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Proportion of Poor Sleep Quality and Sleep Hygiene Implementation in Medical Students of Udayana University

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ABSTRACT

Background: A good night's sleep is sleep with a sufficient duration, namely seven to eight hours a day. Sleep quality can be determined by sleep hygiene. People who practice sleep hygiene have better energy and cognitive function. Poor sleep quality due to poor sleep hygiene can affect person's mental and physical health. This often occurs in productive ages, such as students, due to demands and pressures regarding work.
Objective: To determine the proportion of sleep quality and poor sleep hygiene implementation in Udayana University Medical Students.
Method: This study is a quantitative descriptive study with a cross-sectional approach. The sample came from 245 students of the Undergraduate Medical Study Program, Faculty of Medicine, Udayana University, Class of 2021. Data were obtained using a questionnaire and presented in the form of a pie chart. Sleep quality assessment was based on the Pittsburgh Sleep Quality Index (PSQI) and sleep hygiene was based on the Sleep Hygiene Index (SHI).
Results: A total of 211 (86.1%) medical students of Udayana University Class of 2021 had poor sleep quality and 34 (13.9%) had good quality. Even so, the majority of students have good sleep hygiene, which is 229 people (93.5%), while 10 people (4%) are in the moderate category, and 6 people (2%) are in the poor category.
Conclusion: A total of 211 people (86.1%) of medical students at Udayana University have poor sleep quality and 6 people (2%) of all students have poor sleep hygiene.

Keywords: Sleep Quality, Sleep Hygiene, Medical Students, Udayana University

INTRODUCTION

Adequate sleep, typically seven to eight hours nightly for most adults, allows for complete homeostatic restoration and consistently high sleep quality. This improved sleep quality enhances memory and learning, and supports concentration, cognitive function, and sensorimotor integration.[1]

Sleep disturbances are prevalent among students across various disciplines, a population characterized by high activity levels. The rigorous academic demands and demanding schedules frequently lead to circadian rhythm disruptions.[2] Medical students, in particular, exhibit a statistically higher incidence of sleep disorders, especially during their first three years of study.[3] Studies indicate that a significant

percentage of medical students experience poor sleep quality, with 51% in the United States and 59% in Lithuania reporting such difficulties.[4] Furthermore, a study of 370 medical students across all four years of training revealed that 67,42% experienced sleep deprivation.[5] Medical students face a heightened risk of sleep disorders due to rigorous academic demands and pressures, leading to significant sleep deprivation from intensive study.[6]

Sleep quality is a metric reflecting the soundness and restorative nature of a person's sleep, distinct from sleep satisfaction, a subjective evaluation of one's sleep experience.[7] Several factors contribute to optimal sleep quality, including total sleep time (TST), sleep onset latency (SOL), sleep maintenance, total wake time (TWT), sleep efficiency (SE), and the presence or absence of sleep disruptions like apnea.[8] The factors affecting sleep quality are described as follows: First, subjective sleep quality refers to a person's own assessment of their sleep, encompassing factors such as fatigue upon waking and nighttime awakenings. Second, sleep latency is the time required to fall asleep after getting into bed. Third, sleep duration refers to the total time spent asleep. Fourth, sleep efficiency is the ratio of total sleep time to the total time spent in bed. Fifth, the use of sleeping pills may suggest poor sleep quality and daytime sleepiness, potentially linked to pre-sleep and daily activities.[9] Poor sleep quality can lead to decreased daily activity, fatigue, weakness, unstable vital signs, poor neuromuscular condition, slower wound healing, and reduced immunity. Furthermore, poor sleep negatively impacts mental well-being, potentially contributing to stress, depression, anxiety, and difficulty concentrating.[10]

Establishing optimal sleep hygiene involves maintaining consistent sleep and wake times, a comfortable bed and sleep environment, regular exercise, minimizing daytime naps, avoiding caffeinated or stimulant beverages and emotionally or cognitively stimulating activities before sleep. Poor sleep hygiene results from inconsistent daily activities, such as an uncomfortable bed or consuming caffeinated beverages.[11]

Optimal sleep quality is attainable through diligent adherence to sleep hygiene practices, a key element of cognitive behavioral therapy for insomnia. Implementing effective sleep hygiene strategies enhances energy levels and cognitive performance. Inadequate sleep quality among medical students, attributable to deficient sleep hygiene practices, significantly compromises their mental and physical well-being, resulting in compromised academic performance.[12]

Given the preceding information, the author proposes research exploring the correlation between sleep quality and deficient sleep hygiene practices among Udayana University medical students. Maintaining optimal sleep hygiene is an established and effective treatment strategy for sleep disorders, especially within the medical student population, because depression is common among them and may worsen. The demands and pressures of medical school present significant challenges to students' health, leading to high levels of anxiety, depression, fatigue, and stress, which contribute to poor sleep quality.[13]

MATERIALS & METHODS

This research, authorized by the Udayana University Faculty of Medicine research ethics commission (number 2432/UN14.2.2.VII.14/LT/2024), was carried out from August to September 2024. Employing a quantitative descriptive research method with a cross-sectional approach, the study aimed to determine the proportion of poor sleep quality and the prevalence of poor sleep hygiene among Udayana University medical students. Data on sleep quality and hygiene were gathered via online questionnaires distributed to the students.

