

Prevalence and association between sleep, stress, and physical activity among medical students in southern region, Saudi Arabia

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Abstract

Background: Sleep is a recurring state of relaxation that is characterized by an altered state of consciousness, with inhibited sensory activity, and muscular inhibition. With sleep the brain can have good attention which is very important for daily activity. Good quality of sleep can get better results in a wide variety of aspects like good quality work performance, less mistakes, no stress, enjoying ones' own daily routine. With low sleep hours, performance in ones' own duties can decline.

Aim: To estimate prevalence and association between sleep, stress, and physical activity among medical students in southern region, KSA.

Methodology: A descriptive cross-sectional approach was used targeting all accessible students. A descriptive Cross-sectional questionnaire survey was used. Study setting: The study was conducted in southern region, KSA. Study population: all male and female medical students in southern region, Saudi Arabia. Sampling technique: Multi-stratified randomized technique.

Results: The study included 490 medical students whose ages ranged from 17 to 28 years old with mean age of 22.7 ± 1.7 years. Male respondents were 256 (52.2%) and 310 students (63.3%) were in the clinical grades (4th -6th) and 49 (10%) were interns. Exactly 351 students (51.2%) reported that their sleep quality is either bad or fairly bad. As for perceived stress level among the medical students (Table 3), low stress level was diagnosed among 67 (13.7%) students, moderate stress among 355 (72.4%) students while 68 (13.9%) students had a high stress level. Considering physical activity pattern, Table 4 demonstrates that 291 (59.4%) students never practice vigorous sports while 51 (10.4%) practice it for 4-7 days per week.

Conclusions: In conclusion, the study revealed that students had poor sleep hygiene, high stress, and improper practice of physical activity.

Key words: Sleep hygiene, stress, physical activity, students, relation, performance, effect

Background

Sleep deprivation and stress are linked to each other and they are involved in the hypothalamo-pituitary-adrenal (HPA) axis [1-3]. Medical students with high levels of stress may have decrease in concentration and cognitive functions [4]. They may also suffer from burnout (approximately 52%) and depressive symptoms (40 %) [5]. Students face a lot of challenges that put them in a high level of stress, such as homework, seminars and CV requirements provoking them to make more time for work [6]. Academic performance is declining due to sleep deprivation and this is due to multiple requirements in the college in a short time and not allowing for sleep as one of the top priorities [3, 6]. Studies show that there is relation between negative between stress and physical activity so that students academic performance may decline \ and weight may increase [4, 7, 8]. The aim of this study is to confirm the relationship between sleep quality, physical activity, and academic stress among medical students in the southern region of Saudi Arabia. One of the most important factors can affect sleep quality is stress. Medical students around the world have reported a high ratio of stress, for example in Pakistan (60%), Thailand (61%), Malaysia (42%), and the United States (57%) [9-11]. Many studies confirm medical students have a sleep disturbance. [6, 12-14, 16]. If the medical students have poor sleep quality it may affect many aspects of physical and emotional health like cognition and memory, depression, irritability, and may also affect academic performance [13]. On other hand, 12-week physical activities programmes have shown an improvement in sleep quality among female university students [15]. There is, however, lack of studies that emphasizes the relationship between sleep quality, physical activity, and academic stress among medical students. The aim of this study is to confirm the relationship between the sleep quality, physical activity, and academic stress among medical students in the southern region of Saudi Arabia. Some studies indicate that college students are lacking physical activity. Two of them were specifically conducted on medical students and one of them can point to a possible cause of burnout in undergraduate medical students [17, 18, 20, 21]. A study suggests that students doing physical activity during medical school may improve the counselling of physical activity that as future clinicians need to provide for the patients [19]. Those medical students lacking physical activity are susceptible to emotional exhaustion, depersonalization, and reduction in personal accomplishment [21]. A study indicates that physically active medical students have higher GPA than physically inactive medical students [22].

Methodology

An online questionnaire based descriptive cross-sectional approach was used targeting all students in King Khalid University, Abha, Saudi Arabia, during academic year 2019-2020. The study was conducted during the period from April 2019 to June 2020. Students with disability, chronic psychological disorders, and who had prescribed hypnotics were excluded. Data

