Original Article

Relationship between Job Stress and Fatigue Based on Job Demand-control-support Model in Hospital Nurses

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Abstract

Background: This study aimed to examine nurses' job stress based on Karasek's demand-control-support model and assess its relationship with different aspects of fatigue. **Methods:** This cross-sectional study was conducted on 522 nurses working in educational hospitals. Job stress dimensions and fatigue were measured by the Persian version of Job Content Questionnaire (JCQ) and Multidimensional Fatigue Inventory (MFI), respectively. **Results:** The results showed that psychological and physical job demands obtained high scores, but social support and decision latitude got low scores. MFI results indicated that the highest score was related to the general fatigue. Moreover, the results showed a significant positive relationship between psychological job demands and general fatigue, but a significant negative correlation to reduced activity. **Conclusions:** Considering the effects of job stress on nurses' fatigue, it is necessary to develop a suitable interventional program for nurses in healthcare centers, especially hospitals, to decrease job stress and improve working conditions.

Keywords: *Cross-sectional studies, fatigue, job stress, nurses*

Introduction

In the past decades, job complexities have increased fast in both public and private sectors[1] because workers need to learn many new and complicated things. This has resulted in increase in job demands and job strains in workers in different workplaces, especially healthcare settings, such as nurses, in hospitals.[2] This fast rise in job demands and job strains among workers, especially nurses, can lead to health problems,[3] low productivity,[4] increase in human errors (medical errors),[5] and increase in cost and job turnover.[6]

Studies have indicated that job stress is a critical issue in health and safety of workers in different workplaces.[7,8] Research has also demonstrated various factors, such as social support, physical and psychological job demands, and decision control, as the risk factors of job stress.[9] These risk factors have been mentioned to be effective in job stress in Karasek's job demand-control-support model. Karasek's model hypothesized that job stress is resulted from the combination of high physical and psychological job demands accompanied by low social support and decision latitude.[10] Furthermore, job stress caused by high psychological job demands can lead to physical and mental problems in working populations in different societies.[7,11] Researchers believe that this aspect of job strain may be created and increased by poor psychological conditions in workplaces. Thus, job stress can have adverse effects on different aspects of workers' health and life.[12,13]

Individuals in various jobs suffer from different levels of job stress.[14] Nursing is one of the high-stress jobs and nurses suffer from job stress[15] and its destructive consequences, including fatigue.[16,17]

Fatigue is defined as a type of physical and mental burnout[18] that is increased as a result of stress,[16] high workload,[19] and some psychosomatic disorders.[20] Fatigue can also occur due to the problems associated with high job demands and low job control.[21] Besides, a continuation of chronic fatigue decreases health status and performance[22] and increases the risk of accidents and job disability.[23,24]

In the recent years, fatigue has attracted notable attention in occupational health studies. Today's safety and health costs are a small part of the negative consequences of fatigue.[25] Based on epidemiological

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studies conducted in European Union countries recently, the prevalence of fatigue has increased in workplaces. These studies conducted on 8833 subjects revealed that 22% of the participants suffered from fatigue.[26] Houtman also carried out a study on workers in the Netherlands and reported that 1 out of the 3 cases receiving compensation for job disability was related to psychological and mental disorders with fatigue being the contributing factor.[27]

Furthermore, evidence has indicated the multifactorial etiology of fatigue, with psychological factor playing an important role. For example, the results of a study performed by England National Health Service on workers in 131 different jobs revealed that psychological factors, such as high job demands and role ambiguity, were important in the occurrence of fatigue among workers.[28]

In reviewing the literature, very few studies were found on the association between job stress and fatigue among Iranian nurses. Previous published studies were carried out among healthcare stuff from other countries. This study was therefore conducted to investigate the relationship between job stress dimensions and different aspects of fatigue among Iranian nurses based on Karasek's demand-control-support model.

Methods

Study population and sample selection

The participants were recruited from the nurses working in educational hospitals affiliated to Shiraz University of Medical Science (SUMS), Shiraz, Iran. Totally, 570 questioners were distributed between the nurses, but 522 questioners were completed or returned to researchers (response rate: 92%). Simple random sampling was used to select hospitals, wards, and nurses. First, we listed all educational hospitals affiliated to SUMS. The researchers randomly selected hospitals. The hospitals and wards included Namazi, Faghihi, Hafez, Mother and Child, and Ali-Asghar, and coronary care unit, Intensive Care Unit, emergency, surgery, internal, babies and infants, childbirth, and dialysis, respectively. Then, the researchers distributed the questioners among nurses with BS or above university degree and at least 1 year of job experience. The researchers explained the questioners to subjects, and at the end of shift time, they collected all questioners from different wards.

Data collection tools

In this study, the data were collected through self-report using a demographic questionnaire. It had included some demographic features such as age, sex, marital status, and education level.

Fatigue was assessed by multidimensional fatigue inventory (MFI-20). MFI-20 consists of 20 items in five dimensions. These dimensions include general fatigue (GF), physical fatigue (PF), mental fatigue (MF), reduced motivation (RM), and reduced activity (RA). The items of MFI-20 were scored based on a five-point scale ranging from Yes (true) to No (not true). The reliability and validity of the Persian version of this inventory (P-MFI-20) were assessed and approved by Hafezi *et al*.,[2] and they reported $\alpha = 0.85$ and $r > 0.7$, respectively, for the MFI-20.

