



Relationship between Poor Quality Sleep during Ramadan and Academic Performance among Students in Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Adequate sleep is essential for improving cognitive function, memory retention, and academic performance. During Ramadan, many students suffer with the changes in mealtimes that lead to variations in caloric and nutrient intake and affect sleep quality. Disturbed and poor sleep results in

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decreased academic performance and impaired judgment. This study aim was to assess the relationship between poor quality sleep during Ramadan and academic performance among students in Saudi Arabia. It also provided suggested strategies to improve students' sleep quality and academic performance. It was a cross-sectional study, which was conducted by using an online questionnaire from April to May 2022. The questionnaire consisted of two components. The first portion contained demographic data, such as gender, age, and academic performance. The second section was devoted to the Pittsburgh Sleep Quality Index (PSQI). Study participants were students of both genders aged 18 and older. The survey was completed by 583 students, of whom 364 (62.4%) were female and only 219 (37.6%) were male. Almost all the participants were aged between 21–23 years. Four hundred and eight (70.0%) were single. The results of the PSQI overall score were that 460 students (78.9%) had poor sleep quality, whereas 123 (21.1%) had good sleep quality. Most of the students with poor academic performance had very bad sleep quality (45%), sleep latency of more than one hour (41.4%), sleep duration < 5 hours (43.2%), and sleep efficiency of <65% (52.3%). The majority of these students had sleep disturbances three or more times a week (43.2%), and they suffered dysfunction every day (43.2%). The results revealed an association between all the PSQI components and academic performance ($p < 0.05$) except sleep duration. The majority of students had poor sleep quality in Ramadan. We would recommend that students be made aware of the impact of poor sleep habits on academic performance, that students are taught skills, such as how to manage their time well and how to get a good night's sleep, and suggest that universities change the time that students study during Ramadan to fit their abilities.

Keywords: Academic performance; ramadan; poor sleep; Saudi Arabia.

1. INTRODUCTION

Fasting is a centuries-old practice described as abstinence from food and liquids [1]. During Ramadan, Muslims fast from dawn until sunset for 29–30 days. Ramadan fasting restricts food, water, sexual activity, and smoking during the day and alters one's daily routine [2]. The predawn meal is consumed before dawn (suhoor), and the main course is consumed following sundown (iftar) [3]. During Ramadan, this shift in mealtimes could be attributed to the caloric and nutrient intake changes that affects dietary, social, and sleep habits [4,5]. Fasting in Ramadan may cause sleep deprivation. This is mainly because those who fast during the day eat more at night and sleep late, affecting their sleep quality and academic performance [6].

According to research conducted among Ramadan adherents, mental activities are reduced throughout the day and increase after sunset. A self-perceived capacity for mental activity follows a similar pattern [7]. In a study of 265 university students who followed the Ramadan fast, more than half of the subjects reported less activity, a decreased motivation to study, and a reduced capacity to concentrate [8]. Observing Ramadan comprises more than just fasting, but it seems likely that the fast is the primary factor affecting academic performance [9]. A previous study demonstrates the critical role of nutritional consumption in schoolchildren's

cognitive functioning [10]. Adequate, high-quality sleep of optimal duration aids in memory processing and learning. It promotes the maintenance of concentration, executive cognition, sensorimotor integration, and memory processing [11].

Individual sleep patterns and habits vary according to age, occupational responsibilities, social engagements, psychiatric and somatic states, and unique physiological characteristics [12]. In the short term, disturbed and poor sleep results in impaired judgment, agitation, irritability, and difficulty comprehending information; in the long term, it can contribute to cardiometabolic problems and even higher mortality [13]. Students are one of the identified high-risk groups for developing sleep disorders. A previous study on sleep disturbances among medical students was conducted with varying results that depended on education level and geographic region. Around 90% of Chinese medical students experienced daytime disturbances [14]. Sleep deprivation has been linked to a decline in academic performance [15]. Research has shown that Pakistani students do not get enough sleep, which affects their academic performance [16].

To our knowledge, no study has been done in Saudi Arabia to assess the relationship between poor quality sleep during Ramadan and academic performance. Therefore, the aim of this

study was to assess the relationship between poor quality sleep during Ramadan and academic performance among students in Saudi Arabia. It also provided suggested strategies to improve students' sleep quality and academic performance.

