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Articles

Sleep Disorders Among Undergraduate Health Students in Bristol, United Kingdom

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Abstract

Daytime Sleepiness and poor sleep quality are common among medical students. The objective of study is to determine the prevalence of daytime sleepiness and sleep quality and associated risk factors among medical students in medical college, in Bristol, United Kingdom. It was a cross-sectional study and 153 medical students were selected through stratified random sampling techniques. Pittsburgh Sleep Quality Index was used to assess the sleep pattern and Epworth Sleepiness Scale was used to measure daytime sleepiness. Association of sleep quality and daytime sleepiness and its risk factors were determined through regression analysis. Students suffering from severe disorder of sleep quality was 21.6% and severe daytime sleepiness 3.9%. In multivariate analysis after adjustment of covariates, in daytime sleepiness, male gender (OR.1.33, CI 1.06-3.04) [p-value 0.040] and those students who smoke cigarettes [OR 4.65, (CI 1.48-5.14) [p-value 0.018] were more likely associated with severe daytime sleepiness disorder. In Sleep quality disorder, those students who had low academic score [OR 3.13(CI 1.28-4.87) [p-value 0.035] and those students who smoke cigarettes [OR 3.04 (CI 2.34-4.29) [p-value 0.010] were more than likely associated with severe sleep quality disorder. Majority of students suffered from poor sleep quality and day time sleepiness. Male gender, smoking, academic score and academic years was the major predictor for poor sleep quality and day time sleepiness. There is need for awareness and counselling among student for reduced the sleep disorder burden.

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1. Introduction

Sleep is an important physiological process for good physical and mental health of human being (Tag et al., 2020). It is affected on the quality of life because it is the physiological need for every human. Normal average sleeps in human approximately 8 hours and it varies between living

things (Bassetti et al., 2020; Li et al., 2019). Sleep is important for learning ability because it has refreshed the memory of human being (Aidman et al., 2019; Ezquiaga et al., 2015). Professional students have experience sleep problems due to burden of the study (Hahn et al., 2019).

Undergraduate students have suffered sleep disorders compared to general population because of stress of the study (Williams et el., 2020). Another study found that average fifty percent of students were suffered day time sleepiness which lead to poor academic performance and increased risk for psychological problems (Mirghani et al., 2015).

Health Science students were more suffered from sleep disorder due to more burden of studies compare to other sciences students (Mohammed et al., 2015). Long working hours are one of the most important factors which caused sleep disorders among health sciences students (Higson et al., 2020). Sleep disorder affects the mental and physical health of health science students which lead to reduced their working abilities (Mume et al., 2011).

Sleep disorders among health science students not only lead to physical and psychological morbidities, but also affects learning, memory and cognition of students (Sahraian et al., 2010). A study was conducted in a Nigerian university which shows that 32.5% health science students were sleep-deprived (James et al., 2011). Similarly, a study was conducted in Pakistan showed that poor sleep habit was common among health science students and was associated with affected lifestyle (Chen et al., 2019). A previous study suggests that increased propensity toward risky behaviour among insomnia participants (Somma et al., 2020).

Globally, Health science students are more susceptible to sleep disturbance and problems (Thorpy, 2017; Williams et al., 2020). In a previous study, results found that most of the students have poor quality of sleep (Tag et al., 2020). Another study reported that majority of health science students had experienced day time sleepiness in a class and male students were more effected (Jalali et al., 2020). A study conducted in India, result found that, 30.6% reported daytime sleepiness (Azad et al., 2015). A previous study result found that only 47% of health science students had refreshing sleep at night compared to law students. Insomnia problem were more common in health science students (Lumley et al., 2015). Personality traits have Five Factor Model (FFM) and they are correlation with sleep quality (e.g., Stephan et al., 2018). Middle-aged and older adults (N > 22,000), that low neuroticism (i.e., the tendency to experience a wide range of negative emotions, Stephan et al., 2018).

