

# Shift Work in Medical Students: A Cross-sectional Study on Medical Interns

Fatemeh Samadi<sup>1</sup>, Aram Tirgar<sup>2\*</sup>, Maryam Nikpour<sup>2</sup>, Alireza Sefidchian<sup>2</sup>

<sup>1</sup> Faculty of Medicine, Babol University of Medical Sciences, Babol, Iran • <sup>2</sup> Social Determinants of Health Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran • \* Corresponding Author: Aram Tirgar, Email: a.tirgar@mubabol.ac.ir, Tel: +98-911-3133781

## Abstract

**Background:** Medical students are required to do part of their services in different shifts. This pattern can harm their health and education. This study was aimed to investigate the relationship between shift work and the health status of medical interns. **Methods:** This cross-sectional study was conducted on 104 medical interns of Babol University of Medical Sciences, Iran. The data collection instrument included Survey of Shift workers (SOS) and Goldberg's General Health Questionnaire (GHQ-28). Descriptive statistics such as frequency and percentages, as well as analytical statistics (independent t-test, Chi-square, and correlation) was performed. **Results:** According to the results, married and female students made up 75% and 18% of the participants, respectively. The mean age of participants was  $25 \pm 1$  years. The statistical analysis showed that almost two thirds (71.6%) of students did not have appropriate mental health status and there was a significant relationship between mental health status and gastrointestinal problems ( $P= 0.041$ ). There was a significant relationship between shift-work satisfaction and its adverse effects on students' family life ( $P<0.05$ ). About 81.1% of students stated that they were unsatisfied with their shifts. In addition, students suffered from relatively high prevalence of digestive problems (76.3%) and insomnia (63.2%). **Conclusion:** The results of this study indicated a high prevalence of shift work problems among medical interns. It is recommended to train medical interns about the effects of shift work problems on their life and possible solutions.

**Keywords:** Sleep Disorders; Medical Students; Iran

## Introduction

The internship course can be considered as the most important stage in training of medical students. In this course, the students must be able to competently implement all the skills learned.<sup>1</sup> In the internship course, medical students experience job stress and high work pressure<sup>2, 3</sup> and are forced to present part of their training and services in the form of long-term and night shifts.<sup>4</sup> Night shifts in the internship course can harm students' health and

even their education. Night shifts adversely affect human health by disturbing the circadian rhythm, reducing melatonin hormone, and disturbing the sleep-wake cycle.<sup>5,6</sup> Shift work is associated with physical problems such as digestive,<sup>7</sup> cardiovascular disorders,<sup>8</sup> metabolic syndrome,<sup>9</sup> obesity,<sup>10</sup> and diabetes.<sup>11</sup>

Shift workers are also exposed to psychological problems such as mood disorders, irritability, anxiety, depression,<sup>12</sup> and some social

**Citation:** Samadi F, Tirgar A, Nikpour M, Sefidchian AR. **Shift Work in Medical Students: A Cross-sectional Study on Medical Interns.** Archives of Occupational Health. 2017; 1(1): 6-12.

**Article History:** Received: 6 June 2017; Revised: 24 July 2017; Accepted: 1 October 2017

**Copyright:** ©2017 The Author(s); Published by Shahid Sadoughi University of Medical Sciences. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

consequences such as conflict with the family.<sup>13,14</sup> Higher prevalence of sleep disturbance, stress, as well as lack of focus reported in interns and medical assistants.<sup>15</sup> Interns are directly involved in the health issues of the society and any change in their behavior and performance affects their service quality. Although there are tens of studies on the consequences of shift-work on nurses' health status, no studies have been conducted on the possible effects of shift working on the health status of interns attending night shifts. This study aimed to investigate the health consequences of attending shift work in medical interns of Babol University of Medical Sciences.

## Methods

This cross sectional study was conducted on all interns working in all educational hospitals affiliated to Babol University of Medical Sciences during the 2016. The study was conducted according to the Declaration of Helsinki and approved by the University Ethical Committee. Totally 104 medical intern were enrolled in the study. Inclusion criteria were having at least six months of work experience in the internship course with different shifts and filling out the consent forms of participation. Interns with a history of mental problems, long-term use of drugs associated with sleep disorders, and chronic diseases were excluded.

