

## Six minute walk distance and sleep quality in healthy medical students of Gauhati Medical College and Hospital, Assam

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### Abstract

Sleep, a specialized state of brain activity, has a lot of important physiological functions. This peculiar cyclical unconscious state influences various body systems and plays an important role in homeostasis. Researchers have studied the influence of sleep on different aspects like memory, mental health, cognitive function, athletic performance etc. Likewise, effect of sleep on sub-maximal exercise which encompasses much of the day to day activities may be a subject of research as concept in this issue may help in achieving knowledge about the role of sleep on daily activities and hence quality of life. Present study aims at finding the six minute walk distance and sleep quality in healthy young students of Gauhati Medical College, Guwahati Assam and to find if there is any association. 57 students of Gauhati Medical college (19 male and 38 female) participated in the study. Sleep quality was assessed by Pittsburgh sleep quality index and 6MWD was assessed as per American Thoracic Society standard. 59.6 % of the students were found to have poor sleep quality (score $\geq$ 5) and 40.4 % students were found to have good sleep quality (score $<$ 5). Mean 6Minute Walk Distance was found to be 535 $\pm$ 53 f for female and 583 $\pm$ 37 m for male. In this study we could not find significant association between sleep quality and six minute walk distance (p value=0.965) which implies that sleep may not significantly influence regular day to day activities in healthy young adults.

**Key words-sleep quality, 6MWD, quality of life**

### Introduction-

Sleep is a state of brain activity which is of paramount importance for cognitive and physical performance. Good quality sleep is a pre requisite for sound health. Previous studies had shown association between poor sleep quality with poor physical performance (1). Sleep quality is negatively influenced by a number of factors including stress, anxiety, nutrition, life style etc.

Though a number of studies have been conducted to assess relationship of sleep with athletic performance, yet no available literature was found regarding sleep behavior and quality of life of young healthy population. Therefore, it is a matter to be studied whether poor sleep quality is associated with poor quality of life or not. If association is found between sleep behavior and quality of life hampering performance of day to day activities, then awareness can be grown on the basis of established finding to improve sleep habits. People of modern era, particularly the youth are frequently seen to be persuading faulty life style and sleep behavior. So awareness of the people may help in better performance of day to day activities.

The six minute walk test is a sub maximal exercise test which helps to evaluate physical functional capacity. (2) Therefore, being a tool to assess sub maximal level of functional capacity, it may be a better indicator of functional exercise level executed for performing day to day activities. Being self-paced, subjects are free to choose their own intensity of exercise and sub maximal level of exertion encompasses most of the activities of daily life. Hence in healthy young adults this test can give a clue to the quality of life by assessing physical functional capacity. Six-minute walk distance not only better reflect the functional exercise level for daily physical activities (5) it is also used for evaluating physical status of patient of many diseases. It is frequently used in clinical field for assessment of exercise capacity in patients suffering from various diseases like cardio pulmonary or neuromuscular diseases (3). It can also be used for early detection of emerging medical conditions by assessing aerobic capacity and endurance (4).

With this knowledge in the background, a descriptive cross-sectional study was designed to investigate if there is any association between sleep quality and six minute walk distance (6MWD) in healthy young students of Gauhati Medical College and Hospital. Objectives derived for that purpose were -

Recording six-minute walk distance in medical students of Guwahati Medical College, Assam

Evaluating quality of sleep of young healthy students of Gauhati Medical College, Assam

## **Materials and methods-**

After getting institutional ethical committee approval for this descriptive study, data was collected from 57 healthy medical students from Gauhati Medical College and Hospital. The sample was probability sample and the sampling method adopted was simple random sampling. Prior to the study informed consent was taken.

Subjects were chosen on the basis of the inclusion criteria of being free from apparent clinical illness with no history of cardio pulmonary illness, any muscular disorder, fibro myalgia, spinal cord injury and spinal muscular atrophy.

After taking brief history to rule out the exclusion criteria, general anthropometric parameters like height, weight, are measured and pulse and blood pressure were also recorded. Sleep duration and quality of the participants were assessed by using Pittsburgh sleep quality index.(5) Pittsburgh sleep quality index is a tool for assessment of sleep quality in adults where few pre-validated questions related to sleep over past one month are asked. It can categorize subjects as having poor and good sleep quality by measuring seven aspects of sleep-namely subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and day time dysfunction over the last month.

Six-minute walk distance was assessed by performing six minute walk test according to the guidelines of American Thoracic Society Standards. It is a safe and easy tool better tolerated by the subjects. It gives a better idea of the daily living than the other walking tests do.(6)

The statistical analysis was performed using IBM SPSS statistics 21 for windows.To compare different variables, we conducted independent t-test. We have determined correlation coefficients ( $r$ ) also to analyse the association between different variables.

## **Results:**

In this descriptive cross-sectional study conducted in Gauhati Medical College and Hospital, a total of 57 students participated. Out of these 57 students,19 were male and 38 were female.

