Original Article

Relationship of insomnia, stress, and anxiety with shift work among nurses in the Kingdom of Bahrain

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Abstract

Background:
Insomnia, stress, and anxiety affect the mental wellbeing and distorts the work-life balance of health workers influencing their performance at work. This study aimed to assess the relationship of shift work with insomnia, anxiety, and stress among nurses in a tertiary care hospital in Bahrain.

Methods:
We used a cross-sectional study design. Our study population was 345 nurses in a major tertiary care hospital in Bahrain. The sample was selected based on the population probability to size method. Nurses completed a questionnaire that contained items, including sociodemographic data, Bergen's Insomnia Scale, Perceived Stress Scale, and Shift Work Disorder scale.

Results:
The prevalence of insomnia was highest (85.7%) in the youngest nurses (20 to 30 years), Bahrainis (92.2%), nurses working in Surgical (85.5%) and Pediatrics (80.0%) departments, with 1 to 5 years of shift work experience (81.0%), and 1 to 3 night shifts a month (92.0%). Nurses with very high levels of stress were between the ages of 20-30 years, Bahrainis, had a B.Sc. degree, were in the Pediatrics Department, worked for 4 to 6-night shifts per month, and did not consume caffeinated drinks ($p = <0.05$). The prevalence of Shift Work Disorder was 11.3% in our study.

Conclusion:
The prevalence of insomnia, stress, and anxiety was high in the nurses in our study, and it was significantly related to performing shift work. However, shift work disorder in those who had insomnia was low in our study although it was still higher in nurses who suffered from insomnia. Balanced working hours and support in the evaluation and treatment potential mental health challenges associated with working in shifts may improve mental wellbeing of nurses working in tertiary care hospitals in Bahrain.

Keywords:
Insomnia, stress, anxiety, nurses, shifts work disorder

الملخص

الخلفية :
يؤثر الأرق والإجهاد والقلق على الصحة العقلية ويشوه التوازن في الحياة العملية للعاملين الصحيين مما يؤدي الى التأثير على أدائهم في العمل. هدفت هذه الدراسة إلى تقييم علاقة العمل بنظام النوبات مع الأرق والقلق والإجهاد لدى الممرضات في مستشفى الرعاية الثالثية في البحرين.

طريقة البحث :
استخدمنا تصميم دراسة مقطعية (cross-sectional)، يتكون من ٣٤٥ ممرض في احدى المستشفيات الرئيسية للرعاية الثالثية في البحرين. تم اختيار العينة على منهج نسبة الاحتمال إلى الحجم. أكملت الممرضات استبيانًا يحتوي على العناصر التالية: البيانات الاجتماعية والديموغرافية، مقياس بيرغن للأرق، مقياس التوتر المدرك، ومقياس اضطراب العمل بنظام النوبات.

النتائج :
كان معدل انتشار الأرق أعلى (٣٥,٧ ٪) لدى الممرضون الأصغر سناً (٢٠ إلى ٣٠ سنة)، البحرينيون (٩٢,٢ ٪)، العاملون في العمليات الجراحية (٨٥,٥ ٪) وفي طب الأطفال (٨٠,٠ ٪)، ومع من لديهم ١-٥ سنوات من الخبرة في العمل بنظام النوبات (٨١,٠٪)، ومن لديهم بين ١ إلى ٣ نوبات ليلية في الشهر (٩٢,٠٪). يتراوح عمر الممرضين الذين يعانون من مستويات عالية من التوتر بين ٢٠ و٣٠ عامًا من الأصل البحريني، حاصلين على بكالوريوس، عملوا في قسم طب الأطفال لمدة ٤ إلى ٦ ليال في الشهر، ولم يستهلكوا المشروبات التي تحتوي على الكافيين ($p = <٠,٠٥$). دراستنا تشير إلى انتشار اضطراب العمل بنظام النوبات بمعدل ١١,٣ ٪.

الخلاصة :
معدل انتشار الأرق، ومستوى التوتر والقلق مرتفع لدى الممرضون بالبحرين، وكان مرتبطًا بشكل كبير بأداء عمل النوبات. ومع ذلك، اضطراب العمل بنظام النوبات في أولئك الذين يعانون من الأرق منخفضاً على الرغم من أنه لا يزال أعلى من أولئك الذين لا يعانون من الأرق. ساعات العمل المتوازنة والدعم في وقت التقييم وعلاج مشاكل الصحة العقلية المحتملة ستساهم في تحسين السلامة العقلية لدى الممرضون في مستشفيات البحرين.

