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Association Between Work Productivity and Sleep Health among Healthcare Professionals in Rawalpindi

Muhammad Farhan Butt, Mommana Ali Rathore, Azka Butt*, Samreen Misbah, Farrukh Sair, Iftikhar Ahmed Satti**

Department of Community Medicine & Public Health, Army Medical College, Rawalpindi/National University of Medical Sciences (NUMS) Pakistan, *Department of Dermatology, Benazir Bhutto Hospital, Rawalpindi Pakistan, **Department of Public Health, Pak Emirates Military Hospital, Rawalpindi/ National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine the association between work productivity and sleep health among healthcare professionals in Rawalpindi.

Study Design: Analytical cross-sectional study.

Place and Duration of Study: Combined Military Hospital, Pak-Emirates Military Hospital, Benazir Bhutto Hospital, Rawalpindi, Pakistan from Sep 2023 to Feb 2024.

Methodology: The study was conducted on resident doctors of both genders ranging from age 25-40 years. A structured validated questionnaire, comprising of three sections, was used. The first part comprised of demographic information. The second part consists of Work Limitation Questionnaire-25 (WLQ-25), a measure of work productivity loss, while third part comprised of Pittsburgh Sleep Quality Index (PSQI), a measure of quality of sleep. Chi square test was applied to find association between sleep quality and its impact on work productivity loss.

Results: A total of 256 participants were divided into two groups, Medicine and allied (Group-A) and Surgery and allied (Group-B). Out of 143(55.86%) residents from Group-A, 78(54.50%) reported with poor sleep while 60(41.9%) had work productivity loss more than 50%. Of 113(44.14%) residents from Group-B, 67(59.3%) had poor sleep while 71(62.8%) had work productivity loss more than 50%. A significant association (p<0.05) was found between PSQI score and WLQ index score.

Conclusion: Majority of the residents with healthy sleep habits and good sleep quality experience less productivity loss as compared to those with poor sleep quality.

Keywords: Healthcare Professionals, Sleep Quality, Sleep Quality Index, Work Limitation.

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INTRODUCTION

Healthcare professionals are faced with a wide range of intricate responsibilities that necessitate exceptional cognitive and physical capabilities. These tasks encompass the diagnosis, treatment, administration of medication, and patient education. This demanding nature of their work often leads to heightened stress levels, which can adversely impact sleep health. The association of inadequate sleep with mortality, metabolic syndrome and coronary artery disease underscores the critical necessity of prioritizing sufficient rest.[1-3] Depression, a wide spread mental health disorder, is frequently exacerbated by sleep disruptions.[4] Impaired neuro-behavioral performance, marked by diminished cognitive function and alertness, is a consequence of insufficient sleep, negatively impacting day to day functioning and decision making.[5] Similarly, accidents are more likely to occur when individuals are sleep deprived, emphasizing the safety implications of proper sleep.[6]

Presenteeism, i.e. work productivity loss resulting from mental and physical impairments, is a widely recognized measure that accounts for greater productivity loss than absenteeism in the corporate sector.[7] Sleep disorders are now recognized as the fourth most common cause for presenteeism. Furthermore, sleep also affects other significant factors linked to presenteeism, including depression, fatigue, and chronic pain. A study conducted in Rome shows the effects of poor sleep quality on psychomotor performance among nurses doing night shifts.8 Numerous studies have highlighted the elevated risk of sleep disturbances among healthcare professionals due to their demanding work schedules, long hours, and exposure to shift work.[9] A study from Pakistan shows a notable correlation between lack of sleep and job performance among employed mothers.[10]

In this study, a sample of healthcare professionals was investigated to determine if poor

Correspondence: Dr Muhammad Farhan Butt, Department of Community Medicine, Army Medical College, Rawalpindi Pakistan
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sleep health is associated with decreased work productivity.

METHODOLOGY

This cross-sectional study was carried out among resident doctors employed at Combined Military Hospital, Pak-Emirates Military Hospital, Benazir Bhutto Hospital, Rawalpindi, Pakistan from September 2023 to February 2024. Ethical permission was taken from the Institutional Ethical Review Board (ERC/ID/357).

Inclusion Criteria: Resident doctors working in Medicine and allied, and Surgery and allied of either gender and aged between 25 to 40 years were included.

Exclusion Criteria: Residents having any chronic medical or surgical diseases, including mental disorders were excluded.

Sample size was calculated using Open epi keeping the prevalence of poor sleep quality as 78.9%.[11] A total of 256 resident doctors were questioned about their sleep quality, quantity and work productivity loss, along with their demographic details through non-probability purposive sampling. Residents in Medicine and allied were placed in Group-A, while those in Surgery and allied were placed in Group-B.

