A comparative study of sleep quality in different phases of the medical course: A study from Haryana (North India)

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ABSTRACT

Background: Inadequate sleep quality is a crucial problem in today’s hectic lifestyle. Sleep is known to facilitate cognitive skills, aid memory, and is important for physical, emotional and intellectual health. Objectives: To determine the sleep quality of the medical undergraduate students and to explore differences in various phases of medical curriculum. Material and Methods: Sleep quality was assessed in 400 medical students in various phases of the medical course using the Pittsburgh Sleep Quality Index (PSQI). Chi square test was used for comparisons of the all seven components of PSQI and sleep quality for different study year, whereas ANOVA was used for comparison of the components and global score. Results: Of the total, 25.3% of the participants classified their sleep quality as either very or fairly bad, and 31.1% reported taking more than 30 min to fall asleep. The average hours slept per night was 7.1 ± 1.21. Of the total, 8.4% of the participants reported using sleep medication at least once a week. Subjective sleep quality and sleep duration were found to be significantly different among the four groups. Conclusion: Poor subjective sleep quality was high for students in all class years of the undergraduate medical course. The comparison across the various phases of the course showed that first years reported worse sleep quality than did those in other class years.

Keywords: Medical course, phases, sleep quality
This research will provide data for improving the sleep quality of medical students, which in turn will help to enhance their clinical skills and academic standard. Medical students are the future medical professionals of our country and their academic growth will lead to better healthcare in the community.

Methods

Materials and Methods

Study setting
This study was conducted in a medical college in Haryana. The study was reviewed and approved by the Institutional Ethics Committee.

Sample size
The study included all medical students. Of 600 medical students, 400 volunteered and gave consent to participate (response rate: 66.7%).

Study period
The study was done in September 2019. This period was chosen as this period was relatively free from examinations and other activities. During this time, the students were not only exposed to various academic stressors but also psychosocial and health-related stressors.

Study design
Cross-Sectional study design was adopted for this study.

Study tool
This study was conducted in a medical college in Haryana.

Study tool
This was a questionnaire-based study. The socio-demographic profile of the participants was recorded. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI).

Pittsburgh sleep quality index
The PSQI is a self-rated questionnaire consisting of 19 questions used to assess 7 components of sleep – subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, usage of sleep medication, and daytime dysfunction during the previous month. Each question on the questionnaire is scored from 0 to 3, with 0 being the highest and 3 being the lowest score. The seven component scores are then added to get a global PSQI score in the range of 0–21. A global score ≥ 5 indicates poor sleep quality in the past month. The PSQI is reliable with a Cronbach’s α of 0.83. [6]

Data collection
The intention of the study was explained to the students and they were assured of complete confidentiality. Participants who volunteered and gave informed written consent were included in the study. All participants assembled in a lecture hall, in the morning. The questionnaires consisting of a socio-demographic profile and the PSQI, were distributed to the participants. The contents were explained initially by one of the authors. Questions were addressed individually by the other authors. Adequate time was given to complete the questionnaires. The students were asked not to discuss the contents among themselves and were asked to mark the questionnaires appropriately.

Statistical analysis

The data collected from the filled-up questionnaire was fed into MS Excel spreadsheets and data analysis was carried out using Statistical Package for the Social Sciences (SPSS) for window version 21.0. Demographic data were categorized to calculate frequencies and percentages. In the inductive analysis, the Chi-square test was used for comparisons of all seven components of PSQI and sleep quality for different study year, whereas ANOVA was used for between-group comparison of the components and global score. A value of P < 0.05 was considered significant.

Results

All the students were included in this survey from the first year to fourth year. These students were divided into four groups according to their study years [Table 1].

A total of 600 students were called to be involved in this study after which it was revealed that 400 (66.6%) completed the PSQI, being given. The completion rate in the various phases was as follows: 127 (31.8%) in the first year, 111 (27.8%) in the second year, 78 (19.5%) in the third year, and 84 (21%) in the fourth year. A female preponderance was seen in the response.