Introduction

Tertiary care hospital nurses frequently work in shifts that affects their own health and well-being in different ways. Some nurses may develop conditions like insomnia and anxiety because of continued shift work [1,2] .

Insomnia may be defined as difficulty in sleeping as reported by the individuals themselves. It must occur at least 3 times per week for more than one month and is often associated with difficulty in falling asleep, staying asleep, or nonrestorative sleep, even in the presence of the appropriate opportunity and circumstances for proper sleep [3] .Individuals suffering from insomnia often experience daytime impairment or distress often affecting their performance at work leading to problems like committing occupational errors [4] . Insomnia has also been seen to coexist with some other mental health symptoms including anxiety and stress. Anxiety is commonly associated with stress and is a regular human emotion face by many individuals. As defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5™), generalized anxiety disorder is a condition where the individual finds it hard to control their worry. It is associated with three of the six symptoms, including restlessness, irritability, feeling easily fatigued, difficulty concentrating, muscle tension, and/or sleep disturbance [5]. When anxiety exceeds the average threshold, it distorts the individual; leading to a non-adaptive response and a dysfunctional state. Women usually have a higher prevalence of anxiety disorders than men, the female to male ratio of panic disorder and generalized anxiety disorder is about 2:1 [6]

. Stress, on the other hand, is a more serious mental disorder compared to the anxiety and affects not only the individuals themselves, but it is also a burden on their families. Stress also has an economic impact on society because of low productivity, and it also disturbs people's quality of life [7].

Considering that the nurses work in a highly demanding and intense work environment, it is important to understand and assess their mental health. Although studies have shown that the shift work could lead to a range of psychosomatic disorders in nurses, few studies have explored such a relationship in the healthcare context of Gulf Cooperation Council countries. Shift work has been previously shown to disturb workers' health through psychosocial, behavioral, or psychological mechanisms [8]. Studies have shown that insomnia, excessive sleepiness, fatigue, anxiety, and depression are more prevalent in employees involved in shift work [9]. In the present study, we aimed to assess how shift work could be linked with insomnia and stress among nurses in a tertiary care hospital in Bahrain.

Methods

Study design and sample

This cross-sectional study was carried out between July and August 2016 at a tertiary care hospital in Bahrain. The study population included about 2150 nurses working in the hos-

pital during 2016. At least 2000 of them were involved in shift work at the time of this study. Generally, about half of the nurses in Bahrain are expatriates, and most are female. A sample size of 345 nurses, consisting of only those involved in shift work in the past year, was obtained using the sample size estimation formula for simple random sampling, with the assumptions of 95% level of confidence, 34% prevalence of insomnia and 5% bound on the error. Based on the population proportion to size sampling, we selected 90 nurses from Pediatric, 86 from Obstetrics and Gynecology, 89 from Medical, 52 from Accident and Emergency, and 28 from the surgical department. Nurses were included to participate in the study by convenient sampling. Bahraini and non-Bahraini nurses who worked either during night or day shifts were eligible to participate in the study. Data collection

Participants were approached by the data collection teams in their wards and requested to fill in the questionnaires while the data collectors waited, which ensured that participants completed the questionnaires, and if they needed any assistance with understanding any questions, the data collectors could help them. The data were collected through a validated self-administered questionnaire consisting of four sections of questions. Information was collected about the social and demographic variables, the departments where they worked, and whether they took any caffeinated drinks or medications to stay awake. Bergen's Insomnia Scale was used to diagnose insomnia [9], and consisted of six questions, and each had a seven-point scale where the number between 0 and 7 indicated days per week a certain symptom had been experienced. The total score ranged from 0 to 42. A score of 3 or higher on at least one of the first four questions (night-time problems), combined with a score of 3 or higher on at least one of the two last questions (daytime consequences) was regarded as the fulfillment of the insomnia criteria. The scale was based on the American Psychiatric Association DSM-IV-IR inclusion criteria for insomnia. To distinguish between participants with or without Shift Work Disorder, four questions were used. These questions were developed based on the criteria for Shift Work Disorder from the International Classification of Sleep Disorders [10]. Perceived Stress Scale was used for measuring the perception of stress by asking ten questions,

which focused on the person's thoughts and feelings [11]. The data were analyzed using Statistical Package for the Social Sciences version 20.

