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Analysis Of Polysomnography Measures Between Active And Sedentary Men

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Abstract

The purpose of this study: *The purpose of this research is to investigate and compare sleep patterns and polysomnography measures between active and sedentary men, aiming to identify any variations in sleep architecture and sleep-related consequences associated with different activity levels. Exercise can have many positive effects on sleep, it's essential to find the right balance and not overdo it, especially close to bedtime. Intense exercise too late in the day can stimulate your body and mind, making it difficult to wind down and fall asleep. Additionally, individual responses to exercise can vary, so it's essential to pay attention to how your body reacts to different types and timings of exercise in relation to your sleep patterns.*

Materials and methods: *Ten men participated in the study, divided equally into two groups: an active group comprising five individuals and a sedentary group comprising five individuals. Participants were selected based on predetermined criteria, including age range, absence of known sleep disorders, and similar socioeconomic backgrounds. PSG equipment was utilized to monitor participants' sleep patterns throughout the night.*

Results: *Stage One Sleep (S1) (t = -35.01, p =.000) and Stage Two Sleep (S2) (t = -11.699, p =.000) between Active and Sedentary men at the 0.05 level of significance, respectively. There was a statistically significant difference between the sedentary and active men in the third sleep measure (S3) (t = -21.199, p =.000). There was a statistically significant difference between the sedentary and active male groups on the variable rapid eye movement (REM) (t = -16.250, p =.000).*

Conclusions: *According to the results, polysomnography variables change significantly between active and sedentary men. Regular exercise seems to improve sleep architecture, with benefits such as a quicker time to deep sleep and longer time in deep sleep.*

Keywords: *Polysomnography, Active male, Sedentary male, Non-Rapid Eye Movement (NREM), Rapid Eye Movement (REM).*

Introduction

A vital portion of ensuring the body is always working at its best is sleep, which is regarded as one of the most miraculous gifts from nat[1]ure to mankind. Rejuvenating tired bodies is no easy task, but it is a necessary prerequisite for recharging one's energy stores (Carskadon et al., 2011). Sleep may be clearly defined by its unique physiological and behavioural characteristics that differentiate it from awake. The occurrence of both REM and non-REM sleep is defined by these factors taken together. Stages 1, 2, 3, and 4 make up NREM sleep according to the system proposed by Rechtschaffen and Kales. At each level, unique EEG patterns are shown.

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In the average night, non-rapid eye movement (NREM) sleep accounts for around 75–80% of the entire time we sleep (Kushida, 2013). The sleep cycle is defined by the shift from lighter to deeper non-REM sleep phases, which end with the transition to rapid eye movement (REM) sleep. When non-rapid eye movement (NREM) sleep begins, your body temperature and blood pressure drop, you're breathing and heart rate normalize, and your electroencephalogram (EEG) activity becomes synchronized, with low frequency and high amplitude.

Extensive research has shown that maintaining a regular exercise routine improves the quality of sleep. For instance, exercise greatly enhanced total sleep quality and decreased sleep disruptions across different groups, according to a meta-analysis by Kredlow et al. (2015). There is evidence that physical activity may alleviate the difficulties associated with sleeplessness. Reid et al. (2010) found that middle-aged and older persons suffering from insomnia had a significant improvement in both the quantity and quality of their sleep after engaging in aerobic activity. A more regular sleep-wake cycle may be the result of regular physical exercise helping to control the body's circadian clock. Research by Buman et al. (2014) confirmed this, finding that exercise on a regular basis enhanced sleep timing and led to stronger circadian rhythms.

Exercising regularly is associated with lower stress and anxiety levels, which in turn improves the quality of sleep. Regular physical exercise was linked to reduced stress and improved sleep quality among teenagers, according to research conducted by Gerber et al. (2014). Exercising may change the structure of your sleep, according to studies. One effect is that it makes you sleep more deeply and with slower waves. In elderly persons who suffer from insomnia, research conducted by Yang et al. (2012) found that moderate-intensity aerobic exercise improved both the duration and quality of their sleep.

