Original Article

Physical Activity and Its Impact on Sleep Quality and Sleep Hygiene Among Physiotherapy Students: A Cross-Sectional Study

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Abstract

Background: Sleep plays a critical role in physical health, mental well-being and academic performance, especially among young adults. Physical activity is known to influence sleep outcomes, but the nature of this relationship in medical students remains underexplored. Therefore this study aimed to assess the relationship between physical activity levels, sleep quality and sleep hygiene among physiotherapy students.

Material and Methods: The study was observational in nature involved 73 physiotherapy students aged 18–27 years from University College of physiotherapy, selected through convenient sampling were included in the study as per selection criteria. After obtaining informed consent, the students were categorized into Physically Inactive (n=20), Minimally active (n=28) and Very Active (n=25) based on their physical activity levels by using International Physical Activity Questionnaire (IPAQ). Then the students were assessed for Sleep quality by using the Pittsburgh Sleep Quality Index (PSQI) and Sleep Hygiene by Sleep Hygiene Index (SHI).

Results: Statistical analysis revealed a significant difference in Pittsburgh Sleep Quality Index (PSQI) and Sleep Hygiene Index (SHI) scores among the Inactive, Minimally Active and Very Active groups ($p < 0.001$). Post-hoc analysis using the Tukey HSD method indicated that the Very Active Group had significantly better PSQI and SHI scores compared to the Inactive Group, while the difference between minimally and Very Active groups was not statistically significant.

Conclusion: The study concluded that physically active students had significantly better sleep quality and sleep hygiene compared to those who did not engage in physical activity. Promoting an active lifestyle may serve as an effective strategy to enhance sleep and overall well-being among student populations.

Keywords: Physical activity, Physiotherapy students, Sleep Hygiene, Sleep Quality.

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Introduction

Sleep is essential for overall health and well-being across all age groups, playing a critical role in cognitive functioning, mood regulation, mental health, and cardiovascular, cerebrovascular, and metabolic processes. Importantly, growing evidence shows a close relationship between sleep and physical activity.[1,2] Insufficient sleep and low physical activity have harmful effects on overall health.[3] A population-based survey in Delhi reported that 4% of males and 2.5% of females suffer from obstructive sleep apnea. Poor sleep not only impacts physical and mental health but can also impair higher functions such as moral judgment.[4] It has further been linked to adverse outcomes, including cardiovascular disease, diabetes, obesity, depression, reduced academic performance, and lower productivity.[5]. On the other hand, people who exercise regularly have better sleep and overall health[6.] Despite being essential, sleep disturbances are highly common among young adults, particularly university students. Surveys indicate that over 60% of college students report poor sleep quality, often characterized by short sleep duration, irregular bedtimes, and the use of stimulants such as caffeine or electronic devices before sleep.[7.] Poor sleep can be caused due various other factors including sleep disorders these are the group of condition which disturb normal sleep patterns which include insomnia, Sleep-Disordered Breathing, central disorders of hypersomnolence, parasomnias etc[8] Another important concept is sleep hygiene, which refers to modifiable behaviors and environmental practices that support better sleep quality and duration. Poor sleep hygiene, such as irregular sleep schedules and late-night electronic use, has been strongly linked to insomnia and poor sleep quality. [9] Sleep quality refers to the overall experience of sleep, including its initiation, maintenance, duration, efficiency, and the sense of restfulness upon awakening. It combines both subjective satisfaction and measurable components such as sleep duration, latency, and continuity.[10] Sleep and physical activity are two essential health behaviors that greatly influence physical, cognitive, and mental well-being. Adequate sleep along with regular physical activity reduces the risk of chronic diseases such as hypertension, cardiovascular disorders, type 2 diabetes, and cancer.[11,12] Yet, many students report poor sleep quality and irregular sleep hygiene due to academic stress, lifestyle habits, and low activity levels. As Physiotherapy is a growing profession and students in this field represent a unique group who face significant academic and clinical demands that may impact both physical activity levels and sleep quality. Their training involves long hours of study, physical exertion and practical clinical placements, all of which can influence sleep hygiene and quality. By focusing on this specific cohort, this study aims to explore the impact of physical activity on sleep quality and sleep hygiene among students.

Material and Methods

Study Design and setting

This was an observational study with a cross-sectional design. The study was conducted at University College of Physiotherapy, Baba Farid University of Health Sciences, Faridkot.