Ethical approval

Ethical approval for the study was obtained from the Ethics and Review committee of Arabian Gulf University and the Ministry of Health Bahrain. The purpose of the study was explained to the participants, and a prior written consent was obtained before the questionnaire administration.

Results

The mean age of the nurses was 36.8± 7.7 years, 62.9% were non-Bahraini, and 37.1%

were Bahraini. About half (50.3%) of the nurses had a diploma degree, 27.8% had done midwifery training, and 12.8% were qualified in general nursing. The females made up 98.60% of the sample, and most (94.8%) of the nurses were married. About 30% nurses used caffeinated drinks to stay awake during a shift, and only 0.60% took sleep medications. Nurses in our study had 12.6 ±7.1 years of experience of working as nurses, 12.4 ±12.1 years of shift work experience and they were involved in 7.60 ±2.50 nights of shift work in a month.

The prevalence of insomnia in our sample was 66.4%. We found a significant relationship of insomnia with age, nationality, marital status and educational level, and the department where the nurses worked. Nurses who worked in the surgery and Pediatric departments and those who had one to five years of total night work experience had the highest prevalence of insomnia. The number of night shifts per month had a significant relationship with insomnia, as nurses who had more night shifts had higher levels of insomnia (P<0.002). In the nurses who had insomnia, 38% used caffeinated drinks (Table 1).

Table 1: Relationship of Insomnia, sociodemographic and shift work experience and stimulating hot drink-related variables among nurses in Bahrain

		Insomnia		p-value*
		Yes (%)	No (%)	
Age (Years)	20-30	66 (85.70)	11 (14.30)	<0.001
	31-40	125 (67.90)	59 (32.10)	
	41-50	27 (41.50)	38 (58.50)	
	51 and above	11 (57.90)	8 (42.10)	
Gender	Male	4 (80.00)	1 (20.00)	0.516
	Female	225 (66.20)	115 (33.80)	
Nationality	Bahraini	118 (92.20)	10 (7.80)	<0.001
	Non-Bahraini	111 (51.20)	106 (48.80)	
Marital Status	Single/Engaged	11 (91.70)	1 (8.30)	0.033
	Married	212 (64.80)	115 (35.20)	
	Divorced/Widowed	6 (100.00)	0 (0.00)	
Educational Level	B.Sc.	119 (79.30)	31 (20.70)	<0.001
	Master's degree	4 (50.00)	4 (50.00)	
	Others	106 (56.70)	81 (43.30)	
Department	Pediatrics	72 (80.00)	18(20.00)	<0.001
	Gynecology	43 (50.00)	43 (50.00)	
	Medical	56 (62.90)	33 (37.10)	
	Accidents and Emergency	34 (65.40)	18 (34.60)	
	Surgery	24 (85.70)	4 (14.30)	

Years of Experience	01-05	43 (84.30)	8 (15.70)	0.04
	06-10	62 (61.40)	39 (38.60)	
	11-15	57 (69.50)	25 (30.50)	
	16-20	44 (62.00)	27 (38.00)	
	21-25	10 (52.60)	9 (47.40)	
	26 and above	11 (57.90)	8 (42.10)	
Years of Night Work Experience	01-5	47 (81.00)	11 (19.00)	0.037
	06-10	61 (62.20)	37 (37.80)	
	11-15	62 (68.90)	28 (31.10)	
	16-20	37 (60.70)	24 (39.30)	
	21-25	8 (47.10)	9 (52.90)	
	26 and above	7 (50.00)	7 (50.00)	
Night Shifts per Month	0-3	23 (92.00)	2 (8.00)	0.002
	04-5	56 (75.70)	18 (24.30)	
	07-9	101 (59.10)	70 (40.90)	
	10-12	45 (70.30)	19 (29.70)	
Sleep Medication	Yes	2 (0.90)	0 (0.00)	0.313
	No	227 (99.10)	116 (100.00)	
Caffeinated drinks	Yes	87 (38.00)	15 (12.90)	<0.001
	No	142 (62.00)	101 (87.10)	

