



SHORT PAPER

Open Access

Gastrointestinal complaints in shift-working and day-working nurses in Iran

Hamid Reza Saberi¹, Ali Reza Moravveji^{2*}

Abstract

Background: There is evidence in the scientific literature of the adverse physiological and psychological effects of shift work. The work of nurses in hospitals is connected with shift and night work. Several publications have described gastrointestinal disturbances in shift workers. The aim of this study was to compare the frequency of gastrointestinal (GI) complaints of nurses on a rotating shift with that of nurses on a regular day shift.

Methods: The study involved 160 nurses (133 working in shifts and at night and 27 working on day shifts) in the Shahid Beheshti Hospital in Kashan, Iran. These nurses answered a Gastrointestinal Symptom Questionnaire regarding the presence of gastrointestinal symptoms (including heartburn, regurgitation, constipation, diarrhea and bloating). Positive responses required frequent symptom occurrence in the past 4 weeks. Significance of group differences was assessed by chi-square and Fisher-exact tests.

Results: Prevalence of GI symptoms was significantly higher ($p = 0.009$) in rotating-shift nurses (81.9%) than in day-shift nurses (59.2%). Irregular meal consumption ($p = 0.01$) and GI medications ($p = 0.002$) were all significantly higher among the rotating shift nurses. In both groups, regurgitation was the most common symptom.

Conclusion: Nurses on rotating shifts in Iran experience more GI disturbances than do nurses on day shifts.

Background

There is increasing evidence that circadian rhythm disturbance can cause a variety of health disorders [1,2]. Nurses, because of their profession, have to perform their important and difficult tasks at any time in the 24 hours of the day. Erratic working shifts can cause decreased proficiency, somatic and psychological disorders and increase in nursing and medical error [3,4].

Previous studies have addressed a variety of maladies associated with shift work, including gastrointestinal (GI) symptoms [5,6]. For example, a study showed that working in different shifts can harm the GI normal movements and cause disorders in excreting digestive enzymes and acid-alkaline balance [7]. These alterations may be caused by sleep disorders, as they have a negative correlation with last night's sleep quality in these subjects [8]. Furthermore, in an investigation designed by German researchers, peptic ulcer incidence was higher in shift-workers and night-workers [9]. In a study

in Japan, conducted by endoscopy, peptic ulcer prevalence was higher in shift-workers (2.38%) than in day-workers (1.03%). Duodenal ulcer also had greater prevalence (1.37% and 0.69%, respectively) [10]. A study in Iceland showed that nurses working 16 hours in a morning-evening shift had more severe GI symptoms, possibly because of a lack of enough resting time between the end of the evening shift and the start of the morning one [11]. Another study identified correlations between GI symptoms and psychological disorders such as anxiety and depression [12].

To supplement the existing literature, we investigated GI symptoms in shift-work and day-shift nurses in a training hospital in Iran.

Methods

Subjects

In this cross-sectional study, all male and female nurses with different working shifts working at the Shahid Beheshti Hospital in the city of Kashan from March 2008 until March 2009 were included. Known cases of GI diseases or any other kind of disorders that may interfere or mimic GI symptoms, for example respiratory tract

* Correspondence: moraveji@kaums.ac.ir

²Department of Community Medicine, Kashan University of Medical Sciences, Kashan, Iran

Full list of author information is available at the end of the article

disorders, and known cases of any kind of heart disease, hepatitis, etc. were excluded from our study. From all 200 nurses in the hospital, 160 were included. The patients were moderately matched by age and gender.

Data collection and questionnaire

The data were collected by the means of a questionnaire addressing demographic information and GI symptom complaints extracted from a questionnaire designed by Bovenschen et al. [13]. The questionnaire contains 16 prevalent GI symptoms, and the severity of each symptom experienced during the previous 4 weeks was measured by a 7-point Likert scale (0-6). To shorten the time for filling the forms, we included only the 5 most common GI symptoms, namely, diarrhea and constipation, bloating, belching, heartburning, and epigastric pain and regurgitation, scaling from “never” to “most of the time”. Any subject with at least one complaint as “most of the time” in the past 4 weeks was considered as a patient with positive history of GI symptoms. Answers to other questions such as tea and coffee consumption and marriage status were also collected.

Statistics

All statistical analyses were performed using the SPSS software package (version 16.0 for Windows, SPSS, Chicago, IL, USA). χ^2 and Fisher exact tests were performed to study differences. P value of less than 0.05 was considered statistically significant.

