

## A Study on the Evaluation of Sleep Quality Index among Indian Undergraduate Students Using Pittsburgh Sleep Quality Index Scale

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### ABSTRACT

**Aim:** To evaluate the sleep quality among the Indian undergraduate students using Pittsburgh sleep quality index scale.

**Materials and Methods:** This was a prospective study conducted among the Indian undergraduate students by using the Pittsburgh sleep quality index scale which was circulated by Google form to various undergraduate students. In this study, students from various undergraduate colleges with both the genders of all age groups were included and students who previously diagnosed with sleep disorders were excluded.

**Results:** A total of 326 Indian undergraduate students were participated in the study and among them 138 (42.3%) were found to be males and 188 (57.7%) were found to be females. Among the 326 study participants, about 138 (42.3%) students were observed to be with good sleep quality and the remaining 188 (57.7%) students were observed to be with poor sleep quality.

**Conclusion:** In this study, more than half of the study participants were observed to be with poor sleep quality index. Poor sleep quality index among the undergraduate students may lead to stress, depression, anxiety, poor academic performance and impaired social relationships. Academicians along with support of the health care professionals should take responsibility in creating the awareness regarding the good sleep quality index which might show a great impact in the student's academic career and overall wellbeing.

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### Introduction

In the modern society, poor sleep quality is the most common problem. Sleep disorders encompass a wide spectrum of diseases with high economic costs to society and significant individual health consequences [1-3]. Among the university students, sleep problems are most common with a prevalence that ranges from 19.2% to 57.5%. Insomnia, narcolepsy, delayed sleep phase syndrome, sleep walking, nightmares and restless leg movement were the most common sleep disorders.

Among the student population, the sleep disorders were often associated with decreased attention, poor academic performance, depression, fatigue, stress, anxiety, impaired social relationships and overall poor health [4-6]. Hence, in this study we made an attempt to evaluate the sleep quality among the Indian undergraduate students using Pittsburgh sleep quality index scale.

### Materials and Methods

This was a prospective study conducted among the Indian undergraduate students by using

the Pittsburgh sleep quality index scale which was circulated by Google form to various undergraduate students. In this study, students from various undergraduate colleges with both the genders of all age groups were included and students who previously diagnosed with sleep disorders were excluded.

A total number of 326 undergraduate students were participated in the study by filling Pittsburgh sleep quality index scale. A link was generated for the questionnaire which was prepared in the format of Google form and this link was circulated among the social media groups in order to get the responses from the study participants.

By using this questionnaire we can measure the quality & patterns of sleep in adults. It differentiate poor and good sleep quality by measuring the seven components subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications and daytime dysfunction over the last month. A total score of "5" or greater is indicative of poor sleep quality [7].



## Results & Discussion

Table 1 represents the gender wise categorization of the study participants. A total of 326 Indian undergraduate students were participated in the study and among them 138 (42.3%) were found to be males and 188 (57.7%) were found to be females.

**Table 1: Gender wise categorization of the study participants**

Gender	Frequency (%)
Male	138 (42.3)
Female	188 (57.7)
<b>Total</b>	<b>326 (100)</b>

Table 2 represents the age wise categorization of the study participants. Among the 326 study participants 134 (41.2%) were of 18-20 years age group, 166 (50.9%) were of 21-23 years age group and the remaining 26(7.9%) were of  $\geq 24$  years of age.

**Table 2: Age wise categorization of the study participants**

Age	Males (%)	Females (%)	Total (%)
18 - 20 years	59 (42.7)	75 (39.9)	134 (41.2)
21 - 23 years	64 (46.4)	102 (54.3)	166 (50.9)
$\geq 24$ years	15 (10.9)	11 (5.8)	26 (7.9)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 3 represents the course wise categorization of the study participants. Among the 326 study participants, 137 (42%) were studying Pharm.D, 77 (23.6%) were studying B.Pharmacy, 57 (17.5%) were studying B.Tech, 31(9.5%) were studying Degree and 24(7.4%) were studying other undergraduate courses.

