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Is it wrong for doctors to be human? Can resident doctors learn to function with less sleep?

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ABSTRACT

Background: Medical residency programs are traditionally supposed to be having long working hours, which can be associated with a poor quality of sleep and resultant daytime sleepiness. This poses threat to both physician and patient. This study has an alarming importance in recent scenario, where India is witnessing growing incidents of assaults against resident doctors. We evaluated the subjective sleep quality, day time sleepiness, satisfaction with life, stress, anxiety and depression and their association with subjective sleep quality amongst the residents on their off-duty days and also compared these findings amongst various departments of our institution.

Methods: This cross-sectional study was conducted among 77 first year resident doctors of Government Medical College, Amritsar during the period from May 2018 to March 2019. The tools used for assessment were Pittsburgh sleep quality index, Epworth sleepiness scale, the satisfaction with life scale (SWLS) and depression, anxiety and stress scale-21 questionnaire.

Results: Our results indicated that 71.43% residents were poor sleepers. 53.24% residents had day time sleepiness of which 46.75% had excessive day time sleepiness. 40.26% residents had mild to moderate stress, 44.16% had mild to moderate anxiety, 31.16% residents suffered from depression of which 18.18% residents suffered moderate to severe depression. 90.91% residents were satisfied with their life on applying SWLS. Poor sleep quality was perceived greatly by the resident doctors in our public hospital.

Conclusions: Understanding the potential impacts of fatigue on resident physicians performance /safety and using this knowledge to optimize shift-duty schedule may reduce the risks to both doctors and patients.

Keywords: Resident doctors, Subjective sleep quality, Day time sleepiness, Satisfaction with life, Stress, Anxiety, Depression

INTRODUCTION

Sleep deprivation is hazardous to pilots and truck drivers. That's why they have restricted hours in cockpit and behind the wheels. Resident doctors on the other hand do not have mandatory restricted hours, which can be associated with poor quality of sleep and daytime sleepiness. This poses threat to both physicians and patient.

Lack of sleep is a wide spread problem in today's society and it can negatively affect psychological and physiological functioning. It may be accompanied by symptoms of anxiety and depression, reduced cognitive performance and deterioration of judgment capacity. The most common causes of sleep deprivation are work-related factors. In this context, health professionals are more vulnerable, who in addition to inadequate sleep also suffer from stressful circumstances such as quick responsive decision making, high expectations, low

tolerance for errors. There is controversy about the appropriateness of the long working hours that demand the participation of medical residents who are on duty for 24 hours or more. The results of important number of studies question this system, arguing that it leads to more medical errors that jeopardize the safety of patients.^{1,2} Contrarily, there are studies showing that 24 hour on call shifts benefits the medical residents and does not jeopardize patient safety.³

The impact of 24 hours on call shifts on health care professionals has been studied from perspectives, including performance, emotional and physiological effects. It has been found that sleep deprivation causes a deterioration in attention, state of alertness and executive functions in general, and an increase in blood pressure, stress hormone levels, a reduction in parasympathetic tone as well.4 From the perspective of the performance of health care workers after 24 hours on call shifts, the main studies have focused on stimulation clinical tasks, attention and monitoring tasks and performance of cognitive tasks.⁵⁻⁷ Other studies have examined the effect of sleep deprivation on doctors by means of questionnaire such as the d2 test and the continuous performance test, showing altered attention and working memory.8

From the perspective of the impact observed on the mental health and emotions of medical residents after 24 hours on call shifts, several studies have found negative effects of sleep deprivation on variables such as burn out, perceived stress and anxiety. 9,10

Sleep disturbances also affect the emotional state or mood of the subject. Irritability, argumentativeness, hallucinations and in extreme cases even disorientation can be the outcomes. Sleep restriction or deprivation is also shown to alter endocrine and metabolic profiles, causes immunological disturbances, increases cardiovascular morbidities, and even cause gene transcription alterations. ¹¹⁻¹⁶

There are not sufficient studies documenting sleep trends specifically in India, even though current employment profiles may be related with reduced or irregular sleep. ¹⁷ In view of major role of sleep in human functioning, and also in the recent scenario, where India is witnessing growing instances of assaults against resident doctors, we undertook the following cross-sectional study at our institution. We evaluated the subjective sleep quality, day time sleepiness, satisfaction with quality of life, stress, anxiety, depression and their association with subjective sleep quality of the resident doctors on their off-duty days and also compared the findings amongst various departments of our institution.

