

**Relationship of body mass index to sleep duration, and current smoking among medical students in Tabuk City, Saudi Arabia**

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**Abstract**

**Background:** Being overweight is associated with cardiometabolic risk, and lifestyles including smoking and good sleep hygiene are also implicated. We aimed to assess the dietary habit, time spent on social media, and sleep duration relationship to body mass index (BMI) among medical students in Tabuk, Saudi Arabia.

**Methods:** A cross-sectional study was conducted among 147 clinical phase medical students in the Medical College, University of Tabuk (Saudi Arabia) from January 2018 to May 2018. A checklist questionnaire was used to measure variables such as age, sex, smoking, level of exercise, whether taking meals and snacks regularly, eating fast food, fruit and vegetable consumption, sleep duration, time spent on social media, and breakfast skipping. Data were analyzed by IBM-SPSS version 20, using one-way ANOVA and Pearson's production-moment correlation ( $r$ ). A  $p$ -value of less than 0.05 was considered statistically significant.

**Results:** Participants consisted of 51% males, mean age (Mean  $\pm$  SD) was 22.90 $\pm$ 1.27 years, sleep duration was 7.50 $\pm$ 2.17 hours, time spent on social media was 5.54 $\pm$ 3.49 hours, body mass index was 24.8 $\pm$ 5.19, and breakfast skipping, fast food consumption, smoking, and regular exercise were reported in 52.4%, 87.7%, 12.9%, and 36.1% respectively. A significant negative correlation was evident between BMI and sleep duration ( $r = -0.185$ ,  $p = 0.025$ ), cigarette smokers were more likely to be obese compared to their counterparts (27.28 $\pm$ 6.85 vs. 24.10 $\pm$ 4.98,  $p = 0.018$ ). No significant statistical relationship was evident between BMI, breakfast skipping, fast food, fruit and vegetable intake, and time spent on social media.

**Conclusion:** BMI was higher among smokers and those with shorter sleep duration, there was no association between BMI and other students' characteristics. Measures to smoking quitting and good sleep hygiene are recommended.

**Keywords:** Obesity, Sleep duration, Social media, Dietary habits, Medical students

**1. Introduction**

Epidemiological studies suggest decreases and breaks of obesity, however, this major health problem is increasing (1). Once considered a problem in high-income countries with the dramatic increase in urban areas, obesity is on the rise worldwide. The prevalence ranges from 20.5% to 34.7% in the USA depending on the region and whether self-reported or using objective measures (2-4). Despite substantial clinical and policy targeting obesity, there is no evidence in any age group that the prevalence of obesity is declining, furthermore 17.4% of children met the criteria for type 1 obesity (5). In the Kingdom of Saudi Arabia, the prevalence is 28.7% (35.5% of women and 24.1% of men) over 15 years of age (6). A study published in Saudi Arabia estimated the prevalence in one region of the

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Kingdom to be 63.4%, with near three-quarters of females being obese, necessitating urgent measures to be undertaken (7). Obesity is a risk factor for severe diseases like diabetes mellitus, hypertension, dyslipidemias, and obstructive sleep apnea causing a lot of morbidity and mortality and putting high pressure on health resources (8-10). Chronic sleep curtailment has been associated with increased overall and central adiposity and cardiovascular risk factors among children and adolescents (11). Previous studies have documented associations between sleep duration, sleep quality, and obesity risk in older individuals (12-14). Sedentary lifestyle and unhealthy diet are associated with obesity and diabetes mellitus, the adoption of moderate physical activity and a health-friendly diet are essential, achievable, preventive measures for obesity and type 2 diabetes and the maintenance of both physical and mental health (15, 16). Medical students are an important sector of the community; they are the doctors of the near future and will be the health educators. Their lifestyles in regard to eating behavior, physical activity, and sleep duration are rarely evaluated. Literature regarding this important topic is lacking. To our best of knowledge, this is the first study to assess sleep duration, the social media, physical activity, and dietary habits among medical students in Tabuk City and relating them to body mass index. Investigating obesity and its associated risk factors could help in preventing this common morbid disease by implementing the necessary interventions. Thus, we proposed this research to study breakfast skipping, fast food, fruit and vegetable consumption, and sleep duration with relationship to body mass index among medical students in Tabuk, Kingdom of Saudi Arabia.

