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The Effect of Shift Work on the Overall Health Status of Hospital

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ABSTRACT

Background: Shift work, particularly common in the nursing profession, is associated with numerous health risks for workers, including physical, psychological, and social well-being concerns. Nurses, who often work irregular hours, including night shifts, are vulnerable to stress, sleep disturbances, and various health issues. Previous research has shown that shift work negatively impacts health outcomes such as gastrointestinal disturbances, metabolic syndrome, and cardiovascular health. This study aims to evaluate the effect of shift work on the overall health status of hospital-employed nursing staff.

Methods: A comparative cross-sectional study was conducted with 157 nursing professionals. Participants were divided into two groups: 80 shift workers (12-hour day shifts, 12-hour night shifts) and 77 workers on a regular 7-hour daily schedule. Data were collected using the Standard Shiftwork Index (SSI) questionnaire, supplemented with subscales for gastrointestinal and cardiovascular health. The questionnaire addressed symptoms of common diseases and medical history, with responses rated on a four-point scale. Statistical analyses were performed using IBM SPSS, including independent samples t-tests and chi-square tests.

Results: Shift workers reported significantly more gastrointestinal symptoms, including appetite loss, nausea, heartburn, and weight gain compared to those working regular shifts. The shift work group also experienced higher overall digestive disturbances ($M=11.30$ vs. $M=9.40$, $p<0.001$) and had a higher incidence of varicose

veins and headaches. However, no significant differences were observed in cardiovascular health between the two groups. A significant correlation was found between years of service and health burden in those working regular shifts, but not in shift workers.

Conclusion: Shift work is a significant risk factor for gastrointestinal issues and metabolic disturbances, especially weight gain, among nursing staff. The study highlights the need for interventions to address the physical and psychological challenges of shift work. Further research is needed to standardize methodologies and explore the impact of shift work rotation patterns, duration, and frequency to better understand its health implications and develop effective preventive strategies.

KEYWORDS: shift work, health, hospital.

1. Introduction

The term "shift work" typically describes the organization of daily working hours where different individuals or teams work in succession to cover periods extending beyond the standard eight-hour day, potentially spanning the full 24 hours. This has become an increasingly common societal phenomenon (Buja et al., 2013; McDowall et al., 2017). Shift work is especially prevalent in the nursing profession, where it is recognized as a workplace hazard with detrimental effects on both patient and provider safety, as well as healthcare delivery outcomes (Caruso et al., 2014; McDowall et al., 2017). Given that workers' health encompasses physical, psychological, and social well-being (Rosa et al., 2019), it is essential to comprehensively assess how shift work influences these dimensions.

Research in the healthcare sector indicates that shift work, particularly night shifts, can negatively affect workers' health and well-being, as human biology is naturally synchronized with the light-dark cycle (Reppert & Weaver, 2002; Savic et al., 2019). Nursing professionals already experience elevated stress levels (Neuberg et al., 2017; 2019). Prior studies have demonstrated that nurses working shifts face heightened stress, reduced coping mechanisms, and diminished life satisfaction compared to those following a standard daytime schedule (Ljevak et al., 2020). Additionally, higher levels of anxiety, stress, and sleep disturbances have been observed among shift-working nurses, coupled with lower social functioning and decreased family and leisure time (Ljevak et al., 2020).

A systematic review of the relationship between shift work and nurses' health highlights that sleep disturbances associated with shift work can lead to lower dietary quality, higher body mass index, reduced physical activity, and an increased prevalence of hypertension (Rosa et al., 2019). Furthermore, the combination of sleep disruption and night shifts has been linked to an elevated risk of type 2 diabetes (Tranmer, 2013), impaired glucose tolerance, and metabolic syndrome, with potential cardiovascular implications (Pietroiusti et al., 2010). Other research suggests that shift work may significantly impact gastrointestinal health (Chang & Peng, 2021), although these effects are not yet fully understood.

Addressing the negative outcomes of shift work, particularly from a psychological

perspective, requires fostering resilience. Resilience refers to the ability to recover from stress or adversity with adaptive and competent functioning (Southwick et al., 2014). Psychological resilience encompasses key aspects such as self-awareness, self-motivation, self-esteem, self-efficacy, self-affirmation, and self-actualization (Jakovljević, 2018). Therefore, interventions addressing mental health and resilience are critical in mitigating the physical and psychological consequences of shift work. However, further research is needed to solidify the connection between shift work and physical diseases.