They all belonged to the age group of 18 to 23 years. Basic characteristics of the subjects are shown in the table-1 where mean  $\pm$ SD of the variables are tabulated

**TABLE-1. Basic characteristics of the subjects**

Parameters	Women (n=38)	Men (n=19)
Age (in years)	20 $\pm$ 1	20 $\pm$ 1
Height (in cm)	157 $\pm$ 6	168 $\pm$ 8
Weight (in kg)	54 $\pm$ 11	65 $\pm$ 11
BMI	22 $\pm$ 4	23 $\pm$ 3
6MWD (in m)	535 $\pm$ 53	583 $\pm$ 37

**TABLE-2 Distribution of the percentage of the subjects as per the PSQI score**

	$\geq 5$	<5	Total	T value	P value
M	15.8%	17.5%	33.3%	-0.707	0.482
F	43.9%	22.8%	66.7%		
Total	59.7%	40.3%	100%		

In this study, we tried to analyse the distribution of the subjects according to poor and good quality sleep. As per Pittsburgh sleep quality index, persons having PSQI score  $\geq 5$  are considered of having poor quality sleep and <5 are considered as having good quality sleep. (5) In this study, 59.7% of the total subjects were found to have poor sleep quality while 40.3% of the total subjects had normal sleep quality. Again, it was found that out of the subjects having poor quality sleep,15.8%were male respondents and 43.9% were female respondents. However this apparent difference in gender distribution was not found to be significant after performance of independent samples test

**TABLE3- Distribution of 6MWD in different PSQI score**

PSQI score		Mean 6MWD	T value	P value
<5	Male	609m	3.219	0.005
	Female	535m		
>5	Male	572m	2.375	.023
	Female	533m		

Finding of table 3 shows that irrespective of the sleep category poor or good, 6MWD is more in male subjects which is statistically significant implying influence of gender on 6MWD.

To see the correlation between PSQI and 6MWD in this study, when we had determined the correlation coefficient and then the p value, we got the values as-

Correlation coefficient	(r value)	p value
PSQI Score VS 6-minute walking distance	0.069	0.965

The insignificant p value obtained here (0.965) indicates that PSQI does not significantly influence the 6 MWD of the subjects

**Table-4 Distribution of 6MWD according to the gender of the subjects**

	Mean 6MWD	T value	P value
Male	583±37m	3.69	0.001
Female	535±53m		

P value <0.05 was considered significant

We tried to evaluate the 6MWD in different sex, and it was observed that 6MWD is more in male than female and it is significant as the p-value is found to be 0.001. We can conclude that gender is a factor that influences the 6-minute walking distance.

In the current study, we have found the mean ± standard deviation (sd) of 6-minute walking distance as 551 ± 53m

Our test hypothesis is comparing the mean walking distance (6 MWD) of the subjects (aged 18-25) with the mean walking distance reported in Chetta et al.'s paper for subjects aged 20-50 (mean 6 MWD of 593m).

We found a significant p-value (.000), which suggests that there is a statistically significant difference between the mean 6-minute walking distance of our subjects and the subjects in the Chetta et al. study.(7) We conclude that the mean 6-minute walking distance of our subjects aged 18-25 years is different from the mean 6-minute walking distance reported in the Chetta et al. study for subjects aged 20-50 years.

**Discussion-**

This cross sectional study was done in the Department of Physiology, Gauhati Medical College & Hospital, Gauhati from November 2022 to May 2023 to evaluate the association of sleep quality with 6MWD to understand if there is any effect of sleep quality on day to day activities of human life. As six minute walk test assesses the sub maximal level of functional capacity so it is a good marker of normal day to day activity and quality of life. In our study mean 6MWT was found to be 551±53m. In a previous study conducted by Chetta et al. mean 6MWD was found to be 593m. This slight disparity may be due to difference in the geographical and anthropometric variables. Previous study states that 6MWT has significant association with gender, continent and anthropometric variables (8), which is similar to our finding where we found that males showed more 6MWD. This may be due to anthropometric and hormonal variations among different gender. Previous studies also indicates that – sleep quality of the women is

comparatively poor and across various stages of life they suffer from various sleep related problems. (6)

We also found that 59.6% of total respondents in the present study have poor sleep quality. This finding is similar to the result found in another study conducted by Becker SP et al., where 62% of participants met cut off criteria for poor sleep (9). Regarding gender distribution of sleep quality, though statistical significance was not found yet percentage wise more female subjects of the present study sample showed poor sleep quality.

In the present study, correlation of PSQI with 6MWD revealed p value not significant ( $p=0.965$ ) indicating that PSQI score does not influence the six minute walk distance. The study conducted by Monoem Haddad et al. to assess the effects of fatigue, stress, delayed onset muscle soreness and sleep on perceived exertion during sub maximal effort showed that these factors are not major contributors of perceived exertion without excessive training loads (10). This finding signifies that sleep is not predominant factor to influence sub maximal exercise performance by not affecting perceived exertion. So inference of our study is also similar to this study finding.

Importance of sleep for sound health is evidence based fact. Though good quality sleep is thought to be essential for optimum physical functions yet findings of previous literatures are not clear cut and many a times equivocal responses are seen. As per some of the studies, some maximal physical efforts and gross motor performances can be maintained following sleep loss. On the other hand some studies found reduction in sport specific performances following sleep loss. So to come into a clear cut conclusion whether sleep quality influences sub maximal exercise and hence day to day activity or not, further studies will be required. Further research on this topic is also required to expand knowledge about temporal relation of sleep on physical activity. Moreover recruitment of large sample size may add on to the existing knowledge.

As a number of factors like use of stimulants , stress, anxiety and the use of electronic devices like mobile, computer etc before sleep can influence sleep quality(11), therefore interventions can be taken to increase the quality of life by improving sleep quality if evidences can be gathered supporting causal relationship of sleep and poor performance of sub maximal exercise.

## **Conclusion-**

In our present study we did not find significant relation of sleep quality with 6MWD. This may indicate that though sleep has positive role in various aspects of our health like metabolic caloric balance, thermal equilibrium, athletic performance and immune competence yet it may not influence sub maximal exercise and hence day to day activities in healthy young adult

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