A total sampling method was employed, encompassing all eligible participants. Inclusion criteria specified active 2021

Udayana University Medical Program students who provided informed consent. Exclusion criteria included students with cognitive impairments precluding questionnaire completion and those who did not complete their studies during the 2021 academic year.

This study employed the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality and the Sleep Hygiene Index (SHI) to evaluate sleep hygiene practices among Udayana University medical students (Class of 2021). The PSQI, a nine-item questionnaire with four response options, categorized sleep quality as good (≤ 5) or poor (> 5). The SHI, a thirteen-item Likert scale instrument, classified sleep hygiene as good (13-27), moderate (28-40), or poor (41-75).

STATISTICAL ANALYSIS

Data and statistical analyses were performed using Microsoft Excel and Statistical Package for the Social Sciences (SPSS) version 27. The analysis incorporated research variables from the questionnaire, with results presented as percentages within tables. These proportions are interpreted and described in the context of the 2021 class of Udayana University medical students.

RESULT

This online study employed the Pittsburgh Sleep Quality Index (PSQI) and Sleep Hygiene Index (SHI) questionnaires. From the initial 249 respondents, four were excluded, resulting in a final sample of 245 participants who met the inclusion criteria. Respondent demographics included age and gender. As shown in Table 1, the median age was 21 years (80,8% of respondents), ranging from 19 to 23 years. Table 2 indicates that the majority of respondents were male, comprising 144 individuals or 58,8% of the total.

Table 1: Respondent Age Characteristics

Variable	Median ± Variance	Min-Max
Age	21,00 ± 0,246	19 – 23

Table 2: Characteristics of Gender and Demographics

Variable	Frequency (n=245)	Percentage (%)
Gender		
Female	144	58,8
Male	101	41,2
Demographic		
Living alone	121	49,39
Living with family	124	50,61

Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI) questionnaire, with each section categorized by rating. The seven PSQI components contribute to an asymmetrical global score ranging from 0 to 21, with a median of 5. This global score summarizes sleep quality, indicating whether it is good or poor. A PSQI score of ≤ 5 suggests good sleep quality, whereas a score > 5 indicates poor sleep quality; higher scores correspond to poorer sleep quality. Table 3 reveals that the preponderance of Udayana University medical students (Class of 2021) experienced poor sleep quality (86,1% of participants).

Table 3: Sleep Quality Proportions among 2021 Medical Students

Sleep Quality	Frequency (n=245)	Percentage (%)
Good	34	13,9
Poor	211	86,1

This study examined subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, drug use, and daytime dysfunction among Udayana University Medical Students, Class of 2021. A total of 195 students (80%) reported good subjective sleep quality, while 50 students (20%) reported poor sleep quality. Furthermore, 224 students (91%) had good sleep latency, while 21 students (9%) reported poor sleep latency.

Among 245 University of Medical students (Class of 2021), 141 (58%) reported adequate sleep duration, while 104 (42%) reported insufficient sleep duration. Sleep efficiency was satisfactory for the majority of participants, with only 5 (2%) exhibiting poor sleep efficiency. Analysis of self-reported sleep disorders (including difficulty initiating sleep within 30 minutes, night time or early-morning awakenings, nocturia, respiratory difficulties, cough, or other causes) indicated that 112 participants (46%) were free from sleep disorders, whereas 133 (54%) reported experiencing sleep disorders. Regarding sleeping pill usage in the preceding month, 100 students (41%) reported no use, while 145 students (59%) reported using sleeping pills. Daytime dysfunction in Udayana University medical students was evaluated based on self-reported sleepiness during daytime activities, the frequency of encountered problems, and the level of enthusiasm for problem-solving. About 63 participants (26%) reported no daytime dysfunction, while 182 (74%) did.

Sleep hygiene was evaluated using the Sleep Hygiene Index (SHI), categorized as good (13-27), medium (28-40), and poor (41-75). Table 4 indicates that 229 respondents (93,5%) of Udayana University medical students in 2021 exhibited good sleep hygiene.

