

SLEEP PATTERNS AND DAYTIME SLEEPINESS AMONG MEDICAL HEALTH WORKERS: A CROSS-SECTIONAL STUDY

Dr. Haramohan Sahoo^{1*}, Dr. Ashish Jangid², Dr. Abhijeet Tripathi³, Dr. Adityaraj Baburao Maindarge⁴, Dr. Akash Marade⁵

^{1*}D.M. Neurology, Assistant Professor, Department of Neurology, Heritage Institute of Medical Sciences, Varanasi

Address: Dr. Haramohan Sahoo, Department of Neurology, Heritage Institute of Medical Sciences, Grand Trunk Road, Bhadwar, Varanasi, 221311, Email: haramohan.neuro@gmail.com

²Junior Resident, Department of General Medicine, Heritage Institute of Medical Sciences, Varanasi, Address: Dr. Ashish Jangid, Department of General Medicine, Heritage Institute of Medical Sciences, Grand Trunk Road, Bhadwar, Varanasi, 221311, Email: jangidashish9@gmail.com

³Junior Resident, Department of General Medicine, Heritage Institute of Medical Sciences, Varanasi, Address: Dr. Abhijeet Tripathi, Department of General Medicine, Heritage Institute of Medical Sciences, Grand Trunk Road, Bhadwar, Varanasi, 221311, Email : Abhijeet.tripathi16926@gmail.com

⁴Junior Resident, Department of General Medicine, Heritage Institute of Medical Sciences, Varanasi, Address: Dr. Adityaraj Baburao Maindarge, Department of General Medicine, Heritage Institute of Medical Sciences, Grand Trunk Road, Bhadwar, Varanasi, 221311, Email: amaindarge@gmail.com

⁵Junior Resident, Department of General Medicine, Heritage Institute of Medical Sciences, Varanasi Address: Dr. Akash Marade, Department of General Medicine, Heritage Institute of Medical Sciences, Grand Trunk Road, Bhadwar, Varanasi, 221311, Email: maradeakash555@gmail.com

ABSTRACT

The irregular schedules, extended work hours, night shifts, work stress and inadequate recovery periods are all risk factors for poor sleep quality and daytime sleepiness among healthcare workers. This is a cross-sectional observation study to measure sleep quality, daytime somnolence and its relationship to medical health workers. The study was carried out for one month with 101 participants (doctors, nurses, and Paramedical staff). Only paired Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness Scale (ESS) information was available for 91 respondents. Poor sleep quality was defined as a PSQI score > 5 , and excessive daytime sleepiness was defined as an ESS score > 10 . Of those that answered, 58 (63.7%) had poor sleep quality and 22 (24.2%) had excessive daytime sleepiness. There was also a strong positive correlation between the PSQI and ESS scores ($r = 0.325$, $p = 0.0016$), suggesting that increased sleepiness on the day was related to decreased sleep quality. However, there was no statistical difference between the PSQI scores of the shift workers and non-shift workers ($t = 0.524$, $p = 0.601$). There was a trend towards poorer sleep quality among night-shift workers than other workers, but this was not statistically significant ($t = 1.989$, $p = 0.074$). The results show that sleep disturbances are prevalent among medical health workers and suggest that shift scheduling, recovery time, educating about sleep hygiene and implementing fatigue-risk management systems should be improved.

KEYWORDS: Sleep quality; Daytime sleepiness; Healthcare workers; Pittsburgh Sleep Quality Index; Epworth Sleepiness Scale.

INTRODUCTION

Sleep is a basic biological function necessary for the maintenance of physical, cognitive, emotional and attentional health. Poor or disrupted sleep is of special concern in healthcare settings, as it can impact clinical decision-making, productivity, safety and provision of patient care. Healthcare professionals often report poor sleep quality and daytime sleepiness, and occupational stress, long working hours, rotating shifts and lack of sleep on the previous day were seen as important factors contributing to these issues (Carvalho et al., 2021). The hospital is always in service, and its workers usually have irregular working times. Given the lack of work to date in this area, a survey was performed in French public hospitals where the results confirmed the importance of sleep behavior and sleep disorders in healthcare professions (Bouchou et al., 2024). Shift work, which involves working at night and sleeping during the day, may also affect regular circadian rhythms and thus the quality and quantity of sleep. The impact of night work on sleep quality and daytime sleepiness can also be different according to gender (Lecca et al., 2023). Shift-work sleep disorder is an important occupational health problem among hospital employees.

