with 50% reporting EDS, and 70% experiencing insufficient sleep. The Epworth Sleepiness Scale (ESS) is an index that evaluates EDS. It consists of eight questions that evaluate a person's likelihood of dozing off in situations such as watching TV or driving. A score of eighteen or more indicates severe sleepiness; scores between 15 to 17 indicate moderate sleepiness; scores between 11 to 14 indicate mild sleepiness; and scores of 10 or below are considered normal levels in healthy adults [10].

Quality of life (QoL)

The World Health Organization (WHO) defines QoL as a person's awareness of their situation in relation to the value and cultivation systems in which they live and their relationship to their goals, standards, and expectations [11]. The four main QoL characteristics that the WHO has identified are environment, social relationships, psychological health, and physical health. The WHOQoL-BREF tool consists of a 26-item self-administered survey. Numerous studies have assessed the WHOQoL-BREF instrument's validity and reliability and shown that it is a suitable tool for determining QoL[4]. Poor QoL for medical students can be influenced by several factors, including the location of the college, being female, learning environment, late adolescent personality traits, lack of leisure and free time, financial constraints, family burden, performance competition, teaching quality, and professor-student relationships [12].

Other articles studied a variety of stressors that may impact medical students' QoL, such as the difficult transition from foundational to clinical years, competition among peers, the overwhelming volume of new information, and the difficulty of balancing academic responsibilities with daily activities. According to a study on medical students conducted in North America, 57% had severe psychological disturbance, and 23% had gloominess. In line with comparable research from Saudi Arabia, it was shown that medical students had alarming levels of stress, sadness, and anxiety [13]. Furthermore, a recent systematic analysis reported that anglophone medical students outside of the United States were more likely to experience depression (6.0% to 66.5%), anxiety (7.7% to 65.5%), and psychological stress (12.2% to 96.7%). Similar to other international research, these percentages show a diffusion of depression by 27.2% with a range from 9.3% to 55.9% based on the country surveyed [12].

QoL and sleepiness in medical students

Despite the improvement in quality of life in adults, sleepiness is one of the most common reasons for poor QoL. This problem has negatively affected medical students due to the extended duration of study time, academic overload, continual exams, and an increase in lifestyle demands. This is supported by a study in Malaysia that showed 44% of medical students have excessive daytime sleepiness (EDS) [1]. Sleepiness in medical students can put them at high risk of depressive and anxiety disorders [14].

After reviewing recent articles, we found that most of their study types are cross-sectional methods [1,2,5,8,10,14] [17-20] [22-27]. A cross-sectional study requires the entire population to be examined to create useful data [15]. Additionally, the researcher's bias may affect the results, and large sample sizes are frequently required [15]. In comparison, the longitudinal method showed more effectiveness in researching developmental trends. It is stronger than cross-sectional methods, highly flexible, and provides accuracy when observing changes [16]. Previous studies focused on medical students in different countries such as Brazil, Rabat-Morocco, Malaysia, Northwest Ethiopia, Hunan province, Pakistan, the USA, Tamil Nadu, India, and Jordan [1,5,8,9,10,14,17,18,19,20].

Limited articles are studying the relationship between sleepiness and QoL (Table 1). Unfortunately, previous studies have ignored the association between the two variables in Saudi medical students.

The outcome of this research will aid students to evaluate whether they have EDS, get more sleep, improve their sleep hygiene, or seek medical attention to determine the cause of their drowsiness. For example, the university can educate students about the importance of sleep in their quality of life by holding conferences and seminars. Additionally, our study will identify the factors that lead to EDS and attempt to resolve them. On the other hand, the researchers can use it as a reference to support their future research. The study aims to estimate the degree of sleepiness and QoL, as well as to evaluate the relationship between sleepiness and QoL among medical students in KSA.

Table 1. Summary of previous study assessed the relationship between sleepiness and QoL.