Table 4: *Sleep Hygiene* Proportions among 2021 Medical Students

Sleep Hygiene	**Frequency (n=245)**	**Percentage (%)**
Good	229	94%
Moderate	10	4%
Poor	6	2%

The sleep hygiene study comprised four categories: sleep-wake schedules, sleep environment, diet, and sleep-promoting activities. Analysis of sleep-wake schedules included assessment of napping habits, sleep duration, and wake-up times. 27 of participants (11%) reported frequently napping for extended periods (two hours or more), exhibiting irregular sleep schedules, and exceeding recommended bedtimes two to three times weekly. Moreover, environmental factors revealed suboptimal sleep hygiene practices in 13 participants (5%) who frequently reported retiring to bed feeling stressed, angry, upset, or anxious, experiencing discomfort during sleep, or having an unsatisfactory sleep environment.

Dietary analysis revealed that poor sleep hygiene was observed in 10 participants (4%) who frequently consumed tobacco or caffeine within four hours of bedtime. Pre-sleep activities contributed to poor sleep hygiene in 12 participants (5%), who often engaged in strenuous exercise within an hour of bedtime, stimulating activities such as watching television or reading, non-sleep related bed activities, completing work before bed, or worrying in bed.

DISCUSSION

Based on the data analysis, 86.1% of the study sample had poor sleep quality. This percentage is higher than that reported in a Tarumanagara Medical Journal study of 197 medical students at Tarumanagara University, where 73.1% reported poor sleep quality.[14] Data on students experiencing poor sleep quality showed 50 people (20%) rating their sleep satisfaction as poor. A total of 21 people (9%) reported taking 60-480 minutes to fall asleep (more than 30 minutes after lying down) more than twice a week. A total of 104 people (42%) reported sleeping less than 7 hours. Data on

sleep efficiency were incomplete. Among the 2% of participants who reported sleeping between 12:30 a.m. and 2:00 a.m., waking between 5:00 a.m. and 6:30 a.m. (sleep duration: 3,5-4,5 hours), 133 (54%) indicated experiencing at least one sleep disorder such as waking during the night or early morning, nocturia, difficulty breathing, coughing or snoring, feeling cold or hot at night, nightmares, pain, or other disorders. A total of 145 participants (59%) reported drug use, and 145 (59%) reported having a heart attack. Exceeding the recommended dosage of sleeping pills, specifically using them more than twice a week, correlates with seven reported instances of daytime dysfunction among 182 participants (74%). These individuals frequently experienced daytime sleepiness and demonstrated a marked lack of enthusiasm for problem-solving. Our findings align with a Lithuanian study published in the Journal of Clinical Sleep Medicine, which reported that over half (59,4%) of college students exhibited poor sleep quality (PSQI score > 5).[15] Furthermore, a Chinese meta-analysis revealed poor sleep quality in 52.7% of medical students. Similarly, research across six Denpasar universities indicated poor sleep quality in 77% of participants, with only 23% achieving a satisfactory PSQI score.[16]

Individual perceptions of sleep quality are subjective and vary considerably. Subjective assessments offer insight into personal sleep experiences, while objective measures provide quantifiable data on sleep patterns and characteristics. Objective assessment may include sleep duration (total nightly sleep time), sleep efficiency (ratio of sleep time to time in bed), and polysomnography, which records brain waves, heart rate, breathing, and eye movements during sleep.[17]

This study revealed that 195 participants (80%) reported good subjective sleep quality, while 50 participants (20%) reported poor subjective sleep quality. Furthermore, 176 participants (72%) reported good objective sleep quality (without polysomnography), and 69 participants (28%) reported poor objective sleep quality (without polysomnography). This suggests that 19 individuals perceived their sleep quality as good, despite objectively poor sleep quality. Several factors may contribute to this discrepancy. One possibility is adaptation to sleep deprivation. Students may be accustomed to less-than-ideal sleep patterns, leading them to feel "normal" even when experiencing daytime fatigue, sleepiness, or difficulty concentrating. Subjective perception also plays a role. Students might feel refreshed upon waking, even if their sleep duration falls short of recommendations.[18]

Stress and anxiety can negatively impact sleep quality, and individuals coping with stress may mistakenly perceive their sleep as adequate despite experiencing sleep disorders. Furthermore, suboptimal sleep environments, including noise and bright lighting, frequently disrupt sleep without conscious awareness. Students may lack sufficient knowledge regarding optimal sleep hygiene, potentially underestimating the significance of sleep duration and sleep cycle integrity. Finally, while sleep aids such as sleeping pills or alcohol may offer short-term relief, they often disrupt natural sleep cycles, ultimately resulting in diminished sleep quality.[18]

Analysis of data from 2% of research participants experiencing poor sleep hygiene indicates that good sleep hygiene is far more prevalent (94%). The study revealed inconsistent sleep-wake schedules among students with poor sleep hygiene. This included 27 participants (11%) who frequently napped for two hours or more, had inconsistent daily sleep schedules, woke at varying times, and spent significantly more time in bed than needed two or three times per week. Furthermore, suboptimal sleep hygiene is characterized by uncomfortable bedding and sleeping environments (e.g., excessively bright, hot, or cold rooms, and disruptive noise), as well as pre-sleep negative affect (e.g., anger,

stress, and distress). Research indicates that indoor lighting significantly impacts melatonin production; a brightly lit sleep environment can reduce melatonin levels by up to 50%.