The effects of exercise on sleep may vary depending on when it is done. Exercising throughout the day usually improves sleep quality, but doing intense activity too soon to bedtime could make it difficult to fall asleep because of the stimulating impact. Research by Driver et al. (1997) confirmed this, showing that strenuous physical activity in the hour before bedtime postponed the start of sleep. The impact of physical activity on sleep could differ across demographics. Some studies have shown that exercise improves sleep quality; for instance, Kline et al. (2013) discovered this in teenagers and Kalak et al. (2012) in young adults.

Table-1 Variables and unit of measurement of polysomnography variables

Sr. no	**Variables**	**Unit of measurement**	**Meaning**
1	Stage one sleep	Minute/%	Alpha and theta waves, which appear on an electroencephalogram (EEG) as low-amplitude and high-frequency waves, are characteristic of stage 1 sleep.
2	Stage two sleep	Minute/%	The body relaxes and the brain's electroencephalogram (EEG) rhythms remain consistent.
3	Stage three sleep	Minute/%	The brain shows distinct slow and high-amplitude delta waves on an electroencephalogram (EEG).
4	Rapid eye movement sleep	Minute/%	We call it "paradoxical sleep" because even if our muscles are completely relaxed, our brains are making electrical patterns that are more typical of being awake. While you're asleep,

			your brain activity increases, becoming closer to what it is while you're awake.

Material and Methods

Study participants

The purpose of this research was to examine the differences in polysomnography parameters between physically active and inactive men. The participants in this research were ten male students selected at random from Punjabi University Patiala (N=10). Two equal groups of active and sedentary men were formed. Participants' ages ranged from eighteen to twenty-five.

Procedure of overnight polysomnography

In the physiology lab of the physical education department at Punjabi University Patiala, each participant recorded their polysomnography throughout the night in order to gather data. Over the course of five consecutive nights, every individual was tested. Computerized methods were used to create the usual polysomnography recordings taken at night. Every recording started at the usual time the subjects went to bed and ended at the usual time they woke up. The sleep was recorded using an RMS Quest 24/32 channel polysomnography machine.

Table 2. Description of selected tool and their measuring unit

Sr. no	**Variables**	**Tool**	**Unit of measurement**
1	Stage one sleep	Polysomnography	Minute/%
2	Stage two sleep	polysomnography	Minute/%
3	Stage three sleep	polysomnography	Minute/%
4	Rapid eye movement sleep	Polysomnography	Minute/%

Statistical Technique

Using SPSS 16.0, an independent t-test was used to mean values after data collection for the Analysis of polysomnography variables between active and sedentary guys. We used a 0.05 percent threshold of significance ($p<0.5$).

Results

Table 3 shows a highly significant difference in stage one sleep time between active and sedentary guys, as shown by the t-value of 35.01 for active males and a significance level (Sig.) of.000. Typically, for a certain degree of freedom, we would compare the t-value to the crucial value (t0.05) in order to get more meaning. But there is a substantial difference for sedentary guys, as shown by the crucial value (t0.05 (8) = 2.306). When comparing active and sedentary men, the mean stage one sleep time for the former is much lower. The stage one sleep period of active guys is more constant (lower SD) than that of sedentary males. There is a statistically significant difference in the mean stage one sleep time between active and sedentary guys, suggesting that the length of stage one sleep may be affected by physical activity level.

Table 3. Comparison of Mean and SD Values of Stage One Sleep (Minute) Variable between Active and Sedentary Males

Group	Mean	SD	t-value	Sig.
Active Males	28.38	1.01	35.01	.000

Sedentary Males	49.10	.86		

t0.05 (8) = 2.306

Table 4 shows that at the.000 level of significance, the t-value for active guys is 11.699, indicating that there is a very significant difference in the amount of time spent in stage two sleep compared to sedentary males. When comparing active and sedentary men, the mean stage two sleep duration for the former is much greater. There seems to be a little more variation in the length of stage two sleep among active guys, since their standard deviation in this area is somewhat larger than that of sedentary males. There is a statistically significant difference in the mean length of stage two sleep between men who are physically active and those who are not, suggesting that the amount of physical activity may influence its duration.

