








Shift work disorder among nurses during the COVID-19 pandemic in Saudi Arabia

Transtorno de trabalho em turnos entre enfermeiros durante a pandemia da COVID-19 na Arábia Saudita

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ABSTRACT

Objective: to assess the prevalence of shift work disorder symptoms among nurses who work multiple shifts for long hours during COVID-19 pandemic. **Methods:** descriptive cross-sectional study was utilized in this study of 120 nurses working in governmental hospitals in Saudi Arabia. The study used structured questionnaires: Hospital Anxiety and Depression Scale, to measure anxiety and depression, Epworth Sleepiness Scale to measure sleepiness and insomnia, and Fatigue Severity Scale to measure fatigue. **Results:** this study showed high prevalence shift work disorder symptoms such as daytime sleepiness (59.2%), fatigue and anxiety (42.5%) across all departments during the COVID-19 pandemic. Also, it showed a 30.5% borderline depression. Significant difference between the educational attainment, hours of working and working departments with Anxiety was identified. Significant difference was found between educational attainment and hours of working with depression. **Conclusion:** the nurses suffered shift work disorder symptoms during the COVID-19 pandemic. **Contributions to practice:** shift work alters the nurses' lifestyle and their health. Little research has conducted on shift work disorder among the nurses on the prevalence and its effects. The results are useful to identify the issues and to overcome the difficulties, which will help to keep the essentials of quality of care.

Descriptors: COVID-19; Shift Work Schedule; Fatigue; Depression; Anxiety.

RESUMO

Objetivo: avaliar a prevalência de sintomas de transtorno de trabalho em turnos entre enfermeiros em vários turnos por longas horas durante a pandemia da COVID-19. **Métodos:** estudo descritivo de corte transversal com 120 enfermeiros em hospitais governamentais na Arábia Saudita. Utilizaram-se questionários estruturados: Escala Hospitalar de Ansiedade e Depressão, para medir ansiedade e depressão, Escala de Sonolência de Epworth, para sonolência e insônia, e Escala de Gravidade da Fadiga, para fadiga. **Resultados:** Mostrou-se alta prevalência de sintomas de transtorno de trabalho em turnos, como sonolência diurna (59,2%), fadiga e ansiedade (42,5%) em todos os departamentos durante a pandemia da COVID-19. Também, registrou-se depressão limítrofe de 30,5%. Evidenciou-se diferença significativa entre nível de escolaridade, horas de trabalho e departamentos de trabalho com ansiedade, e entre nível de escolaridade e horas de trabalho com depressão. **Conclusão:** enfermeiros apresentaram sintomas de transtorno de jornada de trabalho em turnos durante a pandemia da COVID-19. **Contribuições para a prática:** trabalho em turnos altera estilo de vida e saúde dos enfermeiros. Poucas pesquisas foram realizadas sobre transtorno do trabalho em turnos entre enfermeiros sobre a prevalência e seus efeitos. Os resultados são úteis para identificar problemas, superar dificuldades e manter os fundamentos da qualidade do atendimento.

Descritores: COVID-19; Jornada de Trabalho em Turnos; Fadiga; Depressão; Ansiedade.

Introduction

Nurses play a vital role in medical facilities. They have an important role in the holistic care of the patients, and the patient's outcomes depend greatly on the care provided by the nurses during their hospital stay⁽¹⁾. Because nurses must provide an around the clock care, they face countless difficulties in their work shifts and daily hours of work. Since the beginning of the COVID-19 pandemic, nurses have increased responsibilities on their backs regarding workload and work shifts. They encountered new health protocols, rules, and regulations regarding their responsibilities in managing their patients during the pandemic which resulted in nurse's burnout and some of them left their jobs due to great mental and physical stress⁽²⁻³⁾.

The Ministry of Health Statistical Yearbook in Saudi Arabia showed that the number of nurses in 2020 reached 196,701 (42.9% are Saudis), and the number of nursing students who graduate each year is about 5000 graduates. On the other hand, the kingdom needs about 12,000 new nurses each year⁽⁴⁾. This shortage of nurses in Saudi Arabia created even greater pressure on the remaining nurses regarding their working hours and shift rotations⁽²⁾. Major aspects that affected nurses are sleep quality, insomnia, anxiety, depression, and fatigue. These problems fall under the term shift work disorders⁽²⁻³⁾.