Participants

The data was collected from March 2025 to July 2025 using convenient sampling. The study included undergraduate physiotherapy students aged 18 to 27 years, both male and female, enrolled across all four academic years, who willingly and voluntarily provided informed consent to participate. Students were excluded if they had sleep disorders (including sleep apnoea or breathing-related conditions), recent visits to healthcare facilities for conditions such as rheumatoid arthritis, cardiovascular, neurological or psychiatric disorders (e.g., hypomania), were taking sleeping pills or drugs affecting sleep, or self-reported an inability to engage in physical activity. Exclusion also applied to those with pulmonary diseases, illnesses that limit lung capacity (e.g., cold, flu), recent musculoskeletal injuries or a history of illness or surgery restricting physical exertion.

Procedure

Students from all academic years were invited to participate. The study details were explained to them, confidentiality was ensured and written informed consent was obtained from those who agreed to take part. A total of 76 students were initially considered, out of which 3 were excluded (Sleeping disorder: n = 2; Neurological disorder: n

= 1). Finally, 73 students were included in the study after fulfilling the inclusion and exclusion criteria. The students were then categorized into Physically Inactive (n = 20), Minimally Active (n = 28), and Very Active (n = 25) groups based on their physical activity levels using the International Physical Activity Questionnaire (IPAQ). Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), and sleep hygiene was evaluated using the Sleep Hygiene Index (SHI). (Fig.1).

Outcome measures:

International Physical Activity Questionnaire (IPAQ): The International Physical Activity Questionnaire (IPAQ) collects information on the frequency and duration of activities at different intensity levels.[13] It consists of seven questions with reliable measurement properties for assessing physical activity in various settings. The tool evaluates three key aspects: intensity (light, moderate, or vigorous), frequency (days per week), and duration (time spent per day).[14]

Pittsburgh Sleep Quality Index (PSQI): The PSQI is a self-reported questionnaire developed to assess sleep quality in both clinical and non-clinical populations.[15] Participants completed 19 questions assessing various aspects of sleep quality, including sleep duration, latency, and frequency of sleep-related problems over the past 7 days. These items were grouped into seven components, each scored on a 0–3 scale. The sum of these components produced a global PSQI score (range 0–21), with higher scores reflecting poorer sleep quality.[16]

Sleep Hygiene by Sleep Hygiene Index (SHI): This self-reported index assesses environmental and behavioral factors that can contribute to inadequate sleep. The scale consists of 13 items, each rated on a five-point Likert scale. Scores are calculated by summing the responses, yielding a total between 13 and 65. Higher scores reflect poorer sleep hygiene.[17]

