Section: Miscellaneous

Original Research Article

STUDY ON THE CORRELATION BETWEEN SHIFT WORK AND SLEEP DISORDERS IN HEALTHCARE WORKERS

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ABSTRACT

Background: Shift work is an essential component of healthcare delivery but is often associated with disruption of normal sleep patterns, leading to various sleep disorders among healthcare workers. The impact of rotational shift duties on sleep quality, insomnia, and daytime alertness has serious implications for both worker health and patient safety. The aim is to assess the correlation between shift work characteristics and the prevalence of sleep disorders among healthcare workers in a tertiary care teaching hospital.

Materials and Methods: This hospital-based, cross-sectional observational study was conducted among 90 healthcare workers, including doctors, nurses, and paramedical staff, engaged in shift-based duties. Participants completed structured questionnaires evaluating demographic data, shift patterns, and sleep parameters using the Pittsburgh Sleep Quality Index (PSQI), Insomnia Severity Index (ISI), and Epworth Sleepiness Scale (ESS).

Results: Among participants, 72.22% were engaged in rotational shifts, and 64.44% exhibited poor sleep quality (PSQI >5). Clinical insomnia (ISI ≥15) was found in 33.33%, and excessive daytime sleepiness (ESS ≥11) was noted in 44.44% of the participants. Sleep disorders were significantly more common among rotational shift workers compared to fixed night shift workers, with p-values of 0.028, 0.041, and 0.016 for poor sleep quality, clinical insomnia, and excessive daytime sleepiness respectively. Fatigue was reported by 77.78% of participants; however, no significant association was found between daytime napping habits and fatigue levels.

Conclusion: Rotational shift work is significantly associated with poor sleep quality, clinical insomnia, and excessive daytime sleepiness among healthcare workers. Organizational strategies such as shift optimization and promoting sleep hygiene are critical to improving sleep health and occupational performance in this population.

Keywords: Shift work, Sleep disorders, Healthcare workers, Sleep quality, Rotational shifts.

INTRODUCTION

Shift work has become an indispensable part of modern healthcare systems, ensuring continuous patient care across twenty-four hours. However, the demands of working in rotating shifts or permanent night shifts have profound effects on workers' health, particularly on sleep quality and the incidence of sleep disorders. Healthcare professionals, who are often exposed to irregular work schedules, are at an increased risk of sleep disturbances, which can further influence their physical, mental, and emotional wellbeing.[1]

Several studies have demonstrated that healthcare workers engaged in shift work exhibit a higher prevalence of poor sleep quality compared to their

counterparts working regular daytime schedules.[1,2] Shift work disrupts the normal circadian rhythm — the body's internal clock — leading to sleep-wake cycle misalignment, chronic sleep deprivation, and associated health consequences.[2] Nurses, doctors, and support staff working night shifts frequently report sleep disturbances characterized by difficulty initiating sleep, maintaining sleep, or experiencing non-restorative sleep, which cumulatively lead to a condition known as Shift Work Sleep Disorder (SWSD).[3]

The adverse effects of shift work on sleep are not only limited to personal discomfort but also extend to broader issues such as reduced cognitive performance, impaired clinical judgment, and increased risk of occupational accidents. Studies evaluating healthcare workers have consistently linked irregular work schedules to deteriorations in sleep quality, psychological wellbeing, and overall quality of life.[3] Sleep disturbances among healthcare workers compromise alertness, decision-making, and patient safety, thereby raising serious concerns regarding the operational efficiency of healthcare institutions.[2,4]

The physiological repercussions of disrupted sleep patterns are significant. Chronic sleep deprivation, often seen in shift workers, has been associated with a variety of adverse health outcomes including cardiovascular diseases, metabolic disorders, and impaired immune responses.[5,6] Research has established that irregular sleep patterns and circadian misalignment are independent risk factors for major cardiovascular events such as myocardial infarction and stroke.[7] The impact of sleep irregularity and the frequent misalignment of the circadian rhythm have been observed not only during workdays but also extending into workers' non-working days, thereby suggesting a sustained physiological burden.[7]

Additionally, the association between shift work and metabolic disorders has gained considerable attention. Studies have indicated that healthcare workers exposed to prolonged night shifts are at an elevated risk for metabolic syndrome, characterized by a cluster of conditions such as obesity, hypertension, insulin resistance, and dyslipidemia.[8] This is particularly alarming because metabolic syndrome significantly increases the risk for type 2 diabetes mellitus and cardiovascular diseases, further exacerbating the health vulnerabilities of an already stressed workforce.[8]

Tolerance to shift work is highly variable among individuals and appears to be influenced by several demographic and occupational factors. Age, gender, chronotype (individual preference for morningness or eveningness), and years of exposure to shift work have been shown to modulate susceptibility to sleep disturbances.[6] Workers in certain occupations and with specific work arrangements demonstrate better or worse adaptability to shift schedules, highlighting the importance of personalized approaches to managing shift work in healthcare settings.[6]

Moreover, literature reviews have pointed out that while the biological effects of shift work are extensively studied, the psychosocial consequences are equally critical. Healthcare workers operating in night shifts or rotating shifts frequently experience social isolation, family disruption, and reduced participation in leisure activities, contributing further to mental health problems such as anxiety, depression, and burnout.[4] These psychosocial strains, compounded with physical health risks, portray a complex and multi-dimensional impact of shift work on healthcare professionals.