2. METHODOLOGY

2.1 Study Design and Area

We did a cross-sectional study in Saudi Arabia between April and May 2022 to assess sleep quality during Ramadan and academic performance among Saudi students.

2.2 Identification of Study Participants

Study participants were students of both genders, aged 18 and older, from various colleges and majors. Students under 18 years of age were excluded. The online Raosoft calculator was used to estimate that there were 583 students in the sample. Participation in the research was voluntary, and the privacy of all research participants was protected by an anonymous questionnaire. Participants could withdraw from the study at any time without any explanation. Moreover, there were no incentives for participants. The survey was only accessible to individuals who agreed to informed consent. A participant needed approximately six minutes to complete the survey.

2.3 The Data Collection Process

We collected data by using an electronic questionnaire in both Arabic and English. We were using a method known as "convenient and snowball sampling." The questionnaire was sent to Saudi Arabian students through social media between April and May. The structured questionnaire consisted of two components. The first portion contained demographic data, such as gender, age, and academic performance. The second section was devoted to the Pittsburgh Sleep Quality Index (PSQI). PSQI is an effective metric for determining sleep quality and pattern. Sleep quality is rated on seven different dimensions: subjective sleepiness, sleep quality, sleep latency, sleep length, sleep efficiency in the habitual state, sleep disruptions, utilization of sedatives, and daytime dysfunction. Scores range from zero to a maximum of 21. The sum of the scores for all seven components is referred to as the "global PSQI score." A global PSQI

score of more than 5 indicates poor sleep quality, and 5 and less indicates good sleep quality [17].

2.4 Data Statistical analysis

The data was entered and analyzed using the Statistical Package for Social Sciences (SPSS) program. Demographic data was categorized and expressed in terms of frequencies and percentages. All PSQI values were compared to academic performance. The chi-square test determined the association between the PSQI score and academic performance. Significant was defined as a p-value < 0.05.

3. RESULTS

The survey was completed by 583 students, of whom 364 (62.4%) were female and only 219 (37.6%) were male. Almost all of the participants were aged between 21–23 years. Four hundred and eight (70.0%) were single, 151 (25.9%) married, 13 (2.2%) divorced, and 11 (1.9%) widowed. Almost half of all participants were studying for bachelor's degrees (399 or 68.4%), diplomas (78 or 13.4%), master's (88 or 15.1%) and doctorates (18 or 3.1%). The majority of respondents from western Saudi Arabia were students (247 or 42.4%). The GPA of the majority of participants was (49.1%) excellent, (38.6%) very good, (10.3%) good, and (2.1%) fair. Study periods during the month of Ramadan were as follows: (46.5%) studied morning to afternoon, (14.4%) morning only, (7.7%) afternoon to evening, and (17.5%) different periods. The students' preferred study times during the Ramadan month were (38.6%) evening only, (37.0%) morning only, (14.1%) morning to afternoon, and (10.3%) afternoon to evening. The academic performance of students in Ramadan was (12.9%) excellent, (22.1%) very good, (30.5%) good, (15.4%) fair, and (19%) poor. Most of the students (77.9%) reported that their sleep quality decreased in Ramadan. Most of the students (65.9%) reported that their academic performance was reduced in Ramadan (Table 1).

The majority of students who participated in this study were from the faculty of pharmacy (209 or 35.8%), 116 (19.9%) from nursing, 84 (14.4%) from medicine, 65 (11.1%) from business administration, 60 (10.3%) from engineering, 30 (5.1%) from applied sciences, 10 (1.7%) from dentistry, and 9 (1.5%) from others (Fig. 1).

Table 1. Demographic characteristics of students (N=583)