Data collection instrument included Survey of Shift Workers questionnaire (SOS) and General Health Questionnaire (GHQ28). The SOS questionnaire was developed by the Medical Research Council/Economic and Social Research Council (MRC/ESRC) in England.<sup>16</sup> This questionnaire is almost the most valid and complete general questionnaire on work-related problems, which includes 57 questions including items about demographic and individual characteristics, psychological, digestive, cardiovascular, sleep-related problems during the

night, insomnia, musculoskeletal disorders, undesirable effects of shift work on individual life, adverse effects of shift-work on family life (such as not having enough time to do homework, be together with parents, attend family events), and adverse effects of shift work on social life (such as attending celebrations, religious ceremonies, and sports events).<sup>12</sup> Choobineh et al. modified the questions from 57 to 54 items and confirmed its reliability coefficient as 0.81.<sup>17</sup> GHQ28 is one of the well-known instruments for screening mental disorders.<sup>18</sup> In this instrument, lower scores indicate better mental health status.<sup>19</sup> This questionnaire was standardized for Iranian population. The cut-off point was 23 in this questionnaire, so the people with a score of 24 or higher are suspected for mental disorders.<sup>20</sup> All participants were required to complete the questionnaire. The blood pressure was measured using mercury sphygmomanometer (Made in Germany) on the right hand of participants after 5 minutes of rest in the sitting position and results were recorded as mmHg. Students' level of education and their specialized knowledge was recorded using a questionnaire. Body mass index (BMI) calculated as weight in kilograms divided by height in meters squared, and categorized in normal: 18.5 to 24.9, overweight: 25 to 29.9, and obese: 30 and above. Results were analyzed using descriptive statistics such as frequency, relative frequency, and standard deviation, as well as inferential statistics such as t-test, chi-square, and correlation analysis. The t-test was used to examine the difference in mean scores. Moreover,  $p \leq 0.05$  was considered as the level of significance.

## Results

In this study, 104 medical students including 78 females and 26 males (with approximately gender ratio of 3 to 1) were investigated. The mean age of students was 25 (SD=1) year. Furthermore, 18% of them were married and 42%

had more than one year of shift work experience. According to the students' statements, they were committed to work 60 hours a week on average. The results of blood pressure test in students showed that mean of systolic and diastolic blood pressure was 116.76 (SD=10.98) and 77.60 (SD=10.04) mmHg, respectively. Based on BMI, about 25% of students were overweight. This problem was significantly higher in male students than in female students ( $p=0.02$ ) (Table 1). The findings also revealed that the highest rate of complaints in both genders was related to neuropsychiatric problems. All students reported at least one of neuropsychiatric problems such as anger, carelessness in work, repeated mistakes, impatience, irritability, depression, and fatigue

during the day. However, the most prevalent problems were anger and impatience with rates of 37.6% and 27.7% respectively. In addition, about 76.3% of students reported at least one symptom of gastrointestinal disorders. The most frequent one was decreased appetite (28.2%). Eighty percent of students suffered from digestive problems after engaging in shift work. Table 1 provides more information on the shift work by gender. Mental health score of students according to the GHQ28 was 33.93 (SD=14.40). Moreover, the findings showed that only about one-third of students had good mental health status (Table1). Results showed no significant statistical difference between the mental health status score in two genders.