**Table 3: Course wise categorization of the study participants**

Course	Males (%)	Females (%)	Total (%)
Pharm.D	49 (35.6)	88 (46.8)	137 (42)
B.Pharm	25 (18.1)	52 (27.7)	77 (23.6)
B.Tech	37 (26.8)	20 (10.6)	57 (17.5)
Degree	13 (9.4)	18 (9.6)	31 (9.5)
Others	14 (10.1)	10 (5.3)	24 (7.4)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 4 provides the usual time of the study participants when they used to go to bed. About 20 (6.1%) students usually go to the bed between 8:30 to 9:30 pm, 133 (40.8%) students usually go to the bed between 9:30 to 10:30 pm, 40 (12.3%) students usually go to the bed between 10:30 to 11:30 pm and the remaining 133 (40.8%) students used go to the bed

after 11:30 pm. In this study, very few students used to go to bed before 9:30 pm.

**Table 4: Information regarding the usual time of the study participants when they used to go to bed**

Q1.When you usually gone to bed?			
Options	Male (%)	Female (%)	Total (%)
8:30 - 9:30 pm	5 (3.6)	15 (7.9)	20 (6.1)
9:30-10:30 pm	59 (42.8)	74 (39.4)	133 (40.8)
10:30-11:30 pm	9 (6.5)	31 (16.5)	40 (12.3)
After 11: 30 pm	65 (47.1)	68 (36.2)	133 (40.8)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 5 provides the time (mins) taken to fall asleep each night by the study participants. Among the 326 study participants, 113 (34.7%) study participants took a minimum of 10 mins, 109 (33.4%) study participants took a minimum of 20 mins, 68 (20.9%) study participants took a minimum of 30 mins and the remaining 36 (11%) study participants took more than 30 mins to fall asleep each night. In this study, majority of the students (34.7%) used to take 10 mins to fall asleep followed by 20 mins (33.4%) to fall asleep each night.

**Table 5: Information regarding the time taken to fall asleep each night by the study participants**

Q2.How long (in minutes) has it taken you to fall asleep each night?			
Options	Male (%)	Female (%)	Total (%)
10 mins	43 (31.2)	70 (37.2)	113 (34.7)
20 mins	50 (36.2)	59 (31.4)	109 (33.4)
30 mins	30 (21.7)	38 (20.2)	68 (20.9)
> 30 mins	15 (10.9)	21 (11.2)	36 (11)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 6 provides the information regarding the time at which the study participants used to get up in the morning. About 4 (1.2%) students used to get up before 4 am, 27 (8.3%) students used to get up between 4-5 am, 96 (29.5%) students used to get up between 5-6 am and 199 (61%) students used to get up after 6 am. In this study, majority of the students used to get up after 6 am only and very few students used to get up before 4 am (1.2%).

**Table 6: Information regarding the time at which the study participants used to get up in the morning**

Q3. What time usually you gotten up in the morning?			
Options	Male (%)	Female (%)	Total (%)
Before 4:00 am	2 (1.5)	2 (1.1)	4 (1.2)
4:00-5:00 am	11 (7.9)	16 (8.5)	27 (8.3)
5:00-6:00 am	38 (27.5)	58 (30.8)	96 (29.5)
After 6:00 am	87 (63.1)	112 (59.6)	199 (61)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 7 provides the information regarding the frequency of hours of actual sleep of the study participants. About 5(1.5%) students usually sleep for less than 4 hours, 50 (15.4%) students usually sleep for 4-5 hrs, 228 (69.9%) students usually sleep for 6-8 hrs and 43 (13.2%) students usually sleep for more than 8 hours. In this study, majority of the students used to sleep for 6-8 hrs (69.9%) and very few students used to sleep for less than 4 hrs (15%).

**Table 7: Information regarding the frequency of hours of actual sleep of the study participants**

<b>Q4A.How many hours of actual sleep did you get at night?</b>			
<b>Options</b>	<b>Male (%)</b>	<b>Female (%)</b>	<b>Total (%)</b>
< 4 Hrs	1 (0.7)	4 (2.1)	5 (1.5)
4 - 5 Hrs	25 (18.1)	25 (13.3)	50 (15.4)
6 - 8 Hrs	97 (70.3)	131 (69.7)	228 (69.9)
> 8 Hrs	15 (10.9)	28 (14.9)	43 (13.2)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 8 provides the information regarding the frequency of hours that the study participants used to spend in bed. About 57(17.5%) students used to stay for less than 6 hrs in the bed, 211 (64.7%) students used to stay for 6-8 hrs in the bed, 46 (14.1%) students used to stay for 8-10 hrs in the bed and the remaining 12 (3.7%) students used to stay for more than 10 hrs in the bed.