Shift work is unavoidable, it is important for the timely care, routine monitoring, safe and effective client care without any interruption⁽⁵⁾. The demand in the health care system demands the healthcare professionals to engage in shift work to continue the care in clinical settings, emergency care and to function in rescue operations. Shift Work Disorder (SWD) is a serious disorder affecting nurses nowadays more than usual during the pandemic. It's a condition clinically recognized, affecting people working at night. This condition affects employee's health, family, and even decision-making, leading to poor performance in the organization⁽³⁾. SWD is irregular or unusual work timings than their usual work timing among the work-

ers⁽⁶⁾. It is characterized by circadian sleep disorder⁽⁷⁾.

Circadian rhythms continuously function over a 24-hour period, and it influences on day-to-day activities of daily life along with the physiological processes. It includes feeding behavior, sleep-wake cycle regulation, and metabolic homeostasis. An error between the endogenous biological clock and the exogenous light-dark cycle can cause serious suffering and dysfunction, and treatment aims to synchronize with the external clock and environment. Shift work requires a conflicting sleep wake schedule which conflicts with the natural endogenous rhythm of sleep and wakefulness. Changes in circadian rhythm affect the general health of the individual⁽⁷⁾.

Globally nurses face the challenges of SWD. Shift workers faces issues in regular family and social life and shift work causes misalignment between the circadian rhythm and behavior cycle of the human being such as sleep pattern, eating habits etc. several studies reported on the effects of shift work with the quality of health and it results in several issue such sleep disorders, cardiovascular problems, obesity, metabolic disorders, and considerable effect on the cognitive function of the human being^(6,8-9). Nurse who works in shift are risk of depression and anxiety, mental distress, and other mental health problems⁽¹⁰⁻¹²⁾. Shift workers usually experience variations in meal-time patterns, which includes skipping meals, consumption of meals at unusual times, consuming more fat intake and increase caffeine consumption. Some of the studies reported gastrointestinal problems among the shift workers than the fixed workers⁽⁸⁾.

The previous studies which were focused on the nurses reported high prevalence of SWD among the nurses. These studies were commonly studied four major symptoms of SWD. These are Anxiety, Depression, Fatigue, and Insomnia^(2-3,13-15). In a study from Saudi Arabia used Hospital Anxiety and Depression Scale, Epworth Sleep Scale, and Fatigue Severity Scale to identify the shift work disorder symptoms⁽³⁾. In another study used fatigue scale, perceived stress scale, circadian type inventory, and International

physical activity questionnaire⁽²⁾. Munich Chronotype Questionnaire for Shift-Workers, Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index), Canter for Epidemiological Studies Depression Scale questionnaires were used in a study from West Bengal, India⁽¹⁵⁾. In this study, the four major symptoms of SWD were assessed through the four universal scales.

COVID-19 also highly impacted on the health care delivery system in Saudi Arabia with the number of cases and resources. The nurses' shortage was experienced considerably, confirmed COVID-19 cases accelerates intensely. Added to that, the nurses were also reported with the infection. The workforce shortage leads to increase the workload. The nurses also felt stress due to lack of training on care of clients, with COVID-19⁽¹⁶⁾.

The shift work negatively affects the wellbeing of the workers⁽¹⁷⁾. Stressful work environment and sleep problems led the night shift workers to use non-prescribed sleeping pills⁽¹⁸⁾. The nurse in shift work suffers from physical and psychological disturbances, which affect their personal and professional lives⁽¹⁷⁻¹⁸⁾. Addressing this issue will spread awareness among nurses about the negative effects of SWD, which will lead head nurses and chief nurses to consider more flexible scheduling and shift distributions. Shift workers have various tolerance levels based on individual differences. Individual differences are seen among the shift workers in degree of sleepiness during the day & night and the degree of performance impairment. So, it is essential to study the shift workers to identify the impact along with the individual differences. Nevertheless, nurses will become aware of the problem and manage their time to avoid facing it when they are faced with it. The existing conflicting result of the studies prompted the researchers to conduct another study in Saudi Arabia, particularly in Tabuk to bridge the information gap, especially during the pandemic.

The following are the sub-problems of the study: 1) How may the socio-demographic profile be described? 2) What is the prevalence of SWD symptoms among nurses in Saudi Arabia? And, 3) What is the di-

ference of the health-related problems among nurses with SWD to the socio-demographic profile?

Thus, the study aimed to assess the prevalence of shift work disorder symptoms among nurses who work multiple shifts for long hours during COVID-19 pandemic.

