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Research Article

Impact of Shift Work on Sleep and the Quality of Life of Healthcare Workers in a Tertiary Hospital, Saudi Arabia

Saud Abdullah Alshagraawi[1*], Bader Ghanem Alanazi[1], Ibrahim Mohammed Alobaidi[2], Nouf Alturki[1], Mostafa Kofi[1]

[1]Family and Community Medicine Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

[2]College of Medicine, Prince Sattam bin Abdulaziz University, Saudi Arabia

[*]**Corresponding author:** Saud Abdullah Alshagraawi, Family and Community Medicine Department, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

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Abstract

Background: Shift work is critical in today's industrialized economy, particularly in healthcare, and public safety. We conducted this study to evaluate the impact of shift working on the quality of life and sleep among healthcare workers in a tertiary healthcare institution in Riyadh, Saudi Arabia. **Methods:** A quantitative observational analytic cross-sectional study targeted Healthcare Workers (HCWs) at Prince Sultan Military Medical City (PSMMC). The participants were in two groups, shift working and non-shift working HCWs. The data was collected using three well-known and validated questionnaires, the PHQ4, the Pittsburgh Sleep Quality Index (PSQI), and the Epworth Sleepiness Scale (ESS). **Results:** A total of 146 healthcare workers participated, of them, 74.66% were females, 64.38% non-Saudi, 69.18% were nurses, and 68.49% were shift workers. The prevalence of anxiety and depression as measured by the PHQ-4 was 12.3%, and 14.4%, respectively. The overall mean (±SD) global PSQI score was 5.69(±3.53), indicating poor sleep quality. According to the EES scale, severe sleepiness was found among 1.4% of the participants, 2.7% have moderate sleepiness, while 8.9% have mild sleepiness. The results revealed that there were no significant differences between shift workers and no shift workers in terms of the prevalence of anxiety, depression, and other studied comorbidities, except for the total score of ESS, where the mean score was higher among no shift workers at 7.13(±5.22) vs. 4.94(±3.54) in the shift workers group, with a p-value of 0.012. **Conclusion:** Anxiety and depression were prevalent to some extent among the studied healthcare workers, this is in addition to the poor sleep quality they showed, and all of this did not differ significantly according to if they are shift or non-shift workers.

Keywords: Healthcare workers; Quality of life; Shift work

Introduction

Quality of Life (QoL) encompasses physical, mental, and social aspects of life and is an important factor in determining an individual's well-being [1]. The World Health Organization (WHO) defines the quality of life as individuals' perceptions of their position in life in the context of the culture and value systems in which they live, as well as in relation to their goals, expectations, standards, and concerns [2].

Shift work is critical in today's industrialized economy, particularly in healthcare, and public safety, as well as other service sectors where 24-hour access and service are expected. Although there is no universal definition of "shift work,", it is known as working outside of a typical 9 a.m. to 5 p.m. workday and is common for one-fifth of workers worldwide [3,4]. Shift work has the potential to disrupt family and social life, as well as to cause chronic fatigue, sleepiness, and somatic symptoms because it frequently contradicts the diurnal human rhythmic timing system [5,6]. Shift work has a variety of physical and mental health consequences, as well as workplace consequences such as accidents and errors. For example, shift workers have a higher prevalence of sleep loss, excessive daytime sleepiness, and insomnia than non-shift workers [7]. Shift workers are also more likely to report poor subjective sleep quality, as well as difficulties

with concentration during the day, as well as participation in social and leisure activities [8]. These findings imply that work schedules have a significant impact on not only sleep but also lifestyle during nonwork hours.

Several studies have found a link between shift work and health problems, which is usually attributed to chronic misalignment between the endogenous circadian timing system and behavioral cycles such as sleep/wake and fasting/feeding cycles [9]. Sleep deprivation, cardiovascular disease [10], obesity, metabolic syndrome, and diabetes mellitus [11-13], mood disorders, depression [14], cancer [15,16], and cognitive function impairment are all likely outcomes of this disruption of the normal circadian cycle [17].

A systematic review study showed that, Overall, young age, male gender, low morningness, high flexibility, low languidity, low neuroticism, high extraversion and internal locus of control, and some genetic dispositions are associated with higher shift work tolerance [18].

Because of the importance of health care workers' health and the impact of shift work on shift workers' physical and mental health, occupational performance, and safety, we conducted this study to evaluate the impact of shift working on the quality of life and sleep among healthcare workers in a tertiary healthcare institution in Riyadh, Saudi Arabia.