One study in public hospitals in Ethiopia also found that changes in work hours are linked to clinically significant sleep problems among healthcare professionals (Adane et al., 2022). Likewise, healthcare workers (HCWs) have been shown to suffer from poor sleep hygiene and have compromised psychosocial and physical health due to night work (Qanash et al., 2021). Workers may then suffer daytime sleepiness as a result of failing to get good and uninterrupted sleep between one job and the next (Zabin, 2023). The impact of rotating schedules can be altered by circadian preference and/or individual adaptation. Daytime sleepiness and sleep disturbance may differ depending on the shift work type and chronotype of healthcare workers (Kılıç et al., 2023). A comparison between shift-duty workers and day-duty workers also indicates that the timing of the work can affect alertness during the daytime (Borkhatariya & Patil, 2024). Residents

are particularly sensitive to the impact of long working hours, academic commitments, and the demands of clinical practice on their sleep and daytime performance, which act together to impair performance (Jassem et al., 2022). Shift-work sleep disorder also has a significant impact on nurses who rotate their work hours or work at night (Abate et al., 2023).

Emergency workers may suffer sleep disturbance in combination with occupational stress and musculoskeletal pain, suggesting the sleep issues are shaped by multiple factors in the workplace and health (Dong et al., 2022). There are also cross-national data indicating that sleep disturbance is correlated with work-schedule attributes such as shift length, shift timing, and shift recovery among healthcare workers (Min & Hong, 2022). Shift work can have implications other than simply sleep. Disrupted sleep/wake schedules may affect the eating habits, physical activity and daytime sleepiness of healthcare workers (Farias et al., 2020). In addition, our sleep quality has been linked to overweight and obesity status in healthcare workers, highlighting the metabolic importance of sleep (Huang et al., 2024). Occupational and individual factors could be independent risk factors for poor sleep, among hospital-based nurses (Almhdawi et al., 2021). Vulnerability also starts during professional training because medical students have also reported sleep problems (Aderinto et al., 2024).

Under-graduate medical students have also been reported to have excessive daytime sleepiness (Roka et al., 2020). As noted above, sleep problems are also a concern in older adults living in the community, but healthcare workers are a high-risk group that should be evaluated in a special way (Gordon et al., 2022). The Pittsburgh Sleep Quality Index (PSQI) is a validated tool that measures subjective sleep quality in a number of domains (Buysse et al., 1989). The Epworth Sleepiness Scale (ESS) is a standardized assessment for the risk of sleepiness during common daytime situations (Johns, 1991). Nurses have been found to vary in their quality of sleep and vigilance based on their work unit and shift pattern (Surani et al., 2015). Daytime napping could be a compensatory mechanism for inadequate nighttime sleep, but it might not be sufficient to restore alertness (Dhand & Sohal, 2006). A central mechanism by which shift work disrupts normal sleep and wakefulness is called circadian misalignment (Akerstedt, 2003).

The developed study's goal was to ascertain the medical health workers' sleep habits and levels of daytime tiredness. Physicians, nurses, and paramedics on different duty schedules made up this group. The study's objectives were to resolve the frequency of poor sleep quality using the PSQI, the degree of excessive daytime drowsiness using the ESS, the correlation between PSQI and ESS scores, and the effect of shift and night duty on sleep quality.

2. MATERIALS AND METHODS

2.1 Study Design and Setting

A cross sectional observational study was undertaken to examine sleep patterns, sleep quality and daytime sleepiness in the medical health workers. The research was conducted for 1 month. The study involved health care workers in medical environment especially doctors, nurses, paramedical staff etc.

2.2 Study Population and Sample

The study involved 101 medical health professionals. However, 91 participants had complete data for both the Epworth Sleepiness Scale and the Pittsburgh Sleep Quality Index, and these responses were used in the main analysis. The participants included doctors, nurses, paramedics, and other health care professionals.

