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ORIGINAL ARTICLE

Sleep disorders and insomnia among night shift healthcare workers: a cross-sectional study in a leading health establishment in the eastern province, Saudi Arabia

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ABSTRACT

Background: Shift workers, people who work outside workday hours, are thought to be at risk of decreased alertness and productivity; hence, there is an increased possibility of occupational hazards to happen. Hospital employment requires health professions to be available for work at all the times, and this forces the healthcare workers to take on night shifts. Thus, these workers are susceptible to occupationally related sleep disorders. The aim of this study was to assess the quality and duration of sleep among night shift health workers at the Saudi Arabian Eastern Province-hospitals.

Methodology: A cross-sectional study was carried out among health workers working in 8- to 10-hour shifts at Eastern Province hospitals in Saudi Arabia. A pretested, structured online questionnaire with 26 questions was distributed among the hospitals to healthcare workers, with a total of 252 responses received. The online questionnaire assessed and compared the difference between the sleep quality of these workers while working during the night shift, and the quality of sleep of these workers while having days off from work.

Results: Responses of the healthcare workers to the online questionnaire who worked night shifts replied that they had problems falling and staying asleep (76% and 72.2%, respectively). Of these, they suffered from overall poor quality of sleep (59.8%) and reported decreased mental function while awake (64.9%). Furthermore, 74% of respondents reported that during their days off, their occupational-related sleep disorders improved. However, more than half of the respondents noted that they faced difficulties in falling asleep.

Conclusion: Sleep disorders are prominent within night-shift healthcare workers which affected their overall performance at work. Thus, it is recommended that such healthcare workers follow-up with sleep specialists improve their overall quality of sleep.

Keywords: Sleep disorders, insomnia, night shift, healthcare workers.

Introduction

Shift workers are people who regularly work beyond the usual morning to evening working hours. These individuals are known to be at risk of decreased alertness, increased tiredness, decreasing productivity, and mood swings. They also have compromised safety issues at work and suffer from chronic disorders, gastrointestinal, and musculoskeletal disorders [1–3]. However,