Results

Basic characteristics

Of the 160 nurses included in our study, 43 (26.8%) were male. Only 27 (16.8%) subjects were only-morning workers and 133 (83.1%) had more than one working shift. Also 64 (40%) had erratic work shifts. The mean age of morning workers and shift workers were 35 and 38.5 years, respectively. Twenty-one morning shift workers and 108 double shift workers were married. Regular daily tea consumption was 97.7% in shift-workers and 10% in morning workers and regular daily coffee consumption was 12% in shift-workers and 37% in morning-workers.

Complaints

Prevalence of complaint of at least one GI symptom was 81.9% in shift-workers and 52.2% in day-shift workers, this difference being significant ($p = 0.009$). In female subjects these proportions were 84.8% and 55.5%, and in male nurses they were 72.5% and 66.7%, respectively. In non-married nurses, GI symptoms were present in 68% of shift-workers and 50% of day-shift workers. In married nurses, these proportions were 85.2% and 61.9%, respectively.

Table 1 presents the distribution of gastrointestinal symptoms in shift-workers and day-shift workers. It shows that the most frequent complaint was regurgitation (52%) and the least frequent was melena (2%). Prevalence of none of the individual symptoms was significantly different between the two groups. There was also no significant difference in GI symptoms between male and female subjects ($p = 0.14$).

Table 2 shows the number of GI symptom complaints. As seen, this number is significantly higher in shift-workers. Table 3 shows subjects with at least one “most of the time” GI symptoms divided by age groups. Shift

Table 1 Distribution of gastrointestinal symptoms^a

Complaints		Day Worker	Shift Workers	Total	PV
Diarrhea	positive	3(11)	28(21)	31(19)	0.2
	negative	24(89)	105(79)	129(81)	
Constipation	positive	10(37)	50(37)	60(37)	0.9
	negative	17(63)	83(63)	100(63)	
Bloating	positive	9(33)	70(52)	79(49)	0.06
	negative	18(67)	63(48)	81(51)	
Regurgitation	positive	13(48)	71(53)	84(52)	0.6
	negative	14(52)	62(47)	76(48)	
Heart-Burn	positive	8(29)	55(41)	63(39)	0.25
	negative	19(71)	78(59)	97(61)	
Melena	positive	0(0)	3(2)	3(2)	1
	negative	17(100)	130(98)	157(98)	

^a Entries are number of workers. Percentage of total workers is indicated in parenthesis. P-values was calculated by χ^2 and Fisher exact test, as appropriate

Table 2 Number of GI symptom complaints^a

Number of Complaints	1	2	3	4	5	6
Morning workers	5(17.2)	2(10.5)	3(12)	4(11.4)	1(10)	1(14.2)
Shift workers	24(82.7)	17(89.5)	22(88)	31(88.6)	9(90)	8(85.8)
Total	29	19	25	35	10	7

^a Entries are number of workers. Percentage of total workers is indicated in parenthesis.

Table 3 Subjects with at least one GI symptom, divided by age groups^a

Age Groups		Morning only	Shift working	Total
20-29	positive	1	38	39
	negative	2	2	10
30-39	positive	13	58	71
	negative	8	8	16
40-49	positive	1	13	14
	negative	1	8	9
50<	positive	1	0	1
	negative	0	0	0

^a $p = 0.015$, tested by Fisher exact test.

workers had significantly more complaints than day workers ($p = 0.015$).

Medications

Prevalence of consumption of gastrointestinal medication in male subjects was 58.8% and 33.3% in shift-workers and day-shift workers, respectively. These proportions were 62.6% and 27.8% in female subjects. Non-steroidal anti-inflammatory drugs (NSAIDs) and antacids were the most frequent medication used by all groups (Tables 4 and 5).

Discussion

Worldwide, gastrointestinal disorders are common complaints in the general population and must be monitored by community health care organizations [14,15]. For this purpose, questionnaires can be very helpful because they are easy to use extensively, can gather a lot of information rapidly, and are relatively inexpensive (particularly in comparison to monthly check ups) [16-18].

In the present study, gastrointestinal complaints were reported by a very high proportion (81.9%) of shift-workers. This proportion was twice as large as that reported in a previous study in Korea [19]. This could be due to environmental factors, hospital organization,

social factors, insufficient welfare facilities, inordinate hours of working or erratic shifts, or even perhaps inappropriate answers to various questionnaires. On the other hand, Scott and colleagues reported 75% of gastrointestinal complaints in night-workers [20].