2.3 Data Collection Instruments

In order to evaluate subjective sleep quality and sleep-related disturbances, the PSQI, a validated self-reported questionnaire, was employed. In the current study, sleep quality issues were indicated by a global PSQI score more than 5.

The ESS, a measure of the likelihood of falling asleep during regular everyday activities, was used to gauge how sleepy the body felt during the day. An ESS score greater than 10 was considered excessive daytime drowsiness. To find out if there were any variations in daytime alertness and sleep quality across the various shift job types, the participants' shift types and night duty status were also considered.

2.4 Outcome Measures and Statistical Analysis

The incidence of poor sleep quality and excessive daytime sleepiness were among the key findings. Excessive daytime drowsiness was defined as ESS scores > 10, and poor sleep quality was defined as PSQI scores > 5. PSQI and ESS scores, as well as variations in sleep quality by shift and night duty status, were additional secondary outcomes. Descriptive statistics were used to summarise the data.

The frequency of poor sleep quality and excessive daytime sleepiness was reported using frequencies and percentages. The relationship between PSQI and ESS scores was examined using Pearson's correlation coefficient. The PSQI scores of shift workers and non-shift workers, as well as night shift workers and workers on a different shift, were compared using independent-samples t-tests. The analytical strategy also mentioned logistic regression, although the source document has no regression outputs. Statistical meaning was defined as a P value of less than 0.05.

2.5 Ethical Considerations

The study was being conducted after ethical approval and informed consent. Participation was voluntary, confidentiality was maintained, and missing approval details were to be added from the original records.

3. RESULTS

3.1 Participant Response and Data Completeness

There were 101 health workers who took part in the study. 91 (89.9% valid responses) subjects were able to provide complete paired data for both the PSQI and the ESS. The final analysis was then restricted to the participants of these 91. Demographic and occupational distributions were not available separately for doctors, nurses, and paramedical workers. According to the results presented in Table 1, 101 medical health workers participated in this study, with 91 (90.1%) having complete paired Pittsburgh Sleep Quality Index and Epworth Sleepiness Scale responses, and 10 (9.9%) having incomplete or unpaired responses.

Table 1. Participant response and completeness of sleep-assessment data

Participant status	Number	Percentage
Total respondents	101	100.0
Valid paired PSQI and ESS responses	91	90.1
Incomplete or unpaired responses	10	9.9

3.2 Prevalence of Poor Sleep Quality and Excessive Daytime Sleepiness

Amid the 91 participants who gave valid paired responses had a PSQI > 5, indicating poor sleep quality. Poor sleep quality was informed by 63.7% of the individuals. Twenty-two individuals (24.2% of the valid sample) had excessive daytime drowsiness (ESS score >10). On the other hand, extreme daytime sleepiness was more prevalent than poor sleep quality. Approximately 25% of medical professionals experienced clinical daytime somnolence, and 66% of them had poor sleep quality. Table 2 shows that 22 participants (24.2%) scored higher than 10 on the Epworth Sleepiness Scale, and 58 participants (63.7%) had poor sleep quality (PSQI score > 5). According to Figure 1, poor sleep quality was much more common than excessive daytime drowsiness (63.7% vs. 24.2%, respectively).

Table 2. Prevalence of poor sleep quality and excessive daytime sleepiness

Sleep-related outcome	Cut-off criterion	Frequency	Percentage
Poor sleep quality	PSQI > 5	58	63.7
Excessive daytime sleepiness	ESS > 10	22	24.2

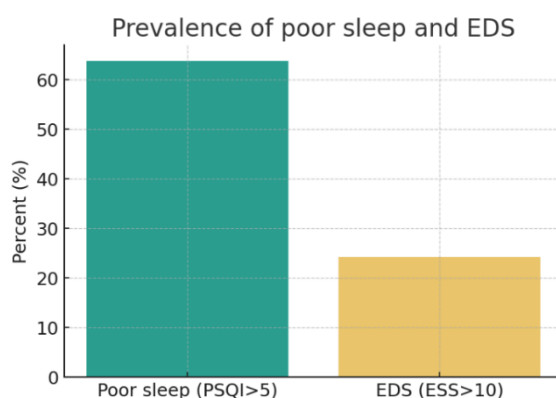


Figure 1. Prevalence of poor sleep quality and excessive daytime sleepiness among medical health workers

