

Comparing the Prevalence of Gastrointestinal Disorders between Day Workers and Shift Workers at Kerman University of Medical Sciences: gastrointestinal disorders between day workers and shift workers

Somayeh Rahimimoghadam
Narges Khanjani

Environmental Health Engineering Research Center,
Kerman University of Medical Sciences, Kerman, Iran.

Maryam Naderi

Dept. of Occupational Health Engineering, Kerman Medical
Science University, Kerman, Iran.

Raziyeh Rasekh

MSc of Nursing Intensive Care, Abu Ali Sina Hospital,
Shiraz Medical Science University, Shiraz, Iran.

Background and Aims: Shift work can lead to adverse health effects including gastrointestinal and cardiovascular disorders. The recent study aimed to compare the prevalence of gastrointestinal disorders among day work nurses, shift work nurses and office employees of Kerman University of Medical Sciences, Kerman, Iran.

Methods: This was a cross-sectional study conducted in 2011. In this study, 159 nurses working at hospitals affiliated to Kerman University of Medical Sciences and 167 office employees of the same university participated. Data was obtained using a researcher-made questionnaire and was analyzed by SPSS 18., Chi-square test and ANOVA was used for analysis.

Results: Results showed anorexia ($P=0.0001$), dyspepsia ($P=0.002$), nausea ($P=0.001$), hiccups ($P=0.003$) and heath burn ($P=0.002$) were more prevalent among shift workers than day workers. The results also showed that the prevalence of anorexia ($P=0.02$), gastric ulcers ($P=0.04$) and heartburn ($P= 0.02$) was more prevalent among nurses with irregular shift work than those with regular shiftwork. Among the demographic characteristics, gender was related to the nausea ($P=0.004$), and nausea was more prevalent in women (4.3, 95% CI: 1.7-6.3). Also, increased age was related to heartburn ($P= 0.02$)

Conclusion: Gastrointestinal disorders are more common in shift workers. Nurses with more ability to cope with these adverse effects should be chosen for shift work. More ways to reduce the negative health effects of shift work should be investigated.

Introduction

Shift work is any type of work that is done outside the routine daily working hours which are from 7 am to 6 pm [1]. The wide prevalence of shift work in modern societies is related to the necessity for receiving 24 hour services, the nature of modern industrial work and gaining more financial income. Shift work is usually in morning, afternoon and night shifts and has other common names which are day shifts, cycling shifts and grave yard shifts [2-3]. Designating the name grave yard shift to the night shift, shows that this shift is not compatible with normal human physiology and is

not well received by some employees. Previous studies have mentioned that employees were more inclined to work during day than night hours [1]. The human body has different capabilities during day and night hours, and these capabilities are rhythmic and recurrent. Among these are activities such as sleep and work, hunger, the peristaltic movements of the stomach and intestines [1]. Research has shown that the maximum activity of the colons is in the morning and after waking up, and its least activity is during night and sleep [4].

The biologic rhythm is responsible for hormone fluctuations during the day which regulate the proper function of organs, and its advantage is the preparedness of the organ or the hormonal system for its optimum performance in specific tasks done during the day [4]. One of the factors that can affect this cycle, is irregular sleep, such as engagement in work shift, which these changes can lead to incoordination and disorder in the biological rhythm [5].

Disturbance in this rhythm leads to several health issues, which are mainly sleep disturbance, lack of concentration, irritability, unstable mood, fatigue, changes in appetite and sexual function [6-10], losing the ability to solve complicated problems, dyslexia [11], increase in gastrointestinal and cardiovascular diseases and cancer [12], increase in occupational accidents, errors in qualitative control [9-13] and trouble in family and social life [7-14]. Gastrointestinal disturbances are one of the most common health problems reported in shift workers [6]. A high prevalence of gastrointestinal problems such as gastrointestinal ulcers, gastritis, constipation and diarrhea has been reported in shift workers [5-15-18]. These symptoms are similar to irritable bowel syndrome (IBS) in night shift workers and include constipation, diarrhea and abdominal pain [4]. Studies have shown a direct relation between the number of shift workers and sleep disturbances with increased risk of colon cancer, gastrointestinal ulcers and abnormalities [12-13]. Also, the unhealthy behavior of some shift workers and tendency toward smoking and drinking caffeine as a relief for their fatigue and sleeplessness, can cause even more gastrointestinal problems [13].

