A Study On Effect Of Sleep Duration On Spo2 And Pulse Rate In College Students Of Angamaly, Kerala

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Abstract

The present study was undertaken with an objective to observe the effect of sleep duration on spo2 and pulse rate in males and females and to create awareness among the general population to improve the quality of life. The present study has been performed at Little Flower Medical Research Centre, Angamaly, Kerala, India. A total of two hundred and twenty two healthy male and female college students, with mean age 18.55 ± 0.94 were participated voluntarily in the medical camp comprising 110 males and 112 females. Two investigators of our study recorded Spo2 and pulse rate by using pulse oximeter from the students at the same time. The participants were grouped into two groups, those who sleep more than seven hours and those who sleep for less than seven hours and their spo2 pulse rate were compared. The analysis of data was done by SPSS 20.0. Independent sample t test is used for data analysis. Spo2 is equal in both the groups. However pulse rate is slightly lower in the students who sleep less than seven hours. However this is not statistically significant (P value 0.372). Our study suggests that Pulse rate is slightly lower in the students whose sleep duration is less. No significant change is observed in spo2 in our study. Hence this study merits to continue with higher sample size.

Key Words: Pulse rate, saturation of hemoglobin, Sleep duration

INTRODUCTION

Each one of us has a unique sleep requirement. Our sleep need depends upon genetic and physiological factors and also varies by age, sex, and previous sleep amounts. However, a simple definition of sufficient sleep is a sleep duration that is followed by a spontaneous awakening and leaves one feeling refreshed and alert for the day.[5] The National Sleep Foundation suggests that adults need 7--9 hours of sleep per night; Individuals who experience long or short sleep durations are more likely to report poor self-rated health than healthy sleepers. [1,2] Although chronic sleep loss is common in today's society, many people are unaware of the potential adverse health effects of habitual sleep restriction. [3] Short sleep duration was more common among adults aged 20--39 years. The relationship between sleep duration, performance and health is important and timely. Between 1959 [6] and 1992 [7] the average amount of sleep reported by middle age individuals decreased by about one hour per night (from 8-9 hours per night to 7-8 hours per night). A study examining the sleep duration from time diaries (records of sleep time and awake time) of full time workers from 1975 to 2006 [8], found a significant increase in the number of individuals who were sleeping less than 6 hours per night. A recent study from the National Health Interview Survey which examined the sleep duration of individuals across several occupations ranging from manufacturing to public administration found that the percent of workers who reported a sleep duration of 6 hours or less per night increased from 24 to 30% [9] in the last 20 years. These findings probably demonstrate the development of widespread partial sleep deprivation or sleep "restriction" which is most likely related to external environmental or social factor(s) such as the need to work more than one job or longer work shifts rather than a biologic change in need for sleep.

The important question is the extent to which such changes produce negative consequences for performance, health, and/or quality of life. Participants who are allowed to sleep for only 6 hours per night for 12 nights responded as slowly as other participants did after one night without any sleep at all [10]. Additional changes associated with similar total sleep loss include decreased short-term memory, Short sleep duration is associated with increased CHD (coronary heart disease) mortality and morbidity in both males and females. [4] Several research studies have shown that sleep restriction to about 4 hours per night on 1 - 2 nights has significant effects on normal individuals. Studies have shown an increased heart rate and blood pressure [11], increased inflammation as measured by C-reactive protein (a marker of inflammation which can be measured in the blood and which has been proposed as a risk factor for coronary artery disease –[12], impaired glucose tolerance (which can be a prelude to the development of diabetes-[13], and increased hunger/appetite (which could promote obesity –[14]. In addition, information obtained from questionnaires in large sample groups has also shown statistical associations between chronically reduced sleep duration and increased risk of hypertension (particularly in women) [15,16]; diabetes[17]; and weight gain[18-20].

The present study was undertaken with an objective to observe the effect of sleep duration on spo2 and pulse rate and to create awareness among the general population to improve the quality of life.

MATERIALS AND METHODS

Subjects

The present study has been performed at Little Flower Medical Research Centre, Angamaly, Kerala, India. A total of two hundred and twenty two healthy male and female college

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students, with mean age 18.55 ± 0.94 were participated voluntarily in the medical camp comprising 110 males and 112 females.

The purpose and procedure of the study were explained to each subject. Written informed consent was taken from all the participants. Study protocol was approved by Institutional Ethics Committee of Little Flower Medical Research Centre, Angamaly.

Materials

Pulse oximetry is a non-invasive method allowing the monitoring of the saturation of hemoglobin and pulse rate. The oximeter uses oximetry to measure functional oxygen saturation in blood. Pulse oximeter works by applying the sensor to a pulsating arteriolar vascular bed, such as a finger or toe. The sensor contains dual light source and a photonic detector.Bone, tissue, pigmentation, and venous vessels normally absorb a constant amount of light over time. The arteriolar bed normally pulsates and absorbs variable amounts of light during the pulsations. The ratio of light absorbed is translated into a measurement of functional oxygen saturation (SpO2).Because a measurement of SpO2 is depend upon light from the sensor, excessive ambient light can interfere with this measurement.