Variable		Frequency	(%)
Gender	Female	364	62.4
	Male	219	37.6
Age	18–20 years old	114	19.6
	21–23 years old	177	30.4
	24–26 years old	108	18.5
	27–29 years old	57	9.8
	More than 30 years old	127	21.8
Social status	Single	408	70.0
	Married	151	25.9
	Divorced	13	2.2
	Widow	11	1.9
Educational level	Diploma	78	13.4
	Bachelor	399	68.4
	Master	88	15.1
Residential area	Doctorate	18	3.1
	Northern Saudi Arabia	27	4.6
	Middle Saudi Arabia	52	8.9
	Western Saudi Arabia	247	42.4
	Eastern Saudi Arabia	26	4.5
GPA	Southern Saudi Arabia	231	39.6
	Excellent	286	49.1
	Very good	225	38.6
	good	60	10.3
	Fair	12	2.1
Study period in Ramadan month	Morning only	84	14.4
	Morning to afternoon	271	46.5
	Afternoon to evening	45	7.7
	Evening only	81	13.9
	Different periods	102	17.5
Favorite period to study in Ramadan month	Morning only	216	37.0
	Morning to afternoon	82	14.1
	Afternoon to evening	60	10.3
	Evening only	225	38.6
Did sleep quality decrease in Ramadan?	Yes	454	77.9
	No	129	22.1
Did educational level decrease in Ramadan?	Yes	384	65.9
	No	199	34.1
How to evaluate academic performance in Ramadan	Excellent	75	12.9
	Very good	129	22.1
	good	178	30.5
	Fair	90	15.4
	poor	111	19.0

According to the results of the PSQI overall score, 460 students (78.9%) had poor sleep quality, whereas 123 (21.1%) had good sleep quality. The seven components of the PSQI were compared to the students' academic performance. Most of the students with poor academic performance had very bad sleep quality (45%), sleep latency of more than one hour (41.4%), sleep duration < 5 hours (43.2%), and sleep efficiency <65% (52.3%). The majority of these students had sleep disturbances three or more times a week (43.2%), had not utilized

sleep medicine during Ramadan (70.3%), and suffered dysfunction every day (43.2%). The study compared students who had excellent and poor academic performance with very bad sleep quality (4.0% vs. 45.0%), sleep latency of more than one hour (20.0% vs. 41.4%), sleep duration >7 h hours (12.0% vs. 6.3%), and sleep efficiency >85% (14.7% vs. 5.4%), respectively. Students who had excellent and poor academic performance were compared with good sleep quality (37.3% vs. 9.9%), respectively, and by poor sleep quality (62.7% vs. 90.1%)

respectively. Moreover, the result revealed an association between all PSQI components and educational level ($p < 0.05$) except sleep duration, which was not statistically significant when associated with academic performance ($p > 0.05$) (Table 2).

The causes that led to a decreased quality of sleep in Ramadan were: study performance during Ramadan (32.60%), caffeine drinks such as coffee and tea (24.00%), performing Islamic worship until late at night (20.10%), fasting during the day of Ramadan (15.80%) and others (7.50%) (Fig. 2).

4. DISCUSSION

We assessed the relationship between poor quality sleep during Ramadan and academic performance among students in Saudi Arabia. Our findings indicate an association between poor quality sleep during Ramadan and academic performance. The majority of students had poor sleep quality, compared to (21.1%) who had good sleep quality. We suggest that poor sleep quality in Ramadan is due to fasting during the day, a change in diet, and drinking a lot of caffeine at night. The study compared excellent and poor academic performance of students to good sleep quality (37.3% vs. 9.9%) and poor sleep quality (62.7% vs. 90.1%) respectively. It was revealed that students who had poor

academic performance suffered from poor quality sleep. We suggest poor sleep quality decreases cognitive function, memory retention, and the ability to concentrate and think, therefore reducing academic performance among students. Past studies reported that Pakistani medical students have low sleep quality, which has a significant impact on their academic performance. Adequate sleep is required to replenish students during the day and aid in learning and memory processing [18]. Abdullah Al-Khani et al. revealed that over two-thirds of the students slept poorly [19]. Of the students in Lebanon, 37.1% sleep poorly, as do 55.7% of students in Egypt [20,21]. Previous research has shown that the quality and length of sleep not only affects health and behavior, but also academic performance [22].

Adequate and effective sleep is important for academic performance and memory. Students must get enough sleep in order to function effectively in the classroom. In this study, most students with poor academic performance had disturbances three or more times a week, and they suffered from dysfunction every day. The results revealed an association between all PSQI very poor sleep quality, sleep latency of more than one hour, sleep duration of less than five hours, and sleep efficiency of less than 65%. Also, the majority of these students had sleep disturbances three or more times a week, and

