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ORIGINAL ARTICLE

# SLEEP HYGIENE AND SLEEP QUALITY IN UNDERGRADUATE MEDICAL STUDENTS

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## Abstract:

**Background:** Sleep is a fundamental biological necessity of the body and its quality is dependent on good sleep hygiene. Few studies have been conducted on these topics, especially in medical students.

**Objective:** To assess the association between sleep hygiene practices and sleep quality of medical students and their association with gender and place of abode.

**Material and Methods:** A four months descriptive cross sectional survey from November 2023 to February, 2024, was conducted among 597 medical students of Lahore Medical and Dental College, Lahore, recruited through a convenience sampling technique. Data was collected using a structured questionnaire consisting of background information, Sleep Hygiene Index and Pittsburgh Sleep Quality Index. Data was analyzed using Chi square, independent sample t tests and Correlation Coefficient (r). The cut-off point for statistical significance was p≤0.05.

**Results:** Students exhibited poor sleep quality (81%) but good sleep hygiene (76%). Sleep hygiene and sleep quality were moderately correlated (r = 0.35; p< 0.001). Poor sleep quality was associated with sleep latency (p<0.001), interrupted sleep (p<0.001), breathing issues (p=0.017), feeling too cold (p<0.001) or too hot (p=0.006), night mares (p=0.002), bodily pains (p=0.008), day time sleepiness (p<0.001), lack of enthusiasm (p<0.001). Poor sleep hygiene was significantly associated with erratic bedtimes (p=0.001) or wake up times (p=0.002), use of stimulants (p<0.001), mind alerting activities (p<0.001), emotional disturbances (p<0.001), using bed for other activities (p<0.001), uncomfortable bed or bedroom (p<0.001), working in bed (p=0.030) and worrying and planning (p=0.010).

**Conclusion:** Medical students need counseling on enhancing sleep quality and hygiene. Multi-institutional studies must be conducted to assess other influences on sleep.

**Keywords:** Sleep quality, Sleep hygiene, Medical students, Pakistan
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## Introduction:

Sleep is a fundamental biological necessity of the body[1], which is essential for maintaining good physical, mental, emotional health[2] and quality of life [3]. Sleep plays a crucial role in consolidating memories, facilitating learning, enhancing decision-making abilities, and fostering critical thinking skills[4]. Both sleep quantity and quality has an important impact on the key cognitive functions related to academic success in higher education[5]. Higher education compels students to adapterratic sleep patterns, induced by their academic schedules[6]. Both sleep deprivation and low sleep quality are widespread among college students[7], including those in the medical studies[8]. Research findings globally reported that most of the medical and other college students reported day time sleepiness as a result of insufficient sleep. This can end in serious outcomes, including poor academic performance[3,9], reduced coping mechanisms for college and life requirements, and increased risk for road traffic accidents[8]. It has been reported that sleep quality affects medical students' working capacity and their vulnerability to make

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errors[9].

Sleep hygiene refers to the behaviors and processes which enhance both the duration and quality of sleep[10]. Activities and conditions while falling, asleep affect sleep quality[11]. Many factors are responsible for altered sleep habits. In current times, bed time smart phones use of is the most important cause for going to sleep late[12]. Another cause of not going to sleep until late is the use of central nervous system stimulants such as caffeine, caffeinated drinks, and caffeinated cocktails with alcohol[3]. Alcohol consumption increases during medical school [13,] and decreases have been shown for exercise, as well as sleep duration, among physicians and medical trainees [14]. Poor sleep hygiene refers to the various behaviors, practices, routines, and habits that lead to difficulties falling asleep or staying asleep, as well as experiencing sleep that doesn't leave one feeling refreshed[14].

It is also understood that many students are themselves unaware of their sleep deprivation or poor sleep quality. They may not seek counseling or advice regarding this important problem. It is important to pay attention to sleep disorders in medical students because of their negative impact on quality of life, cognitive performance, and other associated health disorders. These problems can be solved by carefully investigating the prevalence of such problems and finding a solution[3].

Despite the importance of the topic, few studies in Pakistan have assessed sleep quality and sleep hygiene of medical students. The present study was conducted to assess the association between sleep hygiene practices and sleep quality of medical students. Study also assessed the association between gender and place of abode with sleep hygiene and sleep quality of medical students.

## Material and Method:

**Study Design, Setting and Time frame:**

A descriptive cross sectional survey was conducted among medical students at Lahore Medical and Dental College (LMDC), University of Health Sciences (UHS), Lahore, Pakistan. The study spanned through a period of four months, from November 2023 to February, 2024.

**Study Population:**

Students registered in first to final year MBBS classes in the year 2023 constituted the study population. Using a convenience sampling technique, all students who agreed to participate in the study were taken as the study sample (N=597).

