doi:10.22100/ijhs.v10i3.1146
Original Article

IJHS 2024;10(3):37-43
ijhs.shmu.ac.ir

IJHS
International Journal of Health Studies

Investigating the Sleep Quality and its Relationship with the Job Stress and Mental Load in Firefighters: A Case Study in Isfahan City

Omid Dehghani[1], Hamidreza Heidari[*2]

[1] Department of Health, Safety and Environment, Aghigh Institute of Higher Education, Shahinshahr, Isfahan, Iran.
[2] Associate Professor in Occupational Health and Safety Engineering, Environmental Health Research Center, Golestan University of Medical Sciences, Gorgan, Iran.

Received: 19 November 2024
Accepted: 19 December 2024

Abstract

Background: *This study aimed to investigate the quality of sleep and its relationship with the amount of occupational stress and mental workload in firefighters in Isfahan City.*
Methods: *The research was a cross-sectional study with a descriptive-analytical approach. The statistical population includes all the firefighters of Isfahan city equal to 715 people, of which 124 personnel were selected as a sample by simple random sampling. Standard questionnaires including the NASA Workload Index (NASA-TLX), the Job Stress Questionnaire of the Health and Safety Institute of England (HSE), and the Pittsburgh Sleep Quality Questionnaire) were the tools used in this research.*
Results: *The results showed that there is a moderate negative correlation between sleep quality and job stress (r=-0.59, P-value=0.001). The results of the mental load survey also showed that the average time pressure was 52.09±19.26, which is higher than the other dimensions of mental load, and the lowest dimension of mental load was related to failure and frustration (35.16±18.89).*
Conclusions: *Based on the results of this study moderate and reverse relations were obtained between sleep quality and job stress as well as sleep quality and mental workload. In addition, the number of the missions of the firefighters determined as an influencing factor on increasing the mental workload. While doing regular exercise led to better sleep quality for firefighters. These findings can be used by policymakers in this field to improve the sleep quality of firefighters and reduce associated health problems.*

Keywords: Sleep quality, Job stress, Mental workload, Firefighters.
[*]**Corresponding to:** H Heidari, **Email:** Hr.heidari.tums@gmail.com

Please cite this paper as: Dehghani O, Heidari H. Investigating the Sleep Quality and its Relationship with the Job Stress and Mental Load in Firefighters: A Case Study in Isfahan City. Int J Health Stud 2024;10(3):37-43.

Introduction

Sleep is an organized and repetitive behavior with a pattern based on the biological rhythm of people, which has been considered a guarantee of physical and mental health since ancient times. However, this pattern and its quality are affected by various factors such as age, gender, psychological, and environmental factors of people[1]. In jobs where there is a lot of work pressure, due to the presence of fatigue and inappropriate schedule, the quality of sleep decreases and causes a decrease in memory, damage to the thinking process, irritability, and a decrease in learning[2]. Sleep quality consists of subjective indicators related to the sleep experience; like the level of satisfaction with sleep and the feeling that occurs after waking up. About one-third of a person's life is spent in sleep, and the lack of sleep time or its quality can affect human health[3]. For an organization to reach its goals, employees must perform their duties at an acceptable level of efficiency. This issue is crucial for governmental organizations whose poor performance leads to failure in public services and for private companies whose poor performance leads to their bankruptcy[4].

Currently, more than 40% of the world's population is in the labor force, and considering that each of the people who is in the labor force spends about a third of their life in the workplace, ensuring the health of the environment work and reducing job stress is very important for them[5].

Job stress occurs when the expectations of a person are more than his responsibilities and abilities. In other words, job stress is a harmful physical and mental response and occurs when the job requirements do not match the capabilities, support resources, and needs of the working person[6]. When the opportunity to show creativity and decision-making is taken from a person in the work environment, stress appears, which ultimately leads to a decrease in efficiency. This is one of the main problems and threats to people's health in today's modern societies[7]. Stress is an integral part of all professions, but this issue is more evident in jobs that are closely related to the health and life and death of people and require more attention[8].