Methods

This study is a descriptive cross-sectional study that has a set of controlled variables that were measured by using a set of questionnaires to explain the relationship between SWD symptoms and working in multiple shifts for long hours during the pandemic. The study population was the nurses who were on shift working. The nurses who worked in shifts for the past 3 months and agreed to join were included in the study. The nurses who were working in the hospitals for less than 6 months and student nurses were excluded from the study. The nursing supervisors with general duty and the nurses from the educational department were excluded from the study. This study approval was taken only for the hospitals under Ministry of Health. So, the nurses from private hospitals and Military hospital were excluded from the study. In the initial part of the survey, it was given with the clear information about the focus of the study. The researchers contacted the nursing director for the list of eligible nurse participants.

Estimation of sample size was done based on using a z value of 1.96 with a 95% confidence level and a margin of error of 5%. The estimated proportion (p) was determined from the previous studies^(3,14). The estimated sample size was 196. Within the study period, 120 responses were received. This study was conducted from May 2022 to November 2022.

Based on the previous studies, four major symptoms of SWD were assessed with the English version of the following tools. These are namely: the Epworth Sleepiness Scale (ESS)⁽¹⁹⁾, Hospital Anxiety and Depression Scale (HADS)⁽²⁰⁾, and the Fatigue Severity Scale (FSS)⁽²¹⁾. All the tools that were used in

the study are free-to-source tools that are available for usage and duplication. The ESS, HADS, and FSS have the following Cronbach's alpha reliability test of 0.73-0.86, 0.78, and 0.98 respectively. The time needed to complete the survey was 20 minutes.

The 1st part of the research questionnaire was the socio-demographic information of the respondents and their shift work characteristics. The socio-demographic information needed was the following: Age, sex, nationality, highest degree, marital status, number of kid/s, department, years of experience, number of shifts per week, and hours of work per shift.

The 2nd part was to measure insomnia and sleepiness using the ESE tool, with an 8-item question that can be answered on a scale of 0-3. If the total score is less than 10, this suggests that the participant may not be suffering from sleepiness and insomnia, if the total score exceeds 10, it suggests that you may have an underlying sleeping disorder that needs further assessment.

The 3rd part was be used to measure anxiety and depression using the HADS tool, with 14-item questions that can be answered on a scale of 0-3. If the results show a score of 0-7 indicates a normal range, 8-10 indicates a borderline abnormality, 11-21 indicates abnormality.

The 4th part was be used to measure fatigue using the FSS tool with 9-item questions that can be answered on a scale of 1-7. A score of less than 36 indicates no suffering from fatigue, a score of 36 or more indicates an underlying fatigue problem that needs further investigation.

After obtaining the ethical approval, the research team took the list of eligible participants from the concerned hospitals. The online questionnaire and the consent form were distributed with the clear description of each part and how to answer each questionnaire. The correspondent's contact information was available for any clarifications and queries about the study. The questionnaire needed a one-time completion that took approximately 7-10 minutes to complete. After collecting the data in google forms, all

the data was organized and coded in Microsoft Excel and treated using the SPSS program version 28. The Mean, Median, Frequency, percentage, and standard deviation were utilized for descriptive statistics. The Mann-Whitney Test used to find the significant difference between the gender and shift work disorder symptoms. Kruskal-Wallis test was used to find the significant difference between the other variables and SWD symptoms.

This study has obtained ethical approval from the Tabuk Institutional Review Board with approval number TU-077/022/135. The anonymity and confidentiality of the participant were respected in this study. The participants participated in our study without coercion to them and they participated with their own desire to answer the questionnaire. We provided all the necessary information, and the purpose of the study to all participants as much as possible before answering the questionnaire.

Results

Out of 120 responses, (45%) belonged to the age group 21-25 years old, followed by 33 (27.5%) from the age group 26-30 years old, and 20 (16.7%) of them were from the age group 31-35 years old, while the remaining 10.8% were divided between the ages of 36-50+. 103 (85.8%) of the respondents were Females and only 17 (14.2%) were Males. For nationality, 84 (76.6%) were Saudi nurses, while the remaining 34 (28.34%) were non-Saudi. Most of the respondents (75%) had a bachelor's degree in nursing, followed by 18.3% with a diploma degree. The majority (65%) were single. Also, the majority (72.5%) answered no child. The respondents' department of work varied greatly, but the highest number of participants assigned to the outpatient department with 17.5%, followed by the critical care unit/ intensive care unit (16.7%), and next is the medical and surgical with a percentage of respondents of 12.5%. The majority of the respondents 84, (70%) had 1-5 years of experience. Most of the respondents (43.7%) worked in 1 shift,

while 37.5% worked in 3 or more shifts. The majority of the respondents (64.2%) worked an 8-hour shift, followed by 21.7% who worked 12- hour shifts.