**Table 8: Information regarding the frequency of hours that the study participants used to spend in bed**

<b>Q4B.How many hours were you in bed?</b>			
<b>Options</b>	<b>Male (%)</b>	<b>Female (%)</b>	<b>Total (%)</b>
< 6 Hrs	27 (19.6)	30 (15.9)	57 (17.5)
6 - 8 Hrs	89 (64.5)	122 (64.9)	211 (64.7)
8 - 10 Hrs	18 (13.0)	28 (14.9)	46 (14.1)
> 10 Hrs	4 (2.9)	8 (4.3)	12 (3.7)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 9 provides the information regarding the study participants who could not get to sleep within 30 minutes. About 73 (22.4%) students could not get sleep within 30 mins for less than once a week, 62 (19%) students could not get sleep within 30 mins for twice a week and 55 (16.9%) students could not get sleep within 30 mins for three or more times a week. About 136 (41.7%) students were not observed with this issue.

**Table 9: Information regarding the study participants who could not get to sleep within 30 minutes**

<b>Q5A.Cannot get to sleep within 30 minutes</b>			
<b>Options</b>	<b>Male (%)</b>	<b>Female (%)</b>	<b>Total (%)</b>
Not During The Past Month (0)	62 (44.9)	74 (39.4)	136 (41.7)
Less Than Once a Week (1)	29 (21.0)	44 (23.4)	73 (22.4)
Once or Twice a Week (2)	23 (16.7)	39 (20.7)	62 (19.0)
Three or more times a week (3)	24 (17.4)	31 (16.5)	55 (16.9)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 10 provides the information regarding the study participants who used to wake up in the middle of the night or early in the morning. About 85 (26.1%) students used to face this issue for less than once a week, 70 (21.5%) students used to face this issue for once or twice a week and 61 (18.7%) students used to face this issue for three or more times a week. About 110 (33.7%) students were not observed with this issue.

**Table 10: Information regarding the study participants who used to wake up in the middle of the night or early in the morning**

<b>Q5B.Wake up in the middle of the night or early morning</b>			
<b>Options</b>	<b>Male (%)</b>	<b>Female (%)</b>	<b>Total (%)</b>
Not During The Past Month (0)	50 (36.2)	60 (31.9)	110 (33.7)
Less Than Once a Week (1)	33 (23.9)	52 (27.7)	85 (26.1)
Once or Twice a Week (2)	31 (22.5)	39 (20.7)	70 (21.5)
Three or more times a week (3)	24 (17.4)	37 (19.7)	61 (18.7)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 11 provides the information regarding the students who used to get up to use the bathroom. About 73 (22.4%) students used to get up to use the bathroom for less than once a week, 58 (17.8%) students used to get up to use the bathroom for once or twice a week and 60 (18.4%) students used to get up to use the bathroom for three or more times a week. About 135 (41.4%) students did not used to get up to use the bathroom.



**Table 11: Information regarding the students who used to get up to use the bathroom**

Q5C.Have to get up to use the bathroom			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	55 (39.9)	80 (42.6)	135 (41.4)
Less Than Once a Week (1)	37 (26.8)	36 (19.1)	73 (22.4)
Once or Twice a Week (2)	21 (15.2)	37 (19.7)	58 (17.8)
Three or more times a week (3)	25 (18.1)	35 (18.6)	60 (18.4)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 12 provides the information regarding students who cannot breathe comfortably. About 43 (13.2%) students could not able to breathe comfortably for less than once a week, 21 (6.5%) students could not able to breathe comfortably for once or twice a week and 11 (3.4%) students could not able to breathe comfortably for three or more times a week. About 251 (76.9%) students were not observed this issue.

**Table 12: Information regarding students who cannot breathe comfortably**

Q5D. Cannot breathe comfortably			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	104 (75.4)	147 (78.2)	251 (76.9)
Less Than Once a Week (1)	19 (13.8)	24 (12.8)	43 (13.2)
Once or Twice a Week (2)	8 (5.7)	13 (6.9)	21 (6.5)
Three or more times a week (3)	7 (5.1)	4 (2.1)	11 (3.4)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 13 provides the information regarding the students who used to cough or snore loudly. About 43 (13.2%) students who used to cough or snore loudly for less than once a week, 21 (6.5%) students who used to cough or snore loudly for once or twice a week and 11 (3.4%) students who used to cough or snore loudly for three or more times a week. About 251 (76.9%) students were not observed with this issue.