**Table 1.** Distribution of shift work complications in interns of Babol University of Medical Sciences by gender

	Woman n (%)	Men n (%)	Total n (%)	p-value
<b>Mental Health (GHQ28)</b>				
Appropriate	19 (24.36)	10 (41.67)	29 (29.00)	0.08
Inappropriate	59 (75.64)	14 (58.33)	73 (73.00)	
<b>Gastrointestinal complaints</b>				
Yes	45 (73.77)	16 (84.21)	61 (76.25)	0.35
No	16 (26.23)	3 (15.79)	19 (23.75)	
<b>Musculoskeletal discomfort</b>				
Yes	33 (51.56)	20 (80.00)	53 (59.55)	0.01
No	31 (4.44)	5 (20.00)	36 (40.45)	
<b>Complain of insomnia</b>				
Yes	46 (64.79)	14 (58.33)	60 (63.16)	0.57
No	25 (35.21)	10 (41.67)	35 (36.84)	
<b>Disturbance in concentration</b>				
Yes	21 (33.33)	14 (66.67)	35 (41.67)	0.01
No	42 (66.67)	7 (33.33)	49 (58.33)	
<b>The effect of work shift on individual life</b>				
High	27 (51.92)	4 (23.53)	31 (44.93)	0.04
Low and moderate	25 (48.08)	13 (76.47)	38 (55.07)	
<b>The effect of work shift on family life</b>				
High	26 (41.94)	4 (22.22)	30 (37.50)	0.10
Low and moderate	36 (58.06)	14 (77.78)	50 (62.50)	
<b>The effect of work shift on social life</b>				
High	26 (44.07)	5 (35.71)	31 (42.47)	0.57
Low and moderate	33 (55.93)	9 (64.29)	42 (57.53)	
<b>Satisfaction with the educational shift system</b>				
Yes	9 (12.16)	9 (36.00)	18 (18.18)	0.01
No	65 (87.84)	16 (64.00)	81 (81.82)	
<b>Job stress</b>				
Yes	46 (80.70)	11 (57.89)	57 (75.00)	0.05
No	11 (19.30)	8 (42.11)	19 (25.00)	
<b>Body mass index</b>				
Normal	63 (81.82)	14 (58.33)	77 (76.24)	0.02
Overweight	14 (18.18)	10 (41.67)	24 (23.76)	

**Table 2.** Correlation between some occupational and individual characteristics with shift work related complaints in medical interns of Babol University of Medical Sciences

	Gastrointestinal complaints	Sleep related complaints	Musculoskeletal complaints	Personal relationships	Family relationships	Social relationships
Satisfaction with the educational system	$r=-0.11$ $p=0.32$	$r=0.11$ $p=0.29$	$r=-0.21$ $p=0.07$	$r=-0.27$ $p=0.09$	$r=-0.27$ $p=0.01$	$r=-0.56$ $p=0.64$
Job stress	$r=0.05$ $p=0.72$	$r=0.14$ $p=0.07$	$r=0.10$ $p=0.41$	$r=0.57$ $p<0.001$	$r=0.01$ $p=0.89$	$r=0.06$ $p=0.61$
Mental health score (GHQ28)	$r=-0.28$ $p=0.04$	$r=0.28$ $p=0.01$	$r=-0.12$ $p=0.24$	$r=-0.20$ $p=0.09$	$r=-0.19$ $p=0.07$	$r=-0.10$ $p=0.37$

r: correlation coefficient; p: p-value

Pearson correlation test showed a significant and inverse correlation between mental health status, gastrointestinal complaints ( $r=-0.28$ ,  $p=0.014$ ), and sleep related complaints ( $r=-0.25$ ,  $p=0.014$ ) (Table 2).

According to the findings, students mean sleep duration was 4 (SD=1) hours when they attending their internship course. The average of this duration was 8.5 (SD=1) hours during non-internship course. Based on student's statements, the average desired sleep time was estimated to be 8 (SD=1) hours a day. The results showed that 75% of medical interns suffer from occupational stress and more than 80% of them are dissatisfied with their educational shift working system (Table 1). Spearman correlation test showed that there is a significant inverse correlation between dissatisfaction with this educational system (shift work) and satisfaction with family relationships ( $p=0.01$ ). Further, there was a significant and positive correlation between occupational stress and Personal relationships reported ( $p<0.001$ ) (Table 2).