The necessity for providing 24 hours medical services in hospital has imposed a need for rotating shiftwork among hospital employees [19]. Nurses are the most populated occupational group in health care services [20] and about 40% of the employees in the hospital are nurses [21].

Research shows that nurses are nowadays at risk of serious health problems and sleeplessness is an important factor that can decrease the performance quality of nurses and lead to mistakes in patient care and can therefore cause irreversible damage [21]. Low sleep quality in nurses can cause complications such as increase in cardiovascular diseases, increase in gastrointestinal problems, increased psychological problems such as anxiety and depression, decreased function, increased sleepiness and increased incidence of professional errors such as using or injecting the wrong medications and non-professional errors such as driving accidents on the way to work or home [21-22]. Seyed Rasooli et al have commented that today's nurses are tomorrow's patients and their somatic, psychological and social health is seriously threatened [23].

Nurses have an important role in the health care team and performing a wide range of duties that are related to patients' life; therefore, the general health of nurses is important in the quality of health care services [24-25]. Studies have shown that the accuracy of shift working nurses in performing their duties decreases during the night and the initial hours of morning [26]. Also, research has shown that night working nurses have 2 times the sleepiness and probability to commit medical errors, compared to other nurses [27].

This study was performed in order to compare the prevalence of gastrointestinal problems in shift working nurses, day working nurses and office employees of Kerman University of Medical Sciences. In this study, outcomes probably related to the different working situation of these three groups have been compared.

Materials and Methods

The present cross-sectional study was done on the of employees of Kerman University of Medical Sciences in 2013. About 250 nurses were working in these hospitals, and according to the Morgan table for sample size in limited populations, at least 152 nurses had to be enrolled in this study. Nurses were randomly selected from a list according to random numbers. Then the same number of office employees were randomly selected as the control groups and by a similar method.

This study was approved by the Ethic Committee of Kerman University of Medical Sciences and nurses participated in the study after consent.

Demographic and work status information was inquired from the participants. Information about gastric disturbance was evaluated with the Caruso questionnaire [5]. This questionnaire includes questions about gastrointestinal disturbance, and diseases diagnosed by physicians and the medications that the participants used. Also, the standard SOS (Survey of Shift Workers) questionnaire created by the shift work research group of the MRC/ESRC practical/social psychology unit was used [28]. After preparing the Persian version of the questionnaire, its content validity was approved by professional evaluation.

The first part of the questionnaire, included demographic information and information about shift work status and history of shift work. In the second section about gastrointestinal diseases, the history of 14 gastrointestinal symptoms in the past 6 months in the range of never, sometimes, frequently was asked. Also, participants were asked to name the gastrointestinal diseases with a certain medical diagnosis that had been made by a physician and nurses were asked about over the counter medications that they used and their reason for using them. The Cronbach's Alpha of this questionnaire was 0.78 among the nurses and 0.83 among the office employees.

All of the nurses from 3 educational hospitals of Kerman University of Medical Sciences who were interested to participate, could enter the study. Before completing the questionnaires, a brief oral explanation was given to the participants about completing the questionnaire and the nurses could spend about 5 minutes during their rest time for completing the questionnaire.

The questionnaire without the shift work part was also filled by the office employees of Kerman University of Medical Sciences.

The inclusion criteria were being employed as a nurse or employee for more than one year. People with a history of neurological diseases or a family history of gastrointestinal problems were excluded from the study. The rate of response was 91% in nurses and 96% in university office employees. Data was analyzed by SPSS 18. P-values less than 0.05 were considered significant.

In order to compare the gastrointestinal problems in the groups under study the chi-square test was used, and for comparing the means of quantitative variables (such as age, years of work, working hours per week) in the study groups ANOVA was used.