## **2. Material and Methods**

### **2.1. Research design and participants**

This cross-sectional study was conducted among the clinical stage medical students of Medical College, University of Tabuk (Saudi Arabia) from January 2018 to May 2018. The University of Tabuk lies in north-west Saudi Arabia with four Colleges and 5,000 students.

### **2.2. Sampling**

The participants were randomly selected from the class list (4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> classes), and then two out of three students from the serial number were chosen (total 210 students). Students were approached in a ratio of 2:1 from the class list (two students were chosen from three) to select 147 participants.

### **2.3. Ethical consideration**

The ethics of study was approved by the ethics committee of Medical College, University of Tabuk (Ref: 30-305). A meeting was prepared with the participants and they were informed that their participation was completely voluntary and their information would be considered confidential. The participants read a one-page information sheet about the study and signed a written informed consent, then completed the checklist. Also, the students were assured that their marks or teaching would not be affected by any means.

### **2.4. Data collection**

The following information was collected: Age, sex, class, smoking, level of exercise (assessed by if involved in moderate physical activity for 30 minutes/day) if taking meals and snacks regularly, fast food, fruit and vegetable consumption (assessed by answering two questions: how many times/week do you take the following food items? and how many servings/day?), sleep duration, time spent on social media, and breakfast skipping. The weight and height of all the participants were measured, and the body mass index was calculated. Breakfast was defined as any food or beverages consumed between 5:00 a.m. and 10:00 a.m. (17), those who skipped breakfast for at least three days were defined as breakfast skippers.

### **2.5. Statistical analysis**

The Statistical Package for Social Sciences (SPSS) IBM© SPSS© version 20 (IBM© Corp, Armonk, NY, USA) was used for data analysis. The one-way ANOVA and Pearson product-moment correlation were used to test the relation between body mass index and different parameters. A P-value of <0.05 was considered significant.

## **3. Results**

Out of 147 clinical phase medical students (51% males), 34.7% were 4th class, 32.7% were 5th class, while 32.7% were 6th class, 17.7% were overweight, and 12.9% were obese. The current data showed that only 36.1% were practicing regular exercise, 12.9% were smokers, 66.7% were taking their meals regularly, 63.9% were taking regular snacks, breakfast skipping was reported in 52.4%, the majority were consuming fast food regularly, and 53.7% were regular consumers of fruits and vegetables (Table 1). In the current study, the mean height was 162.93±8.21 cm, the mean weight was 65.43kg, mean body mass index (BMI) was 24.8±5.19 kg/m<sup>2</sup>, sleep duration

was  $7.50 \pm 2.17$  hours, and the time spent on social media was  $5.54 \pm 3.49$  hours. In the current study, a significant negative correlation was found between sleep duration and body mass index (Pearson correlation coefficient ( $r$ ) = -0.185,  $p=0.025$ ), while no significant correlation was reported between body mass index and time spent on social media ( $r= -0.158$ ,  $p=0.055$ ) (Table 2). In the present study, a significant statistical difference (one-way ANOVA) was evident between cigarette smokers and their counterparts regarding BMI ( $27.28 \pm 6.85$  vs.  $24.10 \pm 4.98$ ,  $p=0.018$ ), no significant differences were found between breakfast skippers and regular consumers ( $24.23 \pm 5.58$  vs.  $23.92 \pm 4.76$ ,  $p=0.175$ ), and exercise ( $24.43 \pm 5.51$  vs.  $23.68 \pm 4.80$ ,  $p=0.384$ ). Table 3 illustrates the relationship of body mass index and dietary habit of the medical students.

**Table 1.** Dietary habits, body mass index, sex, smoking, and exercise among the study group

Character		Correct answer; n (%)
Sex	Males	75 (51)
	Females	50 (49)
Class	6 <sup>th</sup>	48 (32.7)
	5 <sup>th</sup>	48 (32.7)
	4 <sup>th</sup>	51 (34.7)
BMI	Obese	26 (17.7)
	Overweight	19 (12.9)
Exercise		53 (36.1)
Smoking		19 (12.9)
Taking meals regularly		98 (66.7)
Taking snacks		94 (63.9)
Breakfast skipping		77 (52.4)
Fast food		129 (87.7)
Fruits and vegetables		79 (53.7)