## Discussion

Despite the fact that work-shift is an inevitable and harmful model for health care providers, several studies have already been carried out to investigate its adverse effects on medical personnel.<sup>21,22</sup> However, there are currently no sufficient reports and documentations on the effects of shift work on medical students. The results of this study showed that shift work can affect the health and life status of medical students (students who have to be engaged in internship courses due to the

educational model) from a variety of aspects. The most commonly reported complaint in this study was nervous and psychiatric problems (disturbance in concentration, anger, impatience, etc.). Another study also reported a similar result in a study on shift work among nurses. They mentioned that nurses had the highest level of confusion, indignation, anger, and anxiety, while they had the lowest energy level after the night shift. It was also noted that night work can cause multiple psychological problems for shift workers by disrupting concentration, decision-making power, and subsequent carelessness on the job, frequent mistakes, irritability, and mood disorders.<sup>23</sup> Forty percent of the students in this study stated that they do not have the proper focus on their work. Gastrointestinal complaints were among the prevalent health outcomes reported by 76% of the students. More importantly, 80% of participants did not have the problem before entering the shift work.

The causes of high incidence of gastrointestinal disorders in students can be attributed to several factors such as disrupted circadian rhythm, stress, as well as irregular and inappropriate eating habits. The disrupted circadian rhythm caused by poor sleep quality may interfere with gastric acid secretion in the gastrointestinal tract, which in turn causes digestive complications.<sup>24</sup> However, stress, or high psychological stress, can be among the other possible causes of gastrointestinal complaints. A total of 75% of the students stated that they

suffered from occupational stress. Moreover, there was a positive and significant correlation between stress and gastrointestinal complaints. It seems that students in medicine and dentistry fields experience higher levels of stress than students of other fields. Our results are consistent with other studies in this field.<sup>25</sup> The high level of stress in this profession can be due to lack of holidays, high workloads,<sup>25</sup> dealing with patients' problems, and mental stresses in the hospital environment.<sup>26</sup> In addition, there are other factors involved in this regard such as an increase in concerns about career issues, marriage, and fulfillment of the needs in the last academic years.<sup>27</sup> Sleepiness and lack of sleep are among the common problems of shift work, which can cause mood changes, increased psychological disorders, fatigue, and impairment of learning process.<sup>24</sup> Several studies reported sleeping problems in shift workers.<sup>28,29</sup>

In our study, 60% of students suffered from lack of sleep because they had to work at least 60 hours per week, which is equal to 240 hours of attendance in a hospital per month. According to these findings, the average sleep duration was calculated as 4 hours during night shifts, while the students reported at least 8 hours of sleep a day as preference. In other words, their lack of sleep was not compensated at other shifts. Researchers have reported in several studies that sleep disturbance can induce adverse effects on physical, mental, and social health.<sup>30-32</sup> Student's mental health status was measured using GHQ28 and the results showed that only one third of them had good mental health status. In a study in Malaysia, about 41.2% of medical students were suspected to having mental disorder.<sup>32</sup> Iranian researchers reported the similar rate, i.e. 30%-40% in different groups of medical students (medicine, dentistry, health, midwifery, nursing, and other medical students) in various studies.<sup>25-33</sup> The higher incidence of this disorder in the present study may be attributed to its specific

group of participants. Students who participated in the previous studies were studying in all medical fields and in different educational years. In our study, only medical interns who completed their final years of education were evaluated. Starting job responsibilities during internship, acquiring skills, and learning while playing the role of a medical doctor at work can damage students' mental health status. Furthermore, the commitment to work for a long time (240 hours per month) with shift work and being awake at night or early in the morning should be considered as other possible factors influencing the current situation. Women had lower mental health score than men, which was statistically significant. Women are more likely to be exposed to mental diseases due to mental and emotional sensitivity.<sup>34</sup>

According to our findings dissatisfaction expressed by more than three quarters of students (80%) from the existing educational system. More precise plans are required to reduce the negative consequences of this pattern on the quality of education and students' productivity. Obviously, in this regard, the experience of other leading countries as well as scientific achievements will be useful. The results of this study suggested that the shift work had negative effects on personal, familial, and social relationships. Our results are consistent with those reported earlier.<sup>35</sup> With increase of students' dissatisfaction with the shift work pattern, their satisfaction with personal, familial and social relationships has also decreased. Another study reported a positive significant relationship between satisfaction with work shift and personal or family relationships. In this study, the effect of work shift on women's individual characteristics was significantly higher than that of men.<sup>22</sup> This seems to be due to women's physiological characteristics; they are more vulnerable and more affected by the environment.<sup>26</sup>

One of the strengths of this study was its focus

on a medical intern who has received less attention so far. The weaknesses of the present study, although included small sample size and use of self-reporting questionnaire to record the information.

