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Assessment of Quality of sleep and its relation with screen time and body mass index in Post Graduate Residents in tertiary care hospital in Northern India

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Abstract

Sleep plays a vital role in an individual's psychological and physical well-being. Medical students are one subgroup of the general population who appear to be especially vulnerable to poor sleep. This may be perhaps due to long duration duties and high-intensity studies. Also increased screen time (ST) can affect sleep, furthermore high body mass index (BMI) may lead to snoring and obstructive sleep apnea (OSA) which affects the quality of sleep.

Aims and Objectives: To assess the quality of sleep in post-graduate (PG) residents and its association with screen time and BMI in a teaching hospital in Northern India.

Material and methods: It was a cross-sectional study. Total 287 PGs were considered and divided into 2 categories: clinical and non-clinical PGs in view of the distribution of workload. They were evaluated based on measurements of weight and height, a self-rated scale for the ST exposure and the Pittsburgh sleep quality index (PSQI).

Results: Almost 89% of the participants were poor sleepers. About 31.5% (n=90) had ST between 4-8 hours. It was also seen that clinical PGs with PSQI >5

have mean BMI of 25.09 ±3.38, similarly non-clinical PG with PSQI >5 have mean BMI of 23.74 ±2.8. **Conclusion:** The post-graduate residents significantly perceives poor sleep quality. Interventions are thus necessary in order to ensure adequate sleep among them.

Keywords: PSQI, Screen Time, BMI

Introduction

Sleep is a physiological process which is essential to normal functioning in humans. There are various factors which influence sleep habits and problems, for example: physical, mental, and environmental factors such as age, gender, job, lifestyle and emotional tension. On an average, between seven and nine hours of sleep each night is required by humans and considered as good sleep. Both the quantity and quality of sleep play an essential role in an individual's psychological and physical well-being. [1] The brain conducts memory consolidation and integration during sleep. Adequate and quality sleep eliminates concentration difficulties without which, judgments, mood, and ability to learn and retain information are weakened. [2,3] Sleep increases understanding and improves retention power of the brain. [4] Medicine is one of the most stressful fields of education because of its highly demanding professional and academic requirements. In the hospital, residents have many duties to perform, including working in out-patients departments (OPD), in-patient departments (IPD), emergency on-call etc. On an average residents work 8 hours daily with extra emergency duties on a rotational basis. This causes longer and sometimes double working hours, which results into poor sleep and further increases psychological stress.

ST is another important factor which affects sleep significantly by various mechanism, first is the time-displacement mechanism, in which increased ST leads to delay in bedtime which was supposed to be the time spent sleeping. Second likely mechanism which negatively impacts sleep is the exposure of light emitted by the screens. This mechanism affect sleep by various pathways: increasing arousal and reducing sleepiness at bedtime; disrupting sleep architecture as assessed by polysomnographic (PSG) recording, and delay in the circadian rhythm and postponing sleep-onset, [5] which results in shortened sleep duration. Light emitted from the screen media devices are of short -wavelength, which suppresses melatonin response. [6] The American Academy of Pediatrics recommends no more than 2 h/day of ST in children and adolescents.[7] The study conducted among Chinese college students to assess the effect of low physical activity and high screen time on mental health and sleep quality in which they considered self reported screen time and physical activity status, they observed that high ST was significantly positively associated with anxiety (OR=1.38, 95%CI: 1.15-1.65), depression (OR=1.76, 95%CI: 1.47-2.09), psychopathological symptoms (OR=1.69, 95%CI: 1.43-2.01) and poor sleep quality (OR=1.32, 95%CI: 1.06-1.65). [8]

Similar study conducted by Feng Q et al. [9] observed that high Physical Activity and low ST were independently associated with significantly lower risks for poor sleep quality (OR: 0.48, 95% CI: 0.30–0.78) and depression (OR: 0.67, 95%CI: 0.44–0.89), respectively.

There are various studies, [10,11,12,13] which had focused on the sleep duration and quality association with BMI. [14,15,16,17] Increased BMI is an important factor which indirectly affects sleep quality by causing various disorders like OSA, snoring etc.

So,with this background this study was conducted to assess the quality of sleep and its relation with ST and BMI in Post Graduate Residents in tertiary care hospital in northern India.