Many studies in the United States, Australia, India and other countries have found that students with a poor sleep quality have poor marks on their examinations and were more depressed than their colleagues (Menon et al., 2015; Short et al., 2013; Vanderlind et al., 2014). When health

science students move from first year to final year, there is increased burden of study due to practical training has been started. Students are involved in practical training from third year and different working time schedule which lead to more sleep disorders (James et al., 2011). Sleep disorders outcome are decreased morale, reduced motivation, depression, anxiety which affect their academic performance (Kim et al., 2007). Given the high prevalence and important consequences of sleep loss and sleep disorders among health science students, there is a clear need for readily available and sensitive measures of sleepiness for use with health sciences students. Specifically, the ability to easily assess the relative degree of sleepiness in this group may improve the identification of at-risk individuals and help track treatment progress over time. There are very few literatures available in United Kingdom to determine the sleep quality and day time sleepiness among health science students. There are more than 200 health science colleges working in the country and more than 10000 students studying in these colleges. The results of this study will help the in revision in of curriculum of health science programme and increase the awareness among the health science students regarding sleep problems. The objective of this study was to determine the prevalence of daytime sleepiness and sleep quality among health science students at health science college at Bristol, United Kingdom.

2. Materials and Methods

This was a cross sectional study which was conducted at health science College, Bristol, UK. It's a public sector college and each year 100 students were enrolled. Students were age group from 18-24 years, male and females were included in the study. Sample size was calculated by WHO sample size calculator by keeping the proportion of poor sleep quality 11% from previous study (Lumley et al., 2015), using 95% confidence interval and 5% margin of error. Total sample size was 153 students were included in the study. Stratified random sampling technique was used. Total four year of education, 38 students were selected from each year of education.

Participants were included all undergraduate students of college; those were willing to giving consent. Participants were excluded those who have any chronic mental disorder. Age, Gender, academic year, Sleep Hours, Narcolepsy by *Epworth Sleepiness Scale* (ESS), Sleep Habits by *Pittsburgh Sleep Quality Index* (PSQI), Sleep Habits during Exams, Sleep Habits and Extracurricular Activities, Stress and Sleep Habits, Sleep and Physical Activity, Satisfaction with Sleep Habits.

Sleep quality and daytime sleepiness were measured by Semi-Structured questionnaire which is based on objective of the study. It consists of two sections which is socio-demographic characteristic and sleep disorder of participants. A self-administered Performa was used for

collection of data. Performa contains Standard sleep scales *i.e. Epworth Sleepiness Scale (ESS) and Pittsburgh Sleep Quality Index (PSQI)* (Buysse et al., 2000). Subjects were given instruction prior to data collection.

PSQI scale is a validated scale. If PSQI score is 0-10 =Normal sleep quality, 10-15= Mild, 15-20= Moderate, >20 =severe disturbance of sleep quality. Its Cronbach's α for total PSQI was 0.791, sensitivity of 98.7 and specificity of 84.4 (Popević et al., 2018). The overall PSQI global score correlation coefficient for test–retest reliability index was 0.87. Validity analyses showed high correlations between PSQI and sleep log data (Backhaus et al., 2002).

ESS is a validated scale and Epworth sleepiness scale (ESS) has been used widely in the assessment of daytime sleepiness for research and clinical purpose. If ESS score is 0-7 =Normal, 8-9=mild, 10-15=moderate, 16-24= severe day time sleepiness. The reliability coefficient (Cronbach's alpha) for complete ESS was 0.81. Factor-based analysis showed that the Cronbach's reliability coefficient was 0.83 and 0.75 for the first and second factor, respectively (Krishnamoorthy et al., 2019).

Permission was taken from participants and informed about the purpose of the study and written consent was taken before going to ask question from them. Data was analysed by using Statistical packages for social science software (SPSS version 22, SPSS Statistics is a software package used for interactive, or batched, statistical analysis).

Data from questionnaire was encoded into database by data encoder. Questionnaire forms and database were checked for completeness daily. Data was entered twice and then cleaned for any missing variables. Quantitative variables like age mean and standard deviation was calculated. Categorical variables like gender, years of education and father occupation were described using frequencies and percentages.

Association between the poor sleep quality and associated risk factors were determined by regression (multinomial) analysis. Independent variables which were appeared with a p-value ≤ 0.05 were included in the multivariate analysis. Daytime sleepiness data classify into four categories, normal, mild, moderate and severe. Multinomial regression analysis was done to determine the association of daytime sleepiness (Normal is reference category and mild, moderate and severe were risk category with the socio demographic characteristics).