In our population of nurses in Iran, the prevalence of GI symptoms was significantly higher in shift-work nurses than in day-shift nurses, which is consistent with findings in other geographical locations [11,12]. The causes of this difference, however, are not evident. Factors such as sleep disorders [21-23], inappropriate nutrition or irregularity in the timing of meals [24], and mental and psychological disorders [12] might be responsible for the higher incidence of GI symptoms.

Irregularity in the timing of meals was previously described and was attributed to lack of time, appetite disturbance and work stress [5,24]. This could cause the nurses to have more GI symptoms, but, surprisingly, in our study nurses with meal timing irregularity had fewer symptoms ($p < 0.001$).

We found that use of gastrointestinal medication was much more common among shift-work nurses than among day-shift nurses ($p = 0.002$; Table 4). One might speculate that shift workers have more problems than others and try to eliminate them by using drugs. However, quite a few shift workers in our population used NSAIDs. These medications are mainly used for musculoskeletal pain and can cause or worsen GI symptoms. Thus, perhaps greater use of NSAIDs may be responsible for the greater incidence of GI symptoms in shift-work nurses.

It was somewhat surprising that no particular symptom was more prevalent in shift-work nurses than in day-shift nurses (Table 1). However, in Bilski's study, defecation irregularity was the only complaint more prevalent in shift-work nurses, and the frequency of other complaints, such as diarrhea, non-specific pains and gastric ulcers, did not differ from that in day-shift nurses [24].

Gastrointestinal symptoms were higher in nurses under 40 years of age ($p = 0.015$). This age effect was also reported by Zhen Lu and colleagues [12]. One would expect aging to make people more prone to gastrointestinal disorders, but it was the younger group who reported more GI symptoms in our study. Perhaps younger nurses are more likely to volunteer to work above average working hours or on irregular shifts.

We have to note that our study has some limitations. We had difficulties finding nurses that only worked in morning shifts. As mentioned earlier, only 27 (16.8%) nurses had morning-only shifts. Our data were obtained from a single hospital, and we are considering collecting data from more hospitals nationwide in the future. Our study was cross-sectional and thus, necessarily, only

Table 4 Number of subjects using at least one gastrointestinal medication^a

Gender		yes	no	total
Male	Day	3	6	9
	Shift	20	14	34
	Total	23	20	43
Female	Day	5	13	18
	Shift	62	62	99
	Total	67	50	117

^a There is a significant difference between male and female ($p = 0.032$) and between day workers and shift workers ($p = 0.002$).

Table 5 Distribution of gastrointestinal medication types used by nurses

Type of medication	Day workers	Shift workers	Total
NSAID	4	50	54
H2 Blockers ¹	3	24	27
Antacids ²	2	32	34
Clinidum-C	1	17	18
Metoclopramide	0	10	10
Omeprazole	1	12	13
Laxatives ³	3	12	15
Dimethicone	0	3	3

¹ histamine type 2 receptor antagonists: ranitidine, famotidin, nizatidine, etc.

² all aluminum/magnesium hydrochloride, etc.

³ all kinds of laxative from various categories such as docustate, bisacodyl, sennacastor oil, etc.

descriptive. Prospective longitudinal studies must be carried out to evaluate the causes and long-term effects of GI symptoms in shift-work nurses.

Acknowledgements

The authors wish to thank Dr. Koohpayezade for his assistance in the study design and in the preparation of the research project.

Author details

¹Department of Occupational Health, Kashan University of Medical Sciences, Kashan, Iran. ²Department of Community Medicine, Kashan University of Medical Sciences, Kashan, Iran.

Authors' contributions

HRS and ARM participated in design, acquisition of data, analysis and interpretation of data, and manuscript preparation. Both authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