Methods

This was a quantitative observational analytic cross-sectional study that targeted Healthcare Workers (HCWs) at Prince Sultan Military Medical City (PSMMC) regardless of their medical specialty in the medical field. The targeted population was from two different groups: group 1 (HCWs working in shifts), and the inclusion criteria for this group were working for a number for shifts regularly on a monthly variable schedule in form of either partially as in form of being on-call, or is working in a shift schedule with involvement of non-morning shifts. The exclusion criteria were non-medical health care workers, and undergraduate students/interns. The second group, group 2 (non-shift workers), and included subjects were those who work for fixed non-shift work-related day schedules, and the exclusion criteria were non-medical health care workers, and undergraduate students/interns. The case definition of shift work that was used in the current study is "a healthcare-related work that requires the HCWs to work for hours between 4 PM to 7 AM".

The data collection tool for the current study was a self-administered questionnaire that was distributed to the targeted population. The data collection tool included three well-known and validated questionnaires, which are the PHQ4, the Pittsburgh Sleep Quality Index (PSQI), and the Epworth Sleepiness Scale (ESS). This is in addition to the socio-demographic characteristics of the participants, which included age, gender, weight, height, nationality, nature of work, caffeinated/carbonated drinks/day, smoking status, physical activity status, the status of shift-work & its frequency per week, time since being involved in shift work, and comorbidities.

The study has been conducted after taking ethical approval from the Institutional Review Board (IRB) at PSMMC. The aims and objectives of the study were explained to the HCWs, and those who accepted to participate were asked to sign a written consent form. Participants were informed that data will be kept confidential and anonymously and will be used for research purposes only.

Statistical analysis

Data were analyzed by using Statistical Package for Social Studies (SPSS 22; IBM Corp., New York, NY, USA). Continuous variables were expressed as mean ± standard deviation. Categorical variables were expressed as percentages. T-test was used for continuous variables. Chi-square and Fisher's Extract tests were used for categorical variables. A p-value <0.05 was considered statistically significant.

Results

A total of 146 healthcare workers participated in the current study, almost three- quarters of them (74.66%) were females, the mean (±SD) age was 31.73(±5.47) years, most of them were non-Saudi (64.38%), and nurses (69.18%). The highest percentage (42.47%) of the participants was taking coffee, cola, and power drinks twice daily. Smoking was reported among 28.77% of the participants, and only 33.56% reported doing regular physical activity. Most of the participants (68.49%) were shift workers, more than half (56.57%) of them were working in shift works for a period of 1 to 5 years, and 48% were doing shift work 5 times per week. Data is shown in table 1.

		Number	%
Gender	Male	37	25.34
	Female	109	74.66
Age (Mean, SD)		31.73	5.47
Weight (Mean, SD)		70.80	16.93
Height (Mean, SD)		162.11	16.84
Nationality	Saudi	52	35.62
	Non Saudi	94	64.38
Working as	nurse	101	69.18
	physician	35	23.97
	technicians	10	6.85
Work in	Family medicine	41	28.08
	Emergency medicine	7	4.79
	ICU	5	3.42
	Pediatrics	5	3.42
	Radiology	14	9.59
	Internal Medicine	1	0.68
	Oncology	1	0.68
	Other	72	49.32
How much intake of coffee, Cola, Power Drinks per day?	never	15	10.27
	1	41	28.08
	2	62	42.47
	3	23	15.75
	4	5	3.42
Do you smoke Cigarettes or Water pipe daily?	Yes	42	28.77
	No	104	71.23
Do you do Regular physical activity daily:	Yes	97	66.44
	No	49	33.56
Are you a shift worker? (Shift workers is an employee who works shifts outside standard working hours.)	Yes	100	68.49
	No	46	31.51
For how many years have you been doing shift work	3 months to 1 year	12	12.12
	1 year to less than 5 years	56	56.57
	More than or equal 5 years	31	31.31

How frequent do you do shift work?	6-7 times per week	21	21.00
	5 times per week	48	48.00
	4 times per week	14	14.00
	3 times per week	10	10.00
	Less than 3 times per week	7	7.00

Table 1: Characteristics of the participants (N=146).

As shown in table 2, the prevalence of self-reported hypertension, diabetes, anxiety, and depression among the studied sample was 11.64%, 6.85%, 9.59%, and 4.11%, respectively. A percentage of 6.16% of the participants reported having a traffic road accident as a driver in the past few months.

		Number	%
In the past few months, have you had?	Road traffic accidents as a driver	9	6.16
	Domestic (Home) accidents like (Knife cuts)	17	11.64
	None	94	64.38
Have you been any of these health problems?	High_blood_pressure	17	11.64
	DM	10	6.85
	Depression	6	4.11
	Anxiety	14	9.59
	None	108	73.97

Table 2: Comorbidities.

The prevalence of anxiety and depression as measured by the PHQ-4 in the current study is shown in table 3. Anxiety prevalence was 12.3%, while depression was prevalent among 14.4% of the participated healthcare workers. For the severity of depression and anxiety, they were severe among 6.2%, moderate among 6.2%, and mild among 12.3%.