The results for the seven components of the PSQI were analyzed for the total sample and for the four study groups. Of the total sample, 25.3% of the participants classified their sleep quality as either very or fairly bad, and 31.1% reported taking more than 30 min to fall asleep. The average number of hours slept per night was 7.1 ± 1.21 hours. Of the total sample, 40% reported having difficulty staying awake during the day at least once a week. Subjective sleep quality and sleep duration were found to be significantly different among the four groups [Table 2].

Global PSQI scores for all students ranged from 0 to 15 and are depicted in Figure 1.

The mean global PSQI scores for groups A, B, C, and D were respectively 6.36 ± 2.58, 6.09 ± 2.53, 5.15 ± 2.69, and 6.35 ± 3.16 and 27.3% of the total sample had scores <5 [Table 3]. Further, analysis by undergraduate class showed that PSQI scores of <5 were found in 23.6% of first year students, 27.9% of second year students, 35.9% of third year students and 23.8% of fourth year students.

Additionally, the mean scores on the seven components of the PSQI were compared between groups [Table 4]. It was observed...
that subjective sleep quality (component 1) was significantly different between groups A and C and A and D (p-value of <0.001 and 0.010, respectively). Sleep latency was found to be significantly different in groups C and D (P value 0.020) whereas sleep duration was significantly affected in groups A and C (P value 0.001). The use of sleep medicine was significantly different in groups A and D (P value 0.003).

### Table 1: Sample distribution by group and gender

| Group       | No. of Students | Percentage |
|-------------|----------------|------------|
| A 1<sup>st</sup> Year | 127            | 31.8%      |
| B 2<sup>nd</sup> Year | 111            | 27.8%      |
| C 3<sup>rd</sup> Year | 78             | 19.5%      |
| D 4<sup>th</sup> Year | 84             | 21%        |
| Total       | 400            | 100%       |

| Gender | No. of Students | Percentage |
|--------|----------------|------------|
| Male   | 163            | 40.8%      |
| Female | 237            | 59.2%      |
| Total  | 400            | 100%       |