Table 1 – Shift work disorder among nurses. Saudi Arabia, 2022

Measurements	n (%)
Anxiety	
0-7 Score (Normal)	34 (28.3)
8-10 Score (Borderline)	35 (29.2)
11-21 score (Abnormal)	51 (42.5)
Total	120 (100.0)
Depression	
0-7 Score (Normal)	60 (50)
8-10 Score (Borderline)	37 (30.8)
11-21 score (Abnormal)	23 (19.2)
Total	120 (100.0)
Fatigue	
> 36 (- fatigue)	69 (57.5)
36 and more (+ fatigue)	51 (42.5)
Total	120 (100)
Sleepiness	
>10 (no day time sleepiness)	49 (40.8)
10 and more suffer from daytime sleepiness	71 (59.2)
Total	120 (100.0)

Based on Table 1 of 120 respondents, the prevalence of SWD symptoms was as follows: 51 (42.5%) of them showed abnormal levels of anxiety, 37 (30.8%) showed borderline depression, and 23 (19.2%) showed depression signs, 51 (42.5%) suffered from fatigue, and 79 (59.2%) suffered from daytime sleepiness and insomnia.

Table 2 – Difference between gender and the presence of shift work disorder symptoms. Saudi Arabia, 2022

Symptoms	Male (Mean rank)	Female (Mean rank)	Mann-Whitney U	Significance
Anxiety	57.21	61.04	819.5	0.652
Depression	60.04	60.52	873.5	0.987
Fatigue	59.71	60.63	862.0	0.906
Insomnia	63.82	59.95	819.0	0.617

Table 3 – Difference between socio-demographic profile (Age, gender, nationality and educational attainment) and the presence of shift work disorder symptoms. Saudi Arabia, 2022

Socio-demographic profile	Symptoms	Kruskal-Wallis H	Significance (2-tailed)
Age	Anxiety	1.230	0.082
	Depression	3.800	0.704
	Fatigue	3.548	0.738
	Insomnia	1.885	0.930
Nationality	Anxiety	7.148	0.946
	Depression	1.532	0.881
	Fatigue	-0.121	0.190
	Insomnia	0.110	0.230
Educational attainment	Anxiety	22.007	0.000
	Depression	10.432	0.015
	Fatigue	2.967	0.401
	Insomnia	0.699	0.892

*p-values less than 0.05 considered as significant

Table 4 – Difference between Socio-demographic profile (Marital status, number of kids, department, years of experience, number of shifts per week and hours worked per week) and the presence of shift work disorder symptoms. Saudi Arabia, 2022

Socio-demographic profile	Symptoms	Kruskal-Wallis H	Significance
Marital status	Anxiety	1.137	0.566
	Depression	1.520	0.468
	Fatigue	4.284	0.177
	Insomnia	0.913	0.633
Number of kids	Anxiety	7.753	0.101
	Depression	2.192	0.701
	Fatigue	3.098	0.541
	Insomnia	3.592	0.464
Years of experience	Anxiety	-0.048	0.605
	Depression	4.555	0.336
	Fatigue	1.212	0.876
	Insomnia	2.919	0.572
Department	Anxiety	33.491	0.002
	Depression	18.230	0.197
	Fatigue	14.033	0.447
	Insomnia	13.930	0.455
Number of shifts per week	Anxiety	2.926	0.232
	Depression	4.930	0.085
	Fatigue	5.312	0.070
	Insomnia	2.890	0.236
Hours of work per shift	Anxiety	10.090	0.018
	Depression	8.090	0.044
	Fatigue	5.766	0.124
	Insomnia	2.139	0.544

*p-values less than 0.05 considered as significant

Table 2 shows that there is no significant difference between gender and shift work disorder symptoms. Tables 3 and 4 showed the difference between the socio-economic profile and the SWD symptoms. Results showed a significant difference between the anxiety level and educational attainment groups, depression and educational attainment groups, anxiety level and working departments and anxiety and hours of working, and depression and hours of working. No significant difference was found between the SWD symptoms and other variables.

Discussion

This study aims to examine the prevalence of SWD-related disorders among nurses in Saudi Arabia during the COVID-19 pandemic. The findings revealed that a significant proportion of nurses, approximately also 59.2%, experienced sleepiness as a major SWD during this challenging period. Similarly, a higher prevalence of SWD among the nurses was observed from a Chinese multicentric study⁽¹¹⁾, and also an Indian study reported that 69% poor sleep quality among the shift working nurses on ESS⁽²²⁾. Another study from Ethiopian Federal Government hospitals reported 49% of the shift worker nurses suffered from sleep problems⁽¹⁵⁾. These percentages are considerably higher than what was reported by other studies conducted in Egypt (31.1% of the nurses with daytime sleepiness) and Ethiopia (30.4% of the nurses with Shift work sleep disorder)⁽²³⁻²⁴⁾. Another study reported that decreasing the shift intensity may reduce insomnia among hospital nurses working rotating shifts⁽¹³⁾.