Pulse oximetry is based on two principles

· Oxyhaemoglobin and deoxyhaemoglobin differ in their absorption of red and infrared light.

· The volume of arterial blood in tissue (hence light absorption by the blood) changes during the pulse.

The oximeter determines SpO2 by passing red and infrared light into an arteriolar bed and measuring changes in light absorption during pulsatile cycle.Red and infrared low – voltage light emitting diodes (LED) serves as light sources; a photonic diode serves as the photodetector.Because oxyhaemoglobin and deoxyhaemoglobin differ in light absorption, the amount of red and infrared light absorbed by blood is related to hemoglobin oxygen saturation.

To identify the oxygen saturation of arterial hemoglobin, the oximeter uses the pulsatile nature of arterial flow. During systole, a new pulse of arterial blood enters the vascular bed, and blood volume and light absorption increase. During diastole, blood volume and light absorption reach their lowest point. The oximeter bases its SpO2 measurements on the difference between maximum and minimum absorption (measurements at systole and diastole).by doing so, it focuses on light absorption by pulsatile arterial blood, eliminating the effects of non – pulsatile absorption by tissue, bone and venous blood.

Data collection

The preset study was conducted at 9 am in the morning for the convenience of students. Two investigators of our study recorded Spo2 and pulse rate by using pulse oximeter from the students at the same time. The participants were grouped into two groups, those who sleep more than seven hours and those who sleep for less than seven hours and their spo2 pulse rate were compared.

Data analysis

The analysis of data was done by SPSS 20.0. Independent sample t test is used for data analysis.

Table: 1 Mean values of Spo2 and pulse rate in college students.

Variable	Sleeping time		p value
	More than or equal to 7 hours	Less than 7 hours	
SPo_2	98.47±1.75	98.18±0.60	0.277
Pluse rate	91.34±7.82	89.98±7.47	0.372

Table: 2 Mean values of Spo2 and pulse rate in male college students.

Variable	Sleeping time - Males		p value
	More than or equal to 7 hours	Less than 7 hours	
SPo2	98.22±2.10	98.16±0.45	0.864
Pluse rate	90.89±7.39	89.66±7.39	0.594

Table:3 Mean values of Spo2 and pulse rate in female college students.

Variable	Sleeping time - Female		p value
	More than or equal to 7 hours	Less than 7 hours	
SPo2	98.6±1.56	98.24±0.83	0.371
Pluse rate	91.57±7.56	90.59±7.79	0.665

RESULTS

The analysis of data is presented in Table:1. Mean spo2 in the students who sleep more than seven hours is 98.47±1.75 and in those who sleep less than seven hours is 98.18±0.60, indicates that spo2 is equal in both the groups. Mean pulse rate in the students who sleep more than seven hours is 91.34±7.82 and in those who sleep less than seven hours is 89.98±7.47, indicates that pulse rate is slightly lower in the students who sleep less than seven hours. However this is not statistically significant (P value 0.372).

Mean spo2 in male students who sleep more than seven hours is 98.22±2.10 and in those who sleep less than seven hours is 98.16±0.45, indicates that spo2 is almost equal in both the groups.Mean pulse rate in the students who sleep more than seven hours is 90.89±7.39 and in those who sleep less than seven hours is 89.66±7.39, indicates that pulse rate is slightly lower in the students who sleep less than seven hours. However this is not statistically significant (P value 0.594).

Mean spo2 in male students who sleep more than seven hours is 98.6±1.56and in those who sleep less than seven hours is 98.24±0.83, indicates that spo2 is almost equal in both the groups. Mean pulse rate in the students who sleep more than seven hours is 91.57±7.56and in those who sleep less than seven hours is 90.59±7.79, indicates that pulse rate is slightly lower in the students who sleep less than seven hours. However this is not statistically significant (P value 0.665).

DISCUSSION

Self-reported sleep disorders are associated with greater variability in home BP/HR and both have cardiovascular prognostic value.21 A short sleep duration is expected to elevate blood pressure the next morning. Days with sleep duration of less than 7 hours showed higher morning systolic blood pressure and heart rate compared with days with sleep duration between 7 and 8 hours, but no difference was found in diastolic blood pressure. Moreover, although the difference in morning systolic blood pressure had disappeared at night, the difference in heart rate was

still maintained.22

Insomnia symptoms and shorter objective sleep duration are associated with lower HRV and higher HR and LF/HF ratio, indicative of disturbance of cardiac autonomic modulation (CAM) towards more sympathetic and lower parasympathetic modulation.23 Sleep duration may be associated to low mean oxygen saturation in OSA patients.24 In the present study we have observed lower pulse rate is in the students who sleep less than seven hours. The same is observed when compared with in males and within females. We haven't observed significant difference in spo2.

CONCLUSION

Our study suggests that Pulse rate is slightly lower in the students whose sleep duration is less. No significant change is observed in spo2 in our study. Hence this study merits to continue with higher sample size

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