Article reference	Country	Respondents	Sample size	Population	Measurement	Results	Study design
Babicki et al. [2]	Poland	7735	14844	Polish students	Sleepiness assessed by (ESS),QoL assessed by (MANSA).	Significant	Correlation study
Perotta et al. [5]	Brazil	1350	1650	Medical students	Sleepiness assessed by ESS. QoL assessed by WHOQoL-BREF, QoL self-assessment, VERAS-Q.	Significant	Correlation study
Sameer et al. [17]	Pakistan	441	596	Medical students	Sleepiness assessed by ESS, QoL assessed by WHOQoL-BREF	Significant	Correlation study
Alami et al. [22]	USA	101	126	Medical residents	Sleepiness assessed by ArESS. QoL assessed by RAND	Significant	Correlation study

METHODS

A longitudinal-correlational design was applied to female medical students at Imam Abdulrahman University College of Applied Medical Science in Jubail (IAU-CAMSJ). We collected the data in two phases: the first in February, and the second in May. The total population size consisted of 385 students. The sample was determined using a simple random sampling (SRS) technique with a random number generator. Based on Krejci and Morgan, the ideal sample size was calculated to be 196 students. However, we implemented 50% over-sampling, resulting in a total of 294 students. This study included female medical students in IAU-CAMSJ in KSA. Participants with significant missing data in the online survey, those diagnosed with sleep disease, and pregnant women were excluded.

Questionnaire

A self-administered electronic survey was used to collect data in this study. It was conducted in English and sent by email, and on social media such as WhatsApp (Table 2). The questionnaire was based on a Likert scale, containing two surveys that measure the variables of our study (sleepiness and QoL). It began with requesting informed consent, followed by five questions exploring participants' demographic data. EDS was assessed by using ESS, which consists of 8 questions evaluating the likelihood of a person nodding off in 8 situations (e.g., watching TV). The response obtained from the ESS was then put on a four-point Likert scale (3 = high chance of nodding off, 0 = would not nod off), with a total score ranging from 0 to 24. Participants scoring 10 ≤ were advised to find out why they feel drowsy, adopt better sleep habits, or seek medical advice. A score of eighteen or more indicates severe sleepiness, 15 – 17 indicates moderate sleepiness, while 11 – 14 indicates mild sleepiness. Those scoring 10 or less are considered healthy adults.

The (WHOQoL- BREF) questionnaire, which was composed of 26 questions to measure the four main QoL domains specified by the WHO, was used to assess QoL. It comprised 3 questions about social relationships, 6 questions about psychological health, 8 questions about the environment, and 7 questions about physical health. The response obtained from the WHOQoL-BREF was then put on a five-point scale (1=not at all, 5=an extreme amount), (1=not at all, 5=completely), (1=very poor, 5=very good), (1=never,5=always), (1=very dissatisfied, 5=very satisfied), (1=not at all,5=extremely. A total score of 95 = Near perfect QoL, 85 = Very good QoL, 70 = Good QoL, 57.5 = Moderately good QoL, 40 = Somewhat bad QoL, 27.5 = Bad QoL, 15 = Very bad QoL,5 = Extremely bad QoL.

Table 2. Structure of the survey

Section number	Structure of the survey
1	Start with the question asking to give informed consent
2	Five questions exploring participants demographic data
3	Two questions about sleepiness while driving
4	Six questions discuss the possibility of sleepiness during the practice of some daily habits
5	Two general questions about QoL
6	Three questions to understand the social and economic situation
7	Seven questions to ask about their physical health
8	Six questions to ask about their psychological condition
9	Eight questions ask about satisfaction with their environment

Statistical analysis

The level of sleepiness and QoL was determined by using a pie chart. Pearson correlation was used to find the relation between sleepiness and QoL at a 0.05 level of significance. The statistics were run through SPSS for Windows version 26.0 reference: [32] and Stata [33]. Based on previous articles, the ESS and WHOQoL-BREF scales were reliable and valid [4,10]. Mean ±SD is determined for continuous variables and compared using an independent sample t-test.