METHODS

This was a cross-sectional study undertaken in the tertiary care set up of Government Medical College, Amritsar. A

total of 104 residents pursuing their residency had taken part in the survey and a thoroughly informed consent on a duly prescribed consent form as prescribed by the ethical clearance committee of our institution was obtained from the participants prior to the study, of which 77 residents were pursuing first year of their residency from May 2018 to March 2019. Keeping in mind the fact that first year residents bear the major brunt of work load and sleepless nights during their duty hours, our study was mainly focused on the first year residents belonging to various specialties of our institution. We surveyed the subjective sleep quality of the residents during their non emergency or off duty days, when the residents were supposed to get a good night sleep.

Participants and procedure

The residents were approached during their academic days in their respective wards. The purpose of the study was explained to the residents and they were asked to voluntarily participate in the study. Participants were from different specialties namely Internal Medicine, Paediatrics, Obstetrics and Gynaecology, Ophthalmology, Psychiatry, Surgery, Radiology, Otorhinolaryngology, Orthopaedics, Dermatology, Respiratory Medicine, Pathology and Anaesthesia. The data collected was kept confidential and were used only for the research purpose.

Surveys

The tools used for assessment were Pittsburgh sleep quality index (PSQI), Epworth sleepiness scale (ESS), the satisfaction with life scale (SWLS) and depression, anxiety and stress scale (DASS)-21 questionnaire.

PSQI

The PSQI is a validated scale which assesses sleep quality across seven domains (subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of medications and day time dysfunction) and the composite obtained indicate "good" (score<5) and "poor" (score≥5) sleepers.¹⁸

ESS

The ESS is a scale intended to measure day time sleepiness that is measured by use of a very short questionnaire. Introduced in 1991 by Dr. Murray Johns of Epworth Hospital in Melbourne, Australia It is a self administered questionnaire with 8 questions. Respondents are asked to rate on a 4 point scale (0-3), their usual chances of dozing off or falling asleep while engaged in eight different activities. Most people engage in those activities at least occasionally, although not necessarily every day. The ESS score (the sum of 8 item score, (0-3) can range from 0 to 24. The total score (≥8) was considered having day time sleepiness and those having

score (≥10) were considered having excessive day time sleepiness. 19

SWLS

It is also a valid and reliable measure of satisfaction with life across all age groups. Those having a score of >20 were satisfied with their life.²⁰

DASS-21

The DASS-21 is a set of three self- report scales designed to measure the emotional states of depression, anxiety and stress. Each of the 3 DASS-21 scales contains 7 items, divided into sub scales with similar content. The DASS-21 is based on dimensional rather than a categorical conception of psychological disorders. The assumption on which the DASS-21 development was based (and which was confirmed by the research data) is that the differences between the depression, anxiety and stress experienced by normal subjects and clinical populations are essentially differences of degree. The DASS-21 has therefore no direct implications for the allocation of patients to discrete diagnostic categories postulated in classificatory systems, such as the diagnostic and statistical manual (DSM) of mental disorders and international statistical classification (ICD) of diseases and related health problems. The residents having score of ≥15 in stress scale is considered having mild to moderate stress and residents having score ≥19 were considered having moderate to severe stress. A score of ≥ 8 on anxiety scale is considered having mild to moderate anxiety and those with score ≥10 have moderate to severe anxiety. On depression scale score ≥10 were considered having mild to moderate depression and score ≥14 having moderate to severe depression.²¹

Data analysis and statistics

Descriptive statistics were compared for PSQI, ESS, SWLS and DASS-21 scales. A score for poor sleep quality, excessive day time sleepiness, anxiety, stress and depression was calculated for each individual participant. Correlation analysis was done to examine the relationship between psychometric study variables. The prevalence rate of poor sleep quality, excessive day time sleepiness, stress, anxiety and depression were also assessed and expressed as percentage of the total. Independent t- test and analysis of variance were performed to analyse the differences of means between the variables in context of poor sleep quality, stress, anxiety and depression. Further the comparisons among different departments were done. All analysis was performed using SPSS software version-22. For all tests, alpha (α) was set as 0.05.