Efforts to mitigate the effects of shift work on sleep have included strategies like forward-rotating shifts, strategic napping, optimizing shift lengths, and providing education on sleep hygiene. However, despite such interventions, the fundamental challenge remains rooted in the intrinsic conflict between work demands and the body's biological predispositions. Thus, there is an urgent need for healthcare institutions to recognize the extent of the problem and implement systemic changes to support shift workers.[2,4]

The growing body of evidence emphasizes the necessity of organizational policies that prioritize workers' sleep health. These may include designing shift schedules that allow sufficient recovery time, providing access to facilities that promote rest, and incorporating sleep disorder screening into occupational health programs.[5] Early identification of sleep problems among healthcare workers can not only improve their quality of life but also enhance patient care outcomes by ensuring that the workforce remains vigilant and effective.

MATERIALS AND METHODS

This hospital-based, cross-sectional observational study was conducted at a tertiary care teaching hospital. Institutional Ethics Committee approval was obtained before initiating the study. Written informed consent was taken from all participants prior to their inclusion in the study. A total of 90 healthcare workers, including doctors, nurses, and paramedical staff engaged in shift-based duties, were consecutively recruited for the study through convenience sampling.

Inclusion Criteria

- Healthcare workers aged between 21 and 55 years.
- Engaged in rotational shift work (including night shifts) for at least the past 6 months.
- Willingness to participate and provide written informed consent.
- Ability to comprehend and complete the study questionnaire.

Exclusion Criteria

- History of pre-existing diagnosed psychiatric illnesses or sleep disorders prior to shift work.
- Workers who had transitioned from shift work to regular day shifts in the past 3 months.

- Current use of medications known to affect sleep patterns (e.g., sedatives, antidepressants).
- Pregnant healthcare workers.

Procedure

Participants were asked to complete a structured questionnaire during their working hours in a confidential setting to ensure privacy and reduce response bias. The questionnaire collected demographic information including age, gender, marital status, professional role, and years of service. Details related to shift work were also obtained, such as the type of shift (fixed or rotational), duration of exposure to shift work (measured in months or years), and the number of night shifts per month. Sleep-related parameters were assessed using standardized tools: the Pittsburgh Sleep Quality Index (PSQI) to evaluate overall sleep quality, and the Insomnia Severity Index (ISI) to determine the severity of insomnia symptoms. In addition, participants provided information regarding self-reported levels of fatigue, daytime sleepiness assessed through the Epworth Sleepiness Scale, and history of napping behavior. The questionnaires were self-administered under the supervision of the research team, who were available to clarify any doubts and to ensure completeness and accuracy of the collected data.

Definitions

- Poor sleep quality was defined as a PSQI global score >5.
- Clinical insomnia was defined as an ISI score ≥15.
- Excessive daytime sleepiness was considered present if the Epworth Sleepiness Scale score was ≥11.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (means, standard deviations, frequencies, and percentages) were calculated for demographic and shift work variables. The correlation between shift work characteristics and sleep disorder indices was analyzed using Pearson's or Spearman's correlation coefficients, depending on data distribution. Categorical variables were compared using Chi-square or Fisher's exact test as appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

[Table 1] presents the demographic profile of the 90 healthcare workers enrolled in the study. The majority of participants (38.89%) were in the 31–40 years age group, followed by 33.33% in the 21–30 years group. Only 5.56% of participants were aged between 51–55 years. There was a slight female predominance, with 55.56% females and 44.44% males. In terms of marital status, 61.11% of participants were married, while 38.89% were unmarried. Regarding professional roles, 44.44% were nurses, 33.33% were doctors, and 22.22% were paramedical staff. The p-values for gender (p=0.412), marital status (p=0.378), and professional role (p=0.267) indicated no statistically significant difference among demographic categories, suggesting a fairly representative sample without significant demographic bias.