Several factors may affect poor sleep quality, among which psychological factors and job stress are more prominent than other factors[9]. In the meantime, the firefighting job is classified as a hard and harmful job due to its high risk, direct contact with harmful factors, and stressful environment. People who work in these jobs have a lot of stress and are prone to suffering from mental disorders and anxiety. As research has shown, the highest number of illnesses and deaths of firefighters are directly or indirectly related to the stressful nature of their work[10].

Another psychological factor that can be seen in different jobs with different degrees is mental workload. Mental workload is a subset of cognitive ergonomics that puts a person in the face of external demands, organizational, psychological factors, and perceptive and cognitive abilities[11]. In other words, the mental workload is the difference between the information processing system required to perform the expected tasks and

the available capacity of information processing power by the user at the specified time[2,12].

According to the mentioned materials and since the profession of firefighting is considered a vulnerable and dangerous profession in all societies and mental health disorders in firefighters lead to a decrease in their efficiency and productivity, planning for improving their mental health through measures such as improving working conditions, training, improving shift work schedule and proper sleep seems necessary to reduce workload, mental load, and stress.

So far, many studies have been conducted in the field of mental health and sleep quality in different situations. The results of these studies all confirm that the study of mental health status and sleep quality of people can provide valuable information in the field of educational planning, treatment, and prevention of mental disorders and sleep disorders in the hands of planners and managers of organizations and place service provider centers.

The weakness of the research background in the field of simultaneous examination of job stress, mental workload, and sleep quality of the employees of the fire department prompted us to provide useful information to the officials and managers of this group by conducting such research, so that by using its results, the above to increase efficiency, to prevent the drop in job performance and burnout in the organization's employees.

Materials and Methods

In this cross-sectional descriptive and analytical study that was conducted in 2022, 124 firefighters were selected randomly from the community of firefighters in Isfahan City. The inclusion criteria for people in this study were having at least one year of experience in the firefighting job not having any mental disorder and experiencing any severe stress (such as the death of a close relative) in the past 6 months, and people who didn't meet the inclusion criteria or didn't intend to participate or cooperate in this research, they were not included in the study.

In this research, a questionnaire method was used to collect the required data. In this regard, job stress, mental workload, and sleep quality were assessed by the occupational standard questionnaire of the Health and Safety Institute of England (HSE), NASA-TLX, and the Pittsburgh Sleep Quality Scale, respectively. In addition, demographic and occupational information of people including age, work experience, number of missions per week, education, marital status, and whether or not they have a regular exercise pattern in their daily plans were collected through a researcher-made questionnaire. Finally, the gathered data was analyzed using SPSS software, version 26.

The Official NASA Task Load Index (TLX) is a subjective workload assessment tool that allows users to perform subjective workload assessments on operator(s) working with various human-machine interface systems. Originally developed as a paper and pencil questionnaire by NASA Ames Research Center's (ARC) Sandra Hart in the 1980s, NASA TLX has become the gold standard for measuring subjective workload across a wide range of applications.

By incorporating a multi-dimensional rating procedure, NASA TLX derives an overall workload score based on a weighted average of ratings on six subscales including mental demand, physical demand, temporal demand, performance, effort, and frustration. The definition and meaning of each subscale are given in the questionnaire, which the respondent reads before answering. This questionnaire has 6 questions which are divided into 5 points using a visual scale from 0 to 100 the respondent determines the number of each subscale by marking on the visual scale. The average of the subscales is reported as the amount of mental workload, which is a number between 0 and 100. Average scores below 50 are acceptable and scores above 50 are considered high mental load[13]. The face validity of the Persian version of this scale has been confirmed by Mohammadi et al. and its internal consistency reliability has been evaluated as 84% by Cronbach's alpha method[14].

Job stress in this study was evaluated using the standard job stress questionnaire which was designed and compiled in the late 1990s by the Health and Safety Institute of England (HSE) in order to measure the job stress of employees.