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insomnia, defined as the inability to sleep, along with other sleep disorders, including snoring, sleep apnea, sleep deprivation, and restless leg syndrome, is the most common problems documented by shift workers [4,5]. Impaired sleep patterns and a decrease in the alertness of shift workers have been referred to in comparisons between irregular work hours and circadian rhythms [6]. During prolonged periods of shift work, circadian rhythms gradually adapt to the new schedule yet; this adaptation is not complete, especially when shift work is irregular [6]. The relationship between shift work, sleep disorders, and insomnia have been studied in research centers and factories in western countries [5–8], but there exist only a few studies on hospital employees [9–11] in the Middle East, especially in Saudi Arabia. There are many studies that were conducted around the world which show evidence that shift work does have an effect on their sleep habits causing insomnia and sleep disturbances [12]. Moreover, this has various impacts on people health and also has a strong correlation to cardiovascular disease, gastrointestinal disease, increased risk of accidents, and disturbed sleep and fatigue [13]. A Chinese study revealed that 18- to 34-year-old insomniacs are eight times more likely to suffer a stroke than their sound-sleeping peers. This particular study, furthermore, looked at more than 21,000 people who had been diagnosed with insomnia and 64,000 normal sleepers. The European Respiratory Society found that the association between stroke and lack of sleep was highest in young adults, yet, beyond age 35, this link became much weaker. Most people, without adequate sleep which is generally 6 to 9 hours a night, have there the nervous system go into "fight-or-flight" mode, otherwise known as sympathetic stimulation, producing excess stress hormones, which, in turn, produce dangerous inflammations within the body. In addition to raising the risk of stroke, chronic inflammation can also contribute to cardiovascular problems, diabetes, and obesity [14]. While all these effects are important, the latter two constitute the dominant day-to-day health problems. Additionally, insufficient sleep is often the reason for leaving night shifts [13]. Also, there is an association between the difficulty of sleep initiation and hypertension (HTN) 40.1%; 130.7 per 1,000 persons annually difficulty of maintaining sleep by 42.3% at a rate of 136.7 individuals per 1,000 persons annually [15]. Moreover, insomnia has a negative socio-economic impact on workers [16]. Another study conducted in Riyadh, Saudi Arabia investigated medical shift worker to determine their frequency of psychological stress, sleeping disturbance, and chronic disease [17]. The results of this study revealed that shift workers sleep lesser than 5 hours at a time [18.8%], while those who sleep 5 to 6 hours was 29.9%. This study additionally reported that 29.8% of respondents took 30–60 minutes to fall asleep, while our study revealed a higher percentage [76%] of respondents who would take 30–60 minutes to fall asleep at night. Additionally, 72.2% did not have uninterrupted sleep at night. Furthermore, another study revealed that 11.6% of respondents are using some form of the sleeping tablet; on the other hand, the former study found that 7.45% of respondents did so. A recent study in 2015 reported that a night shift workers' recovery from sleep disturbance and insomnia was not fully complete for up to 11 days based on observing a decreased concentration of cortisol, while day-shift employees would normally complete recovery on their first day off, with full recovery to non-stressed levels reached by day four [18]. A 2013 Taiwanese study of 16,440 employee participants reported their work shift patterns 1 week before the survey. Shifts were classified into four types: fixed day, rotating day, fixed night, and rotating night shifts to study the association of night shift sleep problems, burnout, and minor mental disorders. Results of this study showed that both male and female fixed night shift workers were found to have a greater risk of a short duration of sleep, a high-level burnout score, a high prevalence of insomnia, and minor mental disorders, which might be helped by sleep disturbance [19]. The work in hospitals must be carried out around the clock daily with the potential of emergency conditions and responses to accidents and fire damage. Therefore, working under stress coupled with the constant possibility of responding to eminent high-stress situations, the authors of this present study believe it reasonable to hypothesize that shift work might have considerable adverse effects on sleep behavior in those hospital workers experiencing this in the Eastern Provence of Saudi Arabia. The aim of the present study is to assess the effect of rotating shift work on perceived sleep quality and sleep duration of workers at Saudi Arabia's Eastern Provence hospitals. This study is conducted with the broader aim of improving the psychological conditions that are part of night shift work and how to adapt to it in hopes to reduce its negative consequences.

Subjects and Methods

This study is a cross-sectional descriptive study with group comparisons which were conducted in health institutions, namely, the Dammam Medical Complex, Al Qatif Central Hospital, and Jubil General Hospital in the Eastern Province of Saudi Arabia. The study population was healthcare employees who worked for more than 6 months in a non-standard shift schedule. In health care, shift work of professionals is defined as recurring and alternating periods (shifts) in which an individual (worker) or multiple individuals (workers) work at different times to cover 24 hour periods. In this study, shift work is considered to be work done at the health care facility being scheduled any time outside the normal working hours. Generally, daily work timings in Saudi Arabia are from 7:30 a.m. to 4:30 p.m. Each health care specialty has a specifically designated monthly working schedule, known as a rota, in which staff is listed at different times each day per week to cover the entire 24-hour required service, so workers alternate to cover the specific specialty area. In this present study, the sample size equation used was: $N = (1.96)^2 * p\ (1-p) / (0.05)^2$. The estimated ($p$) value is 40% considering

