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Original Research Article

Sleep quality, mental health and body mass index among undergraduate medical students: a cross-sectional study

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ABSTRACT

Background: Association of sleep disorders is found cardiovascular mortality, stroke, diabetes, impaired glucose tolerance, immune dysfunction, endocrine impairments, and psychiatric morbidities including depression. Sleep quality affects college students physical and psychological health. Thus, poor sleep quality is a serious problem in college students. This study was done to assess the quality of sleep among undergraduate medical college students, to explore relationship between quality of sleep and body mass index, to study relationship between quality of sleep and anxiety, to study relationship between quality of sleep and depression.
Methods: Total 300 medical students were selected by systematic random sampling method i.e. 25 students from each year studying in 3 government medical college were selected. A descriptive questionnaire for all socio-demographic parameters along with validated instrument i.e. for sleep quality, Pittsburgh sleep quality index (PSQI), for anxiety Hamilton anxiety rating scale and for depression, Becks depression inventory were used for the data collection instruments.
Results: Amongst the 300 subjects 189 (63.00%) were found to be poor sleepers. The sleep quality was poor among the subjects who are in final academic year though the difference was not statistically significant (χ^2=2.78, df=3, p=0.4267). It was found that sleep quality was decreased among overweight and obese persons, but the difference was not statistically significant. (χ^2=4.657, df=2, p=0.0974). Prevalence of anxiety was found to be more in poor sleepers. Depression was also more common among the poor sleepers and the difference was statistically significant.
Conclusions: Poor sleep quality was associated with depression and anxiety in students.

Keywords: Sleep quality, BMI, Poor sleep quality, Anxiety, Depression, Undergraduate students

INTRODUCTION

"Sleep quality" is an important clinical construct for two major reasons. First, complaints about sleep quality are common; adult population complain of frequent sleep quality disturbance, such as difficulty falling asleep or difficulty maintaining sleep. Second, poor sleep quality can be an important symptom of many sleep and medical disorders.[1] One frequently measured component of sleep quality, sleep duration, may even have a direct association with mortality. Epidemiological evidences showing association of sleep disorders with cardiovascular mortality, stroke, diabetes, impaired glucose tolerance, immune dysfunction, endocrine impairments, and psychiatric morbidities are expanding.[2] Sleep quality affects college students' physical and psychological health. Thus, poor sleep quality is a serious problem in college students. Although it is well established that an imbalance between caloric intake and physical activity are key factors responsible for the current obesity problem, there is emerging evidence suggesting that other factors may be important

contributors to the obesity problem. One of the factors in question is sleep.[3] There are many tools for assessing sleep quality. The Pittsburgh sleep quality index (PSQI) is one of such tools used to assess sleep quality and disturbances over a month time interval.[1] There is dearth of research on sleep health in Indian population. A few studies are showing high burden of sleep problems in undergraduate students.[4-21] It has been observed that there is overlap between sleep deprivation and depression. If the sleep problems are addressed, the sleep symptoms may improve. Among medical college students, sleep disturbance has been associated with a wide variety of functional and psychiatric domains, including suicidal ideation, irritability, poor physical health, academic difficulties, substance use, and poor mental health.[22] Thus there is need to research the sleep quality of college students as very few studies are available.

Many studies had done work to study the anxiety and depression in undergraduate medical students. Very few studies, that too international had studied the mental health components sleep quality, anxiety, depression and physical health component particularly body mass index and their association if any. Evidence based studies have shown a positive relation between depression and increased BMI as well as between sleep deprivation and obesity. The present study was intended to help to add a new outlook to the above said observations.

The present study was done to assess the quality of sleep among undergraduate medical college students by using PSQI as well as to explore relationship between quality of sleep and body mass index, to study relationship between quality of sleep and anxiety and to study relationship between quality of sleep and depression using Becks depression inventory.

METHODS

This study was a cross-sectional study carried out in 3 Medical Colleges of Central India namely Government Medical College, Nagpur, Indira Gandhi Government Medical College Nagpur and Government Medical College, Akola amongst undergraduate medical students for the period of 2 months from June 2019 to August 2019. Total 3 Government Medical Colleges were selected for the study. 25 students from each year i.e., from first year, second year, third year minor and major were selected from systematic random sampling technique. Thus total 100 students from one medical college and 300 students from 3 medical colleges were selected. A pre-designed, pre-tested structural questionnaire was used for data collection. The students were interviewed by interviewer one at a time. Hostels were chosen as a site of interview as students are more relaxed there. All the questions were explained to the students and total confidentiality was assured.