[Table 2] summarizes the shift work characteristics of the participants. A significant proportion (72.22%) of healthcare workers were engaged in rotational shifts that included night duties, whereas only 27.78% were working fixed night shifts. This distribution was statistically significant (p=0.003), indicating a predominance of rotational shift workers among participants. Regarding the duration of exposure to shift work, 38.89% had been working in shifts for 1–3 years, followed by 33.33% for 6 months–1 year, and 27.78% for more than 3 years; however, this difference was not statistically significant (p=0.219). When considering the number of night shifts per month, 44.44% reported working 6–10 night shifts, 33.33% had more than 10 night shifts, and 22.22% worked five or fewer night shifts monthly. The association between the number of night shifts and participant distribution was statistically significant (p=0.041), suggesting that the intensity of night shift work may vary among healthcare workers.

[Table 3] illustrates the prevalence of sleep disorders among the participants, as assessed through standardized sleep indices. Poor sleep quality (PSQI >5) was noted in 64.44% of the participants, indicating a high burden of impaired sleep. Clinical insomnia (ISI ≥15) was observed in 33.33% of participants, while 44.44% demonstrated excessive daytime sleepiness (ESS ≥11). These findings highlight that sleep-related disturbances were widespread among healthcare workers involved in shift duties, though no direct p-value comparison was made within this descriptive analysis.

[Table 4] explores the relationship between shift characteristics and the occurrence of sleep disorders. Among participants with poor sleep quality, 65.52% were working rotational shifts compared to 34.48% on fixed night shifts. Similarly, among those with clinical insomnia, 66.67% were rotational shift workers, whereas only 33.33% were fixed night shift workers. Excessive daytime sleepiness was also more prevalent among rotational shift workers (70%) compared to fixed night shift workers (30%). These associations were statistically significant, with p-values of 0.028 for poor sleep quality, 0.041 for clinical insomnia, and 0.016 for excessive sleepiness. These results suggest a strong correlation between rotational shift patterns and the prevalence of sleep disturbances among healthcare workers.

[Table 5] details self-reported fatigue and napping behavior among the study participants. A large majority (77.78%) reported experiencing fatigue related to their work schedules. Daytime napping behavior was equally divided, with 50% of participants regularly engaging in daytime naps and 50% reporting irregular or no napping behavior. The

association between napping habits and fatigue levels was not statistically significant (p=0.567). Despite the high prevalence of fatigue, napping behavior did not show a meaningful association with reported fatigue, indicating that other factors, such as sleep quality and shift intensity, might play a stronger role.

Table 1: Demographic Profile of Participants (n = 90).

Variable	Frequency (n)	Percentage (%)	p-value
Age Group (years)			0.241
21–30	30	33.33	
31–40	35	38.89	
41–50	20	22.22	
51–55	5	5.56	
Gender			0.412
Male	40	44.44	
Female	50	55.56	
Marital Status			0.378
Married	55	61.11	
Unmarried	35	38.89	
Professional Role			0.267
Doctors	30	33.33	
Nurses	40	44.44	
Paramedical Staff	20	22.22	

Table 2: Shift Work Characteristics.

Variable	Frequency (n)	Percentage (%)	p-value
Type of Shift			
Fixed Night Shift	25	27.78	
Rotational Shift (including nights)	65	72.22	0.003*
Duration of Shift Work Exposure			
6 months – 1 year	30	33.33	
1–3 years	35	38.89	
>3 years	25	27.78	0.219
Average Night Shifts/Month			
≤5 shifts	20	22.22	
6–10 shifts	40	44.44	
>10 shifts	30	33.33	0.041*

Table 3: Sleep Quality and Disorders (Based on PSQI, ISI, and Epworth Scores)

Sleep Parameter	Frequency (n)	Percentage (%)
Poor Sleep Quality (PSQI >5)	58	64.44
Clinical Insomnia (ISI ≥15)	30	33.33
Excessive Daytime Sleepiness (ESS ≥11)	40	44.44

Table 4: Relationship Between Shift Characteristics and Sleep Disorders

Shift Characteristic	Poor Sleep Quality (n=58)	Clinical Insomnia (n=30)	Excessive Sleepiness (n=40)	p-value (for shift type vs outcome)
Fixed Night Shift	20 (34.48%)	10 (33.33%)	12 (30.00%)	
Rotational Shift	38 (65.52%)	20 (66.67%)	28 (70.00%)	Poor Sleep Quality: 0.028* Clinical Insomnia: 0.041* Excessive Sleepiness: 0.016*

Table 5: Self-Reported Fatigue and Napping Behavior

Variable	Frequency (n)	Percentage (%)	p-value
Reported Fatigue	70	77.78	
Regular Daytime Napping	45	50.00	
Irregular/Never Napping	45	50.00	0.567