the high percentage of having sleep disorders caused by other conditions in addition to insomnia in the night shift population, thus, accordingly $N = 368$, but, optimally the sample size should have been 370 night shift workers. All health employees in this study worked for more than 6 months in healthcare institutions. These were divided into two groups being those who worked in a non-standard shift schedule at a health institution and those who worked in standard shifts. The questionnaire was divided into five main sections these include questions on demographic data, such as age, gender, marital status, number of children, and living status, along with the assessment of the presence of sleep disorders and insomnia, if any. Questions also include the assessment of the presence of major health risks and the relationship of sleep disorders, insomnia, and health problems. The protocol and questionnaire for this present study were reviewed and approved by the ethical committees at Arabian Gulf University and the Ministry of Health in Saudi Arabia. Following this approval, permission was taken from the General Directorate of Health Affairs in the Eastern Province, Saudi Arabia. The confidentiality of all information was assured by the following: a confidentiality document, autonomy of the staff, and an information sheet which was given to the staff with the questionnaire. The Statistical Package for Social Science (IBM SPSS Version 24) was used for data entry and analysis. Frequency distribution tables were constructed. The chi-squared test was used for the association between of non-standard shift worker in regards to age, gender, marital status, consumption of sleep medication, alcohol, and smoking.

Results

The results of this study revealed that out of the total number (252) of individuals who participated in the study, 70%, being 175, were female, while 30%, being 75 respondents, were male. The mean age of all the respondents was of 31-year old. Just less than half of those surveyed were physicians, meaning 118 out of the total number of 252 which was 47.6% of respondents. Among participants, 123 (53%) worked on non-standard night shifts (NSS) in the last month, while 109 (47%) did not. There was data missing regarding the type of work in 20 participants which accounted for 7.9% of the total sample. Most of those who work on an NSS were younger than 30 years of age, 82 (67.8%), ($p < 0.001$). Additionally, most of those working in NSS 206 (80.42%) were living with a spouse ($p = 0.23$). Four individuals (3.3%) of those working in NSS stated that they drank alcohol, in comparison to one person (0.9%) of those not working an NSS, $p = 0.23$. Additionally, 19 individuals (15.4%) of those working an NSS were smokers in comparison with five (4.6%) of those not working an NSS ($p = 0.005$). Data were collected from both male and female health workers, 70% (175) were females. In both genders combined, 67.2% only were married, while 82.4% of married people lived with their spouse. Of all respondents, 118 (46.8%) were physicians, 106 (42.1%) were nurses, and 25 (9.9%) worked in other various departments in the health institution. In regard to chronic diseases, 6 (2.4%) had diabetes mellitus (DM), 5 (2%) had dyslipidemia, 17 (6.7%) had HTN, 6 (2.4%) sickle cell disease (SCD), 3 (1.2%) had thalassemia, and 41 (16.3%) had a variety other diseases. It was found that 24 (10.3%) of night shift workers were smokers, 6 (2.4%) consume alcohol, and 27 (11.6%) take sleeping pills to fall asleep. The majority 123 (53%) of the sample have been working in night shifts and 16.3%(17) of those surveyed have worked in an NSS for less than a year. In our sample, nearly one third have worked between 1 and 3 years in NNS = 32.7% (34), on the other hand, 26.9%(28) of people worked for 3–5 years on NNS. Twenty-four percent (25) of people had worked in a night shift for more than 5 years. Of those surveyed, 72.1% (75) responded felt that they were not getting enough sleep; furthermore, 82.7% (86) of NNS workers said they do feel sleepy during their work hours. Seventy six percent (79) have trouble falling asleep at night, whereas 72.2% (70) cannot stay asleep and 80.4% (78) struggle to wake up the next day. In regards to the respondents' overall quality of sleep, only 3.71% (39) of them rated their sleep quality as good. It was also found that 62.9% (58) did not feel so well in general, and 64.9% (63) had mental function disturbances when they did wake up. Results additionally revealed that 64.7%(55) of night shift workers who drive a car have been dozing off while driving. In contrast to working days those who drove reported that only 34.6% of them dozed off while driving the car. As for those respondents who are passengers in cars and busses, 34.1% (56) of them reported sleeping on their way to work. It was found that 54.1% (46) workers got a regular break in their shift, defined as the day off following the night shift. Results revealed that 53.5% (23) of them did not experience sleepiness during their break, while 46.5%(20) did feel sleepy on their day off. Despite this, 74.4% (32) were very satisfied with the amount of sleep they had during their break. Nevertheless, 44.2% (19) had trouble staying asleep on their day off, whereas the other 55.8% (24) were able to have a steady sleep. The overall quality of sleep during the break was satisfactory according to 79.1% (34) of respondents. Additionally, 81.4% (35) reported normal mental function upon waking in the morning during the off day, while only 18.9% (8) had mental function disturbances when waking up. When asked about sleep delay, 62.5% had trouble falling asleep in a short period (Tables 1–3).

