

# Comparing the Prevalence of Gastrointestinal Disorders between Day Workers and Shift Workers at Kerman University of Medical Sciences

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## Abstract

**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 heart 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.

**Keywords:** Gastrointestinal disorders- Shift work- Day work

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## 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

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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.

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 Asprin use and history of use gastrointestinal medications.

Asprin is a non-steroidal anti-inflammatory drug which suppresses prostaglandins. Gastrointestinal problems are among the side effects of Asprin. But in this study, using Asprin 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

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

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 Asprin				
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)	

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

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

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

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*

gastrointestinal symptoms.

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

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. Khodavaishi 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 evaluate 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.

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