In this context, evaluating the effects of shift work on health outcomes, including gastrointestinal, cardiovascular, and other systemic impacts, provides an opportunity to better understand its implications, especially when compared to regular daytime schedules.

2. Subjects and Methods

This study employed a comparative cross-sectional design, conducted . A total of 157 nursing professionals participated in the study, comprising 135 (86%) females and 22 (14%) males. The average age of the participants was 33.3 years (age range: 20–54, SD = 8.033). The participants were divided into two groups: one group included 80 (51%) individuals who worked in specific shift patterns (12-hour day shift / 24 hours off / 12-hour night shift / 48 hours off), while the second group consisted of 77 (49%) individuals who followed a regular daily schedule of seven working hours (from 7:30 AM to 2:30 PM).

Both groups completed six scales from the Standard Shiftwork Index (SSI) questionnaire, along with questions about general socio-demographic data (Barton et al., 1995). The health and well-being assessment included nine items, primarily addressing common disease symptoms and medical history, along with two standardized subscales to measure gastrointestinal and cardiovascular disorders, which are prevalent among shift workers. These subscales were developed from existing health measures and in consultation with specialists in gastroenterology and cardiology. The questionnaire used a four-point response scale to minimize a tendency towards central answers: "almost never," "quite seldom," "quite often," and "almost always." The higher average scores on the scales and subscales indicated poorer overall health.

Data were collected and organized in an MS Excel database, and statistical analysis was performed using IBM SPSS Statistics for Windows. Descriptive statistics were used for initial data processing, with categorical variables presented as frequencies (N) and percentages (%), and continuous variables expressed as means (M) and standard deviations (SD). Chi-square tests were used to assess differences between categorical variables, while independent samples t-tests were used for continuous variables. The normality of the data distribution was tested using the Shapiro-Wilk test. Factor analysis, using principal components analysis with varimax rotation, was applied to verify the factor structure of the scales. Bartlett's test was used to determine the significance of the correlation matrix, and the Kaiser-Meyer-Olkin measure assessed the suitability of the correlation matrix for factorization. Statistical

significance was set at $p \leq 0.05$ (two-sided).

3. Results

The study revealed significant differences between the two groups of hospital nursing professionals in terms of their health status. Shift workers experienced notably more digestive and gastrointestinal issues. Specifically, they reported higher frequencies of appetite loss (M=2.51), nausea (M=2.19), heartburn (M=2.34), and weight gain (M=2.46) compared to those on a daily schedule, whose scores were lower (M=2.04 for appetite loss, M=1.70 for nausea, M=1.99 for heartburn, and M=2.08 for weight gain) (Table 1). No significant differences were found for other symptoms (Table 1).

When examining overall digestive disturbances, the shift work group showed a significantly higher symptom burden, with a greater number of reported symptoms (M=11.30) compared to those working a daily schedule (M=9.40), with a significant difference found (t= -4.283, p<0.001). In contrast, no significant differences were observed in the severity of cardiovascular disorders between the two groups (p=0.411) (Table 1).

A comparison of the prevalence of acute and chronic conditions showed an increase in most health issues after employees began their respective work schedules. However, shift workers had a significantly higher incidence of varicose veins (p=0.037) and headaches (p=0.001) than those on the daily schedule (Table 2).

A significant correlation was found between the length of employment and the frequency of symptoms and diseases, but this was only evident in employees working the daily schedule. Specifically, individuals with more years of service reported a higher disease burden.

Table 1. A comparison of individual and overall symptom burden pertaining to digestive and cardiovascular health between the two groups of hospital nursing professionals (daily schedule vs. shift work)