were collected using an online questionnaire which was constructed by the researchers after intensive literature review and expert's consultation. The questionnaire data included student's socio-demographic data such as age, gender, body mass index, and GPA. The Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep hygiene among students [23]. Perceived Stress Scale (PSS) formed of 10 items was used to assess degree of stress among students [24]. The International Physical Activity Questionnaires (IPAQ) which comprises a set of 4 questionnaires was used to assess physical activity among included students [25]. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The questionnaire was uploaded online using social media platforms by the researchers and their relatives and friends to be filled out by all the population in Aseer region. A consecutive convenience sampling method was used due to the current lockdown and lack of physical contact due to COVID-19 pandemic. All those who received the electronic questionnaire during the study period and who fulfilled the inclusion criteria were invited to participate through filling in the questionnaire. The ethical approval of IRB at King Khalid University was taken before starting data collection. Data were analysed using SPSS version 22 using two tailed tests with level of significance of 0.05. Descriptive analysis was done using frequency and percentage for different variables including demographic data GPA, personal habits, sleep items, stress, and physical activity. Categorization for sleep and stress scales were based on attached scales and attached scoring methods. For PSQI, global score was calculated after having different components scores (7 components) with score ranging from 0-21. Students who had a score of 13 points or more were considered to have good sleep pattern. Regarding PSS, total score was calculated after reversing positive items scores, then categorized into low, moderate, and high levels reference to scale reported values. Cross tabulation was used to assess distribution of students' sleep hygiene, perceived stress level, and physical activity practicing from their personal data. Also, relation between perceived stress level and students sleep hygiene and physical activity was tested using unadjusted regression model.

Results

The study included 490 medical students whose ages ranged from 17 to 28 years old with mean age of 22.7 ± 1.7 years. Male respondents were 256 (52.2%) and 310 students (63.3%) were in the clinical grades (4th -6th) and 49 (10%) were interns. Exactly 222 (45.3%) students were at normal weight while 102 (20.9%) were either obese or morbidly obese. The majority of the students were single (93.7%; 459) and 52 (10.6%) were smokers (Table 1).

Table 2 illustrates sleep hygiene among the respondent students. Exactly 351 students (51.2%) reported that their sleep quality is either bad or fairly bad. According to the Pittsburgh Sleep Quality Index (PSQI), 352 students (71.8%) were poor sleepers with mean score of 6.5 out of 21.

As for perceived stress level among the medical students (Table 3), low stress level was diagnosed among 67 (13.7%) students, moderate stress among 355 (72.4%) students while 68 (13.9%) students had high stress level. Stress score ranged from 3-38 with mean score of 20.1 out of 40.

Considering physical activity pattern, Table 4 demonstrates that 291 (59.4%) students never practice vigorous sports while 51 (10.4%) practice it for 4-7 days per week. This practice was for less than one hour among 119 (59.8%) of the students. Considering moderate sports, 254 (51.8%) of the students reported negative practice while 54 (11%) practice it for 4-7 days weekly. This practice was for less than one hour among 140 students (59.3%). As for walking, 212 (43.3%) of the students practiced walking for 4-7 days weekly. This was for less than one hour among 218 of them (55.3%).

Table 5 illustrates distribution of medical students sleep hygiene, stress level, and physical activity by their personal data. Poor sleep was recorded among 87.8% of students

below the age of 20 years compared to 69.4% of those who were aged 25 years or more ($P=.033$). Exactly 76.1% of the female students had poor sleep quality compared to 68% of males ($P=.046$). Also, poor sleep quality was recorded among 71.6% of students with normal weight compared to 81.6% of those who were morbidly obese ($P=.017$). Considering stress, moderate to severe stress was diagnosed among 91% of female students compared to 82% of males ($P=.004$). Also, non-practicing of sports was reported by 10.7% of females compared to 18.4% of males ($P=.017$).

Table 6 demonstrates association between students' stress level, sleep hygiene and practicing physical activity. Students with moderate to high stress level reported a significant, nearly 6 times more likelihood, poor sleep hygiene than others with low stress ($OR=5.7$; 95% CI: 3.4-9.9). Considering practicing physical activity, students who practice physical activity had a 1.5 times likelihood for high stress than others who did not ($OR=1.4$; 95% CI: 0.76-2.88).

Table 1: Personal data of medical students in Southern region of Saudi Arabia

Personal data	No	%	
Age in years	< 20 years	49	10.0%
	21-24	369	75.3%
	25+	72	14.7%
Gender	Male	256	52.2%
	Female	234	47.8%
Body mass index	Underweight	50	10.2%
	Normal	222	45.3%
	Overweight	116	23.7%
	Obese	64	13.1%
	Morbid obesity	38	7.8%
Grade	Academic (1-6)	131	26.7%
	Clinical (7-12)	310	63.3%
	Intern	49	10.0%
GPA	2-2.5	13	2.7%
	2.5-3	42	8.6%
	3-3.5	104	21.2%
	3.5-4	101	20.6%
	4-4.5	143	29.2%
	4.5-5	87	17.8%
Marital status	Single	459	93.7%
	Married	31	6.3%
Smoking	Non-smoker	438	89.4%
	Smoker	52	10.6%