**Data Collection Tool:**

The study tool comprised of a structured questionnaire consisting of three sections. The first section contained background information of study participants on age and place of abode.

The second part assessed the sleep hygiene behaviors through a 13-item Sleep Hygiene Index (SHI), developed by Mastin, Bryson and Corwyn (2006), created from the diagnostic criteria for inadequate sleep hygiene26.Each item is rated on a five-point scale ranging from 0 (never) to 4 (always). The items summed up provide a global assessment of sleep hygiene, ranging from 0 to 52, with higher scores representing poorer sleep hygiene status. SHI scores below 26 are considered as good, 27-34 as normal and35 and above are considered as poor sleep hygiene 27. The scale has an internal consistency of Cronbach's α 0.66, and good test retest reliability of 0.71.

The third section comprised of The Pittsburgh Sleep Quality Index (PSQI) is a self-report questionnaire that assesses sleep quality and quantity. The19-item self-report questionnaire yields seven component scores: subjective sleep quality, sleep latency, duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction28. The PSQI global score of<5 indicate good sleep quality and scores ≥5 denotes poor sleep quality. The PSQI has a Cronbach's alpha of 0.70when tested among medical students [29].

**Statistical Analysis:**

Data was entered, cleaned and analyzed using Statistical Package for Social Sciences (SPSS), version 22. Data was presented as tables and graphs. Descriptive statistics was used in terms of number, percentages and mean scores. Sleep quality and sleep hygiene were both categorized as good or poor according to the pre-set cut-off scores. Chi square test was employed to observe relationship between sleep quality and sleep hygiene with gender and place of residence, factors associated with sleep quality and sleep hygiene. The independent sample t test was applied to assess association between sleep quality and sleep hygiene with mean scores of PSQI, SHI, sleep time and sleep onset latency. The correlation between SHI and global PSQI scores was ascertained applying Cronbach's α. The cut-off point for statistical significance was p≤0.05.

**Ethical Considerations:**

Prior to the commencement of the study, ethical approval was obtained from LMDC's Institutional Review Board and Ethical Committee (IRB & EC). Informed verbal consent was also taken from the study participants, assuring anonymity and confidentiality.

## Results:

Around 55% of study participants were female and 63% were residing in their homes. Among the MBBS students, 22% were from first year, 21% from second year, 19% from

third year, 21% from fourth year and 17% from final year (Table 1).

| Table 1.Background characteristics of participants (n=597) | | |
|---|---|---|
| **Characteristics** | **Freq** | **Perce%** |
| Gender Male Female | 266<br>331 | 44.6<br>55.4 |
| Place of residence Living in hostel Living at home | 220<br>377 | 36.9<br>63.1 |
| MBBS Class<br>First year<br>Second year<br>Third year<br>Fourth year<br>Final year | <br>132<br>123<br>114<br>124<br>104 | <br>22.1<br>20.6<br>19.1<br>20.8<br>17.4 |

The participants had an average night time sleep of 5.90 hours±1.52. Mean sleep onset latency of students was 30.68 minutes±33.01.The mean score for sleep hygiene of students was 21.94 (standard deviation= 6.440; range= 5–44). The sample in this study had a mean global PSQI score of 7.53 (standard deviation = 4.411; range = 0–75).

Among study participants, 483(81%) exhibited poor sleep quality and 114 (19%) had a good quality of sleep. The good SHI was exhibited by 455(76%) students and 142(24%) participants had bad sleep hygiene. The SHI had modest positive correlations with global PSQI score (*r* =0.35, p<0 .001)

Table 2 displays that measures of sleep quality were significantly deranged among participants with poor sleep compared with those with good sleep attributes. Among the two categories, statistically significant difference was observed within mean PSQI scores (p=0.002), mean SHI scores (p<0.001), mean total sleep time (p<0.001) and mean sleep onset latency (p<0.001). Similarly, participants with good and bad sleep hygiene also displayed statistically significant differences in mean PSQI scores (p<0.001), mean SHI scores (p<0.001), mean total sleep time (p=0.006) and mean sleep onset latency (p= 0.002).

**Table 2. Comparison of sleep attributes of participants with good and poor sleep quality and hygiene (n=597)**

| Variables | Sleep Quality | | p value | Sleep Hygiene | | p value |
|---|---|---|---|---|---|---|
| | | | | | | |
| | Good | Poor | | Good | Poor | |
| Mean PSQI scores | 3.05±1.15 | 8.59±4.23 | <0.001 | 6.69±3.06 | 10.23±6.51 | <0.001 |
| Mean SHI scores | 18.54±5.76 | 22.75±6.33 | <0.001 | 19.25±4.57 | 30.57±3.10 | <0.001 |
| Mean sleep time | 7.0±1.3 hours | 5.7±1.5 hours | <0.001 | 6.09±1.42 | 5.31±1.66 | 0.006 |
| Mean sleep onset latency | 16±28.4 minutes | 34±21.8 minutes | <0.001 | 28.86±29.37 | 36.51±42.22 | 0.002 |

There was no statistically significant association between sleep quality with gender of the study participants (p=0.96) or their place of residence (p=0.88).

