

## A CROSS-SECTIONAL STUDY ON CORRELATION OF SLEEP QUALITY WITH PHYSICAL FITNESS AND BODY MASS INDEX AMONG YOUNG ADULTS

Jyotismita Deka<sup>1</sup>, Anupi Das<sup>2</sup>, Raktim Ranjan Das<sup>3</sup>

<sup>1</sup>Professor, Department of Physiology, Silchar Medical College, Assam, India

<sup>2</sup>Associate Professor Department of Physiology, Jorhat Medical College, Assam, India

<sup>3</sup>3<sup>rd</sup> Year MBBS Student.

Received : 06/10/2023  
Received in revised form : 01/11/2023  
Accepted : 12/11/2023

**Keywords:**

Pittsburgh sleep quality index, Physical fitness, Harvard step test, Body mass index.

Corresponding Author:

**Dr. Anupi Das,**

Email: dranupidas80@gmail.com

DOI: 10.47009/jamp.2023.5.6.40

Source of Support: Nil,

Conflict of Interest: None declared

*Int J Acad Med Pharm*  
2023; 5 (6); 198-201



### Abstract

**Background:** Sleep quality and physical fitness are critical for young adult's growth and health. In the present era there is a decline in quality of sleep at a young age which has resulted in decreased physical fitness and obesity in young individuals. Good quality sleep will give an opportunity to the body to restore muscular strength, prolong the life of body cells, increase wellbeing and good physical fitness. **Materials and Methods:** The research was a cross-sectional study carried out among 105 young healthy adults. The sleep quality was assessed by using PSQI (Pittsburgh Sleep Quality Index) questionnaires. For physical fitness testing Harvard Step test was conducted. BMI was calculated using the Quetelet's Index which says BMI is weight in kgs divided by squared height in meters, i.e;  $BMI = \frac{Wt.(kg)}{(Ht(m))^2}$ . Independent t tests were used to compare the groups of each variable. Correlation between PSQI index, physical fitness and BMI were assessed by calculating Karl Pearson's Correlation Coefficient. **Result:** No significant correlation was found between all variables of sleep quality, physical fitness score and body mass index of the subjects. **Conclusion:** As no significant correlation was observed among sleep quality, physical fitness and body mass index of the subjects, further research is needed to identify other factors that may affect the sleep quality and physical fitness of medical student's life.

## INTRODUCTION

Sleep is a vital part of one's daily life. It is very essential to maintain proper sleep quality as any derangement of sleep quality may suggest underlying medical problems or it may lead to some serious complications, and may even be directly or indirectly associated with mortality. The population of young adults is at extreme risk, since it goes through lifestyle changes in terms of extensive electronic media use and academic demands, which can potentially lead to insufficient sleep and poor sleep quality,<sup>[1]</sup> often accompanied with poor diet,<sup>[2]</sup> and lack of physical activity (PA).<sup>[3]</sup> The most useful instrument to measure sleep quality is Pittsburgh Sleep Quality Index (PSQI). Physical fitness implies the ability to make adequate physiological adjustments to the stress imposed by a specific task. Physical fitness should be given importance from the very young age to avoid serious complications in the later life. Studies have shown relationship between physical fitness and sleep quality. Individuals with poor sleep quality and physical fitness had an increased risk of all cause mortality, cardiovascular disease and developing symptomatic diabetes. There

are various techniques to assess one's physical, especially cardiovascular fitness. Harvard step test is one such universally accepted technique. Body Mass Index (BMI) is an important tool for diagnosing obesity and malnutrition. Higher BMI in young age often leads to various systemic and metabolic complications in future life. High body-mass index (BMI) has become one of the biggest public health problems worldwide in the last two decades.<sup>[1]</sup> It has been well-documented that BMI over 25 kg/m<sup>2</sup> in the general population represents a risk factor for cardiovascular, metabolic, and musculoskeletal diseases.<sup>[2,3]</sup> One recent study has shown that the prevalence of overweight/obesity status in children, adolescents, and adults has risen by 10 times over the last forty years, with a special emphasis on high and middle-income countries.<sup>[4]</sup> Previous studies have reported that the benefits of regular physical activity and exercise improve sleep quality and decrease self-reported sleep disturbance. A recent study has demonstrated that physical fitness may be an important resource that can help students to cope with stress. However these studies primarily focus on adults or elderly, there is relatively less focus on young adults. Furthermore in light of high prevalence and negative impacts of sleep disturbances among

young adults, there is very little study showing the association of sleep quality and physical fitness and body mass index in young adults.<sup>[5-11]</sup>

### Aim and Objectives

Our study aims to study the correlation of sleep quality with physical fitness and body mass index among healthy young adults.