		Number	**Prevalence (%)**
Anxiety & Depression	Normal	110	75.3
	Mild	18	12.3
	Moderate	9	6.2
	Severe	9	6.2
Anxiety		18	12.3
Depression		21	14.4

Table 3: Prevalence of Anxiety & Depression (PHQ4).

The sleep quality assessment as measured by the PSQI is shown in table 4. The overall mean (±SD) global PSQI score was 5.69(±3.53), indicating poor sleep quality. The highest mean scores were for the sleep latency and sleep duration components, with mean scores of 1.01(±0.88), and 1.00(±0.84), respectively. The mean total score of the Epworth sleepiness scale was 5.63(±4.25). Severe sleepiness was found among 1.4% of the participants, 2.7% have moderate sleepiness, while 8.9% have mild sleepiness, as shown in table 5.

Component*	Mean	SD
Subjective sleep quality	0.95	0.75
Sleep latency	1.01	0.88
Sleep duration	1.00	0.84
Sleep efficiency	0.82	0.89
Sleep disturbance	0.97	0.64
Use of sleep medication	0.40	0.77
Daytime dysfunction	0.66	0.84
Global PSQI Score** (Out of 21)	5.69	3.53

*Each scored 0 (no difficulty) to 3 (severe difficulty). **Higher scores indicate worse sleep quality (A total score of "5" or greater is indicative of poor sleep quality. If you scored "5" or more it is suggested that you discuss your sleep habits with a healthcare provider)

Table 4: Sleep Quality Assessment (PSQI).

	Number	Prevalence (%)
Normal sleepiness	127	87.0
Mild sleepiness	13	8.9
Moderate sleepiness	4	2.7
Severe sleepiness	2	1.4
Mean of the total score of Epworth Sleepiness Scale (ESS)=5.63±4.25		

Table 5: Epworth Sleepiness Scale (ESS).

The mean total score of Sleep Quality Assessment (PSQI), PHQ4, and Epworth Sleepiness Scale (ESS) by shift workers is shown in table 6. The results revealed that there were no significant differences between shift workers and no shift workers in any of the studied variables except for the total score of Epworth Sleepiness Scale (ESS), where the mean score was higher among no shift workers at 7.13(±5.22) vs. 4.94(±3.54) in the shift workers group, with a p-value of 0.012.

	Shift Worker				P value
	Yes		No		
	Mean	SD	Mean	SD	
PSQI Component*					
Subjective sleep quality	0.95	0.74	0.96	0.76	0.961
Sleep latency	0.96	0.83	1.11	0.99	0.380
Sleep duration	0.94	0.83	1.13	0.87	0.203
Sleep efficiency	0.83	0.91	0.79	0.87	0.810
Sleep disturbance	0.97	0.64	0.98	0.65	0.943
Use of sleep medication	0.30	0.61	0.61	1.02	0.062
Daytime dysfunction	0.63	0.82	0.74	0.88	0.468
Global PSQI Score** (Out of 21)	5.48	3.49	6.15	3.63	0.287
Total score of PHQ4 (Out of 12)	1.98	2.92	2.15	2.87	0.740

Total score of Epworth Sleepiness Scale (ESS) (Out of 24)	4.94	3.54	7.13	5.22	0.012[#]

[*]Each scored 0 (no difficulty) to 3 (severe difficulty); [**]Higher scores indicate worse sleep quality (A total score of "5" or greater is indicative of poor sleep quality. If you scored "5" or more it is suggested that you discuss your sleep habits with a healthcare provider); [#]Significant p value

Table 6: Mean of total score of Sleep Quality Assessment (PSQI), PHQ4 and Epworth Sleepiness Scale (ESS) by shift worker.

There were no significant differences between the shift work and no shift work participants in terms of any of the studied comorbidities, since all p values were >0.05, as shown in table 7. Similarly, the two groups did not differ significantly in regards to the prevalence of anxiety, depression, and their severity. On the other hand, there was a statistically significant (P>0.002) difference according to the Epworth Sleepiness Scale (ESS), where the prevalence of normal sleepiness was higher among shift workers at 94% compared to 71.7% in no shift work, as shown in table 8.

		Shift Worker				
		Yes (n=100)		No (n=46)		
		Number	%	Number	%	P value
In the past few months, have you had?	Road traffic accidents as a driver	8	8.0	1	2.2	0.162
	Domestic (Home) accidents like (Knife cuts)	13	13.0	4	8.7	0.326
	None	60	60.0	34	73.9	0.103
Have you been any of these health problems?	High_blood_pressure	11	11.0	6	13.0	0.721
	DM	6	6.0	4	8.7	0.389
	Depression	4	4.0	2	4.3	0.616
	Anxiety	7	7.0	7	15.2	0.117
	None	74	74.0	34	73.9	0.991

Table 7: Comorbidities by shift worker.