Results

There were 326 people participating in this study, in which 134 (41.4%) were shift working nurses, 25 (7.7%) were day working nurses and 167 (51.2%) were university office employees. 108 (80.6%) of the nurses had irregular rotating shifts and university employees. 108 (80.6%) of the nurses had irregular rotating shifts and 26 (19.4%) worked in regular rotating shifts. Among all participants 81.3% were female. The rest of the demographic information has been shown in Table 1.

| Quantitative variables | Shift working nurses | Day working nurses | University employees | P-value |
|------------------------|----------------------|--------------------|----------------------|---------|
|------------------------|----------------------|--------------------|----------------------|---------|

| | mean± sd | | | |
|---|--------------|--------------|---------------|---------|
| | N=134 | N=25 | N=167 | |
| # age(year) | 34±6.90 | 35.68±6.36 | 37.04±6.82 | 0.87 |
| # years working (year) | 7.6 (10.68) | 7.12 (15.12) | 9.6 (13.47) | 0.72 |
| ## years of shift work | 10.24 (7.92) | 9.68 (5.77) | 0 | - |
| # hours of work per week | 43.64 (7.83) | 41.72 (3.51) | 45.25 (10.19) | 0.32 |
| Qualitative variables | | | | p-value |
| *Marital status | | | | |
| Single | 36 (26.9) | 3 (12) | 38 (22.80) | |
| Married | 98 (72.37) | 22 (80.8) | 129 (77.30) | 0.41 |
| **Education | | | | |
| High school diploma | 0 | 0 | 39 (23.40) | |
| Graduate diploma | 0 | 0 | 27 (16.20) | |
| Bachelor in Science | 131 (97.8) | 23 (92) | 78 (46.70) | |
| Master degree | 3 (2.20) | 2 (8) | 23 (13.80) | 0.0001 |
| **Smoking status | | | | |
| Yes | 1 (0.70) | 0 | 2 (1.20) | 0.51 |
| No | 133 (99.3) | 25 (100) | 165 (98.8) | |
| ** Second occupation | | | | |
| Yes | 5 | 0 | 17 | |
| No | 129 | 25 (100) | 150 | 0.42 |
| * History of gastric diseases | | | | |
| Yes | 52 (38.8) | 11 (44.0) | 63 (37.7) | |
| No | 82 (61.2) | 14 (56.0) | 104 (62.3) | 0.83 |
| * History of taking Aspirin | | | | |
| Yes | 25 (18.7) | 6 (24.0) | 9 (11.4) | |
| No | 109 (81.3) | 19 (76.0) | 148 (88.6) | 0.1 |
| * History of taking gastrointestinal medication | | | | |
| Never | 75 (56.0) | 15 (60.0) | 124 (74.3) | |
| Sometimes | 52 (38.3) | 9 (36.0) | 28 (16.8) | 0.1 |
| Frequently | 6 (5.2) | 1 (4.0) | 15 (8.9) | |

Table 1: The Demographic Characteristics and the Status of Shift Work among the Three Groups under Study.

*ANOVA; ## t-test; ** chi-square test; *** Fisher's exact test

As Table 1 shows, there was no significant difference in regard to age, work history, marital status, number of hours working per week, second job or smoking between the three groups except education. This study shows that 93% (125 people) of the shift working nurses and 84% (21 people) of the day working nurses had at least one gastrointestinal symptom. Also, there was a significant difference among the three groups in regard to gastric problems, history of Aspirin use and history of use gastrointestinal medications.

Aspirin is a non-steroidal anti-inflammatory drug which suppresses prostaglandins. Gastrointestinal problems are among the side effects of Aspirin. But in this study, using Aspirin was not related to gastrointestinal problems (P=0.12).

Among the demographic characteristics, gender was related to the nausea (P=0.004), and nausea

was more prevalent in women (4.3, 95% CI: 1.7-6.3). Also, age was related to heartburn (P= 0.02) and as age increased, the number of heartburn cases increased as well. But none of the other demographic variables were related to gastrointestinal symptoms.