RESULTS

Our study indicated that 71.43% resident doctors had poor sleep (PSQI\ge 5). 53.24% (ESS\ge 8) resident doctors

had daytime sleepiness of which 46.75% (ESS≥10) had excessive daytime sleepiness. The mean PSQI score was obtained as 6.00±2.92 and mean ESS score was obtained as 8.90±4.87. The positive correlation between scores of PSQI and ESS were found statistically significant with a p value of <0.0001 (highly significant) (Table 1).

Table 1: Characteristics associated with sleep quality.

Characteristics	N	%	Mean	P value	
PSQI					
<5	22	25.57	6.00+2.02	0.0001	
≥5	55	71.43	6.00±2.92		
ESS					
>8	41	53.24	9.00 + 4.97	0.0001	
≥10	36	46.75	8.90±4.87		
SWLS					
<19	7	9.09	24.81±6.40	0.0001	
>20	70	90.91	24.81±0.40		
Stress					
<15	46	59.74	13.50±7.89	0.0001	
≥15	31	40.26	13.30±7.89		
Anxiety					
<8	43	55.84	8.00±5.92	0.0001	
≥8	34	44.16	6.00±3.92		
Depression					
>10	24	31.16	8.46+6.59	0.0001	
≥14	14	18.18	0.40±0.39	0.0001	

40.26% (≥ 15 on stress scale) resident doctors had mild to moderate stress, 44.16% (≥ 8 on anxiety scale) had mild to moderate anxiety, 31.16% (≥ 10 on depression scale) suffered from depression of which 18.18% (≥ 14 on depression. The mean stress, anxiety and depression scores were 13.50 ± 7.89 , 8.00 ± 5.92 , 8.46 ± 6.59 respectively. We also obtained a positive correlation between scores of PSQI and stress, anxiety and depression with a highly significant p value of < 0.0001.

90.91% residents were satisfied with their life on applying SWLS with a mean SWLS score of 24.81±6.40 and again it had a positive correlation between scores of PSQI and SWLS, which came as statistically significant with p value <0.0001.

On comparison between various departments, all except otorhinolaryngology, ophthalmology and psychiatry residents had poor sleep (Table 2).

Respiratory Medicine, Pathology and Dermatology residents had mild to moderate daytime sleepiness whereas Orthopaedics, Paediatrics and Obstetrics and Gynaecology residents had excessive daytime sleepiness (Figure 1).

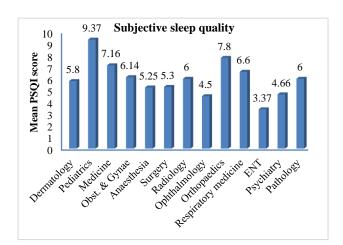
Only residents of paediatrics department showed dissatisfaction with their life due to their work load (Figure 2).

Departments	N	Mean PSQI score	Mean ESS score	Mean SWLS score	Mean stress score	Mean anxiety score	Mean depression score
Dermatology	5	5.80±1.09	8.00 ± 5.78	21.40±2.30	11.40±3.57	7.60±2.19	8.00 ± 2.00
Paediatrics	8	9.37 ± 4.98	12.75±3.50	16.92±5.93	12.25±5.36	5.50 ± 2.79	10.00±10.44
Medicine	6	7.16±3.04	7.66 ± 3.28	27.66±8.10	10.33±10.28	5.66±1.67	6.33±5.76
Obstetrics and gynaecology	7	6.14±1.64	12.42±1.30	22.14±6.87	20.71±10.08	12.28±3.03	11.28±2.28
Anaesthesia	8	5.25 ± 2.86	7.25 ± 5.72	26.25±4.26	13.50±6.00	9.50 ± 8.64	8.87±7.25
Surgery	6	5.30 ± 2.70	12.50±4.39	23.33±3.11	12.00±7.66	9.37 ± 7.40	7.66±5.29
Radiology	3	6.00 ± 3.00	3.66 ± 2.08	27.00±7.54	6.00±5.29	5.33±5.03	4.00±4.00
Ophthalmology	5	4.50±1.67	5.66±3.11	28.33±6.80	14.00±4.33	7.66 ± 6.72	7.00±1.78
Orthopaedics	5	7.80 ± 2.16	16.40±3.20	30.08±3.34	16.80±2.58	8.60±1.67	10.02±3.27
Respiratory medicine	5	6.60±2.50	9.20±5.11	22.20±6.97	16.40±13.66	16.80±12.69	18.00±12.32
ENT	8	3.37±1.22	5.12±1.51	23.62±10.90	12.87±10.73	7.12±3.49	5.37±3.84
Psychiatry	6	4.66±3.64	5.83 ± 3.36	27.33±5.40	6.33±4.60	3.00±1.78	4.00±4.60
Pathology	4	6.60±3.31	8.25±3.59	26.75±2.62	13.50±8.54	4.50±3.00	9.00±12.80