Figure1 shows 17 people had worked in an NSS for less than a year. The majority of the sample had worked between 1 and 3 years in NNS = 34. Twenty-eight people worked for 3–5 years. Twenty-five people worked in a night shift for more than 5 years.

Figure 2 shows that 65% of night shift workers who drive do fall asleep for a second while they drive, in contrast to the 35% who do not doze off.

Figure 3 shows about 72% of night shift workers had an unsatisfactory amount of sleep during working, while they had a satisfactory amount of sleep during breaks.

Table 1. *Demographic characteristics and associated illness, common hereditary and non-hereditary diseases, and personal behavior among night shift workers.*

Variable	Numbers	%
Marital status		
Married	168	67.2
Not currently married	82	32.8
Gender		
Male	75	30
Female	175	70
Status living		
Without spouse	44	17.6
With spouse	206	82.4
Specialty		
Physician	118	46.8
Nurse	106	42.1
Other	25	9.9
Diseases		
DM	6	2.4
Dyslipidemia	5	2
HTN	17	6.7
SCD	6	2.4
Thalassemia	3	1.2
Other diseases	41	16.3
Consumptions		
On sleep medication	27	11.6
Alcohol drinker	6	2.4
Smoker	24	10.3

The total number of the study population is 252.

Table 2. *Duration of work under the NNS system and descriptive questions regarding the quality of sleep and sleeping problems, general health and mental functions, and the probability of dozing off while driving.*

Variable	Number	%
Working in non-standard, the shift in the past month		
Yes	123	53
No	109	47
When I started working in non-standard shift		
Less than one year	17	16.3
More than 5 years	25	24
1 < 3 years	34	32.7
3–5 years	28	26.9
The overall amount of sleep		
Sufficient	29	27.9
No	75	72.1
Experience sleepiness while working		
Yes	86	82.7
No	18	17.3
Problem falling asleep at bedtime		
Yes	79	76
No	25	24
Problem staying asleep		
Yes	70	72.2
No	27	27.8
Problem with waking up too early		
Yes	78	80.4
No	19	19.6
Quality of sleep		
Good	39	40.2
Not so good	58	59.8
Sense of wellbeing		
Good	36	37.1
Not so good	61	62.9
Normal mental function when awake		
Normal	34	35.1
Not normal	63	64.9
Dozing off while driving		
Not at all	30	35.3
Yes	55	64.7
Dozing off while communicating		
Yes	29	34.1
No	56	65.9

Discussion

Working in various capacities in a hospital, potential life, and death situations can strike at any moment. Healthcare employees have high-stress situations in their jobs and working NNS adds stress factor into an already tense work arena. From our results, NNS appears to possibly affect sleep quality and sleep habits of those working in this environment. When observing the results of our study, it is striking that the vast majority of individuals have difficulty sleeping, getting enough rest, and when sleeping the quality of their sleep is generally poor. This was generally true in over 70% of respondents. Nearly, half of the respondents have worked 3 years or more on the NNS so it appears that many continue to work regardless of the problems they may suffer about working the NNS and sleep difficulties, which has the potential of affecting their performance on the job. Of all respondents, over 80% said that they fall asleep during their work hours which is probably related to not sleeping well when off from. On the other hand, although tired during work, when going to sleep at night, over 75% percent had trouble falling asleep and over 70% could not remain asleep at night. A high-stress job and irregular sleeping patterns do not allow the body and mind to relax and sleep well. As a regular daily pattern of sleep is not possible, it appears that this cycle of NNS and break days