The study was approved by the Bristol University ethical committee. The approval code is IRB-UGS-2019-134. Verbal and written informed consent after explanation about the study was obtained from the study participants. Counselling was done after the interviewed providing the basic information regarding the prevention the sleep disorder.

3. Results

Mean age of study participants was 21.48±4.03. Most (62.1%) of the study participants were females and 24.2% of students were smoking habit (Table 1).

Table1. Socio-Demographic Characteristics of Study Participants. (n=153)

Characteristics	Frequency (%)
Age (Years) (Mean ±SD)	21.48±4.03
Gender	
Male	58(37.9)
Female	95(62.1)
Marital Status	
Single	121(79.1)
Married	32(20.9)
Academic Year of Study	
First year	56(36.6)
Second year	22(14.4)
Third Year	74(48.4)
Fourth Year	1(0.7)
Father Occupation	
Business	57(37.3)
Job	96(62.7)
Smoking	
Ever	37(24.2)
Never	116(75.8)
Family History of Sleep Disorder	
Yes	59(38.6)
No	94(61.4)
Academic Score (GPA)* (Last Semester)	
Low	3(2.0)
Average	7(4.6)
Good	143(93.5)

*low 1-3.5, Average 3.5-4.5, Good>4.5

According to Epworth sleepiness scale 30.73% of the study participants were suffered in moderate daytime sleepiness and only 3.9% were in severe daytime sleepiness (Table2).

Table 2 Prevalence of Day time Sleepiness among study Participants(n=153)

Characteristics	Frequency (n)	Proportion (%)
Normal Sleep*	79	51.6
Mild day time*Sleepiness	21	13.7
Moderate day time*Sleepiness	47	30.7
Sever Day time*Sleepiness	6	3.9

***** Epworth sleepiness scale (0-7 =normal, 8-9=mild, 10-15=moderate, 16-24= Severe day time)

According to PSQI scale, 21.6% were severe impaired in quality of sleep and 29.4% were mild impaired quality of sleep (Table 3).

Table 3. Prevalence of Sleep Quality among study Participants (n=153)

Characteristics	Frequency (n)	Proportion (%)
Good Sleep*	36	23.5
Mild disorder of sleep quality*	39	25.5
Moderate disorder of sleep quality *	45	29.4
Severe disorder of sleep quality*	33	21.6

***PSQI scale (0-10= Normal, 10-15= Mild, 15-20= Moderate, >20 =Severe)

After adjustment of covariates male gender (OR 1.33(CI 1.06-3.04) [p-value 0.040], and those students who had smoking habits (OR 4.65(CI 1.48-5.14) [p-value 0.018] were statistically significant associated with daytime sleepiness (Table 4).

Table 4. Association of Daytime Sleepiness with Risk factors among study participants (n=153)

Characteristics	Mild disorder of Sleep quality (Adjusted Odd Ratio 95% CI) [p-value]	Moderate disorder of Sleep quality (Adjusted Odd Ratio 95% CI) [p-value]	Severe disorder of Sleep quality (Adjusted Odd Ratio 95% CI) [p-value]
Gender			
Male	1.35(0.48-3.81) [0.562]	0.53(0.16-1.23) [0.123]	1.33(1.06-3.04) [0.040]
Female	1	1	1
Marital Status			
Single	1.04(0.07-13.18) [0.996]	2.80(0.64-12.15) [0.169]	1.78(0.10-30.77) [0.692]
Married	1	1	1
Academic Year			
First	1.99(0.77-5.87) [0.978]	1.89(0.67-4.91) [0.870]	1.42(0.51-3.69) [0.500)
Second	3.99(0.67-3.87) [0.278]	2.29(0.77-5.91) [0.670]	3.22(0.48-2.79) [0.560]
Third	4.19(0.77-6.57) [0.961]	3.49(0.97-3.99) [0.479]	4.12(0.61-1.69) [0.980)
Fourth	1	1	1
Father Occupation			
Business	1.04(0.30-3.57) [0.950]	3.18(1.25-8.08) [0.015]	1.40(0.20-9.62) [0.727]
Job	1	1	1
Smoking			