Quality of sleep was assessed by using PSQI.[1,3] The PSQI is a self-rated questionnaire which assesses sleep quality and disturbances over a l-month time interval. Nineteen individual items generate seven "component" scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. The sum of scores for these seven components yields one global score. Depression was assessed by Beck's depression inventory (BDI) created by Aaron T. Beck.[23] It is a 21-question multiple-choice self-report inventory, one of the most widely used psychometric tests for measuring the severity of depression. The Beck's depression inventory-II also contains 21 questions, each answer being scored on a scale value of 0 to 3. Higher total scores indicate more severe depressive symptoms. The scores are 0-13 as minimal depression, 14-19 as mild depression, 20–28 as moderate depression, 29-63 as severe depression.

Anxiety was assessed by revised Hamilton anxiety (HAM-A) rating scale.[24] The HAM-A was one of the first rating scales developed to measure the severity of anxiety symptoms and is still widely used today in both clinical and research settings. The scale consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (physical complaints related to anxiety). Each item is scored on a scale of 0 (not present) to 4 (severe), with a total score range of 0–56, where <17 indicates mild severity, 18-24 mild to moderate severity and 25-30 moderate too severe. BMI was calculated by taking anthropometric measurements such as height, weight. The data was analyzed by using statistical software epi info 7.1. The statistical data was analyzed by percentages. Descriptive statistics was analyzed by Chi-square test.

RESULTS

Out of the 303 total subjects, 112 (36.96%) were good sleepers while 191(63.04%) were poor sleepers (Table 1). The sleep quality shows trend across the academic years. But statistically the difference was not significant (χ^2=2.78, df=3, p=0.4267). The mean scores of the different instruments used for assessment among good and poor sleepers (Table 2). All the scores were more among the poor sleepers and the difference was statistically significant. When individual components also considered it was found that sleep quality which is an important marker, the score for it was high in poor sleepers. The total mean score for PSQI is 5.81±2.63. While total mean score of BDI is 9.52±8.08 and total score for HAI is 13.09±8.36. All the mean scores amongst components were more in the poor sleepers (Table 3). Association between sleep quality and nutritional status of study subjects (Table 4). It was found that sleep quality was poor amongst those who are underweight (BMI<18.5 kg/m2) and also amongst those who are overweight and obese, but the difference was not statistically significant (χ^2=4.657, df=2, p=0.0974). When anxiety levels amongst students were studied according to academic year, it was found that majority of first year

students had a mild type of anxiety at the start which gradually decreased. Thus 65 (28.50%) and 59 (25.88%) in second year had mild anxiety which decreased to 49 (21.49%) in the third major. While level of anxiety increases with increase in academic year. Thus 11 (37.93%) out of 29 third major students had moderate to severe anxiety.

Table 1: Sleep quality amongst students according to academic year.

Academic year	Good sleepers N (%)	Poor sleepers N (%)	Total N (%)
1st	33 (29.72)	42 (22.22)	75 (25)
2nd	27(24.33)	48 (25.40)	75 (25)
3rd	28(25.23)	47 (24.87)	75 (25)
4th	23 (20.72)	52 (27.51)	75 (25)
Total	111 (100)	189 (100)	300 (100)

Table 2: Mean scores of different instruments amongst good and poor sleepers.

Scale	Good sleepers	Poor sleepers	t test	P value
PSQI	3.40±0.78	7.27±2.25	8.32	<0.001
BDI	6.42±6.35	11.35±8.45	1.77	<0.001
HAM-A	8.55±5.96	15.76±8.55	2.05	<0.001

Table 3: Mean scores of components of PSQI.

Components of PSQI	Total	Good sleeper	Poor sleeper
Sleep quality	1.05±0.69	0.65±0.50	1.29±0.68
Sleep latency	1.06±0.77	0.65±0.62	1.31±0.74
Sleep duration	0.64±0.79	0.21±0.41	0.90±0.85
Habitual sleep efficiency	0.55±0.87	0.16±0.41	0.78±0.99
Sleep disturbances	1.08±0.28	1.01±0.09	1.12±0.34
Use of sleep medication	0.20±0.64	0.04±0.19	0.31±0.77
Daytime dysfunction	1.23±0.90	0.68±0.54	1.55±0.93
PSQI mean	5.81±2.63	3.40±0.79	7.25±2.30

Association of level of depression with quality of sleep is shown in (Table 5). It was found that mild mood disturbance was most common among both good and poor sleepers while severe and extreme depression was found among poor sleepers. No student in the good sleepers was extremely depressed. It was found that depression was more common among the poor sleepers and the difference was statistically significant. (χ^2=16.52, df=1, p=0.000).This table also shows association between anxiety and sleep quality. Although mild anxiety was common amongst both good and poor sleepers; moderate to severe anxiety was more common amongst poor sleepers. The difference was highly significant. (χ^2=39.26, df=1, p=0.000).