This questionnaire has 35 questions and includes 7 components: role (questions: 17, 13, 11, 4, 1); communication (questions: 34, 21, 14, 5); Support of officials (questions: 35, 33, 29, 23, 8); colleague support (questions: 31, 24, 27, 7); control (questions: 2, 25, 19, 15, 10, 30); demand (questions 22, 20, 3, 16, 12, 9, 6, 18) and changes (questions: 26, 28, 32).

This questionnaire measures job stress based on a 5-point Likert scale: never (1), rarely (2), sometimes (3), often (4), and always[15]. In Iran, Marzabadi et al. reported the reliability of the questionnaire through Cronbach's alpha method and halving method, respectively 78% and 65%[16].

Sleep quality in this study was evaluated using the Pittsburgh Sleep Quality Scale[17]. The sleep quality questionnaire has 19 items, which are graded into 4 options including no sleep problem (score 0), moderate sleep problem (score 1), serious sleep problem (score 2), and very serious sleep problem (score 3). And finally, after adding up the scores, people will be divided into two groups.

Obtaining a score of 5 or higher in the whole questionnaire means poor sleep quality (does not have quality sleep) and obtaining a total score lower than 5 in the whole questionnaire means good sleep quality (has good quality sleep). The validity and reliability of the Persian version of this questionnaire have been confirmed in the study of Afkham Ebrahimi et al.[29] and its internal consistency reliability has been obtained through Cronbach's alpha of 79%, which is considered appropriate[18].

In this research, the collected data was entered into SPSS software version 26. Using this software, the status of the variables is presented using descriptive statistical indicators, including mean and standard deviation or frequency and percentage. Then, the status of variables was examined in terms of normal distribution using the Kolmograf-Smirnov and Shapiro-Wilk tests. If the distribution of variables under

investigation was normal, Pearson's correlation test was used to check the correlation between these variables, and if the distribution was not normal, Spearman's correlation test was used. The significance level in all analyses was considered less than 0.05.

Results

This study was conducted on 124 subjects of firefighters in Isfahan city. The mean and standard deviation of the age of the participants was 34.56±5.21 years and 8.49±5.33 years for their work experiences (Table 1). In addition, this study showed that 70.4% of the participants were married and 79.2% had a bachelor's degree or higher. Also, 63.2% of them reported regular physical activity.

Table 1. Distribution of quantitative demographic variables (n=124)

Variables	Mean±SD	Min	Max
Age (year)	34.56±5.21	23	49
Work experience (year)	8.49±5.33	2	21
Number of missions in month	8.13±5.20	1	40

The results of an assessment of the sleep quality of the studied samples showed that most of them had an overall description of sleep quality as relatively good (74.2%). In 69.4% of cases, they had a slight problem with sleep delay, and most of them (37.1%) had a sleep duration of more than 7 hours. In 59.7%, their sleep was normal. Sleep disorders were reported in 58.9% of the subjects and 87.1% of the subjects did not take sleeping pills in the last month. Based on the overall assessment of the sleep quality questionnaire, 54.8% of the subjects had poor sleep quality (Table 2).

Table 2. Status of sleep quality and its dimensions of participants

Sleep quality and its dimensions	n (%)	Mean±SD
Overall description of sleep quality		
Very good	8 (6.5)	1.15±0.55
Relatively good	92 (74.2)	
Relatively bad	21 (16.9)	
Very bad	3 (2.4)	
Delay in falling asleep		
Normal	17 (13.7)	1.05±0.61
Slight problem	86 (69.4)	
Moderate	18 (14.5)	
Severe	3 (2.4)	
Useful sleep duration		
More than 7 hours	46 (37.1)	1.12±1.03
6 to 7 hours	30 (24.2)	
5 to 6 hours	35 (38.2)	
Less than 5 hours	13 (10.5)	
Sleep sufficiency		
Normal	74 (59.7)	1.19±0.86
Slight problem	16 (12.9)	
Moderate	11 (8.9)	
Severe	23 (18.5)	
Sleep disorders		
Normal	1 (0.8)	1.11±0.35
Slight problem	73 (58.9)	
Moderate	11 (8.9)	
Severe	-	
Amount of sleeping pills		
No pill	108 (87.1)	0.44±0.15
Less than once a week	14 (11.3)	
Once or twice a week	1 (0.8)	
Three or more times a week	1 (0.8)	
Morning performance		
Very good	32 (25.8)	0.96±0.70
Relatively good	65 (52.4)	
Relatively bad	26 (21)	
Very bad	1 (0.8)	
Sleep quality		
Appropriate	56 (45.1)	6.08±2.59
Inappropriate	68 (54.8)	