The prevalence of gastrointestinal problems among the three groups under study has been shown in Table 2.

| Gastrointestinal problems | Shift working nurses | Fixed day working nurses | University employees | p-value |
|---------------------------|----------------------|--------------------------|----------------------|---------|
| | Percent (number) | Percent (number) | Percent (number) | |
| Increased appetite | 15.7 (22) | 4 (1) | 16.8 (28) | 0.25 |
| Anorexia | 28.4 (38) | 12 (3) | 10.2 (27) | 0.0001* |
| Constipation | 23.9 (32) | 12 (3) | 13.8 (23) | 0.55 |
| Intestinal polyps | 1.50 (2) | 0 (0) | 0.6 (3) | 0.63 |
| Dyspepsia | 16.4 (22) | 8 (2) | 4.8 (8) | 0.003* |
| Gastric ulcer | 3.70 (22) | 8 (2) | 1.8 (3) | 0.207 |
| Stomach ache | 38.8 (5) | 24 (6) | 27.5 (46) | 0.07 |
| Diarrhea | 2.20 (3) | 0 (0) | 1.8 (3) | 0.74 |
| Nausea | 20.1 (27) | 12 (3) | 6.6 (11) | 0.002* |
| Abdominal distension | 29.1 (39) | 20 (5) | 22.8 (28) | 0.07 |
| Gastritis | 13.4 (18) | 12 (3) | 10.2 (17) | 0.68 |
| Colitis | 6 (8) | 4 (1) | 5.4 (9) | 0.91 |
| Hiccupping | 7.6 (23) | 20 (5) | 6.5 (11) | 0.02* |
| Heart burn | 20 (27) | 36 (9) | 2.3 (4) | 0.03* |

Table 2: The Prevalence of Gastrointestinal Problems among the three Groups under Study.

There were significant differences in regard to some gastrointestinal symptoms including anorexia, dyspepsia, nausea, hiccupping and heartburn among the three groups. The odds of anorexia, dyspepsia, nausea, hiccupping and heartburn was higher in shift working nurses than day working nurses and university employees together and day working nurses alone (Table 3).

| Gastrointestinal problems | Shift working | Day working | OR (95% CI) | p-value |
|---------------------------|------------------|------------------|-------------------|---------|
| | Percent (number) | Percent (number) | | |
| Increased appetite | 13.8 (22) | 16.8 (28) | 0.79 (0.43-1.46) | 0.46 |
| Anorexia | 25.8 (44) | 10.2 (27) | 3.06 (1.56-5.60) | 0.0001* |
| Constipation | 22 (35) | 13.8 (23) | 1.63 (0.99-3.15) | 0.052 |
| Intestinal polyps | 1.3 (2) | 0.5 (1) | 2.11 (0.19-23.50) | 0.38 |
| Dyspepsia | 15.1 (24) | 4.8 (8) | 3.53 (1.50-8.12) | 0.002* |
| Gastric ulcer | 4.4 (7) | 1.8 (3) | 2.50 (0.60-9.90) | 0.17 |
| Stomach ache | 36.5 (58) | 27.5 (46) | 1.50 (0.94-2.40) | 0.08 |
| Diarrhea | 1.9 (3) | 1.8 (3) | 1.05 (2.28-5.28) | 0.95 |
| Nausea | 19.9 (30) | 6.6 (11) | 3.20 (1.59-6.80) | 0.001* |
| Abdominal distension | 27.7 (40) | 22.8 (38) | 1.20 (0.78-2.14) | 0.3 |
| Gastritis | 13.2 (22) | 10.2 (17) | 1.30 (0.68-2.65) | 0.39 |
| Colitis | 5.7 (9) | 5.4 (9) | 1.05 (0.40-2.07) | 0.91 |
| Hiccupping | 18.6 (27) | 6.6 (11) | 3.42 (1.40-6.50) | 0.003* |
| Heartburn | 22.6 (36) | 2.3 (4) | 4.20 (2.30-7.20) | 0.002* |

Table 3: The Odds Ratio of Gastrointestinal Symptoms in the Day Working Compared to the Night Working Nurses.

The results also showed that the prevalence of some gastrointestinal symptoms such as anorexia

($P=0.02$), gastric ulcers ($P=0.04$) and heartburn ($P=0.02$) was different in shift working nurses with regular rotating shifts and shift working nurses with irregular rotating shifts; and nurses with irregular shift work were more involved.