Material And Methods

The study was cross-sectional in design; conducted among the PG of a tertiary care hospital in Northern India. All the PG, both clinical and non-clinical, were included in the study. Written informed consent was obtained from all the PG, who were willing to participate. Students with comorbid psychiatric illness and those who refused to give consent were excluded from the study. Institutional ethical committee clearance was obtained prior to data collection.

The sample included a total of 287 PGs; sub-divided into two groups: clinical (including general medicine, general surgery, paediatrics, obstetrics and gynaecology, orthopaedics, otolaryngology, opthalomology, psychiatry, dermatology, radiotherapy, radiodiagnosis, anaesthesiology, pulmonary medicine) and non-clinical (includes: anatomy, biochemistry, physiology, pathology, pharmacology, microbiology, forensic medicine, community medicine). The division was made in view that as compared to non-clinical branches, clinical branches has more work load and extra emergency duties after routine duty hours. Also, PG's of clinical speciality have more computer related work for example, making discharges, viewing reports and seeing radiology images on computer screen and hence are exposed to screens more than non-clinical PG especially to duty related activities. For the data collection all PGs were informed, with the prior permission of their respective head of the department, to get together at a particular place after the working hours. PGs on emergency duty were excluded. Sociodemographic characteristics of the PG's were obtained using self-administered questionnaires which included variables like age, marital status , year of residency, branch of speciality, number of 24 hours emergency duty, substance or sedatives use and any chronic medical illness. The participants were evaluated using the Pittsburgh sleep quality index (PSQI) for quality of sleep.[18] PSQI is a self-reported scale which tells about the sleep quality and various sleep disorder mainly within the last one month. It takes 5 to 10 minutes to apply the scale. It consists of 19 items on a series of 4 items Likert scale from 0-3 which leads to 7 component scores, including, latency, daytime problems, duration, quality, efficiency, use of sleeping drugs and other disorders of sleep. The score of PSQI >5, suggestive of poor sleep quality; has 89.6% sensitivity and 86.5% specificity.

ST is defined as time spent on computer including internet use, watching TV/video program and playing games. The subjects reported ST using the following question: How many hours per day do you spend on the mobile phones, computer (including playing video or computer games or using a computer for something) and watching TV/video programs? Duration of hours was graded from 0-2 hours, 2-4hours and so on till more than 12hours arbitrary for this study. Height and weight were measured using a wall-mounted Harpenden standiometer (Holtain, Ltd., Crosswell, Crymyh, Pembs, UK) and calibrated digital scale (Tanita BWB 800: Tanita Corporation of America, Inc, Arlington Heights, IL, USA). Body mass index (BMI) was calculated from these measures using the formula: BMI (kg/m2) = weight (kg) / (height [m])2.

Statistical methods were applied to the data collected. Descriptive analysis was done for frequency distribution and tests such as Chi-square were applied

for comparison. The P-Value < 0.05 was taken as statistically significant.

Results

Two hundred eighty-seven PG participated in the study, of which 88.5% (n=254) were from the clinical department, and 11.5% (n=33) from non-clinical department. The majority are males 59.2% (n=170). Observations regarding the consumption of substance and sedatives is that 57.8% (n=166) out of total participants are consuming the substance of which alcohol 20.6% (n=59) and caffeine 19.9% (n=57) are the most commonly consumed and 5% (n=16) participants are using sedatives. Also, 13 participants have a chronic medical illness like asthma, hypertension, hypothyroid, migraine and atopy. Talking about the emergency duties, i.e. number of 24 hours duty per month, 27.5% of the participants have five such duties per month. Moreover, working hours per day of 61% of participants are between 8-12 hours, which reflect the workload on the medical residents and might affect their sleep quality. The study showed that 89.2% (n=256) participants were poor sleepers with PSQI ≥5 and majority of the participants 31.5% (n=90) have screen time between 2-4 hours, 30.7% (n=88) have screen time between 4-8 hours and only a few participants 9.1% (n=26) are having screen time >12hours shown in table 3. Among clinical group, 89.3% (227) were poor sleepers (PSQI>5) compared to 87.9% (29) of the non clinical group as depicted in table 4. The data was statistically not significant (p-value >0.05). Table 5 shows co-relation between PSQI, BMI and ST among Clinical and Non-clinical branch. Inverse correlation was observed among clinical group between screen time and BMI and also between PSQI and BMI but the data was not statistically significant. Table 6 shows co-relation between PSQI group and mean BMI and mean ST among Clinical and Non-clinical branch. Positive correlation was observed between BMI and PSQI among clinical group and the data is significant as p-value is < 0.05. Table 7 shows overall correlation among all the three parameters: screen time, BMI and PSQI. Significant correlation seen between PSQI and BMI with p-value <0.05.