DISCUSSION

In our study, the majority of healthcare workers were aged between 31–40 years (38.89%) and 21–30 years (33.33%), with a slight female predominance (55.56%) and most participants being married (61.11%). Professionally, nurses constituted the largest group (44.44%), followed by doctors (33.33%) and paramedical staff (22.22%). The p-values for gender, marital status, and professional role were not statistically significant, indicating a balanced distribution across demographics. These findings are consistent with the demographic trends reported by Boivin et al 2014,[9] where younger healthcare professionals were more likely to be engaged in shift work. Similarly, Czyż-Szypenbejl et al 2024,[10] emphasized that female healthcare workers often face higher exposure to shift work-related health risks, partly due to their predominance in nursing roles. The marriage-related stress compounded with shift duties has also been noted by Lee et al 2021,[11] who reported higher psychological

stress in married shift workers compared to unmarried ones, paralleling our demographic profile. The shift work characteristics in our study revealed that 72.22% of participants were engaged in rotational shifts, whereas only 27.78% worked fixed night shifts, a statistically significant finding (p=0.003). Regarding shift exposure, 38.89% had 1–3 years of experience, 33.33% had 6 months–1 year, and 27.78% had more than 3 years. In terms of the number of night shifts per month, 44.44% worked 6–10 night shifts, 33.33% had more than 10, and 22.22% had 0–5 night shifts, with a significant association (p=0.041). These findings align with the observations of Boivin et al 2014,[9] who noted that rotational shifts, compared to fixed shifts, lead to greater circadian misalignment. Similarly, Greubel et al 2016,[12] found that frequent night shifts per month were strongly associated with increased health risks and sleep disturbances. Our data showing predominance of rotational shift workers is similar to Vanttola et al 2020,[13] who found that frequent rotating shifts led to sustained daytime sleepiness even during rest days, mirroring the high burden observed in our study.

The prevalence of sleep disturbances among our participants was alarmingly high. Poor sleep quality (PSQI >5) was found in 64.44% of healthcare workers, clinical insomnia (ISI ≥15) in 33.33%, and excessive daytime sleepiness (ESS ≥11) in 44.44%. These numbers reflect a severe burden of sleep disorders among healthcare workers engaged in shift work. Comparatively, Fadeyi et al 2018,[14] reported similar findings, with 66.1% of nurses suffering from poor sleep and around 40% experiencing insomnia symptoms. American Academy of Sleep Medicine 2014,[15] also documented that shift work disorder is characterized by significant nighttime insomnia and excessive daytime sleepiness, consistent with the findings in our study. Furthermore, Gómez-García et al 2016,[16] linked poor sleep among healthcare workers with reduced quality of patient care, highlighting the broader systemic implications of sleep disturbances, which are highly relevant to our healthcare setting.

In terms of association between shift patterns and sleep disorders [Table 4], our study showed that poor sleep quality was significantly higher among rotational shift workers (65.52%) compared to fixed shift workers (34.48%) (p=0.028). Similarly, clinical insomnia was more prevalent among rotational shift workers (66.67%) compared to fixed (33.33%) (p=0.041), and excessive daytime sleepiness was higher (70% vs. 30%) (p=0.016). These results strongly support the evidence by Waage et al 2014,[17] who reported that rotational shift workers had greater difficulty adapting their circadian rhythms compared to fixed night shift workers. Moreover, Anbazhagan et al 2016,[18] highlighted that rotational shift workers reported higher rates of fatigue and insomnia, reinforcing our findings. Barger et al 2012,[19] also validated that rotating schedules particularly exacerbate sleep disorders compared to stable fixed schedules, which our study demonstrates clearly with statistically significant correlations.

Fatigue and daytime napping behaviors among healthcare workers were widespread, with 77.78% reporting fatigue. Half of the participants (50%) reported regular napping, but there was no statistically significant association between napping behavior and reported fatigue (p=0.567). These results reflect the complex interplay between work demands, sleep deprivation, and recovery mechanisms. Krishnaswamy et al 2016,[20] reported that while daytime naps might provide transient relief from acute sleepiness, they do not reverse the cumulative effects of chronic sleep debt associated with shift work. Similarly, Topp et al 2015,[21] emphasized that worker well-being is primarily influenced by overall sleep quality rather than the presence of compensatory napping. Our findings confirm that napping alone may not be sufficient to counterbalance the profound fatigue stemming from disrupted sleep schedules in shift workers.

CONCLUSION

This study highlights a significant burden of sleep disturbances among healthcare workers engaged in shift work, particularly among those on rotational shifts. Poor sleep quality, clinical insomnia, and excessive daytime sleepiness were notably prevalent. The findings emphasize the urgent need for organizational interventions, such as optimizing shift patterns and promoting sleep hygiene, to safeguard the health and performance of healthcare professionals.

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