Table 4: Relationship between nutritional status and sleep quality.

Nutritional Status	Good sleepers N (%)	Poor sleepers N (%)	Total N (%)
Underweight (<18.5%)	23(20.72)	45 (23.80)	68 (22.67)
Normal (18.5-24.9)	75(67.58)	106 (56.09)	181 (60.33)
Overweight (25-29.9)	11 (9.90)	33 (17.46)	44 (14.67)
Obese (>30)	2 (1.80)	5 (2.65)	7 (2.33)
Total	111 (100)	189 (100)	300 (100)

Table 5: Distribution of study subjects according to level of depression and anxiety.

Level of depression and anxiety	Good sleepers N (%)	Poor sleepers N (%)	Total N (%)
Level of depression			
Normal	83 (74.78)	96 (50.79)	179 (59.67)
Mild mood disturbance	20 (18.02)	50 (26.46)	70 (23.33)
Bordeline clinical disturbance	4 (3.60)	14 (7.40)	18 (6.00)
Moderate depression	4 (3.60)	23 (12.17)	27 (9.00)
Severe depression	0	3 (1.59)	3 (1)
Extreme depression	0	3 (1.59)	3 (1)
Anxiety			
Mild	106 (95.50)	119 (62.96)	225 (75.00)
Mild to moderate	3 (2.70)	43 (22.75)	46 (15.33)
Moderate to severe	2 (1.80)	27 (14.29)	29 (9.67)
Total	111 (100)	189 (100)	300(100)

DISCUSSION

Adequate and efficient sleep in terms of duration, quality plays a crucial role in learning and memory. It is important for students to sleep well in order to perform well in academics. Poor sleep quality consequences are many and have a profound impact in the student's psychobiological health. University students live through a period of psychological challenge and adaptation, since the transition from high school to professional life.[8] We have conducted a cross sectional study on medical college students to assess the sleep quality and its association with anxiety and depression. Our study found

poor sleep quality in 63.00% of the students. Our study also found the mean score for poor sleepers was 7.27±2.25. Surani et al found 39.5% were "poor sleepers". Vargas et al found and 51% were poor-quality sleepers (PSQI >5).[3] A study by Maheshwari et al found 64.24% students with global PSQI score ≥5 indicating poor sleep quality.[10] The mean GPA of poor sleepers was 2.92±1.09 which was significantly lower than that of good sleepers (p<0.0001). Bawo et al found (32.5% of medical students reported poor quality sleep.[6] Lemma et al found the prevalence of poor sleep quality (total PSQI score >5) was 55.8%.[17]

Our research revealed that the sleep quality of the medical students worsens as the student advances to the next academic year. This is consistent with the results of a previous study by Lund et al which states that as the academic stress increases the sleep quality worsens.[5] Emerging evidence suggests an association between body weight and problems in sleeping patterns, particularly its duration and quality. Furthermore, research studies exploring the association between sleep and BMI among adolescents, suggest the relationship is complex. In our study revealed that the overweight and obese person had a poor quality of sleep, but the difference was not statistically significant. A similar result was found by Vargas et al that controlling for age and sex, only sleep disturbances were associated with overweight.[3] Chaput et al found a significant negative association adjusted for age between sleep duration and body weight (-0.33, p<0.01), BMI (-0.12, p<0.01).[25]

Anxiety (which is often brought on by a stressful event) is probably the most common cause of difficulty in falling asleep. This is called "stress related insomnia". Clinicians have long noted associations between sleep disruption and anxiety symptoms. Our study shows that as the level of stress increases from mild to moderate to severe, the sleep quality worsens. We also found that as the students advances in the next year mild & severe anxiety cases increase, although there is no direct relation in moderate anxiety cases. Martua found that mild anxiety levels are more numerous in first-semester students (75%) compared to third-semester students (50%), while moderate-to-severe anxiety levels are more numerous in third-semester students (40%) compared to first-semester students (12.5%) who have received mental health tests during the entrance test.[15] Thus, poor sleep quality which increased as the academic years increased and is associated with anxiety as well as depression in students. Poor sleep quality was observed in students who were underweight and those overweight.

Limitations

Limitations of current study were as follows this study uses various scales for the assessment of sleep, anxiety as well as depression. Though this includes majority of components, but personal variations can be found. Current study included students from colleges belonging to different regions which come as one of the strengths of this study. But this study includes students from only government medical colleges which may not represent students from private colleges and thus may not be generalized.

CONCLUSION

Total 63.04% students were poor sleepers. The sleep quality of the medical students worsens as the student advances to the next academic year. Anxiety and depression was more commonly found in poor sleepers. Poor sleep quality was observed in students who were underweight and those overweight.

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