Table 2: Sleep hygiene among medical students in Southern region of Saudi Arabia

Sleep hygiene	No	%
How would you rate your sleep quality overall?		
<i>Very bad</i>	122	24.9%
<i>Fairly bad</i>	129	26.3%
<i>Fairly good</i>	176	35.9%
<i>Very good</i>	63	12.9%
The Pittsburgh Sleep Quality Index		
<i>Good sleeper</i>	138	28.2%
<i>Poor sleeper</i>	352	71.8%
Range (0-21)	1-18	
Mean \pm SD	6.5 \pm 2.9	

Table 3. Perceived stress level among medical students in Southern region of Saudi Arabia

Perceived stress	Never	Almost never	Sometimes	Fairly often	Very often
How often have you been upset because of something that happened unexpectedly?	14.5%	15.5%	43.3%	15.5%	11.2%
How often have you felt that you were unable to control the important things in your life?	14.7%	15.7%	35.5%	20.8%	13.3%
How often have you felt nervous and stressed?	6.3%	8.6%	35.3%	24.5%	25.3%
How often have you felt confident about your ability to handle your personal problems?	7.8%	14.3%	37.6%	25.5%	14.9%
How often have you felt that things were going your way?	9.2%	15.9%	49.0%	18.8%	7.1%
How often have you found that you could not cope with all the things that you had to do?	8.4%	22.7%	42.2%	18.6%	8.2%
How often have you been able to control irritations in your life?	5.7%	13.1%	45.7%	25.1%	10.4%
How often have you felt that you were on top of things?	10.2%	21.2%	43.9%	18.6%	6.1%
How often have you been angered because of things that happened that were outside of your control?	8.8%	19.4%	38.0%	22.2%	11.6%
How often have you felt difficulties were piling up so high that you could not overcome them?	11.0%	21.6%	43.7%	14.5%	9.2%
Overall perceived stress level	Low		Moderate	High	
	(67; 13.7%)		(355; 72.4%)	(68; 13.9%)	
Range (Mean \pm SD)	3-38 (20.1 \pm 5.6)				

Table 4: Physical activity among medical students in Southern region of Saudi Arabia

Physical activity		No	%
During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	<i>No vigorous sports</i>	291	59.4%
	<i>1-3 days</i>	148	30.2%
	<i>4-7 days</i>	51	10.4%
How much time did you usually spend doing vigorous physical activities on one of those days?	<i>< 1 hr/ day</i>	119	59.8%
	<i>1 hr/ day</i>	49	24.6%
	<i>2 hrs/ day</i>	20	10.1%
	<i>3 hrs/ day</i>	8	4.0%
	<i>> 3 hrs/ day</i>	3	1.5%
During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.	<i>No moderate sports</i>	254	51.8%
	<i>1-3 days</i>	182	37.1%
	<i>4-7 days</i>	54	11.0%
How much time did you usually spend doing moderate physical activities on one of those days?	<i>< 1 hr/ day</i>	140	59.3%
	<i>1 hr/ day</i>	59	25.0%
	<i>2 hrs/ day</i>	18	7.6%
	<i>3 hrs/ day</i>	14	5.9%
	<i>> 3 hrs/ day</i>	5	2.1%
During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	<i>No walking</i>	96	19.6%
	<i>1-3 days</i>	182	37.1%
	<i>4-7 days</i>	212	43.3%
How much time did you usually spend walking on one of those days?	<i>< 1 hr/ day</i>	218	55.3%
	<i>1 hr/ day</i>	83	21.1%
	<i>2 hrs/ day</i>	61	15.5%
	<i>3 hrs/ day</i>	18	4.6%
	<i>> 3 hrs/ day</i>	14	3.6%

Table 5. distribution of medical students sleep hygiene, stress level, and physical activity by their personal data

Personal data		Poor sleeper		Moderate /high stress		Not practicing activity	
		%	P-value	%	P-value	%	P-value
Age in years	< 20 years	87.8%		95.9%		16.3%	
	21-24	70.2%	.033*	86.2%	.052	15.4%	.429
	25+	69.4%		80.6%		9.7%	
Gender	Male	68.0%	.046*	82.0%	.004*	18.4%	.017*
	Female	76.1%		91.0%		10.7%	
Body mass index	Underweight	78.0%		92.0%		20.0%	
	Normal	71.6%		85.1%		12.6%	
	Overweight	61.2%	.017*	84.5%	.336	15.5%	.291
	Obese	81.3%		92.2%		20.3%	
	Morbid obesity	81.6%		81.6%		7.9%	
Marital status	Single	72.8%	.078	86.3%	.897	15.3%	.180
	Married	58.1%		87.1%		6.5%	
Smoking	Non-smoker	71.5%	.592	87.0%	.217	14.4%	.573
	Smoker	75.0%		80.8%		17.3%	