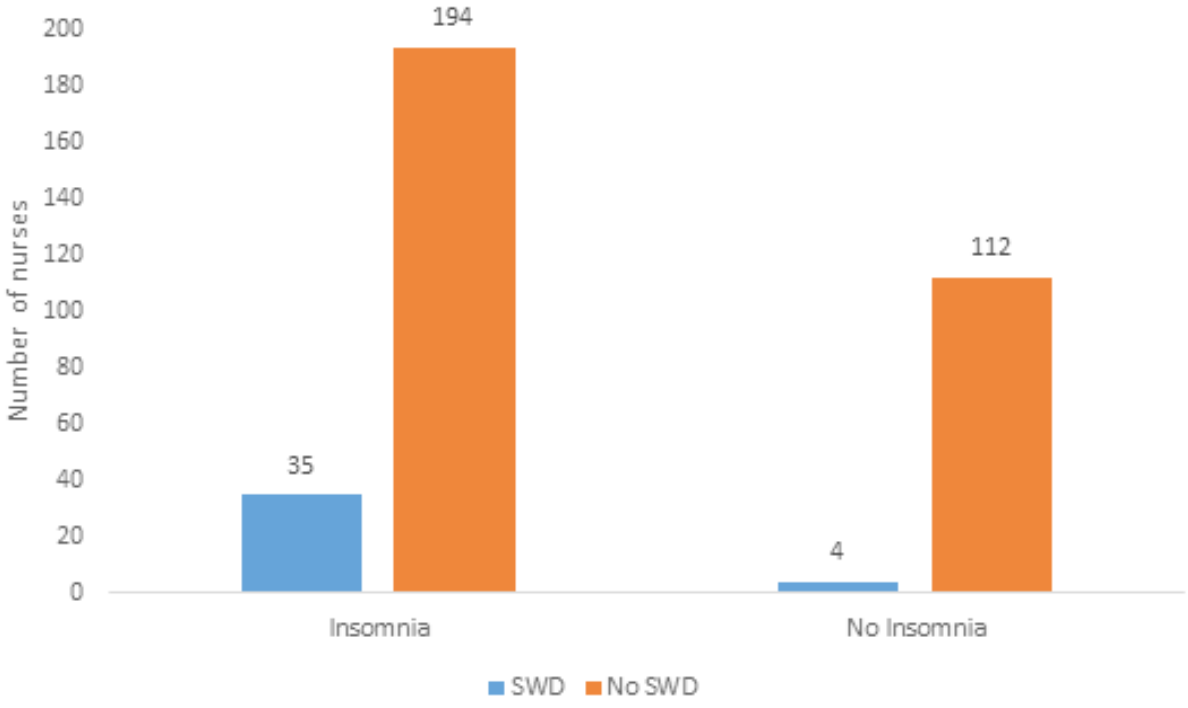
Perceived Stress Scale measurements showed a mean score of 17.24±5.6, which indicated that most of our sample had ‘’high level’’ of stress. Overall, prevalence of very high, high, average, low, and very low levels of stress was 27.8%, 40%, 16.2%, 9.3%, and 6.4%, respectively. More than half (52.3%) of the Bahraini nurses between the ages 20 and 30 years had “very high” stress level, and most nurses who only had a B.Sc. degree suffered from high to very high levels of stress (P<0.001). On the other hand, there was no significant relationship between stress with gender or marital status (P>0.05). Among the sample, 38.9% of nurses who worked in the Pediatric department had very high levels of stress. Nurses with one to five years of night work experience also had the highest levels of stress (P<0.05). Moreover, 43.2% of nurses with four to six-night shifts per month had the highest stress level. Lastly, most nurses who did not take caffeinated drinks suffered from higher levels of stress (P<0.001) (Table 2).