Discussion

The main aims of the present study were to assess the quality of sleep and its relation with ST and BMI in Post Graduate Residents in tertiary care hospital in northern India. In our study we tried to compare to sleep quality among PGs of clinical and non-clinical branch as it is a well known fact that responsibilities of clinical PGs is far more than non-clinical PGs. Clinical PGs are expected to perform various duties including OPD, IPD, emergency on-call and consultation-liaison duties whereas working hours of non-clinical PGs are more structured and limited to the department or laboratories and have fixed time schedule. Our study showed that significant number of participants have poor sleep, PGs of both clinical and non-clinical groups were affected almost equally. A research by Murthy VS et al. [15] compared sleep quality among clinical and para clinical branch. Their result showed that most of the participants of the study had poor sleep quality which is similar to our study. While comparing the sleep quality among the two groups they found that clinical residents were affected more than para-clinical which was not corroborative to our study. Rao WW et al. [19] conducted a meta-analysis of 57 studies with 25,735 medical students in which they assessed sleep quality among medical students. Their result showed that prevalence of poor sleep quality was 52.7% and is more common in Europe. Hence, there is a need to look for the factors affecting sleep among PGs. Keeping this

in mind, in our study we have emphasized on two important parameters i.e. BMI and ST. The general finding of this study regarding BMI was that clinical PG appeared to be overweight when compared with non-clinical PG, in whom the weight was within the normal limit, even so there was no significant correlation between PSQI, BMI and ST among both the groups. However, overall significant correlation was observed between sleep quality and BMI, indicating that increase BMI might have some role in poor quality sleep, that direct our focus to poor health of the PGs. Results of various other studies about association between sleep and obesity among young adolescent have been very inconsistent. Some reported inverse association between sleep duration and BMI, [20] others reported positive association between short sleep duration and BMI, [22] and no association between long sleep duration and BMI. [22,16] A study done by Gangwisch, [21] observed that inadequate sleep can be a risk factor for obesity. [11,12] Various other studies showed similar results showing poor sleep associated with being overweight or obese. [14,15,]

Nowadays, smartphone use among adults is the most common factor for their increased ST, which negatively affect various aspects of a person's life. One of which is sleep. Many studies have been conducted focusing on this aspect, among which the latest is by Grimaldi-Puyana M et.al.[23] who conducted a study among young adults, ST, physical activity, profile of mood, applied PSQI for sleep quality were measured, they found out that excessive smartphone use is associated with low level activity, high sedentary behavior, poor mood state, and poor-quality sleep. A cross-sectional study conducted by Kumar VA et al. [24] among medical students found out that 44% of the participants were addicted to smartphones and the addiction was statistically significantly associated with the poor sleep quality. Similar results were observed by other studies showing negative effect of sleep on using smartphone at bedtime. [25][26] Data of our study showed that mean ST of the PG of both the groups is almost similar. ST is inversely associated with BMI among clinical PG and with PSQI among non-clinical PG. Hence, the association of sleep quality and ST in inconclusive.

Therefore, there are several other factors which can affect sleep quality of the PG, which require further in-depth evaluation. Moreover, if we see the current scenario of India, number of patients seen by a resident is very high and doctor-patient ratio is behind WHO-prescribed 1:1000. Hence, increasing work-hours and poor sleep leads to increased stress level among PG and poor decision-making abilities. [27] Therefore, we must focus on factors to improve sleep quality of PGs so as to increase their efficiency.

Conclusion

The highlight of this study is that post-graduate residents fail to acquire the proper quality of sleep, and this can affect their decision-making abilities while at work. So, there is a need for early identification of sleep disturbance, various causes to be looked into, and proper intervention to be taken. Also, the residents should be educated about basic sleep hygiene and also to maintain a healthy diet and stop self-medication and substance use. Thus, to conclude, a resident should have a good quality of sleep in order to provide a good patient-care which is the prime duty of a doctor.