P: Pearson X² test

* P < 0.05 (significant)

Table 6: Association between students' stress level, sleep hygiene and practicing physical activity

Sleep and physical activity	Perceived Stress level				OR (95% CI)
	Low stress		Moderate /high stress		
	No	%	No	%	
The Pittsburgh Sleep Quality Index					
Good sleeper	42	62.7%	96	22.7%	Ref
Poor sleeper	25	37.3%	327	77.3%	5.7 (3.4-9.9) *
Physical activity					
Not practicing	13	19.4%	59	13.9%	Ref
Practicing	54	80.6%	364	86.1%	1.4 (0.76-2.88)

OR: Odd ratio

CI: Confidence interval

* P < 0.05 (significant)

Discussion

Medical study is considered to be a high stress area of education due to the overload with academic and clinical needs and challenging professionals. This is why it has negative impact on the mental and physical health of the students [26, 27]. Many factors stand behind this situation, including the academic overload, overnight on-call duties, contact with diseases and death, repeated examinations, and comprehensive curricula [28, 29]. Moreover, medical students encounter multiple stressors outside their medical school: physical, social, emotional, and family problems [30-33].

The current study aimed to assess prevalence and association between sleep disorders, and stress, with physical activity among medical students in Abha Saudi Arabia. The study revealed that more than half of the students ranked their sleep quality as bad which was not so far as was detected by the Pittsburgh Sleep Quality Index where more than 70% of the sampled students had poor sleep hygiene. Sleep was more poor among female students than males (76% vs. 68%). Also, young aged students had higher portion regarding poor sleep hygiene, as well as those with high body mass index (obese and morbidly obese students). These findings were consistent with a study conducted in King Abdulaziz University, Saudi Arabia to assess the association of stress with sleep quality among medical students [34]. The study revealed that the prevalence of poor sleep quality (total PSQI score ≥ 5) was 76.4%. In contrast, the current study demonstrated a higher prevalence of stress than that reported among students at a Pakistani medical school (59.7%) and King Saud University (53.2%), respectively [35, 36].

Regarding stress, the current study showed that more than three quarters of the students had moderate to high stress level. Stress was higher among female students at young ages. This is logical as females are less resistant to stressful conditions specially those at young ages who have no experience regarding the medical study environment and workloads. Though, it revealed lower than other Pakistani and Indian medical school students who reported that more than 90% of their students have stress [36, 37]. These variations could be due to the variability of using different stress assessment tools. It is established that the medical training period makes the students face multiple stressors and challenges, [35, 36]. If these challenges are left and neglected, they will contribute to further stress [9]. Medical training alone is considered as a major risk factor for having depressive symptoms which may explain the increased levels of stress and sleep disturbances among the students. Gender variation regarding sleep disturbance and stress reported with the current study compares with other study findings [38, 39]. But there were other studies which showed no gender variation regarding sleep and stress level among students [26, 31].

The study also revealed that there was a significant relation between stress and sleep hygiene, but no relation was found between stress and physical activity and no significant relation between practicing physical activity and sleep quality. Research reported it was evident that moderate physical activities were more popular in scientific research as a physiotherapy method to improve sleep quality. A cross-sectional study showed that neither intensity, nor duration of PA was associated with sleep quality or quantity [40]. Others suggested that regular moderate-intensity activity programmes improve self-rated sleep hygiene in older adults with moderate sleep complaints [41]. According to the results illustrated above, it is reasonable to assume that physical activity and its relation to sleep quality is still questionable, which needs more research.

Conclusions and Recommendations

In conclusion, the study revealed that medical students experienced high levels of stress and poor sleep quality but acceptable level of practicing physical activities. Also, there was a significant effect of stress level on students' sleep quality especially among female young students. The relation between practicing exercises and improving sleep quality is still questionable as the current study failed to provide significant evidence in favour of this relationship. Researchers recommend providing proper help and counselling, health education, and stress coping strategies programs for undergraduate students as part of their clinical rotations. Future studies are recommended to explain the evidence regarding effect of physical exercise in improving sleep quality and detail the relationship between physical intensity and sleep quality.

Conflict of interest:

There is not any conflict of interest associated with this manuscript to be declared.

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