3.3 Distribution of PSQI and ESS Scores

PSQI scores and ESS scores showed that the sleep quality and daytime drowsiness were variable in the study population. The PSQI histogram demonstrated that participants had scores spread over a wide range with a significant number having scores over the threshold of 5. The distribution was similar to the high levels of weak sleep quality seen in the sample. The ESS histogram also showed similarity in daytime sleepiness score. The scores were below the score-cut off of 10 in most participants, but a separate sub-group had elevated scores that were indicative of excessive daytime sleepiness. Mean, median, standard deviation and range of scores were not reported in the source document and should not be inferred from the graphical presentation alone. Figure 2 shows the distribution of Epworth sleepiness scale scores with the majority having scores below the threshold for excessive daytime sleepiness and a smaller proportion having higher scores. Figure 3 reports the allocation of Pittsburgh Sleep Quality Index scores for all the participants, with a significant sample having scores greater than 5 and thus indicating poor sleep quality.

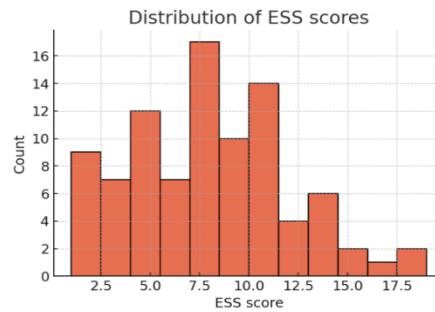


Figure 2. Distribution of Epworth Sleepiness Scale scores among participants

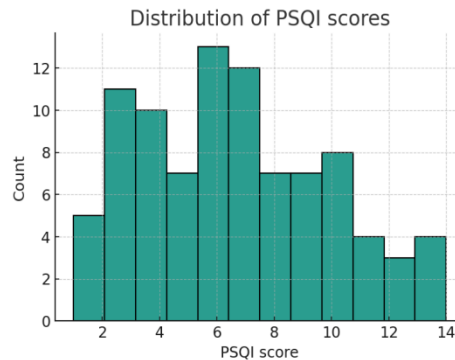


Figure 3. Distribution of Pittsburgh Sleep Quality Index scores among participants

3.4 Relationship Between Sleep Quality and Daytime Sleepiness

Pearson correlation analysis showed that there was a helpful correlation between PSQI and ESS that was statistically significant. The correlation coefficient observed is $r=0.325$, $p=0.0016$. This discovery suggests that those who had less quality sleep also had more daytime sleepiness. While the correlation was somewhat small, it wasn't negligible. The scatter plot showed the upward trend with the ESS scores generally increasing with PSQI scores. Table 3 demonstrates a statistically significant positive relationship between the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale scores ($r = 0.325$, $p = 0.0016$), such that higher scores in the Epworth Sleepiness Scale were accompanied by lower scores in the PSQI, meaning that developed scores on the ESS were correlated with shoddier sleep quality as measured by the Pittsburgh Sleep Quality Index. There was an increasing trend between the Pittsburgh Sleep Quality Index and Epworth Sleepiness Scale scores (Figure 4), indicating that an overall tendency was that worsening sleep value was frequented with increased daytime sleepiness.

Table 3. Correlation between PSQI and ESS scores

Variables compared	Correlation coefficient	p-value	Interpretation
PSQI score and ESS score	0.325	0.0016	Significant positive correlation

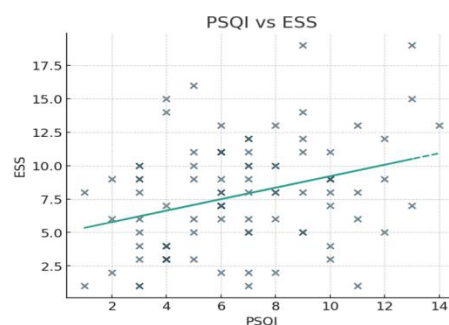


Figure 4. Scatter plot showing the relationship between PSQI and ESS scores

3.5 Comparison According to Shift and Night-Duty Status

When comparing the PSQI scores of shift workers and non-shift workers, the t and p values were 0.524 and 0.601, respectively. Since the p value was higher than 0.05, the difference between these groups was not statistically significant. When compared to employees working different shifts, a t value of 1.989 and a p value of 0.074 were found. There was a tendency for night-shift workers to have poorer sleep quality, though this was not statistically noteworthy. The available document also reported that the night-shift workers showed higher PSQI and ESS score, but the mean and standard deviation for each group were not provided.