The assessment of the state of mental workload in the participants showed that the mean and standard deviation of a score of time pressure was 52.09±19.26, which was higher than the other dimensions of mental workload. Failure and frustration were the lowest dimensions of mental workload (35.16±18.89). In general, the results showed that 36.3% of the participants also had a high mental workload (Table 3).

Table 3. Mean and standard deviation of mental workload of participants

Variables	Mean±SD	Min	Max
Mental pressure	46.85±21.30	10	90
Physical pressure	46.45±17.86	10	90
Time pressure	52.09±19.26	10	90
Efficiency	37.33±18.21	10	80
Effort	46.20±20.42	10	90
Failure and frustration	35.16±18.89	10	90
Mental workload	**Frequency (%)**		
Acceptable mental workload	79 (63.7%)		
High mental workload	45 (36.3%)		

Assessment of job stress in the studied samples showed that based on the obtained scores, the highest job stress was related to the dimension of demand 26.07±3.76, and the lowest was related to the dimension of changes 9.86±1.88. In addition, the results of job stress analysis showed that 87.1% of the samples had severe job stress (Table 4).

Table 4. Mean and standard deviation of job stress and its dimensions of participants

Variables	Mean±SD	Min	Max
Role	19.54±3.41	8	25
Communication	14.05±2.26	8	20
Liability support	16.67±2.63	11	23
Colleague support	14.53±1.86	7	20
Control	18.16±3.91	8	29
Demand	26.07±3.76	19	36
Changes	9.86±1.88	5	14
Total score of Job stress	119.36±11.61	92	152
Intensity of job stress	**Frequency (%)**		
Desirable	0 (0)		
Weak	0 (0)		
Moderate	12 (9.7)		
Severe	108 (87.1)		
Very severe	4 (3.2)		

Examining the relationship between sleep quality and job stress and its dimensions showed that there is a moderate negative correlation between sleep quality and occupational stress (r=-0.59, P-value=0.001). In other words, the results show that the higher the job stress of the samples, the lower the quality of their sleep. In addition, the results showed that dimensions of demand (r=-0.64, P-value=0.006), control (r=-0.53, P-value=0.007), and changes (r=-0.35, P-value<0.001) also had a significant correlation with sleep quality.

The obtained results of the relationship between sleep quality and mental workload showed that overall, there is a significant relationship between mental workload and sleep quality (P=0.04). So among people with high mental workload, 66.7% have poor sleep quality, while among people with acceptable mental workload, 48.1% have poor sleep quality (Table 5). In addition, the results showed that there is a reverse and moderate correlation between mental stress and sleep quality (r=-0.48, P-value<0.001). So with the increase of mental pressure, the sleep quality of the studied samples decreases. Similarly, there was a reverse and moderate correlation between time pressure and sleep quality (r=-0.51, P-value<0.001).

Table 5. The relationship between sleep quality and mental workload

Sleep quality	Mental workload, frequency (%)		P-value
	Acceptable mental workload	High mental workload	
Appropriate	41 (51.9%)	15 (33.3%)	**0.04**
Inappropriate	38 (48.1%)	30 (66.7%)	

The relationship between the age of the studied samples and mental workload showed that there is no significant relationship between age and mental workload (P-value=0.49). Also, there is no significant correlation between the work experience of the studied subjects and mental workload (P-value=0.06). However, there is a statistically significant relationship between the number of missions in a week and mental workload (P-value=0.03). So, the average number of missions was significantly lower in people who had an acceptable mental workload.