Table 2: Relationship of perceived stress levels (perceived stress scale) with sociodemographic variables of nurses in Bahrain

n (%)		Perceived stress levels					p-value *
		Very low	Low	Average	High	Very high	
		n (%)	n (%)	n (%)	n (%)		
Age	20-30	1 (1.30)	4 (5.20)	7 (9.10)	31 (40.30)	34 (44.20)	0.002
	31-40	10 (5.40)	16 (8.70)	34 (18.50)	76 (41.30)	48 (26.10)	
	41-50	9 (13.80)	10 (15.40)	11 (16.90)	22 (33.80)	13 (20.00)	
	51 and above	2 (10.50)	2 (10.50)	4(21.10)	10 (52.60)	1 (5.30)	
Nationality	Bahraini	2 (1.60)	3 (2.30)	10 (7.80)	46 (35.90)	67 (52.30)	<0.001
	Non-Bahraini	20 (9.20)	29 (13.40)	46 (21.20)	93 (42.90)	29 (13.40)	
Marital Status	Single / Engaged	0 (0.00)	1 (8.30)	0 (0.00)	5(41.70)	6 (50.00)	0.155
	Married	22 (6.70)	31 (9.50)	53 (16.20)	131 (40.10)	90 (27.50)	
	Divorced / Widowed	0 (0.00)	0 (0.00)	3 (50.00)	3 (50.00)	0 (0.00)	
Educational Level	B.Sc.	5 (3.30)	8 (5.30)	15 (10.00)	70 (46.70)	52 (34.70)	<0.001
	Higher Education	0 (0.00)	0 (0.00)	3 (37.50)	4 (50.00)	1 (12.50)	
Department	Others	17 (9.10)	24 (12.80)	38 (20.30)	65 (34.80)	43 (23.00)	
	Pediatric	4 (4.40)	6 (6.70)	11 (12.20)	34 (37.80)	35 (38.90)	
	Gynecology	8 (9.30)	11 (12.80)	8 (9.30)	36 (41.90)	23 (26.70)	
	Medical	4 (4.50)	9 (10.10)	26 (29.20)	31 (34.80)	19 (21.30)	0.012
	A&E	6 (11.50)	4 (7.70)	8 (15.40)	25 (48.10)	9 (17.30)	
	Surgery	0 (0.00)	2 (7.10)	3 (10.70)	13 (46.40)	10 (35.70)	
Years of Experience	01-5	1 (2.00)	3 (5.90)	5 (9.80)	19 (37.30)	23 (45.10)	
	06-10	6 (5.90)	10 (9.90)	15 (14.90)	47 (46.50)	23 (22.80)	
	11-15	5 (6.10)	7 (8.50)	17 (20.70)	31 (37.80)	22 (26.80)	0.325
	16-20	5 (7.00)	7 (9.90)	14 (19.70)	23 (32.40)	22 (31.00)	
	21-25	3 (15.80)	2 (10.50)	2 (10.50)	9 (47.40)	3 (15.80)	
	26 & above	2 (10.50)	3 (15.80)	3 (15.80)	9 (47.40)	2 (10.50)	
Years of Night Work Experience	01-5	1 (1.70)	2 (3.40)	9 (15.50)	19 (32.80)	27 (46.60)	
	06-10	6 (6.10)	11 (11.20)	12 (12.20)	47 (48.00)	22 (22.40)	
	11-15	5 (5.60)	11 (12.20)	18 (20.00)	38 (42.20)	18 (20.00)	<0.023
	16-20	5 (8.20)	4 (6.60)	14 (23.00)	18 (29.50)	20 (32.80)	
	21-25	3 (17.60)	2 (11.80)	0 (0.00)	8 (47.10)	4 (23.50)	
	26 & above	1 (7.10)	2 (14.30)	3 (21.40)	7 (50.00)	1 (7.10)	
Night Shifts Per Month	0-3	3 (12.00)	1 (4.00)	4 (16.00)	7 (28.00)	10 (40.00)	0.024
	04-5	1 (1.40)	7 (9.50)	8 (10.80)	26 (35.10)	32 (43.20)	
	07-9	10 (5.80)	15 (8.80)	29 (17.00)	76 (44.40)	41 (24.00)	
	10-12	8 (12.50)	5 (7.80)	14 (21.90)	25 (39.10)	12 (18.80)	
Caffeinated Drinks	Yes	3 (13.60)	2 (6.20)	10 (17.90)	48 (34.50)	39 (40.60)	<0.001
	No	19 (86.40)	30 (93.80)	46 (82.10)	91 (65.50)	57 (59.40)	

Our study showed a significant relationship between insomnia and Shift Work Disorder (P<0.001). Although only 11.3% nurses had Shift Work Disorder; however, 15.3% suffered from Shift Work Disorder and insomnia at the same time (Fig. 1).