### Table 2: Pittsburgh Sleep Quality Index components

| Components | Group-A | Group-B | Group-C | Group-D | Student, n (%) | P     |
|------------|---------|---------|---------|---------|----------------|-------|
| Subjective Sleep Quality |         |         |         |         |                |       |
| Very Good  | 18 (14.2) | 25 (22.5) | 28 (35.9) | 23 (27.4) | 94 (23.5) | 0.006 |
| Fairly Good | 64 (50.4) | 57 (51.4) | 39 (50) | 45 (53.6) | 45 (51.2) |       |
| Fairly Bad | 37 (29.1) | 27 (24.3) | 9 (11.5) | 14 (16.7) | 87 (21.8) |       |
| Very Bad   | 8 (6.3) | 2 (1.8) | 2 (2.6) | 2 (2.4) | 14 (3.5) |       |
| Sleep latency |         |         |         |         |                |       |
| ≤ 15 min  | 44 (34.6) | 33 (29.7) | 31 (39.7) | 17 (20.2) | 125 (31.3) | 0.140 |
| 16 to 30 min | 45 (35.4) | 40 (36) | 30 (38.5) | 36 (42.9) | 151 (37.8) |       |
| 31 to 60 min | 28 (22) | 29 (26.1) | 12 (15.4) | 18 (21.4) | 87 (21.8) |       |
| > 60 min | 10 (7.9) | 9 (8.1) | 5 (6.4) | 13 (15.5) | 37 (9.3) |       |
| Sleep duration |         |         |         |         |                |       |
| > 7 h  | 18 (14.2) | 12 (10.8) | 15 (19.2) | 8 (9.5) | 53 (13.3) | <.001 |
| 6 to 7 h | 20 (15.7) | 24 (21.6) | 28 (35.9) | 26 (31) | 98 (24.5) |       |
| 5 to 6 h | 35 (27.6) | 48 (43.2) | 22 (28.2) | 32 (38.1) | 137 (34.3) |       |
| < 5 h | 54 (42.5) | 27 (24.3) | 13 (16.7) | 18 (21.4) | 112 (28) |       |
| Habitual sleep quality |         |         |         |         |                |       |
| > 85 | 120 (94.5) | 105 (94.6) | 74 (94.9) | 74 (88.1) | 373 (93.3) | 0.675 |
| 75 to 84 | 4 (3.1) | 4 (3.6) | 3 (3.8) | 6 (7.1) | 17 (4.3) |       |
| 65 to 74 | 3 (2.4) | 1 (0.9) | 1 (1.3) | 3 (3.6) | 8 (2) |       |
| < 65 | 0 (0) | 1 (0.9) | 0 (0) | 1 (1.2) | 2 (5) |       |
| Sleep disturbances |         |         |         |         |                |       |
| 0 | 12 (9.4) | 8 (7.2) | 5 (6.4) | 10 (11.9) | 35 (8.8) | 0.541 |
| 1 to 9 | 92 (72.4) | 92 (82.9) | 61 (78.2) | 65 (77.4) | 310 (77.5) |       |
| 10 to 18 | 22 (17.3) | 11 (9.9) | 12 (15.4) | 9 (10.7) | 54 (13.5) |       |
| 19 to 27 | 1 (0.8) | 0 (0) | 0 (0) | 0 (0) | 1 (0.3) |       |
| Use of sleeping medication |         |         |         |         |                |       |
| Not during past month | 123 (96.9) | 103 (92.8) | 71 (91) | 70 (83.3) | 367 (91.8) | 0.075 |
| Less than once a week | 3 (2.4) | 5 (4.5) | 6 (7.7) | 9 (10.7) | 23 (5.8) |       |
| Once or twice a week | 1 (0.8) | 2 (1.8) | 0 (0) | 2 (2.4) | 5 (1.3) |       |
| Three or more times of week | 0 (0) | 1 (0.9) | 1 (1.3) | 3 (3.6) | 5 (1.3) |       |
| Daytime dysfunction |         |         |         |         |                |       |
| 1 to 2 | 30 (23.6) | 21 (18.9) | 26 (33.3) | 19 (22.6) | 96 (24) | 0.188 |
| 3 to 4 | 85 (66.9) | 83 (74.8) | 44 (56.4) | 52 (61.9) | 264 (66) |       |
| 5 to 6 | 11 (8.7) | 6 (5.4) | 8 (10.3) | 11 (13.1) | 36 (9) |       |
| Every day | 1 (0.8) | 1 (0.9) | 0 (0) | 2 (2.4) | 4 (1) |       |

**Discussion**

Sleep quality among medical students is an important subject because of its impact on the academic routine and personal life of the students. Therefore, studying sleep quality by means of a validated and quantifiable instrument such as the PSQI is extremely important for the monitoring of sleep health in students and helps in the planning of interventions aimed at increasing awareness of this issue.

Adherence in the present was nearly 67%, which is similar to literature reports on the rate of return of this type of questionnaire (73.3%), but higher than another study (45.54%). In context of participation by gender, we found a female predominance (59.2%) in effective participation in the study, which is consistent with study (66.62%) but not inconsistent for some other studies that used this instrument in which a male predominance of 73% and 54.7% was seen.
Of the students surveyed, 72.7% were found to be poor sleepers (Global PSQI score of more than 5). This is consistent with another study in Pakistan where 67.3% of medical students were reported to be bad sleepers,[11] while another study in Ghaziabad reported this to be 60%.[12] However, this surpasses the literature findings of 59.4%[13] and 20.7%.[14] The average global score of the PSQI was more than 5 (6.04), i.e. indicative of the presence of clinically significant sleep difficulties.

Nearly 25% of the students in our study classified their sleep quality as either very or fairly bad, a proportion that is lower than that reported in the literature. One study reported poor sleep quality in 40%[15] while another reported it to be 32.53%.[16] On analyzing across various groups, maximum (35.4%) first-year students (group A) reported poor sleep quality. The poor sleep quality observed in group A is corroborated with findings from other studies, with similar findings in incoming students, emphasizing the association between poor sleep quality and first-year undergraduates, in which poor sleep habits, such as nighttime surfing of internet, lack of social life, and improper eating habits, are found to be enhancing factors.[16]

Poor sleep quality is often associated with excessive daytime sleepiness. In the present study, daytime dysfunction was reported by 17.9% of the participants, who had difficulty staying awake during the day at least once a week. There is a wide variation in studies reporting day time sleepiness: 31%,[17] 42.1%,[17] and 63%.[18]