Symptom / Disturbance	Group	M	SD	t	df	p
Appetite loss	Daily schedule	2.04	0.865	-3.020	150	0.003*
	Shift work	2.51	1.091			
Nausea	Daily schedule	1.70	0.779	-3.748	155	0.000*
	Shift work	2.19	0.843			
Heartburn	Daily schedule	1.99	0.966	-2.196	155	0.030*
	Shift work	2.34	1.030			
Heart palpitations	Daily schedule	2.08	0.885	-0.809	155	0.420
	Shift work	2.20	0.999			
Vertigo	Daily schedule	1.79	0.848	-0.231	155	0.817
	Shift work	1.83	0.925			
Hypertension	Daily schedule	1.49	0.641	-0.770	155	0.443
	Shift work	1.59	0.867			
Weight gain	Daily schedule	2.08	1.167	-1.971	155	0.050*
	Shift work	2.46	1.272			
Weight loss	Daily schedule	1.60	0.862	-1.348	155	0.180
	Shift work	1.80	1.011			
Total: digestive	Daily schedule	9.40	2.637	-4.283	155	<0.001*
	Shift work	11.30	2.901			

Total: cardiovascular	Daily schedule	5.36	1.693	-0.824	155	0.411
	Shift work	5.61	2.065			

Denotes statistical significance.

Table 2. A breakdown of specific symptoms and/or diseases developed before or after placement of nursing personnel in either daily schedule or shift work

Diseases	Daily Schedule	Shift Work	Z^2	p
Developed before placement				
Chronic back pain	8 (10.4%)	8 (10.0%)	0.229	0.632
Gastritis	2 (2.6%)	4 (5.0%)	0.534	0.465
Stomach ulcer	3 (3.8%)			
Sinusitis, tonsillitis	6 (7.8%)	21 (26.3%)	0.046	0.830
Asthma	3 (3.9%)	3 (3.8%)		
Angina pectoris	5 (6.3%)			
Heart attack	1 (1.3%)	1 (1.3%)		
Hypertension	4 (5.2%)	11 (13.8%)	3.323	0.068
Cardiac arrhythmia	1 (1.3%)	2 (2.5%)	1.638	0.201
Hypercholesterolemia	5 (6.5%)	12 (15.0%)	2.94	0.086
Diabetes	2 (2.6%)	3 (3.8%)		
Eczema	3 (3.9%)	6 (7.5%)		
Chronic anxiety	7 (9.1%)	8 (10.0%)	0.038	0.845
Depression	1 (1.3%)	1 (1.3%)	0.143	0.705
Haemorrhoids	7 (9.1%)	7 (8.8%)	0.635	0.426
Varicose veins	2 (2.6%)	2 (2.5%)	4.355	0.037*
Anaemia	4 (5.2%)	11 (13.8%)	0.543	0.461
Headaches	11 (14.3%)	9 (11.3%)	10.16	0.001*
Developed after placement				
Chronic back pain	27 (35.1%)	31 (38.8%)	0.229	0.632
Gastritis	16 (20.8%)	13 (16.3%)	0.534	0.465
Sinusitis, tonsillitis	6 (7.8%)	8 (10.0%)	0.046	0.830
Hypertension	1 (1.3%)	3 (3.8%)	3.323	0.068
Cardiac arrhythmia	5 (6.5%)	10 (12.5%)	1.638	0.201
Hypercholesterolemia	1 (1.3%)	2 (2.5%)	2.94	0.086
Eczema	1 (1.3%)	6 (7.5%)		
Chronic anxiety	1 (1.3%)	10 (12.5%)	0.038	0.845
Headaches	17 (22.1%)	37 (46.3%)	10.16	0.001*

Denotes statistical significance.

4. Discussion

One of the defining features of inpatient care is the constant availability of nursing staff in healthcare institutions, particularly in hospitals, which often necessitates the involvement of nurses in night shifts (Gershengorn & Garland, 2016). This study compared nurses working on daily schedules with those working shifts, providing foundational data and evaluating the potential link between shift work and adverse health effects. Our findings align with previous research suggesting that shift work is associated with increased health risks for nurses, particularly regarding their overall well-being (Rosa et al., 2019; Zhang et al., 2020; Chang & Peng, 2021). It is important to raise awareness of these issues among nursing professionals, as they may not fully recognize the negative impact of shift work on their health. Understanding this relationship is crucial for developing effective workplace health

promotion strategies.

Our study found a significant increase in digestive disturbances among shift-working nurses (Table 1), which is consistent with recent systematic reviews and meta-analyses. For example, Chang & Peng (2021) explored how rotating shifts negatively affect gastrointestinal health, specifically increasing the risk of issues such as peptic ulcers and indigestion. A pilot study by Bilski (2006) also observed gastrointestinal problems, particularly irregular bowel movements, among nurses working night shifts. The stress faced by nurses has been linked to functional gastrointestinal disorders, as shown in studies such as Koh et al. (2014) and Kim et al. (2013), where higher rates of irritable bowel syndrome were reported among shift workers.