### Conflict of interests

The authors declare no conflict of interest.

### Acknowledgement

This article represented the findings of a dissertation conducted by a medical students and funded by Vice-Chancellor of Research and Technology of Babol University of Medical Sciences (No. 9542620). Thereby, the authors would like to appreciate all those who participated and helped in this study.

### References

- Nahas VL, Nour V, Nobani M. Jordanian undergraduate nursing students perceptions of effective clinical teachers. *Nurse Education Today*. 1999;19(8):639-48.
- Cuttilan AN, Sayampanathan AA, Chun-Man Ho R. Mental health issues amongst medical students in Asia: a systematic review [2000–2015]. *Ann Transl Med*. 2016;4(4):72.
- Dyrbye LN, Thomas MR, Shanafelt TD. Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine*. 2006;81(4):354-73.
- Admi H, Tzischinsky O, Epstein R, Herer P, Lavie P. Shift work in nursing: is it really a risk factor for nurses' health and patients' safety? *Nursing Economics*. 2008;26(4):250-7.
- Davari M, Mehrparvar AH, 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*. 2013;4(4):54-62. [Persian]
- Rajaratnam SM, Howard ME, Grunstein RR. Sleep loss and circadian disruption in shift work: health burden and management. *The Medical Journal of Australia*. 2013;199(8):11-5.
- Somayeh B, Mehdi P, Habiballah D. The Relation between Shift Work, Fatigue and Sleepiness and Accidents among Workers in Sugar Factory. *Journal of Occupational Hygiene Engineering*. 2014;1(3):45-52.
- Knutsson A. Health disorders of shift workers. *Occupational Medicine*. 2003;53(2):103-8.
- Asare Anane H, Abdul Latif A, Ofori EK, Abdul Rahman M, Amanquah SD. Shift work and the risk of cardiovascular disease among workers in cocoa processing company, Tema. *BMC research notes*. 2015;8(1):1-6.
- Wang XS, Armstrong ME, Cairns BJ, Key TJ, Travis RC. Shift work and chronic disease: the epidemiological evidence. *Occupational medicine*. 2011;61(2):78-89.
- Tenkanen L, Sjöblom T, Härmä M. Joint effect of shift work and adverse life-style factors on the risk of coronary heart disease. *Scandinavian journal of work, environment & health*. 1998;24(5):351-7.
- Nikpour M, Firouzbakht M, Tirgar A. Risk of breast cancer among female shift workers (systematic review). *Caspian Journal of Social Medicine*. 2015;1(1):17-23.
- Zhao I, Turner C. The impact of shift work on people's daily health habits and adverse health outcomes. *Australian Journal of Advanced Nursing*. 2008;25(3):8-22.
- Ardekani ZZ, Kakooei H, Ayattollahi SM, Choobineh A, Seraji GN. Prevalence of mental disorders among shift work hospital nurses in Shiraz, Iran. *Pakistan journal of biological sciences*. 2008;11(12):1605-9.
- Veasey S, Rosen R, Barzansky B, Rosen I, Owens J. Sleepiness and fatigue in Residency Training. *JAMA*. 2002;288(9):1116-24.
- Sajjadnia Z, Siavashi E, Kavosi Z, Moznebi S, Ravangard R. Shift Work and Related Health Problems among Medical and Diagnostic Staff of the General Teaching Hospitals Affiliated to Shiraz University of Medical Sciences, 2012. *Journal of Health Management and Informatics*. 2015;2(3):89-96.
- Barton J, Folkard S. The response of day and night nurses to their work schedules. *Journal of Occupational Psychology*. 1991;64(3):18-24.
- Choobineh A, Soltanzadeh A, Tabatabaee H, Jahangiri M, Khavaji S. Health effects associated with shift work in 12-hour shift schedule among Iranian petrochemical employees. *International Journal of Occupational Safety and Ergonomics*. 2012;18(3):419-27.
- Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychological Medicine*. 1979;9(1):139-45.
- Noorbala AA, Mohammad K, Bagheri A. The validation of general health questionnaire-28 as a psychiatric screening tool. *Hakim Research Journal*. 2009;11(4):47-53. [Persian]
- Farahnaki Z, Pournajaf A, Karami A, Abbasi A, Karchani M. Investigation of Shift Work Disorders in Nurses Working at Teaching Hospitals of Ilam. *Journal of Hospital*. 2014;13(1):35-42. [Persian]
- Zamanian Z, Dehghani M, Mohammady H, Rezaeiani M, Daneshmandi H. Investigation of Shift Work Disorders among Security Personnel. *International Journal of Occupational Hygiene*. 2012;4(2):91-4.
- Munakata M, Ichi S, Nunokawa T, Saito Y, Ito N, Fukudo S, et al. Influence of night shift work on psychologic state and cardiovascular and neuroendocrine responses in healthy nurses. *Hypertension research*. 2001;24(1):25-31.
- Choobineh A, Soltanzadeh A, Tabatabaee H, Jahangiri M, Neghab M, Khavaji S. Shift work-related psychosocial problems in 12-hour shift schedules of petrochemical industries. *International Journal of Occupational Hygiene*. 2011;3(1):38-42.
- Omigbodun OO, Odukogbe AT, Omigbodun AO, Yusuf OB, Bella TT, Olayemi O. Stressors and psychological symptoms in students of medicine and allied health professions in Nigeria. *Social psychiatry and psychiatric epidemiology*. 2006;41(5):415-21.