## MATERIALS AND METHODS

This is a cross sectional study conducted in Silchar Medical College after obtaining ethical clearance from Institutional Ethical Committee. 105 young adults in the age group of 18 to 24 years were randomly selected. All subjects participated in the study after giving written consent. Before the study began, subjects were given a 20–30-minute introductory session. Sleep quality was assessed using Pittsburg Sleep Quality Index, which measures different components such as sleep latency, sleep duration, sleep efficiency, use of sleep medications, sleep disturbances and daytime dysfunction. PSQI is a questionnaire which the subjects were asked to fill in a quiet room. Physical fitness was scored with the help of Harvard step test, the final score of which gives the level of one's cardiovascular fitness as poor, average, good and excellent. Height was measured without shoes in the standing position with the shoulders in relaxed position and arms hanging freely by using an anthropometer. Body weight was measured after removal of shoes with minimal clothing by using digital weighing machine. BMI was calculated using the Quetelet's Index which says BMI is weight in kgs divided by squared height in meters, i.e;  $BMI = \text{Wt. (kg)} / (\text{Ht (m)})^2$ . According to WHO classification of BMI, the study population has been categorized into underweight ( $BMI < 18.5$

kg/m<sup>2</sup>), normal weight ( $18.5 > BMI < 24.9$  kg/m<sup>2</sup>), overweight ( $BMI > 25$  kg/m<sup>2</sup>).

Data results were expressed as mean + SD. Independent t tests were used to compare the groups of each variable by the classification of global PSQI scores larger or smaller than 5. Correlation between PSQI index, physical fitness and BMI were assessed by calculating Karl Pearson's Correlation Coefficient. A two-tail p value less than 0.05 is considered to be statistically significant.

## RESULTS

The total no of respondents who filled the PSQI questionnaire and did the Harvard Step test were 125, of which 5 respondents were excluded due to inappropriate filling of the form. Based on descriptive analysis 40(33%) respondents were female and 60 (50%) were male. The analysis of BMI of the respondents showed that 33% were underweight, 56% were normal weight and 13% were overweight. No subjects were found to be obese. The sleep quality of respondents were categorized into good and bad based on PSQI questionnaire. The analysis showed that 38% had poor sleep quality and 62% had good sleep quality. Physical fitness of respondents was categorized as low, moderate and high based on Harvard Step test. About 16% respondents had low physical fitness, 45% had moderate physical fitness and 38% had high physical fitness. The result of correlation coefficient between sleep quality and physical fitness showed that there is no significant relationship between all variables of sleep quality and physical fitness score. No significant correlation was also observed between all variables of sleep quality and body mass index of the subjects.

**Table 1: Gender of participants**

Gender	n	Percentage
Female	40	33
Male	60	50
Total	120	100

**Table 2: BMI of respondents. No of young adults (N=120) according to BMI**

BMI level	No of subjects	%
20-24	40	33%
25-29	68	56%
30-34	12	13%

**Table 3: Correlation Coefficients (r) between all the variables of Sleep quality and Fitness score**

Variables	Fitness score	Significance
Sleep latency score	-0.14	N.S (p>0.05)
Sleep latency duration (min)	0.03	N.S (p>0.05)
Sleep Duration score	0.11	N.S (p>0.05)
Sleep duration (hours)	0.1	N.S (p>0.05)
Sleep Efficiency	-0.12	N.S (p>0.05)
Sleep disturbances	-0.19	N.S (p>0.05)
Sleep Meditations	-0.23	N.S (p>0.05)
Daytime Dysfunction	0.15	N.S (p>0.05)
Global PSQI Score	-0.09	N.S (p>0.05)

N.S- not significant

**Table 4: Correlation Coefficients (r) between all the variables of Sleep quality and BMI**

Variables	Fitness score	Significance
Sleep latency score	-0.3	N.S (p>0.05)
Sleep latency duration (min)	-0.04	N.S (p>0.05)
Sleep Duration score	-0.19	N.S (p>0.05)
Sleep duration (hours)	0.12	N.S (p>0.05)
Sleep Efficiency	-0.28	N.S (p>0.05)
Sleep disturbances	-0.08	N.S (p>0.05)
Sleep Meditations	-0.27	N.S (p>0.05)
Daytime Dysfunction	-0.25	N.S (p>0.05)
Global PSQI Score	-0.15	N.S (p>0.05)