On the other hand, the correlation of age, work experience, and number of missions in a week with job stress and its dimensions as well as the sleep quality of participants showed that there is no significant correlation between them (P-value>0.05).

To investigate the effect of other demographic variables including marital status, educational level, and having a regular exercise program on occupational stress, mental workload, and sleep quality, separate analyses were performed and the results showed that among the investigated variables, only having a regular exercise program during the day or week by the participants had a significant relationship with sleep quality. In other words, sleep quality was better in those who had regular physical activity (P-value=0.01). The mean and standard deviation of the sleep quality score of this group was 5.57±2.36. The effect of other investigated variables was not significant (P-value>0.05).

Discussion

The present study was conducted to investigate the quality of sleep and its relationship with the level of job stress and mental workload in firefighters in Isfahan City.

Spearman's correlation coefficient was used to investigate the quality of sleep with the level of occupational stress and mental workload in firefighters, and the results showed that there is a reverse and moderate correlation between sleep quality and job stress (r=-0.59, P-value=0.001). In other words, the higher the job stress of the participants, the lower their sleep quality. In addition, the dimensions of demand (r=-0.64, P-value=0.006), control (r=-0.53, P-value=0.007), and changes (r=-0.35, P-value<0.001) also had a significant correlation with sleep quality.

The examination of mental workload in the studied samples also showed that the average time pressure was 52.09±19.26, which was higher than the other dimensions of mental load, and the lowest dimension of mental load related to failure and frustration was determined to be 35.16±18.89.

Shift workers, especially night shift workers, are exposed to negative effects due to long and irregular working hours, such as reducing sleep quality, increasing anxiety levels, increasing fatigue, and disrupting the circadian rhythm, which is associated with hormone secretion disorders[19]. Therefore, the job and workload requirements of these people have increased compared to normal working people and they are exposed to a higher level of job stress and the risk of health problems. It may be because with the increase in working hours, the amount of fatigue perceived by the person increases, and his performance level decreases[20]. Therefore, increasing the effort of the individual to maintain his performance at a suitable level, increases the workload and consequently increases the level of job stress perceived by the individual. Hence, in crisis-oriented and paramilitary organizations such as fire departments, the importance and special attention to the mental workload and job stress level of the human forces is much higher, and this profession is considered one of the most dangerous professions in the whole world, and there are always many dangers associated with firefighters[21]. The result obtained in this research is in agreement with the findings of other studies [22-25].

To investigate the relationship between sleep quality and mental workload in firefighters, which was another main hypothesis of this research, Spearman's correlation coefficient was used and the results showed that there was a reverse and moderate correlation between mental stress and sleep quality (r=- 0.48, P-value<0.001). So with the increasing of the mental pressure, the quality of sleep of the studied samples decreases. In addition, there was a reverse and moderate correlation between time pressure and sleep quality (r=-0.51, P-value<0.001). Shift jobs directly and indirectly increase the mental load of work, conflicts, and thoughts, and the more a person's mind is busy, the more difficult it is to fall asleep and the less useful sleep a person gets; As a result, this leads to a more unfavorable quality of sleep[26, 27].

In developed countries such as Iran, the fire department and its officers are considered the main pillar of a country's safety and rescue system. Since many of the personnel working in firefighting organizations in critical situations are directly faced with saving people's lives and controlling incidents in special situations, full vigilance, the necessity of preparation for difficult, dangerous, and uncertain situations, and quick decision-making and suitability are considered one of the essentials of their work, and all these things create a lot of mental burden in them. So, it is logical that they experience unfavorable sleep quality. Therefore, the amount of attention paid to the quality of sleep and mental workload in this job group is more than in other jobs.