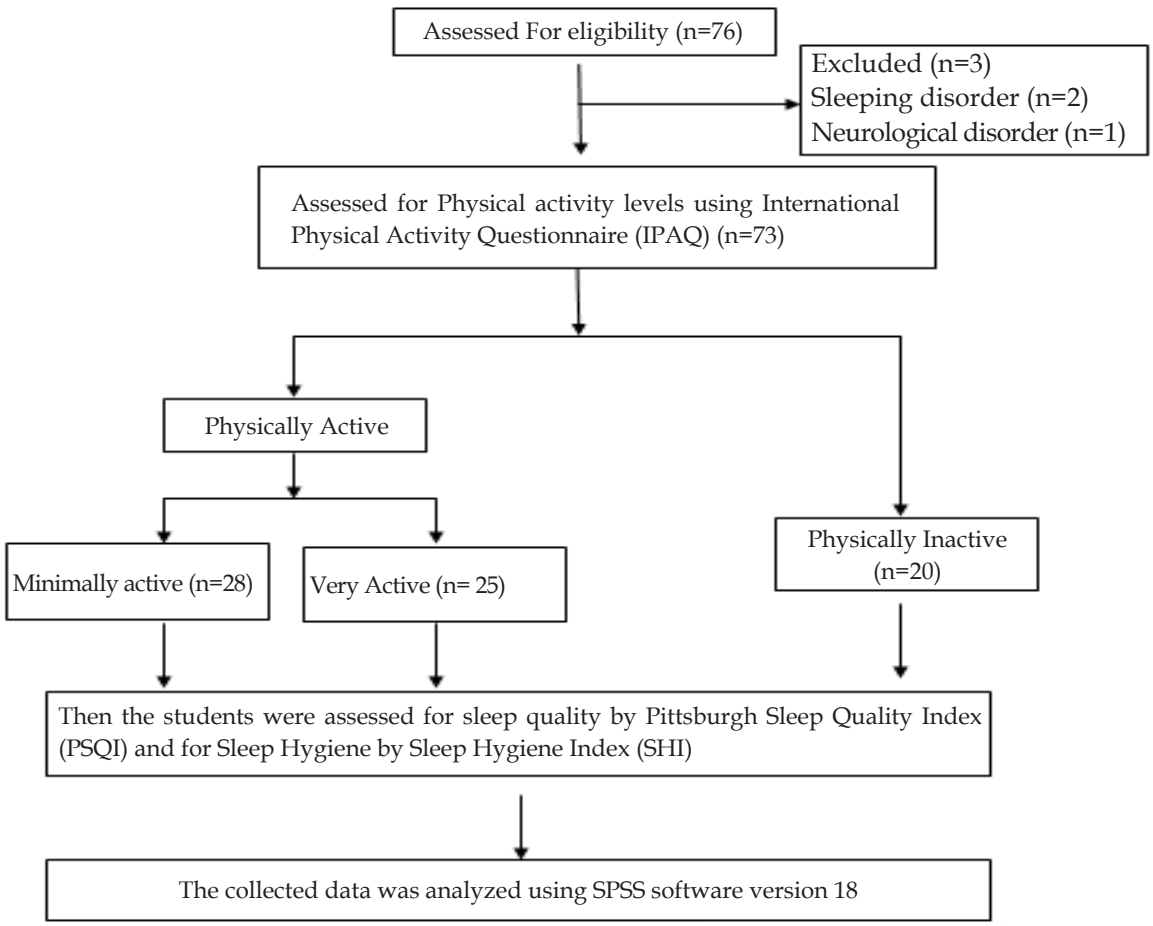

Fig. 1: Flow diagram for study participants

Statistical Analysis: Descriptive statistics were calculated for all variables. To assess differences in sleep quality (PSQI) and sleep hygiene (SHI) across physical activity levels, ANOVA and MANOVA were applied. Post Hoc analysis was performed using the Tukey HSD test. A *p*-value of less than 0.05 was considered statistically significant.

Results

Table 1: Demographic profile of the students according to physical activity levels

Categories	N,%	Mean Age (years)	S.D.	Males	Females
Inactive	20 (27.4%)	21.10	1.744	5	15
Minimally Active	28 (38.4)	20.96	2.202	9	19
Very Active	25 (34.2)	20.56	1.685	8	17
ANOVA	–	F = 0.504	–	–	–
p-value	–	0.605	–	–	–

The demographic characteristics of students are summarized in Table 1. The Inactive group (N=20) had a mean age of 21.10 ± 1.744 years (5 males, 15 females), the Minimally Active group (N=28) had a mean age of 20.96 ± 2.202 years (9 males, 19 females), and the Very Active group (N=25) had a mean age of 20.56 ± 1.685 years (8 males, 17 females). ANOVA indicated no significant differences in age among the groups (F = 0.504, p = 0.605), confirming that the groups were comparable in terms of age and gender distribution.

Table 2: Sleep quality and sleep hygiene based on physical activity level

PSQI	**Mean ± S.D**	**MANOVA-F**	**MANOVA- p value**
Physically Inactive	8.35 ± 1.496	11.429	<0.001
Minimal Active	6.285 ± 1.997		
Very Active	5.88 ± 1.855		
SHI	**Mean ± S.D**	**MANOVA-F**	**MANOVA- p value**
Physically Inactive	35.75± 0.786	75.630	<0.001
Minimal Active	29.571 ± 2.348		
Very Active	28.880 ± 2.297		

* PSQI- Pittsburgh Sleep Quality Index, SHI- Sleep Hygiene Index

The effect of physical activity level on sleep quality (PSQI) and sleep hygiene (SHI) was examined using MANOVA. The analysis revealed statistically significant differences in PSQI scores (Inactive: 8.61 ± 2.50, Minimally Active: 6.42 ± 2.55, Very Active: 5.99 ± 2.29; F = 11.429, p < 0.05) and SHI scores (Inactive: 36.05 ± 8.39, Minimally Active: 28.50 ± 6.74, Very Active: 29.52 ± 6.56; F = 75.630, p < 0.05) among the physical activity groups, indicating measurable group-wise differences in both outcomes measures. (Table 2)