24.81±6.40

13.50±7.89

Table 2: Departmental wise mean score for the various scales.



77

 6.00 ± 2.92

 8.90 ± 4.87

Total

Figure 1: Comparison of subjective sleep quality of residents among various departments.

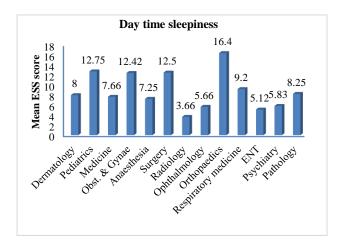


Figure 2: Comparison of daytime sleepiness of residents among various departments.

Residents of orthopaedics and respiratory medicine had mild to moderate stress whereas residents in obstetrics and gynaecology had moderate to severe stress (Figure 3).

 8.00 ± 5.92

 8.46 ± 6.59

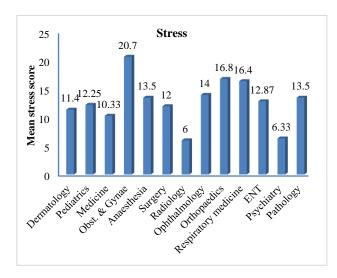


Figure 3: Comparison of stress among residents of various departments.

Orthopaedics residents had mild to moderate anxiety while residents of obstetrics and gynaecology and respiratory medicine had moderate to severe anxiety (Figure 4).

Residents of obstetrics and gynaecology, orthopaedics and paediatrics suffered from mild to moderate depression while residents belonging to department of respiratory medicine suffered from moderate to severe depression (Figure 5).

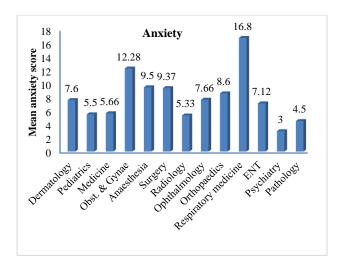


Figure 4: Comparison of anxiety among residents of various departments.

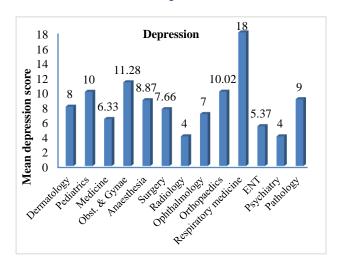


Figure 5: Comparison of depression among residents of various departments.

DISCUSSION

The work-life imbalance for health care professionals leading to burn out and depression has gathered significant attention globally because of the negative impact it renders on patient care and safety. Physicians who had high burnout and depression reportedly committed more medical errors.²² Aim of our study was to evaluate the subjective sleep quality among first year residents and its association with daytime sleepiness, stress, anxiety and depression as well as their correlation with subjective sleep quality on their off-duty days and to compare the findings among various departments of our institution.