During data collection every resident gave informed consent and was assured strict anonymity of questionnaire response. Data was collected online using Google forms. A structured questionnaire comprising of three sections, was used for data collection. The first section composed of demographic information such as age, gender, marital status, institute, discipline, year of training, co-morbid condition, family history, medical and surgical history. The second part consisted of Work Limitation Questionnaire-25 (WLQ-25).[12-13] The participants were asked questions assessing their physical, mental-interpersonal, output and time management limitations. The combined score of all four components was termed as WLQ index score from which work productivity loss was calculated ranging from 0 (No limitation) – 100% (All the time with limitation). A score of 50% or more indicated serious work productivity loss. The third section consisted of Pittsburgh Sleep Quality Index (PSQI).[14] The residents were questioned about their daily sleep schedules and patterns and assessed via PSQI scale. With scores ranging from 0 to 21, it evaluated the quality of sleep on seven different factors, including subjective sleep quality, time taken to fall asleep, duration of sleep, regular sleep efficiency, disturbances during sleep, use of sleeping aids and daytime dysfunction. The combined score of all seven components was termed as global score of PSQI. A PSQI score of 5 or higher signifies poor sleep quality.

The first variable of study, Work Productivity Loss, was assessed on division of work productivity loss into two categories (less than 50% productivity loss and more than 50% productivity loss) based on WLQ index score. The second variable of study, Sleep Quality, was assessed on division of sleep quality in two categories [Good (0-5) and poor (6-21) sleep] based on the PSQI scale. Data was assessed using Statistical Package for Social Sciences (SPSS) version 25. Frequency and percentages were calculated for categorical variables, while quantitative variables were presented as mean and standard deviation. Chi-square test was applied to find association between sleep and work productivity loss. Pearson correlation was applied between WLQ index score and PSQI score was calculated. A *p*-value less than 0.05 was considered statistically significant.

RESULTS

The mean age of respondents was 29.96+1.93 years. The association of demographic characteristics of residents with discipline is shown in Table-I. The number of residents in Group-A were 143(55.90%) and in Group-B were 113(44.10 %). The mean total hours of sleep were 5.78+0.93 per night. The total hours of actual sleep varied between 4 to 12 hours. The important finding of the study was that 168 residents (65.6%) slept less than 6 hours per day, as opposed to only 88 residents (34.3%), who had the required sleeping hours. Among those with sleep less than 6 hours, 76 residents (45%) were from Group-A while 92 residents (54.7%) were from Group-B. In this case, significant association was found between medicine and surgery residents ($p<0.05$), which is shown in Table-I. Among 143 residents from Group-A, 65 (45.5%) reported with good sleep and 78 (54.5%) with poor sleep. Eighty-three (58.1%) residents from Group-A had work productivity loss less than 50%, and 60 (41.9%) had work productivity loss more than 50%. Of the 113 residents from Group-B, 46(40.7%) reported with good sleep and 67(59.3%) with poor sleep. From the same group 42(37.2%) had work productivity loss less than 50% while 71(62.8%) had work productivity loss more than 50%. Association

between the two disciplines (Medicine and allied and Surgery and allied) and work productivity loss was significant (p=0.001) however, no statistically significant association was found between the disciplines and PSQI groups as shown in Table-II. WLQ Categories were found to be significantly associated (p<0.000) with PSQI categories, showing a moderately positive correlation coefficient (r value=0.338) as evident by Figure-1. No statistically significant difference was found between the means of WLQ and PSQI scores among both genders. The median (IQR) was 10.5 for the total sample.

Table-I: Association of Demographic Characteristics of Residents across Groups (n=256)

Parameters	Group-A (n=143) n (%)	Group-B (n=113) n (%)	*p*-value
Gender			
Male	85(59.4%)	86(76.1%)	0.005
Female	58(40.6%)	27(23.9%)	
Institution			
Combined Military Hospital Rawalpindi	38(26.6%)	65(57.5%)	<0.001
Pak-Emirates Military Hospital Rawalpindi	81(56.6%)	10(8.8%)	
Benazir Bhutto Hospital Rawalpindi	24(16.8%)	38(33.6%)	
Year of Training			
1st year	56(39.2%)	38(33.6%)	<0.001
2nd year	38(26.6%)	45(39.8%)	
3rd year	43(30.1%)	28(24.8%)	
4th year	6(4.1%)	2(1.8%)	
Went to Bed at Night			
At or before midnight	94(65.7%)	74(65.5%)	0.967
After midnight	49(34.3%)	39(34.5%)	
Time Taken to fall asleep (Sleep Latency)			
Less than 30 minutes	93(65.1%)	90(79.6%)	0.010
More than 30 minutes	50(34.9%)	23(20.4%)	
Hours of Sleep Per Night			
Less than 6 hours	76(53.2%)	92(81.4%)	<0.001
More than 6 hours	67(46.8%)	21(18.6%)	

DISCUSSION

This study demonstrates that poor sleep has a significant effect on the work productivity of the residents working in tertiary care hospitals. The research indicated that more than half of the residents of both Medicine and allied, as well as Surgery and allied, had inadequate sleep and significant productivity loss. Productivity loss was influenced significantly by subjective sleep quality, decreased sleep duration, and sleep disturbances. These conclusions corroborate the findings of other researchers who have observed that a lack or insufficiency of sleep impact concentration, fatigue, and memory.[15-17]