RESULTS

First data

The response rate for the first dataset was 71% (n=210). However, only 173 students had completed the survey. Among them, 28.23% were in health track primary year, 29.48% in respiratory care, 18.5% in anesthesia technology, and 23.7% in neuroscience technology, as shown in Table 3. A total of 15.19% (n=36) of the participants were excluded due to a diagnosis of sleep disorders, and (n=1) was excluded due to pregnancy.

Table 3. The demographic data of our participants

Demographic Data		
Specialty	Frequency	Percentage

Primary year health track	49	28.32
Respiratory care	51	29.42
Anesthesia technologist	32	18.5
Neuroscience technologist	41	23.7
Academic year	Frequency	Percentage
First year	50	28.9
Second year	44	25.43
Third year	38	21.97
Fourth year	41	23.7
Pregnant women	1	0.47
Sleep disorder	36	15.19

Levels of QoL and sleepiness

The majority of the participants had no sleepiness 67.05% (ESS≤ 10), while one-third of students (32.94%) had a sleepiness problem (ESS> 10). Besides, the mean ±SD of the ESS score was 3.15±0.44, see Figure 1. Furthermore, according to WHOQoL-BREF, most of the students had a good QoL, 43.35% (n=75), while only 4.05% had a bad QoL (n=7), with a mean±SD of 3.28 ±0.47, as shown in Figure 2.

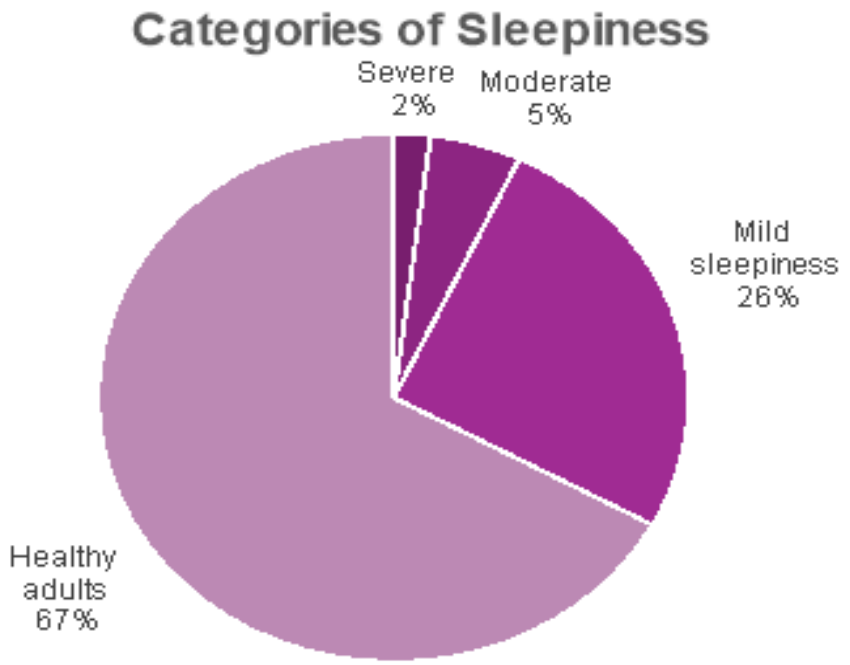

Figure 1. The severity level of ESS score in medical students.

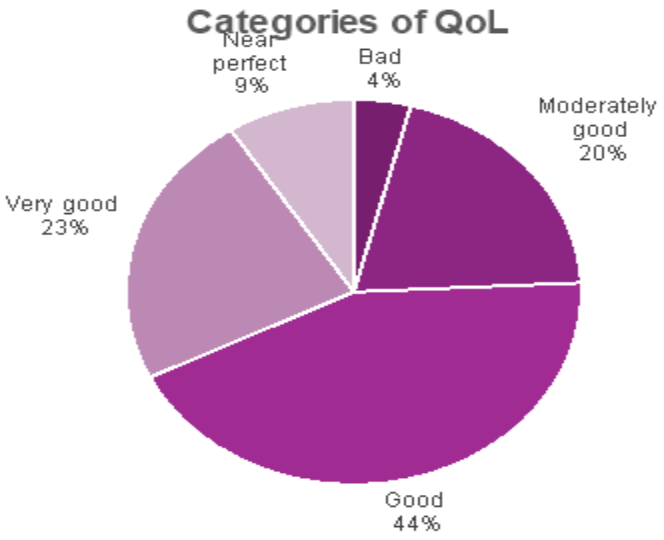

Figure 2. The categories of QoL score in medical students.