Table 3. *Descriptive questions regarding sleep quality and overall well-being and mental functions for night shift workers during the break.*

Variable	Number	%
Get a break?		
Yes	46	54.1
No	39	45.9
Sleepiness during the the awake time during the break		
Yes	20	46.5
No	23	53.5
The overall amount of sleep		
Satisfactory	32	74.4
Not satisfactory	11	25.6
Problem staying asleep during break from working shifts		
Yes	19	44.2
No	24	55.8
Quality of sleep during break		
Satisfactory	34	79.1
Not satisfactory	9	20..9
Mental function during break time		
Normal	35	81.4
Not normal	8	18.9
Sleepiness delay during the break		
No delay	15	37.5
Delay	25	62.5
Dozing off while driving during break		
No dozing off	51	65.4
Yes	27	34.6

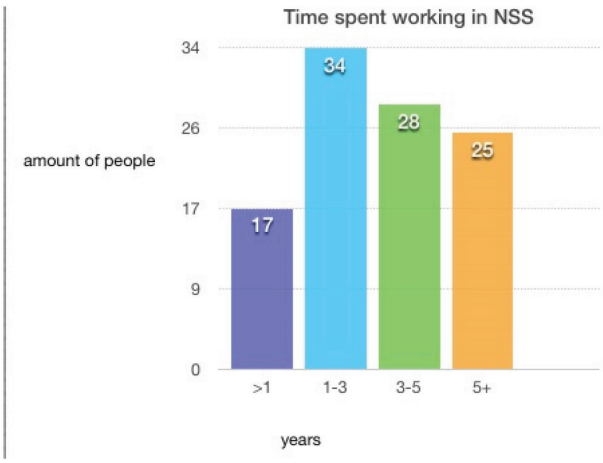

Figure 1. *Number of individuals and years that night shift health workers have spent working in a night shift.*

off does not allow for sound sleep patterns and the vast majority of NNS suffer. This includes the fact that just over 80% struggle to wake up the following day. This cycle continues and affects daily life for the vast majority

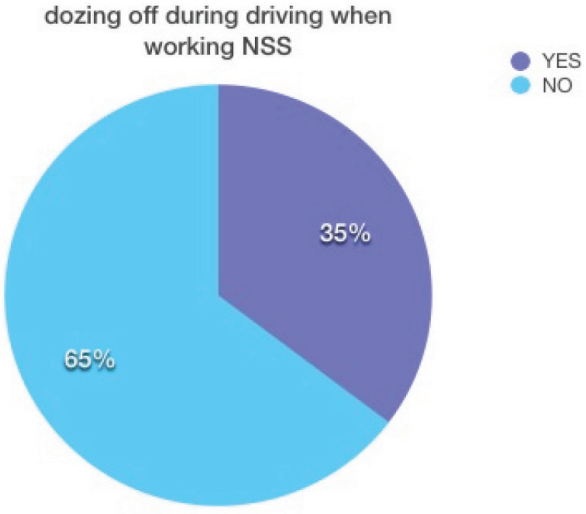

Figure 2. *Percentage of night shift workers dozing off while driving during the time of their night shifts.*

of NNS workers in terms of their sleep. Additionally, it was also noticed a significant number of respondents have reported to doze off while driving; two-thirds have experienced this during their working days. As this has the potential for very dangerous consequences, the NNS appears to have a potential correlation with potentially fatal road traffic accidents. The authors recommend another study look into this correlation. It is also very disconcerting that it was also found that 62.9% (58) did not feel so well in general and 64.9% (63) had mental function disturbances when they did wake up. This may not only lead to depression and possibly also other cognitive dysfunctions. This, in turn, may very possibly lead to not having making optimal decisions or observing patient care and concerns properly in the healthcare of patients. Limitations of this study include that the data collected had a high majority of women being 70.0%, and 82.4%were married and lived with their spouse. This may give skewed the results. Nearly, half of respondents were doctors yet the results may be different within the various specific types of health care workers within a hospital setting when looking into sleep disorders. It was interesting to note that chronic diseases were found in the shift workers but no correlation was made between the individual's job and these chronic diseases and their severity or changes about NNS. Findings in the area of those who smoked or those who took sleeping pills about NNS and insomnia were also not investigated more deeply as addiction and insomnia may have some correlation. Although it should be noted from our literature review that other studies had revealed a lower usage of sleeping pills than our respondents, again, this is another area in which further research could be carried out.