26. Sadeghian E, Heidarian Pour A. Stressors and mental health status among students of Hamadan University of Medical Sciences. *Journal of hayat*. 2009;15(1):71-80. [Persian]
27. Rahaei Z, Yarmohammadi P, Fatahi E, Mehri H, Kasiri N. The Relationship between Demographic Variables with General Health and Quality of Life in Students of Islamic Azad University, Sabzevar Branch, Iran. *Qom Univ Med Sci J*. 2015;9(10):40-4. [Persian]
28. Hadadvand M, Karimi L, Abbasi Validkandi Z, Ramezani P, Mehrabi H, Zeighami Mohammadi S. The Relationship between Internet Addiction and Sleep Disorders in Students. *Journal of Health And Care*. 2013;15(4):39-49. [Persian]
29. Yong LC, Li J, Calvert GM. Sleep-related problems in the US working population: prevalence and association with shiftwork status. *Occupational and environmental Medicine*. 2017;74(2):93-104.
30. Ohayon MM, Smolensky MH, Roth T. Consequences of shiftworking on sleep duration, sleepiness, and sleep attacks. *Chronobiology International*. 2010;27(3):575-89.
- Machi MS, Staum M, Callaway CW, Moore C, Jeong K, Suyama J, et al. The relationship between shift work, sleep, and cognition in career emergency physicians. *Academic Emergency Medicine*. 2012;19(1):85-91.
31. Tajvar A, Saraji GN, Ghanbarnejad A, Omid L, Hosseini SS, Abadi ASS. Occupational stress and mental health among nurses in a medical intensive care unit of a general hospital in Bandar Abbas in 2013. *Electronicphysician*. 2015;7(3):1108-13.
32. Sherina MS, Rampal L, Kaneson N. Psychological stress among undergraduate medical students. *Medical Journal of Malaysia*. 2004;59(2):207-11.
33. Ansari H, Bahrami L, Akbar Zadeh L, Bakhshani NM. Assessment of general health and some related factors among students of Zahedan University of Medical Sciences In 2007. 2008;9(8):295-304. [Persian]
34. Olfson M, Marcus SC, Druss B, Elinson L, Tanielian T, Pincus HA. National trends in the outpatient treatment of depression. *Jama*. 2002;287(2):203-9.