N.S- not significant

## DISCUSSION

The result of our study showed no significant correlation between variables of sleep quality and physical fitness. The similar result was obtained by Erick K Tandiono et al.<sup>[2]</sup> Their study was based on bivariate analysis using Fisher's Exact test. Anggraini used a non-probability sampling method with consecutive sampling design to observe the relationship between sleep duration and physical fitness levels in college students<sup>[3]</sup>. She also found no significant relationship between the two variables using Chi-Square test. However Safaringa and Herpandika in their study found that there is a significant relationship between physical fitness and sleep quality in college students.<sup>[5]</sup> They did the study by using random sampling method, PSQI questionnaire and Multistage Fitness test. They suggested that good physical fitness can fulfil a person's sleep quality and vice versa. (p=0.007; r=0.408). Previous research on sleep quality and physical fitness in Sleman by Putra, also observed a significant relationship between the two variables. Egi et al in her research on the relationship between sleep disturbance and physical fitness of young women in Malang found that sleep disturbance have a significant relationship with physical fitness (p=0.001).<sup>[6]</sup> The difference in results of this study with other previous studies may be due to various factors. One of them may be due to use of different sampling methods and instrument used to measure the physical fitness score. Further there can be some other factors like genetic factors, physical activity, nutritional status, lifestyle and other physiological conditions. Genetic factors can affect the volume and capacity of lungs and heart, cardiac output, stroke volume, red cell mass, peripheral circulation, amount and composition of muscle fibres as well as density of mitochondria.<sup>[15]</sup> Physical activity of an individual is also related to physical fitness. The higher physical activities a person carries out, the higher level of physical fitness he acquires. Physical fitness may be affected by nutritional status also. Excessive deposition of body fat will definitely decrease the physical fitness of an individual. Sedentary lifestyle habits like smoking, drinking alcohol, eating junk foods, excessive use of mobile, stress is known to have profound effect on physical fitness. A person with severe mental illness will definitely have lower cardiorespiratory fitness and muscle strength.

Moreover physical activity can prevent stress because it reduces stress inducing hormones such as epinephrine and cortisol. Both these hormones if high can reduce immune function and affect the sympathetic nervous system.

## CONCLUSION

Based on the findings of the present study, as the sleep quality, BMI and physical fitness score of the students were found to be good, so no significant correlation of sleep quality with physical fitness and BMI could be shown. Further studies with larger sample size and other tools for assessment of sleep quality are recommended to identify the various risk factors that may affect the sleep quality of an individual. Maintenance of good quality sleep in young age is highly advisable to have a physically fit life.

## REFERENCES

1. Lee AJ, Lin WH. Association between sleep quality and physical fitness in female young adults. *Journal of Sports Medicine and Physical Fitness*. 2007 Dec 1;47(4):462-1.)
2. Erick K, Tandiono, etal. Correlation between sleep quality and physical fitness among medical students of Udayana University. *Int J Res Med Sci*, 2021 Mar;9(3):691-695.
3. Anggraini BR. The relationship between sleep duration and body fitness level in 2013 students of the Faculty of Medicine, Islamic University of Indonesia, 2013.
4. Putra RAK. The relationship between quality of sleep with physical fitness of class VIII students. *Yogyakarta*;2019.
5. Safaringga E, Herpandika RP. The relationship between physical fitness and sleep quality. *Sportif*, 2018;4(2):235-47
6. Egi E et al. Relationship of sleep disturbance with private vocational school of princess adolescent at vocational school of Malang. *Nurs News*, 2017; 2(1):292-303.
7. Sharma P, Bhagat OL, Datta A, Sircar S. Fitness scores of Indians assessed by the Harvard step test. *Age (years)*. 2014 Oct 1;18:1-01.
8. Burnstein BD, Steele RJ, Shrier I. Reliability of fitness tests using methods and time periods common in sport and occupational management. *Journal of athletic training*. 2011 Sep 1;46(5):505-13.
9. Wood R. *Harvard Step Test*.
10. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports*. 1985 Mar;100(2):126.
11. Ortega FB, Ruiz JR, Castillo MJ, Sjörström M. Physical fitness in childhood and adolescence: a powerful marker of health. *International journal of obesity*. 2008 Jan;32(1):1-1.

12. Consensus Conference Panel, Watson NF, Badr MS, Belenky G, Bliwise DL, Buxton OM, Buysse D, Dinges DF, Gangwisch J, Grandner MA, Kushida C. Recommended amount of sleep for a healthy adult: a joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. *Journal of Clinical Sleep Medicine*. 2015 Jun 15;11(6):591-2.
13. Yang CM, Wu CH, Hsieh MH, Liu MH, Lu FH. Coping with sleep disturbances among young adults: a survey of first-year college students in Taiwan. *Behavioral medicine*. 2003 Jan 1;29(3):133-8.
14. Baker FC, Wolfson AR, Lee KA. Association of sociodemographic, lifestyle, and health factors with sleep quality and daytime sleepiness in women: findings from the 2007 National Sleep Foundation "Sleep in America Poll". *Journal of women's health*. 2009 Jun 1;18(6):841-9.
15. Ojha P, Pandey N, Singh S. Physical fitness score and academic performance in medical students. *National Journal of Physiology, Pharmacy and Pharmacology*. 2018 Feb 7;8(7):1031.