Discussion

Shift work has a special place in occupational health especially in industrialized countries. Working at night is against human nature and causes dysfunction in the daily rhythms of the human body. This study showed that most shift working nurses suffered from at least one gastric symptom. In a study conducted by Saberi et al at the prevalence of gastrointestinal symptoms in shift working nurses was 81.9% and in day working nurses was 52.2% [29]. In Yoo et al's study in Korea [30] the prevalence of gastrointestinal symptoms was 40.1 among female shift-working textile workers. This present study also showed that the odds of acquiring some gastrointestinal problems such as anorexia, dyspepsia, hiccupping and heartburn was higher among shift working nurses than day working nurses. In Biliski et al's study irregular defecation was the only prevalent symptom among shift working nurses and the prevalence of other symptoms such as constipation, diarrhea and gastric ulcer was not different among shift working and day working nurses [31].

In Choobineh et al's study there was a significant difference between shift working and day working nurses in regard to gastrointestinal symptoms, and the odds of having gastrointestinal problems in shift working employees was 40% and psychological problems was 20% more than day working employees [32]. Also, Zamanian et al's study on the hospital personelle at Shiraz University of Medical Sciences showed that gastrointestinal problems, changes in appetite and gastric ulcers in shift working personelle was significant higher than non-shift working employees [33]. Many other studies have also shown a significant relation between shift work and gastrointestinal problems [34-36] and in many studies, shift workers had more gastrointestinal symptoms than day workers. [37-38]. The difference between the prevalence of gastrointestinal disorders among shift working and day working nurses in different studies might be related to environmental, social or organizational factors, available facilities, different working hours, irregular rotations and even methodological problems such as response bias.

In general, the prevalence of gastrointestinal disorders among nurses in studies conducted inside Iran such as the present study and Saberi et al's study from Kashan [29] was higher than studies from other world countries such as Iceland and Korea [39-40]. The reason although not obvious might be related to more sleep disturbances [41-43], poor nutrition, irregular meals [31] and psychological disorders [40] among Iranian nurses.

Studies have reported more disturbed eating habits and irregular diets among night working and shift working employees in comparison to fixed day and afternoon working employees. Also, a higher prevalence of gastrointestinal ulcers, gastritis and constipation was seen among them [44]. In this regard two points are worth consideration, one is the quality of consumed food and the other is the irregularity of meal times, which in addition to intensifying gastrointestinal problems can decrease essential nutrition and energy intake and therefore lead to weight gain or loss [45].

Different studies done on nurses have suggested that nursing in a stressful job and many psychological problems are related to this stressful job. Irritability, psychological problems, depression, anxiety, high blood pressure, headaches, cardiovascular and gastrointestinal problems are among the common disorders related to job stress [9]. Therefore, the stressful nature of the nursing job is itself another reason for the high prevalence of gastrointestinal problems among nurses in comparison to office employees.

In the present study, the prevalence of gastrointestinal symptoms among nurses with regular shift work was significantly less than nurses with irregular rotating shift work. According to the results

of Davari et al the risk of gastrointestinal and cardiovascular disorders was less among nurses with regular short rotations than nurses with long irregular rotations [46]. Many studies have shown that nurses with irregular shifts suffer more from sleep disorders than regular rotating shift workers. Also, more gastrointestinal problems and more tendency to using medications is seen after sleep disorders [47]. Therefore, irregular rotating shifts might be a risk factor for gastrointestinal problems as well. However, easy accessibility to medications in the hospital environment and knowledge about medications and their administration routes, might also be related to nurse's more medication use.

Another result of this study was that nausea was 4 times more prevalent among women than men and also higher age was related to heartburn. Khodavaisi et al also worked on nurses' occupational stress and concluded that occupational stress is more common among women than men, also younger people had less stress and more adaptability with their working environment [48]. Therefore, more nausea in female employees and heartburn in older employees many also be related to more occupational stress.