Approximately 42.5% of participants reported experiencing both anxiety and fatigue concurrently. The current study highlights a significantly higher prevalence of anxiety compared to a previous study conducted in a tertiary care hospital in Coimbatore, India⁽²²⁾. Working extra hours during this pandemic has intensified their worries, as it puts them at risk and weakens their immune system. Furthermore, another study carried out in the Northwestern region

of KSA reported that 54.8% of nurses were experiencing fatigue⁽³⁾. This percentage closely mirrors our findings on fatigue levels among nurses. In addition, this current study indicates that depression affects approximately 19.2% of respondents, which closely aligns with the results from the above-mentioned Indian-based study, where they found a prevalence rate of 15% of nurses with moderate to severe depression⁽²²⁾. These consistent patterns suggest alarming levels of psychological distress among nurses across different settings and regions. The current study reported high percentage of sleepiness, anxiety, and fatigue as the SWD symptoms. Similarly, other studies also reported a high prevalence of these SWD symptoms^(2,3,14). In contrast, a study from Ghana reported lower SWD (20.8%) among the nurses⁽²⁵⁾.

The differing results between these studies can be attributed to various factors such as variations in demographics and cultural contexts, but importantly also due to the unique circumstances experienced during the pandemic, which may have exacerbated SWDs among healthcare professionals. Furthermore, this study provides insights into other prevalent conditions like anxiety and fatigue among nursing personnel during this time. This greater prevalence due to the added stress and concerns associated with COVID-19. Contrastingly, in another earlier study from Ghana reported 63% of anxiety and 83% of stress among the nurses involved in shift work⁽²⁵⁾.

Educational attainment, hours of working and working department had a significant effect on Anxiety level. Educational attainment and hours of working had significant effect on the depression symptoms. All demographic profile of the respondents does not affect the fatigue and sleep problems in this study. The study results agreed with the findings shown in the study in Hail, Saudi Arabia regarding the presence of a relationship between the shift work hours and SWD symptoms and the absence of a relationship between the number of shifts per week and the existence of SWD symptoms⁽³⁾. An Indian study indicated that the highest prevalence of SWD among nurses who worked

more than 3 shifts per week⁽¹⁴⁾. The result of this study strengthened the findings that the number of shifts per week of the respondents increases the occurrence of fatigue among nurses during the pandemic period.

A study from Taipei reported the difference between the fixed nurses and non-fixed rotating nurses. Non-fixed-rotating-shift nurses reported less healthy dietary behaviors, particularly general dietary behaviors, shorter sleep duration, lower sleep quality, and higher perceived stress compared with fixed-evening or fixed-night-shift nurses⁽²⁶⁾. A study from Ethiopia highlighted how the shift work disorders endanger nurses, patients and the health care setting. Shift work sleep disorder does not affect the nurse's health; it affects the job performance and safety of clients. It is essential for the nurse administrators to work on the assessment and management of SWD among the nurses.

It is highly recommended that this research be conducted in a wider population, which includes other health care specialties in Saudi Arabia and within the Gulf region because of the scarcity of information regarding this area of research. This study recommends including the economic condition and residential area effects on SWD. There is a need for comparison studies to see the difference in anxiety, depression, sleepiness, and fatigue among shift workers and non-shift workers.

Study limitations

This study has several limitations. The design chosen for the study was cross-sectional. A longitudinal design could be used in future studies. This study was conducted only among the nurses from the Tabuk region, which is small. However, the nurses from various departments were included. This study could be replicated with a large sample size and a different region in Saudi Arabia. This study utilized a standardized tool for data collection, but the responses were self-reported by the nurses.

Contributions to practice

The findings of this study could help nurse managers improve the shift work schedules to prevent shift work disorder symptoms, which may affect the performance of nurses in providing quality care to their respective patients.

Conclusion

According to this study that occurred during the pandemic, the most common symptoms of shift work disorder are daytime sleepiness, followed by fatigue and anxiety, considering the minimal cases of depression. This study showed that sleep, fatigue, and anxiety are the major symptoms of shift work disorder. A significant difference between the educational attainment, working hours and working departments with Anxiety was identified. Significant difference was found between educational attainment and working hours with depression.

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Authors' contribution

Conception and design or analysis and interpretation of data: Ablao J, Thangam MMN, Saif R, Alamri R.
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