

Research Paper

The Relationship of Sleep Quality With Body Mass Index in Male College Students With and Without Regular Exercise



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Citation Gilanian Amiri O, Habibian M. The Relationship of Sleep Quality With Body Mass Index in Male College Students With and Without Regular Exercise. The Journal of Qazvin University of Medical Sciences. 2020; 24(1):14-23. <https://doi.org/10.32598/JQUMS.24.1.2>

doi <https://doi.org/10.32598/JQUMS.24.1.2>



Received: 23 Dec 2018

Accepted: 15 Apr 2019

Available Online: 01 Apr 2020

Keywords:

Body mass index,
Exercise, Sleep quality

ABSTRACT

Background Poor Sleep Quality (SQ) may lead to health problems through an increase in body weight and adipose tissue. Physical activity and or exercise are effective factors in SQ and obesity.

Objective The current study aimed to investigate the relationship of SQ with Body Mass Index (BMI) in male college students with and without regular exercise.

Methods In this descriptive-analytical study, 100 male college students with and without regular exercise were selected using a purposive and convenience sampling method and divided into two groups of active with normal weight ($n=50$, $BMI=21.9 \pm 1.2$ kg/m²) and inactive with overweight ($n=50$, $BMI=28.3 \pm 5.2$ kg/m²) groups. The Pittsburgh Sleep Quality Index (PSQI) questionnaire was used to measure SQ, where a total score of more than 5 indicates a poor SQ. The data were analyzed using Spearman correlation and Mann-Whitney U tests.

Findings Sixty percent of the students had a poor SQ. The mean score of SQ in the active group was significantly lower than in the inactive group ($P<0.001$). Moreover, the results showed a significant correlation between the SQ and BMI in overall ($P<0.001$) and in the inactive group ($P=0.043$), but not in the active group.

Conclusion Exercise is an effective factor for improving the SQ. Therefore, physical activity/exercise is recommended as a non-pharmacological therapy to improve SQ in overweight young men.

Extended Abstract

1. Introduction

Chronic insomnia, as one of the most common sleep disorders, affects a large number of people around the world each year [1]. Sleep disorders occur in a large proportion of the adult population, and it is esti-

mated that 10-13% of adults suffer from chronic insomnia [2]. Short sleep duration is associated with obesity, type 2 diabetes, high blood pressure, and cardiovascular diseases [3]. Feeling tired during the day is a predictor of poor Sleep Quality (SQ), and wakefulness is associated with better SQ [4]. In previous studies, the relationship between short sleep duration and increased Body Mass Index (BMI) [5] and the high correlation of increased BMI with decreased SQ with increased frequency of waking up have also reported [6].

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On the other hand, there is a relationship between sleep disorders and weight gain [7]. Insomnia, or its pathophysiological complications, may result in excessive energy intake, leading to increased appetite, excessive consumption of food, and weight gain [8]. Further obesity or increased abdominal fat has been reported in people with shorter sleep duration [9]. Also, excessive consumption of high-fat and high-sugar foods and abdominal fat storages may have a calming effect on the brain hyperactivity [2]. Studies have shown that in obese people without sleep disorders or emotional stress, sleep duration is equal to that of normal people, which indicates the importance of diagnosing and treating sleep disorders as a potential therapeutic intervention for obesity [10].

Exercise may be associated with optimal SQ [11, 12], and can improve sleeping efficiency in people with sleep problems. Even after controlling other influencing factors, physical inactivity may be increasingly associated with symptoms of insomnia or poor SQ [13]. The present study aimed to determine and compare the relationship between SQ and BMI in male college students with and without regular physical activities.

2. Materials and Methods

The study population in this descriptive study consists of all male college students aged 18-27 years studying at Islamic Azad University of Qaemshahr branch in Iran. Of them, 100 students with and without regular exercise were selected using purposive and convenience sampling methods and divided into two groups of active with normal BMI (n=50) and inactive with overweight (n=50). The subjects with a previous history of cardiovascular and respiratory diseases, and the use of drugs such as theophylline, aminophylline, corticosteroids and hypnotic tablets were excluded from the study. SQ was measured using a Pittsburgh sleep quality index (PSQI) which evaluates sleep problems during the last 4 weeks. The PSQI has 7 subscales shown in Table 1.