Table 4. Comparison of Mean and SD Values of Stage Two Sleep (Minute) Variable between Active and Sedentary Males

Group	Mean	SD	t-value	Sig.
Active Males	205.12	6.20	11.699	.000
Sedentary Males	169.52	2.81		

t0.05 (8) = 2.306

Table 5 shows that a t-value of 21.199 and a Sig. of.000, the difference in stage three sleep duration between active and sedentary guys is very significant. In stage three of the sleep cycle, active men often get more time than sedentary men. Stage three sleep time variability is more pronounced in active guys, as shown by a greater standard deviation compared to sedentary males. There is a statistically significant difference in the mean length of stage three sleep between men who are physically active and those who are not, suggesting that the amount of physical activity may influence its duration.

Table 5. Comparison of Mean and SD Values of Stage Three Sleep (Minute) Variable between Active and Sedentary Males

Group	**Mean**	**SD**	**t-value**	**Sig.**
Active Males	85.21	1.93	21.199	.000
Sedentary Males	64.16	1.10		

t0.05 (8) = 2.306

Table 6 shows that there is a very significant difference in REM sleep duration between active and sedentary guys, as shown by the t-value of 16.250 and a significance level (Sig.) of.000. Sedentary men get much more rapid eye movement (REM) sleep than active men. It seems that there is a little greater variability in the length of rapid eye movement (REM) sleep among sedentary guys, since their SD in REM sleep time is somewhat larger than that of active males. Sedentary men, on average, had longer REM sleep duration than active

men, suggesting that physical activity level affects this sleep length. The difference between the two groups is statistically significant.

Table 6. Comparison of Mean and SD Values of Rapid Eye Movement Sleep (Minute) Variable between Active and Sedentary Males

Group	Mean	SD	t-value	Sig.
Active Males	63.52	1.22	16.250	.000
Sedentary Males	76.49	1.30		

t0.05 (8) = 2.306

Discussion

Results showed that at the 0.05 level of significance, Active and Sedentary men differed significantly in the Stage One Sleep (S1) variable (t = -35.01, p =.000). Those who were more active throughout stage one slept less. Because their brains want to go into the next phases of sleep as fast as possible to complete the recovery process, that maybe it. King et al. (2018) also discovered a significant difference in Stage One Sleep (S1) between active and sedentary guys, which is in line with the results of the present research.

Stage Two Sleep (S2) was shown to be significantly different between Active and Sedentary men at the 0.05 level of significance (t = -11.699, p =.000). Stage two sleep duration was greater for active individuals. The fact that it takes their brain a while to get into stage three sleep might be to blame. Results from this research support those by King et al. (2018), who also discovered a significant difference in S2 sleep duration between men who were physically active and those who were not.

At the 0.05 level of significance, the research found that Active and Sedentary men differed significantly in the Three Sleep (S3) variable (t = -21.199, p =.000). Stage three sleep duration was greater for active individuals. For the body to fully recover after exercise, it needs a longer period of sleep during which it is in its most relaxed condition, which may explain why this stage of sleep is so important. We experience varying degrees of fatigue in relation to our level of wakefulness; this is due, in part, to the homeostatic (or "S") mechanism. A longer duration of awakening is associated with a greater sleep pressure. A longer duration of awareness is associated with a larger percentage of deep sleep (S3), which is controlled by the homeostatic process. Park et al. (2021) also discovered a significant difference in Stage Three Sleep (S3) between active and sedentary guys, which is in line with the results of the present research.

Rapid Eye Movement (REM) was shown to be significantly different between the sedentary and active males in the research (t = -16.250, p =.000) at the 0.05 level of significance. People who were more active had less blinking. One possible explanation is that in order to fully recuperate from their activities, individuals who lead busy lives fall into deep sleep for longer durations, reducing the likelihood of rapid eye movement (REM) sleep. Consistent with previous research, the present study found that active and sedentary men vary significantly in their Rapid Eye Movement (REM) sleep patterns.

Conclusion:

According to the results, polysomnography variables change significantly between active and sedentary men. Regular exercise seems to improve sleep architecture, with benefits such as a quicker time to deep sleep and longer time in deep sleep. However, it seems that sedentary behaviors affect the length of rapid eye movement (REM) sleep. Sedentary

males, for example, tend to have longer REM sleep durations. As a result, encouraging men to lead more physically active lives may help them get a better night's rest. In order to better understand how physical exercise affects sleep patterns and how to help sedentary people get a better night's rest, further study is needed.

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