Table 3: Tukey HSD Post Hoc Comparison of Sleep Quality and Sleep Hygiene based physical activity level

Comparison	Mean Difference	Result
Inactive vs. Minimally Active	6.179	Significant
Minimally Active vs. Very Active	0.691	non-Significant
Inactive vs. Very Active	6.870	Significant

The Tukey HSD post hoc comparison of sleep quality (PSQI) and sleep hygiene (SHI) scores across different physical activity levels. The analysis showed that inactive participants had significantly higher scores compared to both minimally active (mean difference = 6.179, $p < 0.05$) and very active participants (mean difference = 6.870, $p < 0.05$), indicating poorer outcomes in the inactive group. In contrast, the comparison between minimally active and very active groups (mean difference = 0.691) was non-significant, suggesting comparable outcomes between these two groups. (Table 3)

Discussion

The primary objective of this study was to examine the relationship between physical activity, sleep quality and sleep hygiene among physiotherapy students. According to physical activity level, the minimally active and very active groups had significantly better sleep quality and hygiene scores than the inactive group. Specifically, inactive participants recorded the highest PSQI and SHI scores, indicating poorer sleep quality and hygiene, while minimally active and very active students showed comparatively lower scores of PSQI and SHI, reflecting healthier sleep outcomes.

This aligns with findings by Narayana et al. (2023)[18] and Liu et al. (2025)[19], who reported a moderate inverse association between physical activity and PSQI scores. Higher physical activity was linked to better sleep quality, while individuals with low activity levels more frequently reported poor sleep. These results suggest that physical activity plays a significant role in improving sleep quality among healthy individuals. Another study by Turgay Altunalan et al. (2024)[20] supports the current findings, reporting that physically active individuals had significantly better perceived sleep quality and sleep hygiene compared to less active participants. Several mechanisms may explain the positive impact of physical activity on sleep hygiene. Regular physical activity can enhance the production of melatonin, a hormone that regulates the sleep-wake cycle, thereby facilitating a smoother transition to sleep and improving overall sleep quality.[21]

Kathrin Wunsch et al. (2017)[22] conducted a study on the effect of physical activity on sleep quality, well-being and affect during academic stress periods. Their findings support the current study, highlighting that maintaining adequate activity levels during high-stress periods can prevent negative impacts on sleep, overall well-being and emotional health. This emphasizes the importance of physical activity not only for general health but also for sustaining academic performance and coping with academic stress among students. Physical activity helps reduce stress, which is a common barrier to falling asleep and maintaining restorative sleep.[23] it also enhances mood, promoting greater engagement in physical activity and creating a positive feedback loop that further supports healthy sleep patterns.[24]

Physical activity in college students is not only important for improving sleep quality and sleep hygiene but also plays a critical role in managing stress and coping with academic pressures. Engaging in regular physical activity can help students buffer the negative effects of academic stress, maintain emotional well-being, and enhance overall cognitive performance, thereby supporting both their physical health and academic outcomes.

These findings emphasize the importance of implementing sleep education programs in academic institutions to raise awareness about healthy sleep practices. Colleges and universities may have to begun initiatives such as wellness workshops, fitness programs, and awareness campaigns to promote healthy sleep and physical activity. Encouraging structured physical activity can be an effective strategy to support better sleep habits. Additionally, improving sleep hygiene may enhance sleep quality, concentration, academic performance, and emotional regulation. Therefore, combining physical activity with sleep education and institutional wellness initiatives could provide a comprehensive approach to supporting students' physical and mental health.

Conclusion

The study concluded that physically active students had significantly better sleep quality and sleep hygiene compared to those who did not engage in physical activity, highlighting the importance of regular physical activity in promoting restful sleep and overall well-being. However, the study had limitations, including reliance on self-reported

questionnaires without objective sleep measures, a small sample size and a cross-sectional design that limits causal inferences. Factors such as diet, lifestyle habits, academic stress, mental health and physical fitness were not evaluated.

Future research should involve larger, more diverse samples, incorporate objective sleep assessments and examine additional factors like diet, stress and health conditions. Including students from other healthcare disciplines and exploring the impact of the timing of physical activity on sleep quality and hygiene would further enhance understanding in this area.

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Ethical Clearance/Statement of Ethics- Ethical approval was not obtained for this study. The research was observational in nature, involved no identifiable patient information or interventions, and posed minimal risk to participants.

Declaration of conflicts of interest statement if applicable: No

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