4. DISCUSSION

This study showed a significant problem of sleep troubles among health care experts. The 91 participants who gave paired responses had poor sleep quality (63.7%) and extreme daytime sleepiness (24.2%). The results showed that while sleep impairment was more prevalent than clinically significant daytime somnolence, it did impact a significant number of workers. Previous studies have found that health professionals have a high prevalence of poor sleep and daytime sleepiness, which are associated with occupational and personal factors (Carvalho et al., 2021). High occurrence of poor sleep quality found in this study might be explained by irregular and long work hours, work stress and lack of sleep between shifts. French public hospitals' healthcare workers have also experienced sleep disruptions and sleep disturbances (Bouchou et al., 2024).

In hospital-based nurses, work-related and individual predictors have been proved to affect sleep quality, indicating that this is a multifactorial issue (Almhdawi et al., 2021). Almost one-quarter of the study participants had excessive daytime sleepiness. This is of occupational significance as daytime sleepiness can impair vigilance, concentration, reaction time and decision-making. Healthcare workers who perform shift and daytime work have also been reported as having symptoms of daytime sleepiness, but the severity of daytime sleepiness may vary due to work pattern (Borkhatariya & Patil, 2024).

The resident physicians may be especially susceptible due to longer working hours and the lack of recovery sleep (Jassem et al., 2022). There was a positive correlation that was statistically significant between PSQI and ESS scores. A 0.325 correlation coefficient showed that there was a correlation between lack of sleep and daytime sleepiness. Not sleep-disrupted sleep appears to be modestly related to decreased alertness during the day. Healthcare workers who work shifts also have been reported to have similar associations between sleep quality, their work schedules, and daytime somnolence (Kılıç et al., 2023). It also corroborates the combined use of the PSQI and ESS, as the two tools measure different aspects of sleep health that are related, but not the same. There was no statistically significant difference relating PSQI scores of shift and non-shift workers. However, if a result is not significant, this does not mean that the result is not an occupational effect. The duration, intensity, rotation, and recovery of work schedules can vary from one another and can have independent effects on sleep disturbance (Min & Hong, 2022). The small sample size and/or the small integer of subgroups may also have decreased the statistical power to find a significant difference. No statistical significance was found in the tendency of night-shift workers to have poorer sleep. The pattern is similar to that found following overnight work, which causes biological effects known as circadian misalignment (Akerstedt, 2003).

An investigation among healthcare specialists has demonstrated that night shifts can have a bad impact on sleep patterns, psychosocial and physical wellbeing (Qanash et al., 2021). Additionally, the response to night shift exposure may be modified by gender and/or personal circadian preference (Lecca et al., 2023). The results are also consistent with previous findings that shift-work sleep disorder is found among hospital workers and nurses (Adane et al., 2022). Nurses who have a rotating shift schedule might find it hard to fall and stay asleep, or feel tired during their shift (Abate et al., 2023). Occupational stress and physical discomfort could be another factor that affects sleep disturbances for emergency healthcare workers (Dong et al., 2022). Roughly, poor sleep can have implications for health as well. Shift work has been linked to changes in eating habits, decreased physical activity and daytime sleepiness (Farias et al., 2020). The lack of sleep quality could also be a factor in overweight and obesity among healthcare professionals (Huang et al., 2024).