Table 3 displays the association of factors causing sleep disturbance with sleep quality. Poor night time sleep quality was observed more in participants who have sleep latency of more than 30 minutes (p<0.001), those who tend to wake up in between sleep (p<0.001), who have disrupted sleep to use the bathroom (p=0.003), have breathing issues (p=0.017), either feel too cold (p<0.001) or too hot (p=0.006), have night mares (p=0.002) and have some bodily pain (p=0.008).

Poor sleep quality was significantly associated with day time sleepiness (p<0.001), lack of enthusiasm in life (p<0.001) and self-perception of not having a good quality night sleep (p<0.001).

**Table 3. Comparison of sleep disturbance among participants with good and poor sleep quality (n=297)**

| Variables | Sleep Quality | | p value |
|---|---|---|---|
| | Good Frequency (%) | Poor Frequency (%) | |
| Cannot get to sleep within 30 minutes<br>Yes<br>No | <br>13(5.2)<br>101(29.0) | <br>236(94.8)<br>247(71.0) | <br><0.001 |
| Wake up in the middle of the night or early morning<br>Yes<br>No | <br>25(9.3)<br>89(27.1) | <br>243(90.7)<br>240(72.9) | <br><0.001 |
| Have to get up to use the bathroom<br>Yes<br>No | <br>17(11.0)<br>97(21.9) | <br>137(89.0)<br>346(78.1) | <br>0.003 |
| Cannot breathe comfortably<br>Yes<br>No | <br>5(7.9)<br>109(20.4) | <br>58(92.1)<br>425(79.6) | <br>0.017 |
| Cough or snore loudly<br>Yes<br>No | <br>7(13.7)<br>107(19.6) | <br>44(86.3)<br>439(80.4) | <br>0.308 |

| | | | |
|---|---|---|---|
| Feel too cold<br>Yes<br>No | 11(7.9)<br>103(22.5) | 128(92.1)<br>355(77.5) | <0.001 |
| Feel too hot<br>Yes<br>No | 6(7.7)<br>108(20.8) | 72(92.3)<br>411(79.2) | 0.006 |
| Have bad dreams<br>Yes<br>No | 19(11.3)<br>95(22.1) | 149(88.7)<br>334(77.9) | 0.002 |
| Have pain<br>Yes<br>No | 6(7.9)<br>108(20.7) | 70(92.1)<br>413(79.3) | 0.008 |
| Daytime sleepiness<br>Present<br>Absent | 8(5.1)<br>106(24.0) | 148(94.9)<br>335(76.0) | <0.001 |
| Lack of enthusiasm<br>Present<br>Absent | 15(7.4)<br>189(92.6) | 99(25.2)<br>294(74.8) | <0.001 |
| Self-perceived sleep quality<br>Good<br>Bad | 112(24.6)<br>343(75.4) | 2(1.4)<br>140(98.6) | <0.001 |

Table 4 depicts the bed time activities associated with good or poor sleep hygiene.

Poor sleep hygiene was significantly associated with participants who had no daily fixed bedtime (p=0.001) or wake up time (p=0.002). Poor sleep quality was also associated substantially with bed time use of stimulants (p<0.001), mind alerting activities (p<0.001), being emotionally disturbed (p<0.001), using bed for other activities (p<0.001), bed or bedroom being uncomfortable (p<0.001), working in bed before sleeping (p=0.030) and lie down in bed worrying and planning (p=0.010).

**Table 4. Comparison of bed time activities of participants with good and poor sleep hygiene (n=597)**

| Variables | Sleep Hygiene | | p value |
|---|---|---|---|
| | Good Frequency (%) | Poor Frequency (%) | |
| Take day time naps of two or more hours<br>Yes<br>No | 400(75.2)<br>55(84.6) | 132(24.8)<br>10(15.4) | 0.092 |
| Different daily bed time<br>Yes<br>No | 401(74.3)<br>54(94.7) | 139(25.7)<br>3(5.3) | 0.001 |
| Different daily time to get out of bed<br>Yes<br>No | 378(74<br>76(89.4)) | 133(26.0)<br>9(10.6) | 0.002 |
| Do strenuous exercise one hour before bedtime<br>Yes<br>No | 194(72.7)<br>261(79.1) | 73(27.3)<br>69(20.9) | 0.066 |
| Use stimulants at bedtime<br>Yes<br>No | 97(53.9)<br>358(85.9) | 83(46.1)<br>59(14.1) | <0.001 |
| Do activities at bedtime that may make one stay awake<br>Yes<br>No | 355(72)<br>100(96.2) | 138(28.0)<br>4(3.8) | <0.001 |
| Go to bed feeling emotionally disturbed<br>Yes<br>No | 377(73.5)<br>78(92.9) | 136(26.5)<br>6(7.1) | <0.001 |
| Use bed for other than sleeping<br>Yes<br>No | 404(74.3)<br>51(96.2) | 140(25.7)<br>2(3.8) | <0.001 |
| Uncomfortable bed<br>Yes<br>No | 152(62.8)<br>90(37.2) | 303(85.4)<br>52(14.6) | <0.001 |
| Bedroom uncomfortable<br>Yes<br>No | 155(63.3)<br>300(85.2) | 90(36.7)<br>52(14.8) | <0.001 |
| Do important work before bedtime<br>Yes<br>No | 396(74.9)<br>59(86.8) | 133(25.1)<br>9(13.2) | 0.030 |