The data demonstrates a significant negative relationship between sleepiness and QoL (Table 4). In terms of QoL domains, sleepiness had a significant impact on the environmental domain ($p<0.05$), while its effects on other domains were not significant ($p>0.05$). For further explanation, see Table 5. We evaluated the WHOQoL-BREF'S mean scores of each domain (social, physical, psychological, and environmental) with ESS scores ≤10 and ESS >10. We found that sleepiness has the highest impact on the environmental domain in comparison to other domains, as shown in Figure 3.

Table 4. The correlation between sleepiness and QoL. *Correlation is significant at the 0.05 level (1-tailed).

		Correlation	Sleepiness
QoL		Pearson Correlation	-.129*
		Sig. (1-tailed)	**.045**

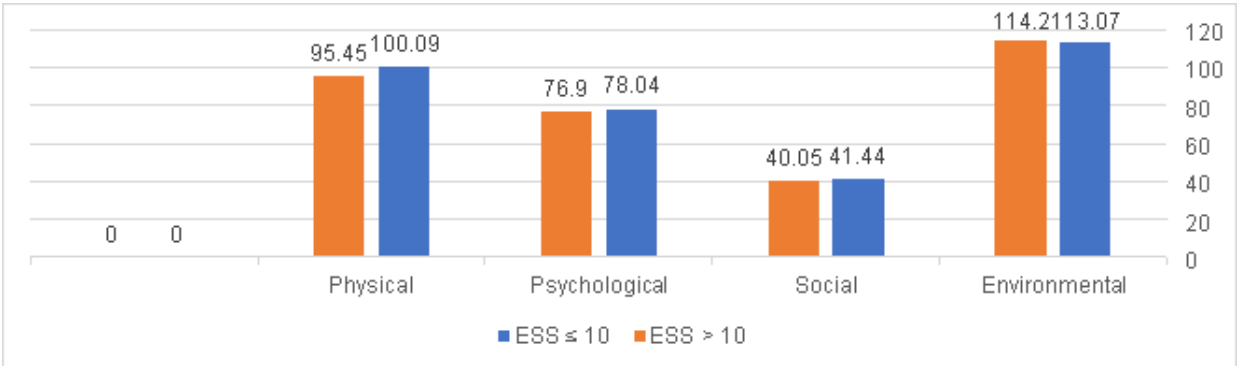

Figure 3. Comparison of QoL domain mean scores between healthy students and those complaining of sleepiness.

Table 5. Correlation between sleepiness and QoL. *Correlation is significant at the 0.05 level (1-tailed).

QoL domains	**R**	**P-value**
Physical	-0.114	0.068
Psychological	-0.22	0.387

Social	-0.012	0.440
Environmental	**-0.167***	**0.014**

Second data

The total response rate was 196. However, only 166 students had completed the survey. 15.30% (n=30) were excluded from our study; 24 of them were diagnosed with a sleeping disorder, and 6 of them were pregnant. The majority of the students (60.84%) had no sleepiness (ESS≤ 10), while only 39.16% did (ESS> 10). Besides, the mean ±SD of the ESS score was 2.20 ±0.53. Furthermore, according to WHOQoL-BREF, most students have a good QoL of 51.20% (n=85), while only 2.41% have poor QoL (n=4) mean± SD was 3.31 ± 0.44. After analyzing the data, a significant negative relationship was found between sleepiness and psychological ($p<0.05$) and physical ($p<0.01$) QoL domains, while associations with other domains were not significant ($p>0.05$), as shown in Table 6.

Table 6. Correlation between sleepiness and QoL. * Correlation is significant at the 0.05 level (1-tailed). ** Correlation is significant at the 0.01 level (1-tailed).