To improve the quality of sleep and reduce the mental workload and job stress of firefighters, intervention programs are proposed to create suitable working conditions, strengthen work capacity, and teach the principles of sleep hygiene. Billings and Focht (2016) in a study found that shift schedules affect sleep quality so shift schedules that disrupt normal circadian rhythms result in poorer sleep quality, which can lead to less effective emergency response and increased risk to firefighter health and safety[28]. The present study was done on the firefighters who were selected from fire departments in Isfahan city with a similar shift schedule. This can be considered as the limitation of this study. Hence, it is recommended that in future studies, the different shift

schedules of the firefighters or any other stressful jobs be considered.

Based on the obtained results, the firefighters experienced serious job stress and the demand components of the stress was the highest reason leading to job stress. On the other hand, time pressure was the main reason for increasing the workload of firefighters. Consequently, moderate and reverse relations were obtained between sleep quality and job stress as well as sleep quality and mental workload. In addition, the number of the missions of the firefighters determined as an influencing factor on increasing the mental workload. While doing regular exercise led to better sleep quality for firefighters. These findings can be used by policymakers in this field to improve the sleep quality of firefighters and reduce associated health problems.

Ethical Considerations

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Golestan University of Medical Sciences (IR.GOUMS.REC.1401. 233).

Acknowledgment

This research which is the result of a master's thesis has been done in Department of Health, Safety and Environment, Aghigh Institute of Higher Education, Shahinshahr, Isfahan with the participation of Golestan University of Medical Sciences. The authors sincerely appreciate the inter-university collaboration as well as the Isfahan Firefighting Organization for their valuable cooperation.

Conflict of Interest

The authors declare that they have no competing interests.

Funding

No funding.

References

1. Mashhadi M, Nasiri M, Khalili M, Shadi D. Study of sleep habits and its effective factors in children admitted to the pediatric wards of Besat hospital in Hamadan. Pajouhan Scientific Journal. 2021;19(3):41-7. doi: 10.61186/psj.19.3.41

2. Mohammadzadeh M, Habibi E, Hassanzadeh A. Relationship between work ability and mental workload with musculoskeletal disorders in industrial jobs. Journal of preventive medicine. 2015;2(4):29-38.

3. He M, Lian Z, Chen P. Effect of quilt materials on sleep quality and thermal comfort for young people in East China. Procedia Engineering. 2017;205:43-9. doi: 10.1016/j.proeng.2017.09.932

4. Salimi M. The role of human development management in human resources productivity. Monthly social, economic, scientific and cultural work and society. 2013;2(5):47-59.

5. Salimi M, Mohammadian M. Factors affecting the occupational stress of employees and its impact on the quality of work life (Study case: Ilam Province Electricity Distribution Company). Contemporary researches in management and accounting sciences. 2020;5(2):86-100.

6. Hannani S, Rezagholy P, Ziba FN, Azadi NA. Relationship between sleep quality with job stress and quality of life of operating room technologists working in university hospitals affiliated to Iran University of Medical Sciences in 2016-17. Pharmacophore. 2018;9(2-2018):103-8.

7. Ebrahiminejad M KZN, Shafie H. . Identifying and ranking factors affecting job stress in employees with AHP technique. Public policy making in management. 2016;7(3):1-13.

8. Fadae Aghdam N, Ameri M, Goli S, Imeni M. Relationship between sleep quality and job stress of nurses in different shifts working. Avicenna journal of nursing and midwifery care. 2020;28(2):103-11. doi: 10.30699/ajnmc.28.2.103

9. Tausig M, Fenwick R. The social stratification of job stress: How social structures create health disparity. Special Social Groups, Social Factors and Disparities in Health and Health Care: Emerald Group Publishing Limited; 2016. p. 261-86. doi: 10.1108/S0275-495920160000034014

10. Jahangiri M, Safaiyan A, Dashtbesh Podonak S, Tayefe Rahimian J, Rajabi A-H. Servuy of mental health among fire department employees of shiraz city in 2016. Occupational Hygine and Health Promotion Journal. 2018;1(3):206-16.

11. Bolghanabadi S, Mousavi Kordmiri SH, Mahmodi A, Mehdiabadi S. The effect of mental workload on stress and Quality of Work Life firefighters. Journal of Sabzevar University of Medical Sciences. 2019;26(5):547-53.