| | | | |
|---|---|---|---|
| Think, plan or worry in bed<br>Yes<br>No | 416(75%)<br>38(92.7) | 139(25.0)<br>3(7.3) | 0.010 |

## Discussion:

Sleep hygiene and sleep quality are essential for undergraduate medical students as they directly impact physical and mental health, and future success as healthcare professionals. In the present study, majority of the students exhibited poor sleep quality but better sleep hygiene. There was a moderate positive correlation between the study participants' scores of SHI and PSQI ($r = 0.35$; $p < 0.001$). In our study, sleep quality was significantly impaired in individuals with poor sleep attributes. This is a matter of concern as continuous sleep deprivation, often due to poor sleep hygiene among medical students, undermines academic success. Poor sleep quality and daytime sleepiness negatively impact academic achievement, relationships, and mental wellbeing, impairing learning and increasing the risk of mental health issues[15,16].

The present study found that bedtime activities were linked to sleep hygiene. Poor sleep hygiene and quality were associated with irregular bedtimes ($p=0.001$) and wake-up times ($p=0.002$), stimulant use ($p<0.001$), mind-alerting activities ($p<0.001$), emotional disturbances ($p<0.001$), using the bed for non-sleep activities ($p<0.001$), working ($p=0.030$), worrying or planning in bed ($p=0.010$), and an uncomfortable sleeping environment ($p<0.001$). Previously, a similar study found out that many participants used their bed for activities like watching television, reading, eating, thinking, planning, and worrying. Additionally, some drank coffee before bed, and most had irregular sleep schedules[15].

In the current study there was no statistically significant association between sleep quality and gender of the participants or their place of residence. These findings are consistent with observations from studies conducted by Pournik and fellow researchers in 2020 and Arshad *et al.* in 202116. However, it was also learnt that a strong link exists between female gender and poor sleep hygiene practices[15].

In our study, poor sleep quality was significantly associated with day time sleepiness ($p<0.001$), a lack of enthusiasm in life ($p<0.001$) and the self-perception of not having a good night's sleep ($p<0.001$). Other studies discovered additional associates of poor sleep quality like short sleep duration, daytime dysfunction and lack of enthusiasm[8,16]. Similar to the results of the current study, previous research have also reported no statistically significant association between sleep duration, severity of sleep disorders and poor sleep quality within medical students [17]. However, Basu *et al.* (2019) discovered from their study that poor sleep quality had multiple statistically significant associates like age, year of study, hostel residence, socioeconomic status, BMI, smoking, alcohol intake, caffeine consumption, exercise, stress, and excessive mobile or laptop use[18].

Unlike the results of our study, a high prevalence of sleep disturbances among medical students was consistently reported in other researches[19].Shafique et al. (2021) identified a statistical correlation between the residence of medical students, their night-time study habits and their sleep hygiene[20].A statistical association was also found between late-night studying and completing assignments as disrupters of sleep hygiene[21]. Other factors related to poor sleep quality that were not probed in the current study, were highlighted in other researchers. These included bed time use of electronic devices for social networking[22]. The study conducted by Surani *et al.* (2015) discovered that Pakistani medical students had notably poor sleep quality, highlighting the need for better sleep hygiene education[23].

Previous studies have established that poor sleep quality is widespread among medical students[24]. Medical students had inadequate sleep knowledge and poor sleep quality. Mazaret al. (2021) further tried a short educational intervention for improvement in medical students' sleep knowledge this experiment did not significantly improved the sleep quality[25].

### Limitations

The current study was conducted in one medical college, which limits the generalization of its results. Also it is a cross sectional study design which can provide associations but no conclusive causal relationship between poor sleep quality and other independent variables.

## Conclusion:

In conclusion, the participants of the present study exhibited poor sleep quality, which was consistent with the results of other similar studies. Sleep hygiene of our students was better than reported in previous research. Medical students need counseling on enhancing sleep quality and hygiene. Further multi-institutional studies must be conducted to assess other predictors of sleep.

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