		Shift Worker				P value
		Yes (n=100)		No(n=46)		
		Number	%	Number	%	
Anxiety & Depression	Normal	78	78.0	32	69.6	
	Mild	9	9.0	9	19.6	
	Moderate	7	7.0	2	4.3	
	Severe	6	6.0	3	6.5	0.318
Anxiety		11	11.0	7	15.2	0.471
Depression		15	15.0	6	13.0	0.754
Epworth Sleepiness Scale (ESS)	Normal sleepiness	94	94.0	33	71.7	
	Mild sleepiness	5	5.0	8	17.4	
	Moderate sleepiness	1	1.0	3	6.5	
	Severe sleepiness	0	0	2	4.3	0.002[*]

[*]Significant p value

Table 8: Prevalence of Anxiety & Depression (PHQ4) and Epworth Sleepiness Scale (ESS) by shift worker.

Discussion

The results of the current study revealed that a non-negligible percentage of the participated healthcare professionals have anxiety and depression, and the condition was severe in almost half of them. In addition, the participants showed poor sleep quality, particularly for the sleep latency and sleep duration.

The reported prevalence of anxiety in the current study at 12.3% is considered almost half of that reported during the COVID-19 pandemic at 23.2% of HCWs according to a systematic study [20]. However, online research in Egypt found that 90.5% of HCWs who were exposed to the COVID-19 pandemic felt varying degrees of worry [21]. The discrepancies in the samples and working circumstances are to blame for the discrepancy. Other explanations of the low prevalence of anxiety in the current study might include the time differences since now vaccinations are available and personnel protective equipment is adequate compared to the previous studies at the beginning of the pandemic.

Similarly, the prevalence of depression among HCWs in the current study is lower than other previous similar studies one of which showed that a total of 57.9% of those who took part were depressed in some way [22]. In addition, according to a systematic review analysis, 22.8% of HCWs experienced depressive symptoms during the COVID-19 [20], and Aly, et al. observed in their study that 94 percent of healthcare providers had mild to severe depression during the COVID-19 pandemic [21].

In agreement with the current study findings, previous studies showed that healthcare workers suffer from poor sleep quality. Sleep disturbances are frequent among healthcare workers, including nurses, physicians, and administrative and technical personnel. There is growing disagreement concerning the prevalence of sleep problems among HCWs, which ranges from 21 to 65.5%. HCWs are at an elevated risk for mental health disorders and sleep difficulties during the current COVID-19 pandemic, due to high-stress levels, greater likelihood of infection, heavy workloads, and weariness [23-28]. Poor sleep quality among HCWs was also reported before the COVID-19 pandemic. A study conducted among healthcare workers in Iran using the PSQI showed that poor sleep quality is common among the participants [29].

Unexpectedly, daytime sleepiness score as measured by the ESS was significantly higher among the non-shift work, and also the PSQI score was higher among the non-shift work but the difference was statistically non-significant. In contrast to this, a previous local study showed that the PSQI score was elevated in both groups but higher in shift workers (p=0.001) [30]. One would think that the PSQI score to be normal (<5) in the non-shift work; nevertheless, the average PSQI global score was 6.15 among non-shift employees, which is even higher than the shift working group at 5.48. This finding could be explained by the fact that non-shift workers may also suffer from sleep disorders. Another possible reason is that this group was previously exposed to shift work, which may have contributed to their current sleep issues. Long sleep latency and short sleep duration seem to be the main variables that contribute to poor sleep quality among health care professionals, as they were high compared to the other measured variables, especially in non-shift work.

Both groups scored ESS values that were consistent with normal day sleepiness. This data might be explained by supposing that shift employees take naps in between shifts or drink caffeinated drinks throughout their shifts. Furthermore, health care institutes in Saudi Arabia adhere to international norms for health care personnel' working hours, which may explain why their work shifts are within these guidelines to avoid excessive or extended work tasks, which may lead to excessive daytime sleepiness and medical mistakes [31]. The ESS is infrequently used to detect drowsiness among shift workers, and it is not as widely used as the Multiple Sleep Latency Test (MSLT) in this group [32].

The current study has some limitations including that it reflects a short period of shift work, and it does not reflect a longitudinal period, our study may not be representative of all healthcare professionals in the kingdom, and we did not ask about naps and caffeine intake in shift workers, this might have affected our study and result in particular daytime sleepiness. In addition, PSQI and ESS may not be the best tools to study sleep quality and daytime sleepiness in health care professionals performing shift work.

Conclusion

A considerable percentage of health care workers who participated in the current study were found to have anxiety and depression according to the PHQ-4 at 12.3%, and 14.4%, respectively. In addition, they showed poor sleep quality as measured by the PSQI. When anxiety, depression, and sleep quality were measured according to the shift working status, we found no significant differences.

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