Research suggests that sleeping in darkness improves sleep quality, decreases nighttime awakenings, and promotes a more refreshed feeling upon waking. Darkness optimizes melatonin production, thereby enhancing rest for both body and mind. A total of 13 participants (5%), who reported frequent pre-sleep feelings of stress, anger, upset, or nervousness, experienced poor sleep and discomfort in their bedrooms. Furthermore, dietary factors such as smoking and caffeine consumption within four hours of bedtime were noted. Elevated caffeine intake may correlate with reduced sleep duration, increased sleep onset latency, and heightened night time awakenings.[19] This study indicates that 10 participants (4%) reported frequent or habitual tobacco use at bedtime. Furthermore, 12 participants (5%) reported frequent caffeine consumption within four hours of sleep or consistent engagement in four activities known to disrupt sleep: strenuous exercise within one hour of bedtime, participation in stimulating activities such as television viewing or reading, non-sleep related bed use, and working, planning, or worrying in bed.

These findings align with prior cross-sectional research among medical students at Tikur Anbessa Specialized Hospital, which reported good sleep hygiene in 51,9% of participants.[12] Similarly, a descriptive cross-sectional study at Nishtar Medical University, Multan, involving pre-clinical medical students, revealed good sleep hygiene in 54,81%.[20] A 2019-2020 cross-sectional observational study in the Journal of Rural Medicine, which examined sleep hygiene among 101 first-year medical students in India, indicated that 65% exhibited good sleep hygiene.[21] A descriptive cross-sectional study of preclinical medical students at Kathmandu Medical College (KMC), conducted from October to November 2019, revealed that 55,77% of participants demonstrated good sleep hygiene.[22]

This study's findings contrast with research from Andalas University, which reported only 33,3% of third-year medical students exhibiting good sleep hygiene.[19] Similarly, a multi-university study in Qatar revealed that only 21% of medical students demonstrated good sleep hygiene.[23] Furthermore, a pilot cross-sectional study of 100 UNAM medical students in Mexico City yielded a good sleep hygiene rate of just 23%.[24]

Analysis of study results reveals that 86.1% of participants reported poor sleep quality, while 94% reported good sleep hygiene. Spearman's rho correlation analysis ($p = 0.095$, $p > 0.05$) indicated no significant correlation between sleep quality and sleep hygiene. This lack of association may be attributable to certain sleep hygiene components that do not impact sleep quality.

Firstly, extended daytime sleep exceeding two hours may disrupt nocturnal sleep patterns; however, this correlation isn't consistently reflected in the PSQI-measured sleep quality. Some participants report feeling rested despite prolonged naps. Secondly, inconsistent sleep schedules can impact circadian rhythms, yet certain individuals maintain satisfactory sleep quality despite irregular bedtimes. This suggests that sleep time variability does not always imply poor sleep quality. Third, inconsistent sleep duration may indicate underlying sleep disorders; however, individual responses vary, and consistent wakefulness despite fluctuating sleep duration is possible, thus not always reflected in PSQI scores. Fourth, while strenuous pre-sleep exercise is generally discouraged, its impact on sleep quality is individualized, with some individuals unaffected. Finally, although pre-sleep caffeine consumption is often linked to poor sleep quality, individual tolerance varies, and PSQI scores may not always reflect this.[23]

A study of 385 medical students revealed no significant correlation between sleep

hygiene and sleep quality (p = 0,362; p >0,05).[20] This suggests that while these students practiced good sleep hygiene, it didn't consistently lead to better sleep quality. This is in contrast to another study showing a significant relationship (p = 0,036; p < 0,050) between sleep hygiene and sleep quality among medical students at Airlangga University.[25] Therefore, factors such as academic stress, lifestyle, and mental health may have a greater impact on sleep quality for medical students than sleep hygiene alone.[26]

CONCLUSION

A study revealed that 211 (86,1%) of Udayana University medical students reported poor sleep quality, while only 6 (2%) demonstrated poor sleep hygiene. Therefore, medical students should prioritize sleep and hygiene to optimize their physical and mental well-being. Strategies to achieve this include incorporating 15- to 20-minute breaks before academic activities, maintaining adequate hydration, and performing light stretches to enhance alertness. Furthermore, institutions should conduct regular evaluations of their learning models and actively solicit student feedback. Future research should employ a larger sample size and conduct a more comprehensive investigation into the factors influencing sleep quality and its correlation with sleep hygiene practices.

Declaration by Authors

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