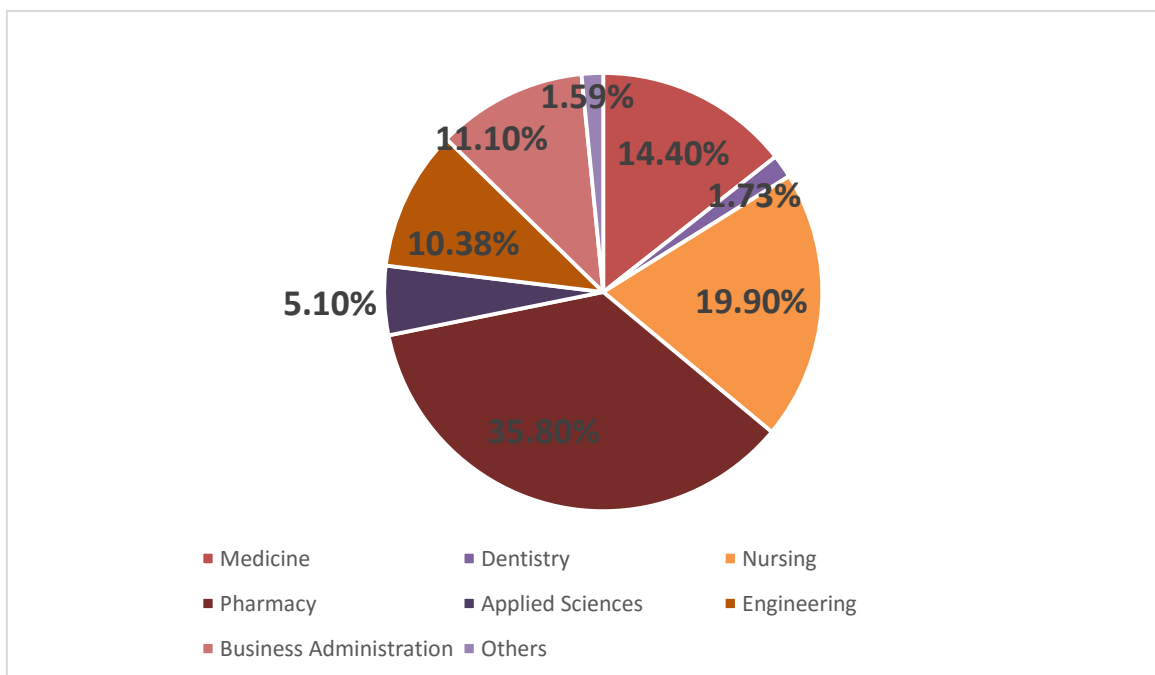


Fig. 1. The students' participants from different faculties (N = 583)

Table 2. Student sleep quality as measured by the PSQI associated with their academic performance (n = 583)

Components of PSQI		Academic performance in Ramadan (%)					P-value
		Excellent	Very good	Good	Fair	Poor	
Subjective sleep quality	Very good	28.0%	17.1%	11.2%	2.2%	6.3%	0.000
	Fairly good	30.7%	47.3%	38.2%	20.0%	17.1%	
	Fairly bad	37.3%	19.4%	33.1%	50.0%	31.5%	
	Very bad	4.0%	16.3%	17.4%	27.8%	45.0%	
Sleep latency	≤ 15 min	34.7%	16.3%	14.6%	31.1%	25.2%	0.000
	16–30 min	28.0%	38.8%	30.9%	25.6%	17.1%	
	31–60 min	17.3%	24.0%	36.0%	20.0%	16.2%	
	>60 min	20.0%	20.9%	18.5%	23.3%	41.4%	
Sleep duration	<5 h	49.3%	40.3%	56.7%	50.0%	43.2%	0.057
	5-6 h	25.3%	34.1%	28.1%	37.8%	32.4%	
	6-7 h	13.3%	17.1%	9.6%	10.0%	18.0%	
	>7 h	12.0%	8.5%	5.6%	2.2%	6.3%	
Habitual sleep efficiency	<65%	13.3%	38.0%	37.1%	46.7%	52.3%	0.000
	65%–74%	36.0%	27.9%	44.9%	37.8%	27.9%	
	75%–84%	36.0%	25.6%	15.2%	15.6%	14.4%	
	>85%	14.7%	8.5%	2.8%	0%	5.4%	
Sleep disturbances	None during Ramadan	45.3%	27.9%	24.7%	17.8%	15.3%	0.000
	Less than once a week	22.7%	21.7%	19.1%	23.3%	7.2%	
	Once or twice a week	8.0%	22.5%	27.0%	25.6%	34.2%	
	Three or more times a week	24.0%	27.9%	29.2%	33.3%	43.2%	
Use of sleep medication	None during Ramadan	74.7%	82.2%	74.7%	73.3%	70.3%	0.002
	Less than once a week	6.7%	10.1%	11.2%	8.9%	9.9%	
	Once or twice a week	4.0%	5.4%	7.9%	15.6%	6.3%	
	Three or more times a week	14.7%	2.3%	6.2%	2.2%	13.5%	
Daytime dysfunction	1–2 days	34.7%	28.7%	20.2%	20.0%	13.5%	0.002
	3–4 days	25.3%	27.9%	29.8%	28.9%	20.7%	
	5–6 days	16.0%	24.0%	15.2%	21.1%	22.5%	
	Everyday	24.0%	19.4%	34.8%	30.0%	43.2%	
PSQI overall score	Good sleep quality	37.3%	20.9%	24.7%	14.4%	9.9%	0.000
	Poor sleep quality	62.7%	79.1%	75.3%	85.6%	90.1%	