Received: 31 July 2010 Accepted: 7 October 2010

Published: 7 October 2010

References

1. Stevens RG, Blask DE, Brainard GC, Hansen J, Lockley SW, Provencio I: Meeting report: the role of environmental lighting and circadian disruption in cancer and other diseases. *Environ Health Perspect* 2007, **115**(9):1357-1362.
2. Stevens RG, Rea MS: Light in the built environment: potential role of circadian disruption in endocrine disruption and breast cancer. *Cancer Causes Control* 2001, **12**(3):279-287.
3. Fitzpatrick JM, While AE, Roberts JD: Shift work and its impact upon nurse performance: current knowledge and research issues. *J Adv Nurs* 1999, **29**:18-27.
4. Coffey LC, Skipper JK Jr, Jung FD: Nurses and shift work: effects on job performance and job-related stress. *J Adv Nurs* 1988, **13**:245-54.
5. Poissonnet CM, Veron M: Health effects of work schedules in healthcare professions. *J Clin Nurs* 2000, **9**:13-23.
6. Knutson A: Health disorders of shift workers. *Occupational Medicine* 2003, **53**:103-108.
7. Claire C, Sally L, Brenda W: Relationship of work schedules to gastrointestinal diagnoses, symptoms, and medication use in auto factory workers. *Am J Indus Med* 2004, **46**(6):586-598.
8. Goldsmith G, Levin JS: Effect of sleep quality in symptoms of irritable bowel syndrome. *Dig Dis Sci* 1993, **38**:1809-1814.
9. Ihre BJE, Müller R: Gastric and duodenal ulcer. *Acta Med Scand* 1943, **116**:33-57.
10. Segawa K, Nakazawa S, Tsukamoto Y: Peptic ulcer is prevalent among shift workers. *Dig Dis Sci* 1987, **32**:449-453.
11. Sveinsdottir H: Self-assessed quality of sleep, occupational health, working environment, illness experience and job satisfaction of female nurses working different combination of shifts. *Scand J Caring Sci* 2006, **20**(2):229-237.
12. Zhen Lu W, Ann Gwee K, Yu Ho K: Functional bowel disorders in rotating shift nurses may be related to sleep disturbances. *Eur J Gastroenterol Hepatol* 2006, **18**(6):623-7.
13. Bovenschen H, Janssen M, Oijen M, Laheij R van Rossum LG, Jansen JB: Evaluation of a Gastrointestinal Symptoms Questionnaire. *Dig Dis Sci* 2006, **51**(9):1509-15.
14. Guillemot F, Ducrotte P, Bueno L: Prevalence of functional gastrointestinal disorders in a population of subjects consulting for gastroesophageal reflux disease in general practice. *Gastroenterol Clin Biol* 2005, **29**:243-246.
15. Dimenas E, Glise H, Hallerback B, Hernqvist H, Svedlund J, Wiklund I: Well-being and gastrointestinal symptoms among patients referred to endoscopy owing to suspected duodenal ulcer. *Scand J Gastroenterol* 1995, **30**:1046-1052.
16. Ofman JJ, Shaw M, Sadik K, Grogg A, Emery K, Lee J, Reyes E, Fullerton S: Identifying patients with gastroesophageal reflux disease: validation of a practical screening tool. *Dig Dis Sci* 2002, **47**:1863-1869.
17. Bardhan KD, Stanghellini V, Armstrong D, Berghofer P, Gatz G, Monnikes H: International validation of ReQuest™ in patients with endoscopy-negative gastro-oesophageal reflux disease. *Aliment Pharmacol Ther* 2004, **20**:891-898.
18. Monnikes H, Bardhan KD, Stanghellini V, Berghofer P, Bethke TD, Armstrong D: Evaluation of GERD symptoms during therapy, Part I. Development of the new GERD questionnaire: ReQuest™. *Digestion* 2004, **69**:229-237.
19. 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.
20. Scott AJ, LaDou : Health, safety in shift workers. In *Occupational Medicine*. Edited by: Zenz C, Dickerson OB, Horvath EP. St Louis, MO (USA): Mosby; , 3 1994:960-986.
21. Rotem AY, Sperber AD, Krugliak P, Freidman B, Tal A, Tarasiuk A: Polysomnographic and actigraphic evidence of sleep fragmentation in patients with irritable bowel syndrome. *Sleep* 2003, **26**:747-752.
22. 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.
23. Fass R, Fullerton S, Tung S, Mayer EA: Sleep disturbances in clinic patients with functional bowel disorders. *Am J Gastroenterol* 2000, **95**:1195-1200.
24. Bilski B: Influence of shift work on the diet and gastrointestinal complains among nurses; A pilot study. *Med Pr* 2006, **57**(1):15-9.

doi:10.1186/1740-3391-8-9

Cite this article as: Saberi and Moravveji: Gastrointestinal complaints in shift-working and day-working nurses in Iran. *Journal of Circadian Rhythms* 2010 **8**:9.

**Submit your next manuscript to BioMed Central
and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