**Table 13: Information regarding the students who used to cough or snore loudly**

Q5E.Cough or snore loudly			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	104 (75.4)	147 (78.2)	251 (76.9)
Less Than Once a Week (1)	19 (13.8)	24 (12.8)	43 (13.2)
Once or Twice a Week (2)	8 (5.7)	13 (6.9)	21 (6.5)
Three or more times a week (3)	7 (5.1)	4 (2.1)	11 (3.4)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 14 provides the information regarding the students who used to feel too cold. About 82 (25.2%) students used to feel too cold for less than once a week, 46 (14.1%) students used to feel too cold once or twice a week and 32 (9.8%) students used to feel too cold for three or more times a week. About 166 (50.9%) students were not observed with this issue.

**Table 14: Information regarding the students who used to feel too cold**

Q5F. Feel too cold			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	73 (52.9)	93 (49.5)	166 (50.9)
Less Than Once a Week (1)	36 (26.0)	46 (24.5)	82 (25.2)
Once or Twice a Week (2)	16 (11.6)	30 (15.9)	46 (14.1)
Three or more times a week (3)	13 (9.5)	19 (10.1)	32 (9.8)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 15 provides the information regarding the study participants who used to feel too hot. About 60 (18.4%) students used to feel too hot for less than once a week, 26 (7.9%) students used to feel too hot for once or twice a week and 15 (4.6%) students used to feel too hot for three or more times a week. About 225 (69.1%) students were not observed with this problem.





**Table 15: Information regarding the study participants who used to feel too hot**

Q5G.Feel too hot			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	96 (69.6)	129 (68.6)	225 (69.1)
Less Than Once a Week (1)	28 (20.4)	32 (17.0)	60 (18.4)
Once or Twice a Week (2)	7 (5.0)	19 (10.1)	26 (7.9)
Three or more times a week (3)	7 (5.0)	8 (4.3)	15 (4.6)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 16 provides the information regarding the study participants who used to have bad dreams. About 96 (29.4%) students who used to have bad dreams for less than once a week, 55(16.9%) students who used to have bad dreams for once or twice a week and 43 (13.2%) students who used to have bad dreams for three or more times a week. About 132 (40.5%) students were not observed with this problem.

**Table 16: Information regarding the study participants who used to have bad dreams**

Q5H. Have bad dreams			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	62 (44.9)	70 (37.3)	132 (40.5)
Less Than Once a Week (1)	36 (26.1)	60 (31.9)	96 (29.4)
Once or Twice a Week (2)	22 (15.9)	33 (17.5)	55 (16.9)
Three or more times a week (3)	18 (13.1)	25 (13.3)	43 (13.2)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 17 provides the information regarding the study participants who used to have some kind of pain. About 49 (15%) students used to have pain for less than once a week, 25 (7.7%) students used to have pain for once or twice a week and 20 (6.1%) students used to have pain for three or more times a week. About 232 (71.2%) students were not observed with this problem.

**Table 17: Information regarding the study participants who used to have some kind of pain**

Q5I. Have pain			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	100 (72.5)	132 (70.2)	232 (71.2)
Less Than Once a Week (1)	20 (14.5)	29 (15.4)	49 (15)
Once or Twice a Week (2)	9 (6.5)	16 (8.5)	25 (7.7)
Three or more times a week (3)	9 (6.5)	11 (5.9)	20 (6.1)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 18 provides the information regarding the study participants who used to have other kind of reasons in facing trouble in sleeping. About 59 (18%) students used to have other kind of reasons for less than once a week, 30 (9.3%) students used to have other kind of reasons for once or twice a week and 15 (4.7%) students used to have three or more times a week. About 222 (68%) students were not observed with any kind of other reasons in facing trouble in sleeping.

**Table 18: Information regarding the study participants who used to have other kind of reasons in facing trouble in sleeping**

Q5J.Other reason (s), please describe, including how often you have had trouble sleeping because of this reason (s)			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	98 (71)	124 (65.9)	222 (68)
Less Than Once a Week (1)	22 (15.9)	37 (19.7)	59 (18)
Once or Twice a Week (2)	12 (8.7)	18 (9.6)	30 (9.3)
Three or more times a week (3)	6 (4.4)	9 (4.8)	15 (4.7)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 19 provides the information regarding the students who had taken the medicine to get sleep. About 36 (11%) students used to take medicine to get sleep for less than once a week, 12 (3.7%) students used to take medicine to get sleep for once or twice a week and 10 (3.1%) students used to take medicine to get sleep for three or more times a week. About 268 (82.2%) students were not observed with this problem.