Its total score ranges from 0 to 21 where the score >5 indicates poor SQ. The validity and reliability of this questionnaire has been reported in the earlier studies [1]. In the present study, the Cronbach's alpha coefficient for its Persian version was obtained 0.716. The Kolmogorov-Smirnov and Levene's tests were used to determine the normality of data distribution and the equality of variances, respectively. The

Table 1. Comparison of the mean sleep quality and its dimensions in male students

Dimensions of Sleep Quality	Groups	Mean±SD	p*	p**
Quality of sleep	inactive	1.12±0.82	<0.001	0.004 [#]
	active	0.77±0.48	<0.001	
Lag in starting the sleep	inactive	1.50±0.82	<0.001	0.042 [#]
	active	1.12±0.76	<0.001	
Sleep duration	inactive	1.32±0.69	<0.001	0.006 [#]
	active	0.92±0.52	<0.001	
Efficiency of the sleep	inactive	0.52±0.42	<0.001	0.035 [#]
	active	0.46±0.30	<0.001	
Sleep disorders	inactive	0.95±0.59	<0.001	0.036 [#]
	active	0.49±0.40	<0.001	
Use of hypnotic drugs	inactive	0.70±0.52	<0.001	<0.001 [#]
	active	0.40±0.20	<0.001	
Disorders of daily functions	inactive	1.90±0.63	<0.001	<0.001 [#]
	active	1.55±0.62	<0.001	
Overall score of sleep quality	inactive	8.05±1.12	0.012	<0.001 [#]
	active	5.27±1.83	0.012	

*Kolmogorov-Smirnov test;

** Mann-Whitney U test; [#]Significant difference compared to the inactive group

Mann-Whitney U and Spearman correlation tests were used for data analysis. The significance level was set at $P < 0.05$.

3. Results

The Mean \pm SD of height, weight and BMI of students in the active group were 176.8 \pm 6.9 cm, 65.6 \pm 8.0 kg and 21.9 \pm 2.1 kg/m², respectively, while for those in the inactive group were 169.4 \pm 16.3 cm, 85.5 \pm 8.4 kg and 28.5 \pm 3.2 kg/m², respectively. The mean score of PSQI and its seven dimensions for active subjects was significantly lower than that of inactive subjects ($P < 0.05$), which indicates that active boys with normal BMI have better SQ and less disturbances compared to the overweight inactive boys (Table 1).

In overall, the BMI of subjects had a direct and significant correlation with overall SQ, sleep disturbances, sleeping medication, and daytime dysfunction. However, the BMI of active group had no significant relationship with SQ score and its dimensions; only the BMI of inactive group had a direct and significant relationship with SQ score.

4. Conclusion

Findings of the present study indicated that the SQ and its dimensions in the active group were lower compared to those of the inactive group. As a result, it can be said that active men have better SQ than inactive men. Physical activity is associated with improvement in SQ by increasing the non-rapid eye movement sleep (low heart rate and cerebral metabolism are significantly reduced), decreasing rapid eye movement sleep and reducing rapid eye movement latency (the time from the sleep onset to the first epoch of rapid eye movement sleep). Moreover, biological and biochemical changes caused by exercise and physical activity can lead to improved physical/mental health and, consequently, the improvement of SQ. Exercise can regulate some intervening factors such as growth regulating hormone, interleukin-1, prostaglandin D2, adenosine, tumor necrosis factor- α , prolactin, corticotrophin, vasoactive intestinal peptide; therefore, it can develop the quality of sleep in active individuals [1, 11, 13]. Sports activities can be considered as an effective factor in improving the quality of sleep. Therefore, the use of physical activity or exercise as a non-pharmacological treatment is recommended to improve the quality of sleep in overweight young men.

Ethical Considerations

Compliance with ethical guidelines

The present paper with dissertation code of 107214049552002 approved in Ghaemshahr Branch,

Islamic Azad University. The participants were informed about the purpose of the research and its implementation stages; they were also assured about the confidentiality of their information

Funding

This research did not receive any specific grant from any organization.

Authors' contributions

All authors had a equal contribution in preparing this article.

Conflicts of interest

The authors declared no conflict of interest.

Acknowledgements

The authors would like to thank the students participated in the study for their cooperation.