12. Bakhshi E, Mazloumi A, Hoseini SM. Relationship between mental fatigue and mental workload among nurses. Zahedan Journal of Research in Medical Sciences. 2019;21(1). doi: 10.5812/zjrms.83082

13. Hart SG, Staveland LE. Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. Advances in psychology. 52: Elsevier; 1988. p. 139-83. doi: 10.1016/S0166-4115(08)62386-9

14. Mohammadi M, Nasl Seraji J, Zeraati H. Developing and accessing the validity and reliability of a questionnaire to assess the mental workload among ICUs Nurses in one of the Tehran University of Medical Sciences hospitals. J Sch Public Health Inst Public Health Res. 2013;11(2):87-96.

15. MacKay CJ, Cousins R, Kelly PJ, Lee S, McCAIG RH. 'Management Standards' and work-related stress in the UK: policy background and science. Work & stress. 2004;18(2):91-112. doi: 10.1080/02678370410001727474

16. Marzabadi WG, A. Fesharaki, M. Evaluation of validity and reliability of HSE job stress questionnaire. Behavioral Sciences. 2010;4(8):298-1.

17. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiatry research. 1989;28(2):193-213. doi: 10.1016/0165-1781(89)90047-4

18. Afkham Ebrahimi AQ, F. Salehi, M. Kafian Tafti, A. Ekhlaghi Farsi, A. . Investigation of sleep parameters and factors affecting sleep quality of outpatients referred to selected clinics of Rasoul Akram Hospital (PBUH). Journal of Iran University of Medical Sciences. 2008;15(58):31-8.

19. Khan S, Duan P, Yao L, Hou H. Shiftwork-mediated disruptions of circadian rhythms and sleep homeostasis cause serious health problems. International journal of genomics. 2018;2018(1):8576890. doi: 10.1155/2018/8576890

20. MacDonald W. The impact of job demands and workload on stress and fatigue. Australian psychologist. 2003;38(2):102-17. doi: 10.1080/00050060310001707107

21. Carlis-Paittoo BO. Occupational related injuries and disabilities among operational fire fighters in Ghana 2016.

22. Fadae Aghdam N, Ameri M, Goli S, Imeni M. Relationship between sleep quality and job stress of nurses in different shifts working in hospitals affiliated to Shahroud University of Medical Sciences in 2016. Avicenna J Nurs Midwifery Care. 2020; 28 (2):103-111[Persian]. doi: 10.30699/ajnmc.28.2.103

23. Asadi, N. Hosseini, S. Investigating job stress and its relationship with sleep quality of personnel working in Bid Boland gas refinery. Journal of Rafsanjan University of Medical Sciences, 2019;8 (18): 810-797 [Persian].

24. Alotaibi ,A. Alosaimi ,F.M. Alajlan ,A. Abdulrahman,K.H.The relationship between sleep quality, stress, and academic performance among medical student . Journal of Family and Community Medicine.2020; 27(1):23-28. doi: 10.4103/jfcm.JFCM_132_19

25. Khalil Omar, M. Hairianie Aluwi, A.wadhiha Mohd Fauzi, M. Hairpuddin, N.F., Work stress, workload, work-life balance, and intention to leave among employees of an insurance company in malaysia. International journal of business, Economics and law.2020; 21(2): 2289-1552.

26. Mirzaei S, Zamanian Z, Hasan Zade J. Effects of work shifts and mental workload on chronic fatigue among female nurses in intensive care units. Journal of Health Sciences & Surveillance System. 2015;3(3):113-8.

27. McDowall K, Murphy E, Anderson K. The impact of shift work on sleep quality among nurses. Occupational Medicine. 2017;67(8):621-5. doi: 10.1093/occmed/kqx152

28. Billings J, Focht W. Firefighter shift schedules affect sleep quality. Journal of occupational and environmental medicine. 2016;58(3):294-8. doi: 10.1097/JOM.0000000000000624