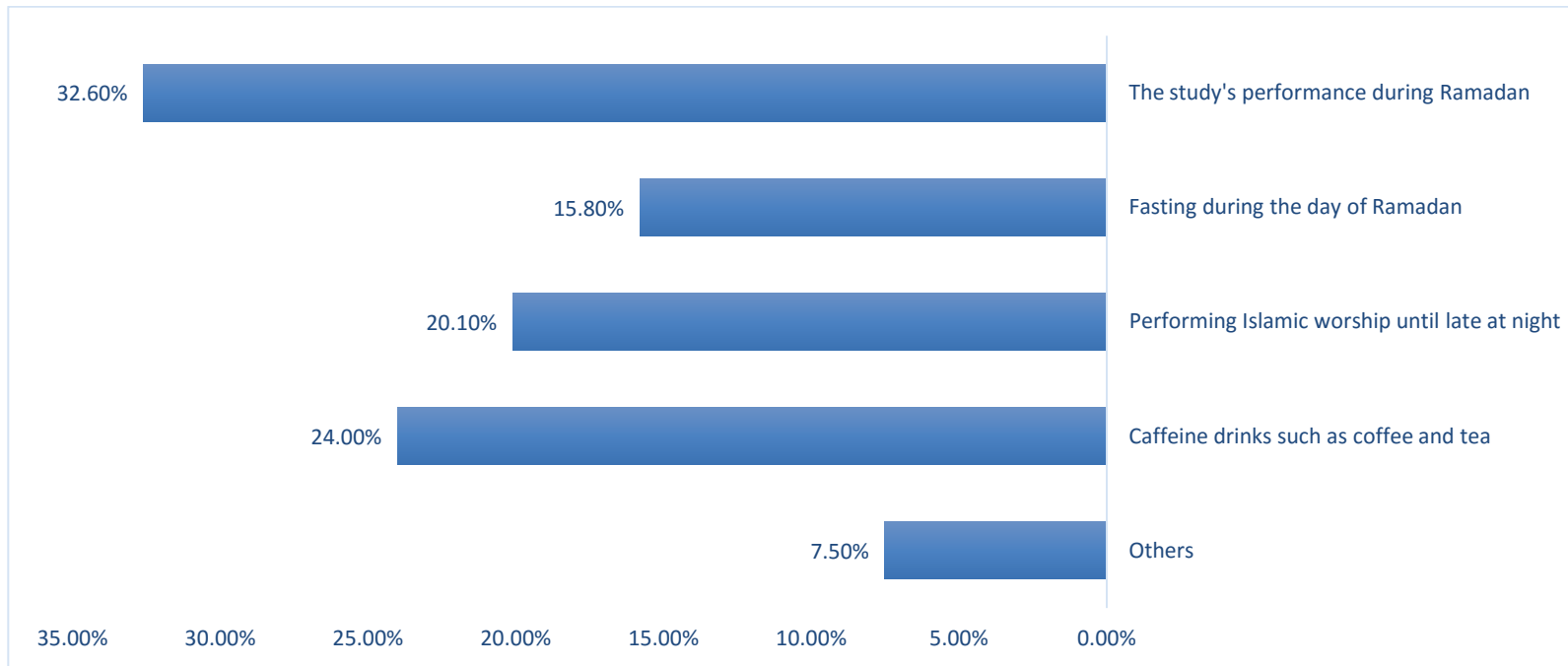


Fig. 2. Causes that lead to a decreased quality of sleep during Ramadan

they suffered from dysfunction every day. The result revealed an association between all the PSQI components and academic performance ($p < 0.05$) except sleep duration, which was not statistically significant in association with academic performance ($p > 0.05$). Moyazzem Hossain et al. reported that subjective sleep quality, sleep disruptions, and the usage of sleeping drugs were all statistically significant. Subjective sleep quality, sleep length, and daytime dysfunction were all positively related to academic achievement; however, sleep latency, habitual sleep efficiency, sleep disturbances, and the use of sleeping drugs were all negatively related to students' academic performance [23]. Previous research has found that academic performance is related to the time of sleep and wakefulness but not associated with total sleep duration [24]. Mohammed A. Alsaggaf et al. reported that poor academic performance was linked to a higher frequency of insomnia symptoms, including the inability to sleep within 30 minutes of going to bed and numerous nightly awakenings [25]. Alapin et al. reported that poor quality sleep impacts general performance and focus [26].

The majority of participants in this study studied from morning to afternoon; (14.4%) in the morning only; (7.7%) from afternoon to evening; and (17.5%) at different times. Participants' preferred study times during Ramadan were the evening only (38.6%) and the morning only (37.0%). We suggest that in Ramadan, many students suffer from shifts in mealtimes that can affect dietary and social well-being and cause sleep deprivation. However, this is mainly because those who fast during the day eat more at night and go to sleep late, which affects their academic performance. Therefore, the majority of respondents preferred to study in the evening only or in the morning only. Past studies have revealed that fasting had a deleterious impact on both behavior and academic performance. According to 61% of students, activity was the most affected. Study desire and concentration skills were affected in 54% and 53% of students respectively [8].

In this study, the common causes that led to a decreased quality of sleep in Ramadan were: study performance during Ramadan; caffeine drinks such as coffee and tea; performing Islamic worship until late at night; and fasting during the day of Ramadan. Zeinab Afifi reported that during Ramadan, people stayed up late watching TV, listening to the radio, praying, or reading the

Koran. They must then rise for the suhoor (pre-dawn) supper [8].