Ever	0.27(0.02-3.53) [0.318]	4.74(1.20-18.64) [0.026]	4.65(1.48-5.14) [0.018]
Never	1		
Academic Score			
Low	0.25(0.04-0.75) [0.998]	1.35(0.16-11.18) [0.776]	0.50(0.06-3.94) [0.518]
Average	0.68(0.06-7.02) [0.749]	0.78(0.07-8.67) [0.840]	4.48(1.08-6.95) [0.043]
Good	1	1	1

*low 1-2, Average 2-3, Good>3 ** Epworth sleepiness scale (0-7 =normal [Reference Category], 8-9=mild, 10-15=moderate, 16-24= Severe day time).

Students whose father occupation had business OR 1.81(1.46-7.02) [0.039], OR2.28(1.68-7.63) [0.018] and OR3.92(1.16-13.22) [0.028] likely associated with severe, moderate and mild disorder of sleep quality respectively. Those students who had smoking habits were more than 3 times (OR 3.04 (CI 2.34-4.29) [p-value 0.018]) associated with severe quality of sleep (Table 5).

Table 5. Association of Sleep quality with Risk factors among study participants (n=153)

Characteristics	****Mild disorder of Sleep quality (Adjusted Odd Ratio 95% CI) (p-value)**	****Moderate disorder of Sleep quality (Adjusted Odd Ratio 95% CI) (p-value)**	****Severe disorder of Sleep quality (Adjusted Odd Ratio 95% CI) (p-value)**
Gender			
Male	2.98(1.03-8.62) [0.043]	1.62(0.57-4.58) [0.356]	0.99(0.30-3.23) [0.992]
Female	1	1	1
Marital Status			
Single	0.04(0.00-0.86) [0.040]	0.30(0.03-2.65) [0.281]	1.15(0.15-8.70) [0.886]
Married	1	1	1
Academic Year			
First	3.82(0.23-13.18)	2.34(0.89-9.73)	5.34(1.30-12.58)

	[0.349]	[0.165]	[0.042]
	1.19(0.08-13.56)		1.49(0.10-10.06)
Second	[0.896]	1.07(0.27-8.76) [0.126]	[0.767]
	0.97(0.05-12.07)	1.12(0.56-4.98)	6.06(0.38-14.57)
Third	[0.987]	[0.243]	[0.198]
	0.56(0.14-12.11)	1.28(0.54-7.76)	3.72(0.13-10.60)
Fourth	[0.761]	[0.324]	[0.441]
Final	1	1	1
Father Occupation			
	3.92(1.16-13.22)	2.28(1.68-7.63)	1.81(1.46-7.02)
Business	[0.028]	[0.018]	[0.039]
Job	1	1	1
Smoking			
	10.38(1.55-19.55)	6.01(1.76-8.28)	3.04(2.34-4.29)
Ever	[0.011]	[0.018]	[0.010]
Never	1	1	1
Academic Score*			
	2.98(0.279-11.92)		3.13(1.28-4.87)
Low	[0.366]	4.58(0.511-11.07) [0.174]	[0.035]
	1.80(0.04-9.26)	4.39(0.43-5.65)	1.92(0.10-4.96)
Average	[0.883]	[0.211]	[0.658]
Good	1	1	1

*low 1-2, Average 2-3, Good>3, **PSQI scale (0-10= Normal [Reference], 10-15= Mild, 15-20= Moderate, >20 =Severe)

Final year students were suffering more in severe daytime sleepiness and poor quality of sleep compared to other academic year of students (Fig.1, 2).