Students in group A experienced greater harmful effects on subjective sleep quality and daytime dysfunction compared to those in other groups, with daytime dysfunction showing a trend toward a significant difference when comparing groups A and C (P = 0.05). This can be explained by the fact that fresher students undergo a period of transition from attending high school to attending a medical undergraduate course, which is characterized by too many academic activities and irregular daily routines, which vary too much because of the class load, shifts, breaks, and free study periods. After the second year of the undergraduate course, there is a better adaptation to the routine of studies and visits.

The results for the sleep latency component showed that sleep latency was slightly altered in 32.1% of the participants.

The results for the sleep duration component revealed that the maximum (34.3%) participants were sleeping for 5-6 hours per night while 28% of participants were sleeping for less than 5 hours. Similarly, daily sleeping hours of 4-6 hours were reported by 69.38%[19] and 70.9%[20] participants in other studies. Also, 68.0% of the participants reported sleeping for 6-7 h per night in another study.[20]

Use of sleeping medication was identified in 8.4% of the participants in the present study, but this proportion is lower than that found in another study where 17% of those students used drugs for sleep induction[21] but higher than another study, which reported that 2.7% of students had used medication for sleep in the past month.[22]

To summarize, we investigated sleep quality in medical students in a medical college in Haryana, North India and found impairments in certain PSQI components, which highlights the need to continue research in different parts of the country and the world, to keep track of such students and encourage the translation of findings into health promotion practices. Our results are in concordance with literature findings of a high frequency of impaired aspects in sleep quality, which may have harmful effects on health.

### Table 3: Global PSQI scores as a function of the number of students

| Global PSQI Score | Group-A | Group-B | Group-C | Group-D | Student, n (%) | P  |
|-------------------|---------|---------|---------|---------|----------------|----|
| <5                | 30 (23.6) | 31 (27.9) | 28 (35.9) | 20 (23.8) | 109 (27.3) | 0.267 |
| 5-8               | 70 (55.1) | 60 (54.1) | 43 (55.1) | 48 (57.1) | 221 (55.3) | 0.003 |
| 9-16              | 27 (21.3) | 20 (18) | 7 (9) | 16 (19) | 70 (17.5) | 0.049 |

### Table 4: Values of P for between-group comparisons of the seven components and the global score of the PSQI

| Groups   | 1<sup>st</sup> | 2<sup>nd</sup> | 3<sup>rd</sup> | 4<sup>th</sup> | 5<sup>th</sup> | 6<sup>th</sup> | 7<sup>th</sup> |
|----------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| A vs. B  | 0.143         | 1.0           | 1.0           | 1.0           | 1.0           | 1.0           | 1.0           |
| A vs. C  | <0.001        | 1.0           | 0.001         | 1.0           | 1.0           | 1.0           | 1.0           |
| A vs. D  | 0.010         | 0.148         | 0.314         | 0.448         | 0.694         | 0.003         | 1.0           |
| B vs. C  | 0.163         | 0.496         | 0.049         | 1.0           | 1.0           | 1.0           | 0.123         |
| B vs. D  | 1.0           | 0.908         | 1.0           | 0.543         | 0.109         | 1.0           | 1.0           |
| C vs. D  | 1.0           | 0.020         | 0.367         | 0.406         | 1.0           | 0.231         | 0.304         | 0.031         |

### Figure 1: Global PSQI score of the students
The limitation of the present study was that other instruments, such as the Epworth Sleepiness Scale, were not used which could provide details on daytime sleep dysfunction. Furthermore, specific protocols for assessing sleep habits could have been used to better compare student behaviors across the various phases of the medical course, given that students in group A had greater problems regarding subjective sleep quality and daytime dysfunction than did those in groups B and C.

In conclusion, this study found that poor subjective sleep quality was high for students in all class years of the undergraduate medical course. The comparison across the various phases of the course showed that first years (group A) reported worse sleep quality than those in other class years (groups B, C, and D). It is imperative to adopt Health Promotion measures specifically in regard to good sleep hygiene among medical students.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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