The present study has evaluated 14 different gastrointestinal symptoms. However, previous studies had evaluated less symptoms. Also in previous studies gastrointestinal disorders were compared among two occupational groups; but in this study 3 groups were compared to evaluated the effect of both shift work and the nursing occupation on gastrointestinal disorders.

One of the limitations of this study was that individual differences, individual adaptability with shift work and the trustworthiness and psychological situation of the nurses was not taken into consideration. Also, the researchers did not have information about the amount of job stress, occupational noise exposure, life style, nutritional habits, irregular meals, illicit drug use, helicobacter pylori infection, using caffeine drinks, alcoholic beverages and other factor affective on gastrointestinal disorders. Meanwhile, the present study was a cross-sectional study and in order to better understand the etiology of gastrointestinal disorders among nurses, studies with stronger methodology such as cohorts are needed.

One other limitation of the study was that some office employees were not sure about the name of medications they used, but nurses were able to name their medications correctly.

This study suggests that in order to improve the working conditions of shift working nurses, shift work with regular rotating shifts be organized. Also, unsuitable nurses should have less shift work. Proper education about healthy diets and behaviors during shift work should be given to nurses.

In conclusion, this study showed a relation between shift work and gastrointestinal problems. As shift work is an essential part of the nursing occupation, ways to reduce the negative health effects of shift work should be investigated.

Acknowledgments

Funding

Funding/Support: This study was supported by Kerman University of Medical Sciences. Grant No: 90/95- 2011.

References

References

1. Moonk T, Folkard S, translation by: Choobineh AR. Shiftwork, problems and solutions. Shiraz University of medical sciences publication, third edition. 2005;1-4.
2. Helander M. translation by: Choobineh AR, The Ergonomics of Manufacturing. Tacher publication, second edition. 2007;309-316.
3. Jafari Roodbandi AS, Feyzi V, Khanjani N, Rahimi Moghadam S, Shafiezadeh Bafghi M, Moghadasi M, Norouzi Z. Sleep quality and sleep lines: A comparison between nurses with and without shift work, and university employees. *International Journal of Occupational Hygiene*. 2016; 8(4)
4. Hoogerwerf Willemijntje A.. Role of biological rhythms in gastrointestinal health and disease. *Reviews in Endocrine and Metabolic Disorders*. 2009; 10(4)[DOI](#)
5. Caruso Claire C., Lusk Sally L., Gillespie Brenda W.. Relationship of work schedules to gastrointestinal diagnoses, symptoms, and medication use in auto factory workers. *American Journal of Industrial Medicine*. 2004; 46(6)[DOI](#)
6. van Mark Anke, Spallek Michael, Groneberg David A., Kessel Richard, Weiler Stephan W.. Correlates shift work with increased risk of gastrointestinal complaints or frequency of gastritis or peptic ulcer in H. pylori-infected shift workers?. *International Archives of Occupational and Environmental Health*. 2009; 83(4)[DOI](#)
7. Choobineh A, Shahcheragh B, Keshavarzi S, Rahnema K. Shift work-related problems among operation room technicians of Shiraz University of Medical Sciences hospitals, 2006-2007. *Iran Occupational Health*. 2007; 4(1):48-52.
8. Ebrahimian AA. Night work Nursing: The level of attention. *Payesh*. 2006.
9. Bagheri M, Valizade N. Night work and its complications on health of nurses. *Journal of Gorgan Bouyeh Faculty of Nursing & Midwifery*. 2006; 9(1):43-48.
10. Momeni H, Salehi A, Seraji A. The comparison of burnout in nurses working in clinical and educational sections of Arak University of Medical Sciences in 2008. *Arak University of Medical Sciences Journal*. 2010; 12(4):113-123.
11. Soroush A, Hamediseresht E, Dabiran S. Assessment of sleep deprivation and fatigue among general surgery residents: Is it necessary to reduce residents' work hours?. *Hakim Medical Journal*. 2008; 43(3):35-41.
12. Santhi Nayantara, Duffy Jeanne F., Horowitz Todd S., Czeisler Charles A.. Scheduling of sleep/darkness affects the circadian phase of night shift workers. *Neuroscience Letters*. 2005; 384(3)[DOI](#)
13. Johnson Mark D., Sharit Joseph. Impact of a change from an 8-h to a 12-h shift schedule on workers and occupational injury rates. *International Journal of Industrial Ergonomics*. 2001; 27(5)[DOI](#)
14. Santhi Nayantara, Duffy Jeanne F., Horowitz Todd S., Czeisler Charles A.. Scheduling of sleep/darkness affects the circadian phase of night shift workers. *Neuroscience Letters*. 2005; 384(3)[DOI](#)
15. Ohida Takashi, Kamal AMM, Sone Tomofumi, Ishii Toshihiro, Uchiyama Makoto, Minowa Masumi, Nozaki Sadahiko. Night-Shift Work Related Problems in Young Female Nurses in Japan. *Journal of Occupational Health*. 2001; 43(3)[DOI](#)
16. Nachreiner F. Individual and social determinants of shiftwork tolerance. *Scandinavian journal of work, environment & health*. 1998;35-42.
17. Poole C. J. M., Evans G. R., Spurgeon A., Bridges K. W.. Effects of a change in shift work on health. *Occupational Medicine*. 1992; 42(4)[DOI](#)
18. Wyatt S, Marriott R. Night work and shift changes. *British Journal of Industrial Medicine*. 1953; 10(3):164.
19. Silva-Costa A, Araújo M, Nagai R, Fischer FM. Environmental and organizational conditions for napping during night work: a qualitative study among Nursing professionals. *Sleep Sci*. 2010; 3(1):11-15.
20. Rathore H., Shukla K., Singh S., Tiwari G.. Shift work - problems and its impact on female nurses in Udaipur, Rajasthan India. *Work*. 2012; 41(IEA 2012: 18th World congress on Ergonomics - Designing a sustainable future)[DOI](#)
21. Ghaljaei F, Naderifar M, Ghaljeh M. Comparison of general health status and sleep quality between nurses with fixed working shifts and nurses with rotating working shifts. *Zahedan*