Figure 1: Relationship of Shift Work Disorder with insomnia in nurses in Bahrain



Discussion

We found that 66.4% of the nurses suffered from insomnia, 40.3% suffered from "high" levels of stress, and 27.8% suffered from "very high" levels of stress. A relationship between working in shifts and insomnia and stress was also a significant finding of this study. Our study showed that nurses who had worked for 1-5 years suffered from insomnia more than those who had more work experience. This could be explained by a lack of coping behavior among less experienced nurses [12]. Nurses working in the Surgical and Pediatric departments reported insomnia more frequently than those in other departments. Our results are consistent with another study on nurses in public hospitals in Greece, which also showed that insomnia was more common among the nurses who worked in the surgical departments [13]. This could be due to the fact that surgical department nurses work within an intensive and stressful work environment compared to other departments, and they usually spend long time while assisting surgical procedures and caring for sick children.

Another finding from the present study was that 62.0% of those who did not consume any caffeinated drinks did not suffer from insomnia. A study from Brazil showed that nurses who drank more than 3 cups of caffeine drinks a day had more insomnia (39.2%) [14]. In our study, a relationship was found between the number of night shifts performed per month and insomnia, with a high prevalence in the nurses who had up to 3 shifts per month. This is consistent with a study that showed that insomnia was more common among those who worked for 2-3-night shifts per month as compared to those who did not [15]. It could be because that nurses with more night shifts may be able to cope with the disturbance in their

sleeping pattern better than those who were not as frequently disturbed.

We also found a significant relationship between insomnia and nurses' age, with the highest prevalence among nurses in the youngest age group (20-30 years). Sleep disturbances in nurses of younger age groups have also been previously reported by a study of sleep disturbance in employed women [16]. The study concluded that there was a higher incidence of sleeping disturbance in those who worked in shifts, and their age and family factors contributed more to sleep disturbances than caffeine and alcohol intake [16].

Also, 52.3% of Bahraini resident nurses suffered from very high levels of stress. In addition, the consumption of caffeinated beverages also seemed to affect the stress in nurses. The nurses who consumed such beverages had lower stress levels than those who did not. This is likely because the consumption of caffeine can stimulate the release of dopamine hormone in the brain which can improve alertness [17]. There was a statistically significant relationship between insomnia and Shift Work Disorder in our study, which is consistent with results from a study that showed that about one-third of the nurses had symptoms indicative of Shift Work Disorder, with highest prevalence in nurses working in night shifts [18]. Our study showed a significant relationship between anxiety and night shift work. A study on nurses in Norway showed how insomnia, excessive sleepiness and fatigue, anxiety, depression, and Shift Work Disorder might all be linked together in nurses with less than 11 hours' rest between shifts [10].

A similar study from Taiwan also showed a positive relationship between anxiety experienced by nurses with their age [19]. Another study with Norwegian nurses showed that about one-third of the nurses had symptoms indicative of Shift Work Disorder, with highest prevalence in nurses working during night shifts. Also, Shift Work Disorder has shown a significant relationship with depression and anxiety [20]. However, another study done with Greek nurses suggested that there was no such relationship between anxiety and being involved in shift work [21].

Strengths and limitations

The fact that we drew the sample from all major departments, considering population in the hospital, is a strength of the study because it adds value to the sample representation and, therefore, some generalizability of the findings. Another strength was that there were no refusals in the study which ensured that all the selected and eligible nurses participated in our study. Using validated standard tools for data collection was also a strength of this study. However, our study was not without limitations. However, the nurses took their time to fill in the questionnaire while the data collectors were present in the hospital premises.

Conclusion

Insomnia and stress coexisted at very high levels in nurses in the tertiary care hospital of Bahrain. Shift Work Disorder was also related to insomnia in these nurses, which indicates that including working in highly demanding departments and working in night shifts, can lead to insomnia and stress among nurses in Bahrain. To help address this problem, it is critical for nurses to maintain a healthy work-life balance. The tertiary hospitals of the region and other similar settings must also provide adequate resting opportunities for the nurses to prevent these psychological and mental health effects of shift work in nurses.

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