We recommend that it is critical to create and implement effective interventions in the study setting to improve academic success and healthy living among university students. The interventions may concentrate on the following areas: making students aware of the consequences that their poor sleep habits have on their academic performance; and providing students with alternative skills to deal with academic burdens, such as good time management and maintaining good class attendance. Furthermore, the intervention may encourage excellent sleep hygiene in order to lessen the impact of behavioral factors on an individual's sleep. Students should understand the significance of sleep quality and how it affects their mental health and academic performance. Moreover, we recommend creating college regulations that encourage healthier and more appropriate sleep among students, which can have a significant impact on their performance and overall health.

This study has certain strengths and weaknesses that should be noted. The study's strength is that it is the first study in Saudi Arabia to assess the relationship between poor quality sleep during Ramadan and academic performance, which may help future studies. We also collected a huge number of questionnaires, with 583 respondents. The study limitations were that other elements that can contribute to poor academic achievement were not taken into consideration or were ignored, such as exam stress and exam complexity. Also, it is a cross-sectional study that only shows a link and does not prove cause and effect.

5. CONCLUSION

The study revealed an association between poor quality sleep during Ramadan and academic performance among students. The majority of students had poor sleep quality in Ramadan. Most students with poor academic performance had very poor sleep quality, sleep latency of more than one hour, sleep duration of less than five hours, and sleep efficiency of less than 65%. The majority of these students had sleep components and academic performance, except sleep duration. The majority of respondents preferred to study in the evening only or in the morning only during Ramadan. The common causes that led to a decreased quality

of sleep in Ramadan were: the study's performance during Ramadan; caffeine drinks such as coffee and tea; performing Islamic worship until late at night; and fasting during the day in Ramadan. We recommend making students aware of the consequences of their poor sleep habits on their academic performance and to provide students with necessary skills, such as good time management and excellent sleep hygiene. Students should understand the significance of sleep quality and how it affects their mental health and academic performance. Moreover, we recommend creating college regulations that encourage healthier and more appropriate sleep among students, which can have a significant impact on their performance and overall health. We also suggest that universities change the times that students' study during Ramadan to fit their abilities.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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