**Table 2.** Correlation between body mass indexes, time spent on social media, and sleep duration

Character	Correlation coefficient (r)*	p-value
Social media	-0.158	0.055
Sleep duration	-0.185	0.025

\* Pearson product-moment correlation test

**Table 3.** The relation to body mass index, breakfast skipping, fast food, and fruit and vegetable intake, smoking, and exercise

Character		BMI (kg/m <sup>2</sup> )	p-value*
Breakfast behavior	Breakfast skippers	$24.23 \pm 5.58$	0.715
	Non-skippers	$23.92 \pm 4.76$	
Fruits and vegetable intake	Regular intake	$24.63 \pm 5.67$	0.172
	Irregular intake	$23.45 \pm 4.53$	
Exercise	Regular exercise	$24.43 \pm 5.51$	0.384
	Irregular exercise	$23.68 \pm 4.80$	
Smoking	Smokers	$27.28 \pm 6.85$	0.018
	Non-smokers	$24.10 \pm 4.98$	
Fast food intake	Yes	$24.19 \pm 5.24$	0.501
	No	$23.31 \pm 4.91$	

\* Pearson product-moment correlation test

#### 4. Discussion

The current study, showed obesity in (17.7%) and overweight (12.9%), the current data were similar to a study published in China (18) and reported similar findings. In the present study, a significant correlation was found between sleep duration and BMI, and those who were cigarette smokers were more likely to be obese than their counterparts. The association of sleep duration with obesity is in line with the study of Khemayanto et al. (13) who found similar results. In similarity to the present findings are Cao et al., (19) who reported the association of short sleep duration and obesity and that increasing the awareness of the students regarding good sleep hygiene is highly

recommended. A recent study published in Nepal (20) found that cigarette smokers were more obese compared to non-smokers, which is in line with the current findings in which smokers had a higher body mass index. An urgent interventional program addressing the association of smoking and obesity and their cardiovascular risk is highly needed. The reported smoking rate in the current study was lower than a percentage (24.8%) reported among students in Hungary (21) and higher than a study from China (22). In the present study, breakfast skipping is congruent with the findings of Sun et al. (23) who reported a prevalence of 41.7%. No association was found between breakfast skipping and body mass index, in accordance with a study conducted in Poland (24), and concluded similar results. The current data showed an association between fruit and vegetable consumption and body mass index, whereas a previous study (25) found no association between fresh fruits and vegetables and obesity, supporting the current observation. A study conducted among medical students in British Columbia (26) concluded that 64% of the students met the recommendation for physical activity. More effort is needed regarding the implementation of an exercise program in our college, as only 36.1% were practicing exercise.

Eating fast food is associated with high energy consumption and vitamin deficiency. In the present study, 87.7% of students consumed fast food at least four times/day and the consumers were not more obese than their counterparts. A previous study (27) found that 84.1% of students consumed fast food regardless of their nutritional status and in accordance with the current observation. The previous study (27) reported no significant differences in BMI between fast food consumers and those who did not consume the food, which is in line with the current data. The present data showed no correlation between body mass index and the time spent on social media. Similarly, a study published in Iran (28) assessed the home environment and found that sleep duration was the only behavior associated with weight status. A plausible explanation could be the time of social media and not merely the duration, as using social media at night is associated with poor sleep quality, depression, and anxiety (29).

### **5. Study limitations and strength**

The strength of the present study is that we assessed various lifestyles including smoking, sleep duration, and dietary habits, which can be easily addressed as preventive measures for obesity. The study limitations were the small size of the study sample, the reliance on a self-administered questionnaire, which is more prone to subjectivity, and that the study was conducted at a single college, so the result cannot be generalized to the Kingdom of Saudi Arabia. A major limitation is that we did not use polysomnography - a multi-parametric test used in the study of sleep and as a diagnostic tool in sleep medicine.

### **6. Conclusions**

A significant negative correlation was found between body mass index and sleep duration, those who were current smokers were more likely to be obese than non-smokers. There was no significant difference between breakfast skippers, fruit and vegetable, and fast food consumers, and those who spent more time on social media and their counterparts regarding body mass index. Increasing the awareness of medical students about good sleep, hygiene and smoking cessation is highly recommend. Further, larger multi-center studies focusing on meal timing, sleep quality, and central adiposity are needed.

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### **Conflict of Interest:**

There is no conflict of interest to be declared.

### **Authors' contributions:**

All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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