Sleep disturbance should, therefore, be considered an occupational safety issue as well as a broader public health problem. Increased strength of the study is that the PSQI and ESS are validated scales. It is not, however, causal because of its cross-sectional design, and is subject to reporting or recall bias due to self-reported measures. There is a relatively small effective sample size, and the paired data may be incomplete, which may be limiting in terms of comparisons of subgroups. Future, multicentre studies should involve larger numbers of participants, objective sleep assessment, detailed shift characteristics, and stress, workload, caffeine usage, mental health, and chronic illness data analysis. These institutional measures involve rational shift scheduling, recovery periods, fatigue-risk management, sleep-hygiene education and provision of psychological assistance.

5. CONCLUSION

In the present cross-sectional study, the authors have found that sleep disturbance is an important occupational health concern where poor sleep quality and daytime drowsiness occur frequently among restorative health workers. In the group of individuals who responded to the survey, almost two thirds reported poor sleep and around a fourth reported excessive daytime sleepiness. The results suggest that daytime somnolence was reported by a smaller proportion of participants, but that poor sleep value was common among all study participants. Further, the strong positive relationship between PSQI and ESS scores indicates that a worsening on the PSQI is linked to an increase in daytime sleepiness, importance the close relationship between nocturnal sleep and daytime functioning. Differences between shift status were not statistically significant, although healthcare workers who worked at night indicated poorer sleep quality than those who worked other shifts. However, the current study results suggest that the pattern would align with previous evidence that irregular work hours and circadian disruption could have a harmful impact on sleep health. Using validated assessment tools such as the PSQI and ESS helps to increase the reliability of the results and offers tools to use in an occupational health setting to screen patients routinely. The study highlights the value of sleep health as a key factor in workforce well-being and patient safety in healthcare. Optimized shift scheduling, sufficient recovery time between shifts, sleep hygiene education, fatigue-risk management, and workplace psychological support can be potential ways to mitigate sleep-related issues and enhance workplace performance. Future multicentre studies with larger and more miscellaneous samples, objective sleep assessment, and longitudinal follow-up are suggested to gain further insights into the factors associated with sleep disturbance and to better assess interventions designed to foster a healthier sleep pattern in health care workers.