Limitation

First, this study was cross-sectional; we cannot exclude the possibility of reverse causality, that is, higher levels of BMI led to poorer sleep quality and both short and long time spent in bed. Second, we used self-reported data to assess screen time, and sleep quality. Third, we

did not consider various other factors which can affect sleep quality like physical activity, stress, substance use disorder, undiagnosed psychiatric illness or physical illness like OSA.

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Abbreviation:

ST- Screen Time
BMI- Body Mass Index
OSA- Obstructive Sleep Apnea
PG- Post Graduate
PSQI- Pittsburgh Sleep Quality Index
OPD- Out Patient Department
IPD- In Patient Department
PSG- Polysomnographic

Legend Tables

Table 1: Shows the sociodemographic profile of the participants.

Variables		No. of cases	Percentage
Gender	Female	117	40.8
	Male	170	59.2
Marital status	Married	55	19.2
	Unmarried	232	80.8
Year of residency	1	111	38.7
	2	101	35.2
	3	75	26.1
Branch	Clinical	254	88.5
	Non-clinical	33	11.5
Number of 24hour emergency per month	0	20	7.0
	1	1	.3
	2	8	2.8
	3	16	5.6
	4	30	10.5
	5	79	27.5
	6	53	18.5
	7	30	10.5
	8	21	7.3
	9	11	3.8
	10	18	6.3
No. of working hours per day	8 hours	39	13.6
	8-12 hours	175	61.0
	12-16 hours	66	23.0
	16-24 hours	7	2.4

Table 2: Shows substance use, sedative use and chronic medical illness among the study participants.

Variables		No. of cases	Percentage
Substance use	None	121	42.2
	nicotine	22	7.7
	Alcohol	59	20.6
	Caffeine	57	19.9
	Cannabis	3	1.0
	Opioid	1	.3
	>1 substance	24	8.4
Use of sedatives	Yes	16	5.6
	No	271	94.4
Any chronic medical illness	Yes	11	3.8
	No	276	96.2

Table 3: Shows the screen time and PSQI value among the participants.

		No. of cases	Percentage
PSQI Group	< 5	31	10.8
	> 5	256	89.2
Screen time	0-2 hours	47	16.3
	2-4 hours	90	31.4
	4-8 hours	88	30.7
	8-12 hours	36	12.5
	>12 hours	26	9.1
	Total	287	100.0

Table 4:Shows the number of poor sleepers (PSQI value >5) among clinical and non-clinical group.

Branch	PSQI Group		Total	Chi-square value	p-value
	< 5	> 5			
Clinical	27	227	254	0.067	0.795
Non-clinical	4	29	33		
Total	31	256	287		

Table 5: Shows the co-relation between PSQI, BMI and Screen Time among Clinical and Non-clinical branch.

Branch			Screen Time	BMI	PSQI
Clinical	Screen Time	Pearson Correlation	1.000	-.010	0.049
		p-value		.868	0.435
		N	254	254	254
	PSQI	Pearson Correlation	0.049	-.107	1.000
		p-value	0.435	.090	
		N	254	254	254
Non-clinical	Screen Time	Pearson Correlation	1.000	0.238	-0.090
		p-value		0.181	0.620
		N	33	33	33
	PSQI	Pearson Correlation	-0.090	-0.098	1.000
		p-value	0.620	0.588	
		N	33	33	33

Table 6:- Shows co-relation between PSQI group and mean BMI, Screen Time among Clinical and Non-clinical branch

Branch		PSQI Group	N	Mean	Std. Deviation	t	p-value
Clinical	BMI	< 5	27	26.49	2.75	2.071	.039
		> 5	227	25.09	3.38		
	Screen time	< 5	27	2.30	0.99	-1.134	.258
		> 5	227	2.59	1.28		
Non-clinical	BMI	< 5	4	26.56	5.42	1.637	.112
		> 5	29	23.74	2.89		
	Screen time	< 5	4	3.75	1.500	1.559	.129
		> 5	29	2.76	1.154		

Table 7: Shows overall correlation among all the three parameters, screen time, BMI and PSQI.

		Screen time	BMI	PSQI
Screen time	Pearson Correlation	1.000	-0.004	0.035
	p-value		0.950	0.554
	N	287	287	287
PSQI	Pearson Correlation	0.035	0.181	1.000
	p-value	0.554	0.002	
	N	287	287	287