As per report in the National Health Profile 2018, Ministry of Health and Family Welfare, Government of India, the average population served per government allopathic doctor is 11,039, a figure more than 10 times the recommended ratio of 1:1000. Going by this data, it is not unnatural to expect that the number of patients a

resident doctor belonging to clinical departments of a teaching hospital attends to is very high. Working hours for a resident doctor in the medical institutions in India are not well defined. It is known that resident doctors belonging to clinical departments have responsibilities including out-patient department, in-patient department, emergency duties and consultation-liaison duties. Hence each resident doctor is expected to perform all the above duties on most of the working hours ranging from 15 hours to 36 hours at a stretch.

Our study found that a significant number of resident doctors experienced poor sleep quality, had more daytime sleepiness and were suffering from stress, anxiety and depression. Although the resident doctors were facing all these problems, most of them were satisfied because of the passion towards their profession. All of them had considered sleep deprivation as a part and parcel of their residency life. Even though the disturbances were higher among those whose work involved direct patient contact and care, the non-clinical resident doctors too faced similar problems due to their work load. Resident doctors had to face tough situations as first contact persons, ensure to be empathetic towards patients and their relatives and make critical therapeutic decisions. But they are often so fatigued that the very same cause got defeated. There are several studies that shows the effects of sleep restriction and fatigue on non-medical personnel also.²³⁻²⁷

There had been some studies on sleep conducted among medical students in India too which reflect similar findings as in our present study.^{28,29} The lack of sleep can lead to making mistakes at work due to impaired decision making and poor communication skills. This is evident from the recent instances of assaults against resident doctors in India.

The findings of this research also provide evidence that intensive 24 hours on call shifts with sleep deprivation affect mood of health care professionals, boost feelings of depression, anxiety and in particular hostility. These results confirm our hypothesis and are consistent with the findings of previous studies that had indicated greater levels of anxiety and perceived stress in medical residents after on call shifts. Although prior studies have examined individual relationship among sleep and work hours, we were interested in finding the correlation between sleep deprivation and perceived stress, anxiety and depression.

The study conducted by Kalmbach et al said that sleep deprivation amplifies the effects of sleep disturbance in depression development whether individuals are experiencing a new onset of depression or a relapse.³⁰ Our findings are also consistent with research in other populations showing that sleep loss and short sleep duration are associated with depression.³¹⁻³⁵

Fernandez-Mendoza et al and others have shown that insomnias with unconstrained short sleep duration are at greater risk of depression than individuals with poor quality sleep or short sleep alone.³⁶⁻³⁷

Our data expand on these findings by suggesting that environmentally unopposed short sleep may similarly amplify the risk relationship between sleep disturbance and stress, anxiety and depression. Overall our findings are consistent with research showing residency- related short sleep may be related to depression and daytime sleepiness. Moreover, our results lend further support to the multidimensionality of sleep health, as proposed by Buysse, who highlights that various dimensions of sleepwake function (i.e., satisfaction, duration, efficiency, alertness, and timing) can uniquely and, when combined, aggregately impact health and function.³⁸

CONCLUSION

Our study highlights the need for early identification of sleep disturbances, interventions to introduce flexible working hours, and shifts of manageable durations and education regarding principles and practices of sleep hygiene among medical residents. There is a crucial need to address the stress, anxiety and depression among resident doctors through effective interventions both at individual and institutional level. Professional counselling services for the residents will certainly be a step forward to manage stress, anxiety and depression among resident doctors. Understanding the potential impacts of fatigue on resident physicians' performance, need for a shift schedule may reduce risk to both doctor and patient. Mandatory short-term vacations to the resident doctors every year should be there to replenish the zeal and energy. Such action will ensure an alert and productive professional who functions at the optimal best in providing patient-care. This is the ultimate goal of the practice of medicine itself. Thus, as the country moves towards national health care reforms, it is imperative to reconfigure the approach to medical training. In addition to professionalism and ethical values, personal well being is critical for a successful next generation of physicians.

Limitations

Clinical interviews are necessary for diagnosis of psychiatric disorders. While subjective sleep ratings are shown to correspond to objective sleep measures, the gold standard of sleep assessment involves the combination of subjective ratings and objective sleep measures (e.g. actigraphy and polysomnography). 39,40

The self rated method used for gathering data would have led to information bias. Distribution of residents in different specialties was not balanced.

The cross-sectional method used in present study limited result for further interpretation of observed associations between measured factors.

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