Shift work has also been associated with cardiovascular diseases (Brown et al., 2009; Gangwisch et al., 2013; Rosa et al., 2019). While the exact mechanisms remain unclear, one possible explanation is the reduction in melatonin production during shift work, which is known to have protective effects on cardiovascular health by lowering blood pressure and reducing blood clotting (Franzese & Nigri, 2007; Rosa et al., 2019). Prolonged exposure to shift work, particularly over six years, has been linked to higher cardiovascular risks, including arteriosclerosis and myocardial infarction (Rosa et al., 2019; Koh, 2010). A study by Ritonja et al. (2019) further suggested that individuals with an evening-oriented chronotype may be more susceptible to cardiometabolic issues due to night work exposure. Although our study did not show a statistically significant difference in cardiovascular symptoms between the two groups, shift workers still reported a slightly higher symptom score (Table 1).

Our findings also revealed a significant link between shift work and weight gain (Table 1), a finding supported by Zhang et al. (2020), who conducted a meta-analysis confirming that shift work contributes to obesity, especially in night shift workers in Europe, Australia, and the U.S. Sleep disturbances, often caused by irregular working hours, have been linked to reduced glucose tolerance and hormonal imbalances, both of which can contribute to weight gain (Qiao et al., 2020). Moreover, shift work may alter eating habits, with irregular meal times and food choices being more common among night workers (Horton Dias & Dawson, 2020). This highlights the importance of hospital management in raising awareness about the obesity risks faced by night shift nurses.

Cortisol production patterns have also been identified as mediators in the relationship between shift work and cardiometabolic risk. Ritonja et al. (2018) found that total cortisol production could partially mediate this effect, but the overall impact was small, indicating that cortisol alone does not fully explain the link between shift work and health risks. Studies on Japanese nurses have shown elevated cortisol levels during night shifts, further illustrating the disruption of circadian rhythms (Baba et al., 2015).

Additionally, our study found that shift workers reported more musculoskeletal issues, such as shoulder pain and epicondylitis. While it is unclear if these issues are directly linked to shift work, previous research by D'Agostini & Negro (2014) showed that nurses on daily schedules had a higher prevalence of neck, lower back, and upper extremity complaints compared to shift workers. In contrast, shift workers

were at an increased risk for occupational musculoskeletal injuries, especially in medical and surgical wards (D'Agostini & Negro, 2014). Other studies, such as Merchaoui et al. (2017), found that shift work increased both mental and physical stress among healthcare workers, with certain physical variables, like grip strength, being significantly influenced by work schedules.

The psychological effects of shift work also warrant attention. Although our study did not find a higher prevalence of chronic anxiety or depression among shift workers (Table 2), previous research has demonstrated that shift work can significantly impact psychological health and family life (Ljevak et al., 2020). Stress-reducing interventions during work have been shown to decrease stress levels and increase resilience among nursing staff, according to a study by Mintz-Binder et al. (2021), which underscores the importance of resilience in mitigating the negative effects of shift work.

Our study has several limitations. While the sample size is adequate, the number of male nurses was small, so gender differences were not analyzed. Additionally, the study's monocentric nature and cross-sectional design limit the ability to assess causal relationships or compare results across different healthcare facilities. Future studies could address these limitations by incorporating objective data on morbidity and absenteeism and exploring individual preferences regarding shift work schedules and other situational stressors that may influence health outcomes.

5. Conclusions

Shift work has the potential to negatively affect the overall well-being of nursing staff, impairing both their performance and health. Our findings highlight that shift work is a significant risk factor for gastrointestinal and metabolic issues, particularly weight gain, as well as a higher incidence of headaches, which may affect personal and social relationships. These challenges should be addressed comprehensively, considering the psychological and sleep disturbances that often accompany shift work.

This study contributes to the existing body of research on the health impacts of shift work among nursing personnel, a field still marked by many uncertainties. Future research should adopt more standardized methodologies to ensure comparability of results across studies. Key factors to consider in these studies include shift rotation frequency, shift duration, start and end times, number of night shifts, rest days, and the predictability of shift scheduling. These elements are crucial for accurately assessing the burden of shift work on health and for developing effective preventive strategies.