REFERENCES

1. Abate, H., Letta, S., Worku, T., Tesfaye, D., Amare, E., & Mechal, A. (2023). Shiftwork sleep disorder and associated factors among nurses working at public hospitals in Harari Regional state and Dire Dawa Administration, Eastern Ethiopia: a cross-sectional study. *BMC nursing*, 22(1), 118.
2. Adane, A., Getnet, M., Belete, M., Yeshaw, Y., & Dagnaw, B. (2022). Shift-work sleep disorder among health care workers at public hospitals, the case of Sidama national regional state, Ethiopia: A multicenter cross-sectional study. *PloS one*, 17(7), e0270480.
3. Aderinto, N., Olatunji, G., Afolabi, S., Muili, A., Olaniyi, P., Edun, M., & Olakanmi, D. (2024). Sleep patterns and quality among Nigerian medical students: A cross-sectional study. *Medicine*, 103(12), e37556.
4. Akerstedt T. (2003). Shift work and disturbed sleep/wakefulness. *Occupational medicine (Oxford, England)*, 53(2), 89–94. <https://doi.org/10.1093/occmed/kqg046>
5. Almhdawi, K. A., Alrabbaie, H., Obeidat, D. S., Kanaan, S. F., Alahmar, M. D. R., Mansour, Z. M., & Oteir, A. O. (2021). Sleep quality and its predictors among hospital-based nurses: a cross-sectional study. *Sleep and Breathing*, 25(4), 2269–2275.
6. Borkhatariya, A. S., & Patil, D. M. (2024). Daytime sleepiness in health-care employees: A cross-sectional study between shift duty and day duty. *National Journal of Physiology, Pharmacy and Pharmacology*, 14(6), 1164–1168.
7. Bouchou, Y., Giffard-Quillon, L., Fontana, L., Roche, F., Pélissier, C., & Berger, M. (2024). Sleep habits and disturbances in healthcare workers: a cross-sectional survey in French public hospitals. *Nature and Science of Sleep*, 1687–1698.
8. Buysse, D. J., Reynolds, C. F., 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, 28(2), 193–213. [https://doi.org/10.1016/0165-1781\(89\)90047-4](https://doi.org/10.1016/0165-1781(89)90047-4)
9. Carvalho, V. P., Barcelos, K. A., Oliveira, E. P. D., Marins, S. N., Rocha, I. B. S., Sousa, D. F. M. D., ... & Mendonça, C. R. (2021). Poor sleep quality and daytime sleepiness in health professionals: prevalence and associated factors. *International Journal of Environmental Research and Public Health*, 18(13), 6864.
10. Dhand, R., & Sohal, H. (2006). Good sleep, bad sleep! The role of daytime naps in healthy adults. *Current opinion in pulmonary medicine*, 12(6), 379–382. <https://doi.org/10.1097/01.mcp.0000245703.92311.d0>
11. Dong, H., Zhang, Q., Zhang, Z., & Zhu, C. (2022). Association of sleep disturbance with shift work, occupational stress, and musculoskeletal pain in Chinese public hospital emergency workers: A multicentre cross-sectional study. *Chronobiology International*, 39(6), 886–894.
12. Farias, R., Sepúlveda, A., & Chamorro, R. (2020). Impact of shift work on the eating pattern, physical activity and daytime sleepiness among Chilean healthcare workers. *Safety and health at work*, 11(3), 367–371.
13. Gordon, N. P., Yao, J. H., Brickner, L. A., & Lo, J. C. (2022). Prevalence of sleep-related problems and risks in a community-dwelling older adult population: a cross-sectional survey-based study. *BMC public health*, 22(1), 2045.
14. Huang, H., Yu, T., Liu, C., Yang, J., & Yu, J. (2024). Poor sleep quality and overweight/obesity in healthcare professionals: a cross-sectional study. *Frontiers in public health*, 12, 1390643.
15. Jassem, M., Abdelwahed, R. N., Alyousbashi, A., & Meer, A. (2022). Evaluation of daytime sleepiness and sleep quality among resident physicians of Damascus: A cross-sectional study. *Sleep Epidemiology*, 2, 100035.
16. Johns M. W. (1991). A new method for measuring daytime sleepiness: the Epworth sleepiness scale. *Sleep*, 14(6), 540–545. <https://doi.org/10.1093/sleep/14.6.540>
17. Kılıç, A., Koran, S., & Ağargün, M. Y. (2023). Healthcare shift workers' sleep quality, daytime sleepiness, and circadian preference. *Comprehensive medicine*, 15(2), 156–164.
18. Lecca, R., Figorilli, M., Casaglia, E., Cucca, C., Meloni, F., Loscerbo, R., ... & Puligheddu, M. (2023). Gender and nightshift work: a cross-sectional study on sleep quality and daytime somnolence. *Brain Sciences*, 13(4), 607.
19. Min, A., & Hong, H. C. (2022). Work schedule characteristics associated with sleep disturbance among healthcare professionals in Europe and South Korea: a report from two cross-sectional surveys. *BMC nursing*, 21(1), 189.
20. Qanash, S., Alwafi, H., Barasheed, S., Bashnaini, S., Andergiri, R., Yaghmour, L., ... & Alsylwid, B. (2021). Impact of night shifts on sleeping patterns, psychosocial and physical well-being among healthcare professionals: a cross-sectional study in a tertiary hospital in Saudi Arabia. *BMJ open*, 11(9), e046036.
21. Roka, K., Khadka, S., Dahal, S., Yadav, M., Thapa, P., & Kc, R. (2020). Excessive daytime sleepiness among first to fourth year undergraduate students of a medical college in Nepal: a descriptive cross-sectional study. *JNMA: Journal of the Nepal Medical Association*, 58(229), 640.
22. Surani, S., Hesselbacher, S., Guntupalli, B., Surani, S., & Subramanian, S. (2015). Sleep Quality and Vigilance Differ Among Inpatient Nurses Based on the Unit Setting and Shift Worked. *Journal of patient safety*, 11(4), 215–220. <https://doi.org/10.1097/PTS.0000000000000089>
23. Zabin, L. M. (2023). Prevalence of sleepiness and associated factors among healthcare staff: a cross-sectional study in a university hospital in Palestine. *Palestinian Medical and Pharmaceutical Journal (Pal. Med. Pharm. J.)*, 9(3), 279–292.