QoL domains	R	P-value
Physical	-.236**	**.001**
Psychological	-.134*	**.045**
Social	-.091	.123
Environmental	-.052	.253

DISCUSSION

First data collection

Our data showed that 32.94% of students experienced a sleepiness problem (ESS> 10), which is similar to findings from a study conducted in Brazil that showed 37.6% of their participants with EDS. Similarly, a study from the USA reported a comparable result of 46.5% [5,22]. On the other hand, our analysis revealed that 44% of students had good QoL, while only 4% had poor QoL. A local study in KSA showed parallel results, where 39.7% of participants had a good level of QoL and 2.1% had poor QoL. The main factors that led to sleepiness and affected QoL in our participants were psychological causes and studying late at night; see Figure 4 for other factors.

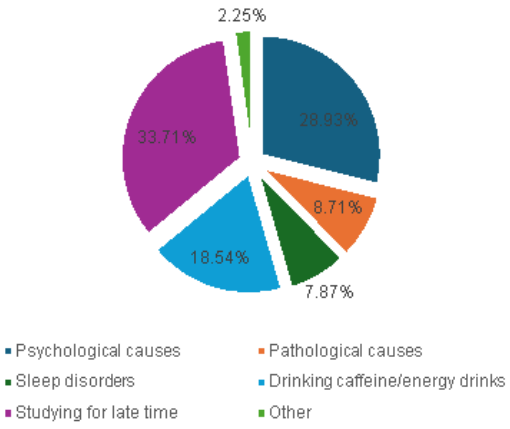

Figure 4. Factors that lead to sleepiness and affect QoL.

Our analysis showed a significant negative correlation between the two variables ($P < 0.05$), similar to other articles [2,5,17,22]. This means a lower score in WHOQoL-BREF is associated with a higher score in ESS. Our study revealed that sleepiness has a significant effect on the environmental domain, similar to a study conducted in Brazil ($P < 0.05$) [5]. Conversely, physical, social, and psychological domains were insignificant. In comparison, previous articles showed a significant association between physical and psychological domains [17,22].

The foundation year showed the highest rate of sleepiness at 42%, followed by the second year (34%), while the fourth year had the lowest (21.95%), as shown in Figure 5. From the results, it is clear that the average student has good QoL. However, the second year has a poorer QoL comparable to the senior year, see Table 7. These findings are similar to those reported by a study in Pakistan, which found that fourth year students had the highest QoL scores, while second year students had the lowest [17]. The observed higher levels of sleepiness in the primary years are likely due to life changes brought on by enrolling in college, such as moving home and taking on new responsibilities. These factors may increase anxiety and apprehension, which increases the risk of developing sleep disorders. [9]

Table 7: QoL domains with academic years.

Variable	Study participants [n (%)]	Environmental	P	Psychological	P	Social	P	Physical	P
Academic Year									
First	50 (28.9)	114.6 ± 22.9		80.9 ± 16.3		43.9 ± 82		96.6 ± 14.6	
Second	44 (25.4)	105.1 ± 24	0.0616	74.4 ± 16.7	0.1937	37.4 ± 9.9	0.0051	90.5 ± 18.3	0.0026
Third	38 (22)	110 ± 18.2		74.4 ± 18.1		40.5 ± 8.6		97.9 ± 18.8	
Fourth	41 (23.7)	116.7 ± 19.9		77.3 ± 15.3		42.7 ± 9.8		104.4 ± 15	