References

Baba M., Ohkura M., Koga K., Nishiuchi K., Herrera LR., Matsuse R., et al. (2015). Analysis of salivary cortisol levels to determine the association between depression levels and circadian rhythm differences in shift-working nurses. Journal of Occupational Health, 57, 237-244. https://doi.org/10.1539/joh.14-0079-OA

Barton J., Spelten E., Totterdell P., Smith L., & Folkard S. (1995). Is there an optimum

number of night shifts? Relationship between sleep, health, and well-being. Work & Stress, 9, 109-123.
Bilski B. (2006). Influence of shift work on diet and gastrointestinal complaints among nurses: A pilot study. Medycyna Pracy, 57, 15-19.
Brown D.L., Feskanich D., Sánchez B.N., Rexrode K.M., Schernhammer E.S., & Lisabeth L.D. (2009). Rotating night shift work and the risk of ischemic stroke. American Journal of Epidemiology, 169, 1370-1377. https://doi.org/10.1093/aje/kwp056
Buja A., Zampieron A., Mastrangelo G., Petean M., Vinelli A., Cerne D., et al. (2013). Strain and health implications of nurses' shift work. International Journal of Environmental Health, 26, 511-521. https://doi.org/10.2478/s13382-013-0122-2
Caruso C.C. (2014). Negative impacts of shiftwork and long work hours. Rehabilitation Nursing, 39, 16-25. https://doi.org/10.1002/rnj.107
Chang W.P., & Peng Y.X. (2021). Differences between fixed day shift workers and rotating shift workers in gastrointestinal problems: A systematic review and meta-analysis. Industrial Health, 59, 66-77. https://doi.org/10.2486/indhealth.2020-0153
D'Agostin F., & Negro C. (2014). Musculoskeletal disorders and work-related injuries among hospital day- and shift-workers. Medicina del Lavoro, 105, 346-356.
Franzese E., & Nigri G. (2007). Night work as a possible risk factor for breast cancer in nurses: Correlation between the onset of tumors and alterations in blood melatonin levels. Professional Nursing, 60, 89-93.
Gangwisch J.E., Feskanich D., Malaspina D., Shen S., & Forman J.P. (2013). Sleep duration and risk for hypertension in women: Results from the Nurses' Health Study. American Journal of Hypertension, 26, 903-911. https://doi.org/10.1093/ajh/hpt044
Gershengorn H.B., & Garland A. (2016). Who should be at the bedside 24/7: Doctors, families, nurses? Seminars in Respiratory and Critical Care Medicine, 37, 107-118. https://doi.org/10.1055/s-0035-1570350
Horton Dias C., & Dawson R.M. (2020). Hospital and shift work influences on nurses' dietary behaviors: A qualitative study. Workplace Health & Safety, 68, 374-383. https://doi.org/10.1177/2165079919890351
Jakovljevic M. (2018). Empathy, sense of coherence, and resilience: Bridging personal, public, and global mental health and conceptual synthesis. Psychiatria Danubina, 30, 380-384. https://doi.org/10.24869/psyd.2018.380
Jakovljevic M. (2017). Resilience, psychiatry, and religion from a public and global mental health perspective. Psychiatria Danubina, 29, 238-244. https://doi.org/10.24869/psyd.2017.238
Kim H.I., Jung S.A., Choi J.Y., Kim S.E., Jung H.K., Shim K.N., et al. (2013). Impact of shift work on irritable bowel syndrome and functional dyspepsia. Journal of Korean Medical Science, 28, 431-437. https://doi.org/10.3346/jkms.2013.28.3.431
Koh S.J., Kim M., Oh D.Y., Kim B.G., Lee K.L., & Kim J.W. (2014). Psychosocial stress in nurses with shift work schedules is associated with functional gastrointestinal disorders. Journal of Neurogastroenterology and Motility, 20, 516-522. https://doi.org/10.5056/jnm14034
Koh Z.M. (2010). Shift work as a contributor to cardiovascular disease in female nurses who work shifts. Singapore Nursing Journal, 37, 23-30.
Lehyak I., Vasilenko I., Guralin M., Duryan M., Metrvyi T., & L. (2020). The impact of shift work on psychosocial functioning and quality of life among hospital-employed nurses: A cross-sectional comparative study. Psychiatria Danubina, 32(Suppl 2), 262-268.
McDowall K., Murphy E., & Anderson K. (2017). The impact of shift work on sleep quality among nurses. Occupational Medicine, 67, 621-625. https://doi.org/10.1093/occmed/kqx152
Merchaoui I., Bouzgarrou L., Mnasri A., Mghanem M., Akrout M., Malchaire J., et al. (2017). Influence of shift work on the physical work capacity of Tunisian nurses: A cross-sectional study in two university hospitals. Pan African Medical Journal, 26, 59.