- Journal of Research in Medical Sciences*. 2010; 13(1):47-50.
22. Sullivan E, Decker P. Effective management in nursing. *New York: Wesley*. 1992.
 23. Seied Rasoli E. Side effects of sleeplessness after night shift in nurses, National Congress of Insomnia. 2005.
 24. Hojati H, Jalalmanesh S, et al. Survey effect sleep deprivation and it's on general healthiness of nurses of night shift of Golestan University of medical science and hygienic medicinal services in 2008. *Journal of Gorgan University of Medical Sciences*. 2009; 11(3):70-75.
 25. Rahimim Moghadam S, Moosazadeh M, Mohamadyan M, Khanjani N†, Layegh Tizabi MN. Psychological Health and its relation with Occupational Stress in Midwives. *International Journal of Occupational Hygiene*. 2016; 8(4)
 26. Ebrahimiyan A, Valizadeh-zare N. Accuracy rate in shift worker nurses. *Payesh Quarterly*. 2006; 5(2):123-130.
 27. Bagheri M, valizadeh-zare N. Shiftwork complication son health'snurses. *Boyeh Journal of Nursingand Midwifery of Gorgan*. 2006; 3(1):43-48.
 28. Smith MJ, Colligan MJ, Tasto DL. A questionnaire survey approach to the study of the psychosocial consequences of shiftwork. *Behavior Research Methods & Instrumentation*. 1979; 11(1):9-13.
 29. Saberi HR, Moravveji AR. Gastrointestinal complaints in shift- working and day-working nurses in Iran, Saberi and Moravveji Journal of Circadian Rhythms 2010, 8:9 <http://www.jcircadianrhythms.com/content/8/1/9>.
 30. Yoo KH. Sleeping Patterns and Gastrointestinal Disorders According to the Shift Works in Female Textile Workers. *Korean J Prev Med*. 1994; 27(1):74-83.
 31. Bilski B. Influence of shift work on the diet and gastrointestinal complains among nurses; A pilot study. *Med Pr*. 2006; 57(1):15-19.
 32. Choobineh A, Soltanzadeh A, Tabatabaie SHR, Jahangiri M. Shift Work-related Health Problems among Petrochemical Industries Employees. *SCIENTIFIC MEDICAL JOURNAL*. 2011; 10(2)
 33. Zamanian Z, Mohammadi H, Rezaeeyani MT, Dehghany M. An investigation of shift work disorders in security personnel of 3 hospitals of Shiraz University of Medical Sciences. *Iran Occupational Health*. 2009; 9(1):52-57.
 34. Fischer Frida Marina, Paraguay Ana Isabel B.B., de Castro Bruni Antonio, de C. Moreno Claudia Roberta, Berwerth Adelaide, Riviello Claudia, Vianna Marta Maria L.. Working conditions, work organization and consequences for health of Brazilian petrochemical workers. *International Journal of Industrial Ergonomics*. 1998; 21(3-4)[DOI](#)
 35. Knutsson A.. Health disorders of shift workers. *Occupational Medicine*. 2003; 53(2)[DOI](#)
 36. Debbabi F, Chatti S, Magroun I, Maalel O, Mahjoub H, Mrizak N. Night shift work and health among hospital workers. *Archives des Maladies Professionnelles et de Medecine du Travail*. 2004; 65(6):489-492.
 37. Pronitis-Ruotolo Debra. Surviving the Night Shift. *American Journal of Nursing*. 2001; 101(7)[DOI](#)
 38. Mazzetti dPM, Ballarati G, Castracane RE, Galanti A, Gallo A, Leonardi C, et al.. Digestive disturbances in shift-workers: a clinical statistical investigation. *Progress in clinical and biological research*. 1990; 341:369..
 39. Sveinsdottir Herdis. Self-assessed quality of sleep, occupational health, working environment, illness experience and job satisfaction of female nurses working different combination of shifts. *Scandinavian Journal of Caring Sciences*. 2006; 20(2)[DOI](#)
 40. Zhen Lu Wei, Ann Gwee Kok, Yu Ho Khek. Functional bowel disorders in rotating shift nurses may be related to sleep disturbances. *European Journal of Gastroenterology & Hepatology*. 2006; 18(6)[DOI](#)
 41. Rotem Amit Y, Sperber Ami D, Krugliak Pavel, Freidman Bruria, Tal Asher, Tarasiuk Ariel. Polysomnographic and Actigraphic Evidence of Sleep Fragmentation in Patients with Irritable Bowel Syndrome. *Sleep*. 2003; 26(6)[DOI](#)
 42. Jarrett M, Heitkemper M, Cain KC, Burr RL, Hertig V. Sleep disturbance influences gastrointestinal symptoms in women with irritable bowel syndrome. *Dig Dis Sci*. 2000;