Table-II: Association of Pittsburgh Sleep Quality Index (PSQI) scoring and Work Productivity Loss across Groups (n=256)

PSQI Scoring	Group-A (n=143) n (%)	Group-B (n=113) n (%)	*p*-value
Good Sleep	65 (45.5%)	46 (40.7%)	0.447
Poor Sleep	78 (54.5%)	67 (59.3%)	
Work Productivity Loss			0.001
Less than 50%	83 (58.1%)	42 (37.2%)	
More than 50%	60 (41.9%)	71 (62.8%)	

Table-III: Association Between Pittsburgh Sleep Quality Index (PSQI) scoring and Work Productivity Loss (n=256)

PSQI Scoring	Work Productivity Loss		*p*-value
	Less than 50% (n=125)	More than 50% (n=131)	
Good Sleep	76 (60.8%)	35 (26.7%)	<0.001
Poor Sleep	49 (39.2%)	96 (73.3%)	

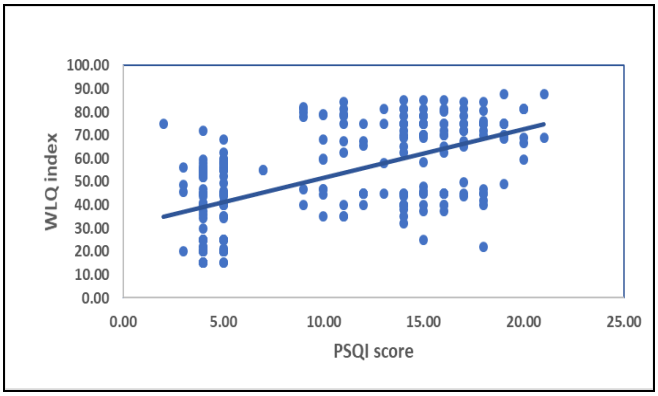

Figure-: Correlation between Pittsburgh Sleep Quality Index (PSQI) score and Work Limitation Questionnaire (WLQ) index score

The majority of our respondents were male. This is in line with a systematic review spanning 25 years from the United States showing that although more than half of the students in medical colleges were females, less than half of them were became resident in Surgery and allied specialties.[18] Most of the participants in this study were from Medicine and allied.

Our study shows that the residents with less than 6 hours of sleep at night experienced poor sleep quality, with more productivity loss as compared to those with more than 6 hours of sleep at night. This was reinforced by other studies indicating a clear connection between the sleep duration and decrease in productivity.[19] It is logical to assume that the decline

in work productivity among residents experiencing sleep issues stems from daytime fatigue, reduced attention span, impaired memory, and compromised decision-making abilities associated with insufficient sleep.

Across different years of training, first year residents were the most affected with poor sleep quality and increased work productivity loss which is in line with a study conducted on anesthesiology residents.[20] It is reasonable to believe that these findings among first year residents are mainly because of their transition phase into the professional environment, long and irregular working hours, stress and peer pressure. Most of the residents in this study, regardless of discipline, experienced the negative effects of less sleep on their work productivity. Among these, residents from Surgery and allied had the major share which was comparable with the results from the study conducted on surgery residents in Spain.[21] The hectic routine of the surgeons especially in operation theatre involving long working hours along with both mental and physical stress require an appropriate amount of night sleep, lack of which was believed be a major reason of them showing an increased productivity loss. The study also revealed that residents experiencing overall poor sleep quality exhibited greater productivity loss at work compared to those with higher sleep quality. A similar association was observed in a study conducted in Japan, documenting that factors such as inadequate sleep, subjective sleep quality, sleep disruptions, reliance on sleep medication, and daytime dysfunction are linked to presenteeism and decreased productivity.[22]

In general, the results demonstrate that most of the residents working in tertiary care hospitals in Rawalpindi have less sleep hours at night as compare to the general population. This contributes to poor sleep quality among residents, which has a significant effect on their work productivity. Also, due to their rigorous hospital routine, which includes acquiring clinical skills, night shifts, enhanced working hours and patient management, their sleep pattern and duration is severely affected resulting into increased work productivity loss.

LIMITATIONS OF STUDY

The study's limitations include its inability to determine a causal relationship between sleep health and work productivity. In future, it would be beneficial to conduct a longitudinal study to establish a cause-and-effect relationship between sleep and productivity. Limitations exist concerning the variables associated with sleep duration. Moreover, self-reported questionnaires used in this study may have been a source of response bias, and objective sleep monitoring through devices like actigraphy could provide more accurate data on sleep patterns. Finally, there is a possibility of unidentified confounding variables. It is essential to implement rigorous measures to identify and control for these confounding factors.

CONCLUSION

It was concluded majority of the residents with healthy sleep habits and good sleep quality experience less productivity loss as compared to those with poor sleep quality. Nonetheless, it appears that residents have a greater frequency of poor sleep habits, which has an impact on their work productivity and efficiency.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MFB & MAR: Data acquisition, data analysis, critical review, approval of the final version to be published.

AB & SM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

FS & IAS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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