**Table 19: Information regarding the students who had taken the medicine to get sleep**

Q6.During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	112 (81.2)	156 (82.9)	268 (82.2)
Less Than Once a Week (1)	14 (10.2)	22 (11.7)	36 (11.0)
Once or Twice a Week (2)	5 (3.6)	7 (3.8)	12 (3.7)
Three or more times a week (3)	7 (5.0)	3 (1.6)	10 (3.1)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 20 provide the information regarding the students who used to had trouble staying awake while driving, eating meals or engaging in social activity. About 79 (24.3%) students used to have this kind of trouble for less than once a week, 30 (9.2%) students used to have this kind of trouble for once or twice and 15 (4.6%) students used to have this kind of trouble for three or more times a week. About 202 (61.9%) students were not observed with this kind of trouble.

**Table 20: Information regarding the students who used to had trouble staying awake while driving, eating meals or engaging in social activity**

Q7.During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	90 (65.2)	112 (59.6)	202 (61.9)
Less Than Once a Week (1)	26 (18.9)	53 (28.1)	79 (24.3)
Once or Twice a Week (2)	14 (10.1)	16 (8.5)	30 (9.2)
Three or more times a week (3)	8 (5.8)	7 (3.8)	15 (4.6)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 21 provides the information regarding the students having problem to keep up them enthusiastic to get the things done. About 73 (22.4%) students used to have the problem for less than once a week, 30 (9.2%) students used to have the problem for once or twice a week and 16 (4.9%) students used to have the problem for three or more times a week. About 207 (63.5%) students do not have the problem during the past month.

**Table 21: Information regarding the students having problem to keep up the enthusiastic to get the things done**

Q8.During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?			
Options	Male (%)	Female (%)	Total (%)
Not During The Past Month (0)	91 (65.9)	116 (61.7)	207 (63.5)
Less Than Once a Week (1)	28 (20.3)	45 (23.9)	73 (22.4)
Once or Twice a Week (2)	13 (9.4)	17 (9.1)	30 (9.2)
Three or more times a week (3)	6 (4.4)	10 (5.3)	16 (4.9)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

Table 22 provides the information regarding the self rated over all sleep quality of the students. About 134 (41.1%) students had a very good quality of sleep, 144 (44.2%) students had a fairly good quality of sleep, 36 (11%) students had a fairly bad quality of sleep and 12 (3.7%) students had a very bad quality of sleep. In this study, most of the students had a fairly good quality of sleep (44.2%).

**Table 22: Information regarding the self rated over all sleep quality of the students**

Q9.During the past month, how would you rate your sleep quality overall?			
Options	Male (%)	Female (%)	Total (%)
Very good (0)	48 (34.8)	86 (45.7)	134 (41.1)
Fairly good (1)	70 (50.7)	74 (39.4)	144 (44.2)
Fairly bad (2)	16 (11.6)	20 (10.6)	36 (11.0)
Very bad (3)	4 (2.9)	8 (4.3)	12 (3.7)
<b>Total</b>	<b>138 (100)</b>	<b>188(100)</b>	<b>326 (100)</b>

Table 23 provides the information regarding the sleep quality index. Among the 326 study participants, about 138 (42.3%) students were observed to be with good sleep quality and the remaining 188 (57.7%) students were observed to be with poor sleep quality.

**Table 23: Information regarding the sleep quality index**

Sleep Quality Index	Male (%)	Female (%)	Total (%)
Good Sleep Quality	55 (39.9)	83 (44.1)	138 (42.3)
Poor Sleep Quality	83 (60.1)	105 (55.9)	188 (57.7)
<b>Total</b>	<b>138 (100)</b>	<b>188 (100)</b>	<b>326 (100)</b>

## Conclusion

In this study, more than half of the study participants were observed to be with poor sleep quality index. Poor sleep quality index among the undergraduate students may lead to stress, depression, anxiety, poor academic performance and impaired social relationships. Academicians along with support of the health care professionals should take responsibility in creating the awareness regarding the good sleep quality index which might show a great impact in the student's academic career and overall wellbeing.

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