https://doi.org/10.11604/pamj.2017.26.59.11279

Mintz-Binder R., Andersen S., Sweatt L., & Song H. (2021). Exploring strategies to build resiliency in nurses during work hours. Journal of Nursing Administration, 51, 185-191. https://doi.org/10.1097/NNA.0000000000000996

Neuberger M., Metrvyi T., & Kozina G. (2019). Contrasting vantage points between caregivers and residents on the perception of elder abuse and neglect during long-term care. Psychiatria Danubina, 31(Suppl 3), 345-353.

Neuberger M., Metrvyi T., & Kozina G. (2017). Is the burnout syndrome associated with elder mistreatment in nursing homes: Results of a cross-sectional study among nurses. Arh Hig Rada Toksikol, 68, 190-197. https://doi.org/10.1515/aiht-2017-68-2982

Pietroiusti A., Neri A., Somma G., Coppeta L., Iavicoli I., Bergamaschi A., et al. (2010). Incidence of metabolic syndrome among night-shift healthcare workers. Occupational and Environmental Medicine, 67, 54-57. https://doi.org/10.1136/oem.2009.046797

Qiao H., Beibei Z., Chong T., Tieying Z., Yuzhi G., Jing M., et al. (2020). Both frequency and duration of rotating night shifts are associated with metabolic parameters: A cross-sectional study. Sleep Medicine, 71, 89-96. https://doi.org/10.1016/j.sleep.2020.02.016

Qualitative Analysis of Open-Ended Responses from a Survey of Nurses. (2019). International Journal of Environmental Research and Public Health, 16, E3821. https://doi.org/10.3390/ijerph16203821

Reppert S.M., & Weaver D.R. (2002). Coordination of circadian timing in mammals. Nature, 418, 935-941.

Ritonja J., Aronson K.J., Day A.G., Korsiak J., & Tranmer J. (2018). Investigating cortisol production and patterns as mediators in the relationship between shift work and cardiometabolic risk. Canadian Journal of Cardiology, 34, 683-689. https://doi.org/10.1016/j.cjca.2018.02.006

Ritonja J., Tranmer J., & Aronson K.J. (2019). The relationship between night work, chronotype, and cardiometabolic risk factors in female hospital employees. Chronobiology International, 36, 616-628. https://doi.org/10.1080/07420528.2019.1570247

Rosa D., Terzoni S., Dellafiore F., & Destrebecq A. (2019). Systematic review of shift work and nurses' health. Occupational Medicine, 69, 249-257. https://doi.org/10.1093/occmed/kqz063

Savic, M., Ogeil, R.P., Sechtig, M.J., Lee-Tobin, P., Ferguson, N., & Lubman, D.I. (Year). How do nurses cope with shift work? [Journal Name], [Volume(Issue)], [Page range].

Southwick, S.M., Bonanno, G.A., Masten, A.S., Panter-Brick, C., & Yehuda, R. (2014). Resilience definitions, theory, and challenges: Interdisciplinary perspectives. European Journal of Psychotraumatology, 5, 25338. https://doi.org/10.3402/ejpt.v5.25338

Tranmer, J. (2013). Shift work and risk for type 2 diabetes. Canadian Nurse, 109, 12.

Zhang, Q., Chair, S.Y., Lo, S.H.S., Chau, J.P., Schwade, M., & Zhao, X. (2020). Association between shift work and obesity among nurses: A systematic review and meta-analysis. International Journal of Nursing Studies, 112, 103757. https://doi.org/10.1016/j.ijnurstu.2020.103757