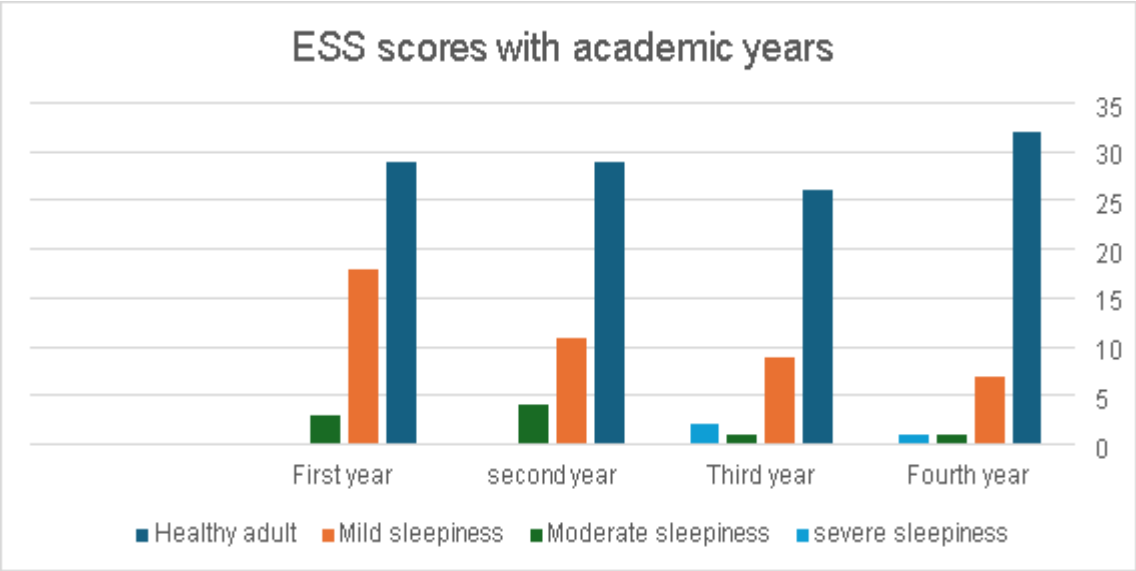

Figure 5: The association between sleepiness and academic years according to the degree.

Second data collection

Our analysis showed a significant negative relationship between sleepiness and QoL. The physical domain was highly significant (P =0.01), while the psychological domain was also significant (p-value <0.05), similar to findings from a study conducted in Pakistan[17]. In this second data collection, we observed that sleepiness increases due to lifestyle changes during Ramadan. A study looking at the effects of sleepiness during Ramadan revealed several factors that contribute to the reduction of total sleep time during fasting. These include changes in dietary habits, disruptions in mealtime, late-night eating affecting circadian rhythm, and lying down with a full stomach, which can cause gastroesophageal reflux [31].

We excluded any participants diagnosed with a sleep disease or pregnant women. A study conducted in North Carolina found that pregnant women are at high risk (73.2%) of sleeping disorders such as restless leg syndrome (RLS), insomnia, and obstructed sleep apnea OSA [29]. Disorders such as OSA, RLS, and narcolepsy disrupt sleep quality, as can circadian rhythm disorder, poor sleep hygiene, and insomnia. These can lead to sleep deprivation, which affects mood, behavior, and overall health [30].

In the present study, a longitudinal method with repeated measures was used to follow particular individuals over long periods of time, providing an accurate measurement of the data under varying circumstances [16]. Moreover, this is the first study to examine these two variables among medical students in KSA and to assess their levels. In addition, we evaluated several factors that may affect these variables and contributed to the limited research on Ramadan.

CONCLUSION

To conclude, medical students in KSA experience EDS that is significantly related to poor QoL. This particularly influences their psychology, placing them at high risk of depression, anxiety, and sleep disorders. As a result, major changes like reorganizing academic activities, providing individualized mentoring, health promotion initiatives, and setting aside time for study and leisure are effective ways to help students manage their time. These changes can indirectly enhance learning, standard of living, and reduce daytime sleepiness. The main limitation of this study is the limited time frame. Therefore, we recommend further research with longer intervals between sampling, a larger population, and assessing the difference between genders.

Ethical Approval

Ethical approval for this study was granted by the Institutional Review Board (IRB) at Imam Abdulrahman Bin Faisal University (IRB Number: IRB-UGS-2023-03-052). All procedures involving human participants adhered to institutional guidelines, and informed written consent was obtained from all participants.

Data Availability

The data supporting this study's findings are not publicly available due to privacy and ethical restrictions concerning human subject data. Data may be made available from the corresponding author upon reasonable request and with permission from the Institutional Review Board.

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