Recent research in this area suggests that poor and disturbed sleep is a major risk factor which is correlated with poor health and can cause poor work performance. Working NNS in this environment cannot only disturb

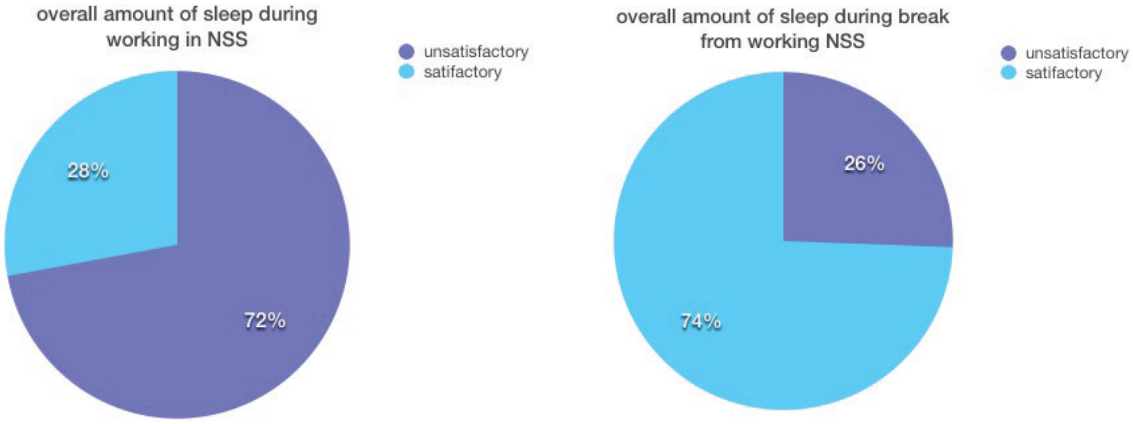

Figure 3. *Comparison of the overall amount of sleep and satisfaction during night shift working days versus during days off.*

people's sleep but also compromise health in general. It is important to look into how chronic insomnia and other sleep disorders can be treated through non-pharmacological techniques. This may include cognitive behavioral therapy or seeing a specialist in sleep disorders. Sleep disturbance should be addressed to lessen the possible physical and mental health complications. High-demanding jobs and over-commitment can cause sleep disturbances, and work-related sleep disturbance can be overcome by good family and workplace support. This work support can prevent future insomnia-related problems. Higher job strain leads to disturbed sleep, lower job strain, and good social support can improve sleep problems which are compounded by NNS. Stress management training and techniques could also help to cope with sleep disturbance which is intensified with NNS.

Conclusion

There is a high percentage of people who are working in NNS having an unsatisfactory sleep. The current study findings revealed that getting unsatisfactory sleep may affect the safety of the health care worker and lower the quality of care provided by this individual in a hospital setting. It was found in the present study that NNS is associated with poor and disturbed sleep. The current study also encourages further research to be carried out in this area which not only affects the life of the individual but also affects those patients in need of high-quality, competent hospital care.

List of Abbreviations

DM	Diabetes Mellitus
HTN	Hypertension
NSS	Non-standard night shifts
SCD	Sickle cell disease

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consent was obtained from all the participants.

Ethical approval

The protocol and questionnaire for this present study were reviewed and approved by the ethical committees at Arabian Gulf University, and the Ministry of Health in Saudi Arabia. Following this approval, permission was taken from the General Directorate of Health Affairs in the Eastern Province, Saudi Arabia. The current study was approved by the Arabian Gulf University, Manama, Bahrain

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