45:952-959.

43. Fass Ronnie, Fullerton Steve, Tung Scott, Mayer Emeran A.. Sleep disturbances in clinic patients with functional bowel disorders. *The American Journal of Gastroenterology*. 2000; 95(5)[DOI](#)
44. de Assis Maria Alice Altenburg, Kupek Emil, Nahas Markus Vinicius, Bellisle France. Food intake and circadian rhythms in shift workers with a high workload. *Appetite*. 2003; 40(2)[DOI](#)
45. Waterhouse JM, Folkard S, Minors DS, Britain G. Shiftwork, Health and Safety: An Overview of the Scientific Literature, 1978-1990. *HM Stationery Office; 1992*.
46. Davari M, Mehrparvar A, Mostaghaci M, Bahaloo M, Poorshafiee M. Comparison of cardiovascular risk factors, gastrointestinal and musculoskeletal complications in different patterns of shift work in tile industry. *OCCUPATIONAL MEDICINE Quarterly Journal. [Research]*. 2014; 4(4):54-62.
47. Salehi K, Alhani F, Mahmoudifar Y, Rouhi N. Quality of sleep and related factors among Imam Khomeini hospital staff nurses. *Iran Journal of Nursing*. 2014; 23(63):18-25.
48. Khodaveisi M, Mohammadi N, Omidi A. Frequency of Job Stress in Clinical Nurses. *Scientific Journal of Hamadan Nursing & Midwifery Faculty*. 2005; 13(24):44-50.