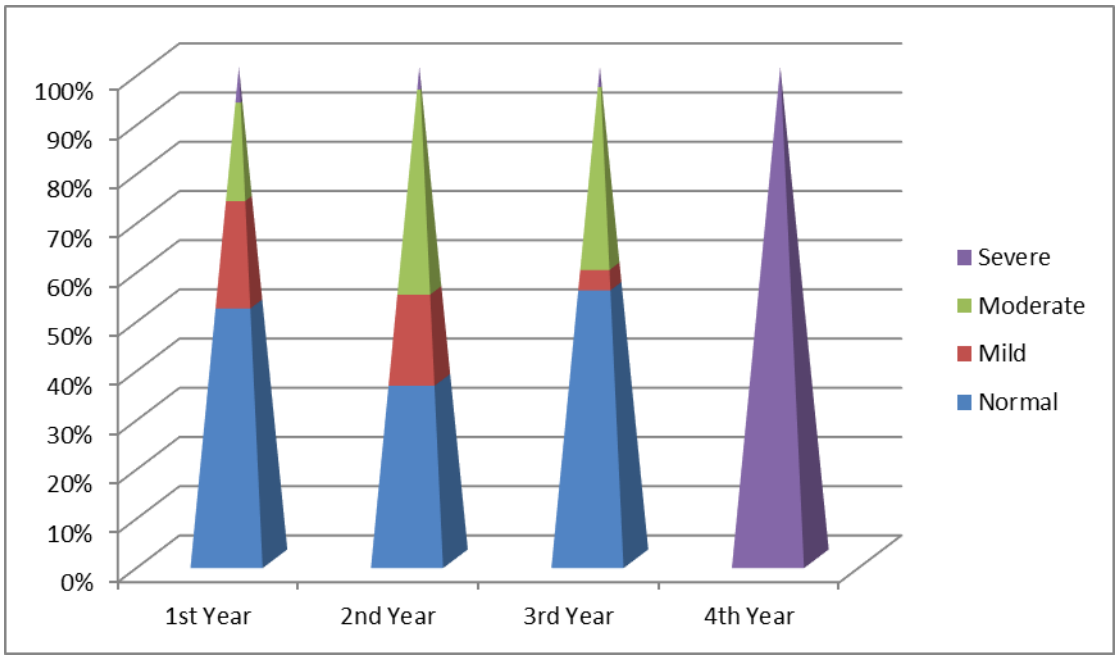

Figure 1. Day-Time Sleepiness among different academic year of students

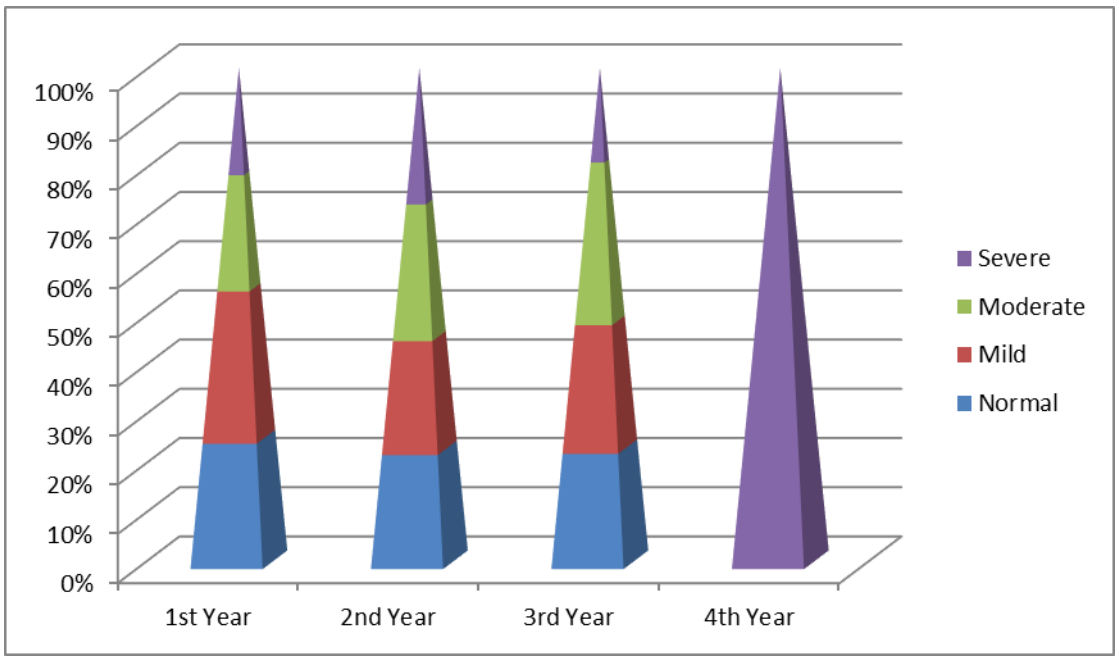

Figure2. Sleep Quality among different academic year of students

4. Discussion

Our study found that poor sleep quality prevalence rate was high among study participants. It was above the prevalence estimate (32-57%) reported by other study using same instrument (PSQI questionnaire) (Belingheri et al., 2020). Moreover; it was more in male gender. Day time sleepiness, with 30.7% study participants has moderate day time sleepiness. This result was coinciding with previous studies results which were conducted in different cities of world,

prevalence rate of daytime sleepiness ranges from 20-35% (El Sahly et al., 2020; Hartescu et al., 2015; Lawson et al., 2013).

This study showed that male gender subjects were more suffering from sleep disorder. Study results is consistent with other study results (Settineri et al., 2019). The results on gender effect are relevant, in order to highlight the continuity with other versions, but also for unconsidered possibilities. Our study showed that severe poor quality of sleep prevalence is 21.6%. It was higher than compared to other study which was conducted on medical students (Al-Khani et al., 2019). It can be attributed to differences in study design and ethnic, cultural and geographical variability between studied populations.

Evaluating causes of poor quality of sleep requires a holistic approach and confirmation with objective tests. Our study result showed that prevalence rate of overall poor sleep quality was 76.5%. Like poor sleep quality, sleep disturbances are dominant in males. It is higher than the prevalence rate in previous study (Bassetti et al., 2020). Examinations are integral part of any study; medical exams are far more difficult relatively. The main academic-related sources of stress were 'frequency of exams', 'academic workload', and 'time management'. Major psychosocial stressors were 'worries regarding future', 'high parental expectations', 'anxiety (Gomathi et al., 2012). Professional exams are stressful psychologically as well as physically. Our study result showed that about 40% students have severe day time sleepiness and their father occupation is business. This result is far less than the previous study which shows around 60% (Lumley et al., 2015). The previous study found that factors such as emotional involvement and associated worries might be of importance in explaining the relation between waking and dreaming (Schredl & Erlacher, 2008).

Stress is a major factor in prevalence of sleep problems (Bassetti et al., 2020). This study showed that 117 students (70.9%) have observed poor sleep quality overall. This result was consistent with previous study result (Ghoreishi et al., 2008), poor sleep quality had affected with poor mental activity which lead to depression and anxiety. Our study showed that first year academic year students were five-time severe poor quality of sleep (OR 5.34). This result was correlates to previous study which also show that sleep quality improves following increased academic year (Lawson et al., 2019).

Our study showed that those students who had low academic score (GPA) were three times (OR 3.13) likely associated with severe poor quality of sleep, this correlates with international studies showing low GPA students were poor quality of sleep (Jahrami et al., 2019; Tian-Ci Quek et al., 2019). This results rate shows that low grades students were more depressed compared to good grade students which lead to poor quality of sleep. The previous study

revealed that the GPA is a significant predictor of sleep quality, where most of the students, whose GPA is less than 4.25 (out of 5) are poor sleepers (Almojali et al., 2017).

5. Conclusion

Health science students have high prevalence of poor sleep quality and daytime sleepiness due to high burden of studies and irregular working hours as the main factors. There is need to revise the policies and counseling services should be provided at the college level to improve the mental health of students. The management of education institutions should plan for effective measures to handle this issue which will help the students and later the community which they will serve in the future. Steady screening for mental health problems among medical students is necessary for early detection and intervention.

6. Limitations

These findings should be interpreted considering some study limitations. First, it's a cross-sectional study which did not determine the causality. Second, information bias is present because survey based on subjective measures of sleep quality. This high prevalence rate can be due to poor awareness among students. There is need to aware students about importance of sleep. Good sleep benefit to the students for improves the mental status, social and academic performance. Workshop, seminars related to sleep disorder improves the academic performance of students and reducing the chronic disorders in professional life. By doing so, students will be able to stand out among other medical institutes and score better in professional exams.

Authors Contributions

Mubashir Zafar – experimental design, research, interpretation of empirical results; Khaled Ansari and Mubashir Zafar– writing a literature review and participation in a general discussion of the empirical results obtained; Khaled Ansari – participation in a general discussion of empirical results.

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