Job content questionnaire (JCQ) was used to measure job stress by 27 items in four different dimensions selected from the full version of JCQ. The selected dimensions for this study included psychological job demands (5 items), decision latitude or control (9 items), social support (8 items), and physical job demands (5 items). The items of JCQ were scored using a four-point scale ranging from 1 (strongly disagree or never) to 4 (strongly agree or often). The score of this questionnaire was calculated in accordance with the "JCQ User's Guide."[29] The Persian version of JCQ (P-JCQ) was previously validated by Choobineh *et al*.[30] In addition, reliability was calculated using Cronbach's alpha that for decision latitude and psychological job demands scales were 0.54 and 0.58, respectively, and ranged from 0.64 to 0.85 for other scales.[30]

Data analysis

The data were entered into the SPSS statistical software, version 16 and were analyzed using descriptive statistics (mean, standard deviation (SD), maximum and minimum scores, and frequency). Pearson's correlation coefficients among MFI and JCQ scales were calculated. $P \leq 0.05$ was considered statistically significant.

Ethical consideration

The vice chancellery for research affairs of SUMS approved the study. Managers and nursing administrators of each hospital gave their permission for the study, and the participants were informed about the protocol and of the study before they gave their consent. The participants were able to withdraw from the study at any time. All participants answered the questionnaires anonymously, and they completed informed consent of SUMS for participation in the current study.

Results

The demographic characteristics of the nurses who participated in the study are presented in Table 1.

The mean ± SD scores of the scales of the Persian version of JCQ have been presented in Table 2. For better comparison of different P-JCQ scales, minimum and maximum attainable scores have been shown, as well.

Based on the results presented in Table 2, higher mean scores of psychological and physical job demands and lower mean scores of decision latitude (control) and social support showed the participants' high levels of job stress.

The mean scores of different scales of MFI-20 are displayed in Table 3. The minimum and maximum

Table 1: The demographic characteristics of the participants (*n*=522)

Characteristics	Value
Sex (%)	
Female	78.4
Male	21.6
Age (years)	
Mean±SD	29.5±7.03
Minimum–maximum	19-62
Job tenure (SD)	9.3 (7.4)
Marital status (%)	
Single	42.7
Married	53.8
Divorced	1.3
Widowed	2.2
Education level (%)	
B.Sc.	92.7
M.Sc. or PhD	7.3

SD=Standard deviation

Table 2: The mean scores of the scales of the Persian version of job content questionnaire (27 items)

Scale	Mean±SD scores	Minimum–maximum scores	Minimum–maximum attainable scores
Psychological job demands (*n*=5)	37.4±5.8	20-48	12-48
Decision latitude (*n*=9)	65.3±7.6	42-90	24-96
Skill discretion (6)	34.3±4.4	18-46	12-48
Decision authority (3)	30.9±4.8	16-44	12-48
Social support (*n*=8)	23±4.8	8-46	8-48
Supervisor support (4)	11.4±4.1	4-32	4-32
Coworker support (4)	11.5±1.8	4-16	4-16
Physical job demands (*n*=5)	15.2±2.7	6-20	5-20
Physical isometric loads (2)	6.2±1.4	2-8	2-8
Physical exertion (3)	9.1±1.6	4-12	3-12

n=Number of questions, SD=Standard deviation

Table 3: The mean scores of the scales of the Persian version of multidimensional fatigue inventory (20 items)

Scales	Mean±SD	Minimum–maximum scores	Minimum–maximum attainable scores
General fatigue (*n*=4)	12.7±3.3	4-20	4-20
Physical fatigue (*n*=4)	10.5±3.3	4-20	4-20
Mental fatigue (*n*=4)	10.9±2.2	4-20	4-20
Reduced motivation (*n*=4)	9.6±2.4	4-20	4-20
Reduced activity (*n*=4)	8.5±3.3	4-20	4-20

n=Number of questions, SD=Standard deviation

attainable scores have also been shown for better comparison of the results.

Based on the results, GF, PF, and MF obtained higher scores in comparison to RM and RA. This indicated a high level of fatigue among the nurses under study.

The correlation between job stress dimensions and different dimensions of fatigue is presented in Table 4.

The results of Pearson's correlation revealed a significant positive relationship between psychological and physical job demands and GF. However, a significant negative correlation was found between psychological job demand and RM. A stronger negative correlation was also observed between psychological job demand and RA. Moreover, the results showed a significant negative association between decision latitude and physical job demand and RA.

Discussion

Based on the results presented in Table 2 and demand-control-support model, high score of psychological job demand and low scores of social support and decision latitude (control) indicated that most of the nurses under study were in the isometric situation that, from macro ergonomic perspective, was the worst situation.[31-33] This implied that the study nurses experienced high levels of job stress. High job stress among hospital healthcare workers, especially Iranian nurses, can be attributed to various reasons, including responsibility for patient safety, high workload, low payment, working environment, and low experience in young nurses.[34]

It is to be noted that the pattern of scores obtained in the present study was similar to that of Barzideh *et al*. study which was conducted on Shiraz city hospital nurses, Iran, in 2014.[31] For instance, the mean score of psychological job demands in the current study (37.4 ± 5.8) was close to that of Barzideh *et al*.(38.19 ± 5.14).[31] The same holds true for social support mean score (23 ± 4.8) for the present study versus 22.67 ± 3.67 for Barzideh *et al*. Moreover, finally, the mean score of decision latitude in the present study (65.3 ± 7.61) was relatively close to that of Barzideh *et al*. (58.18 ± 6.5).[31]

The findings of the present study showed that the mean scores of GF, MF, and PF were higher compared to the two other dimensions of fatigue. Thus, it could be concluded that the nurses suffered from high levels of fatigue.[5] This problem can have negative effects on different aspects of nurses' life, such as social and working life. In other words, fatigue in nurses can be an important problem with distractive consequences, such as medical errors and physical and psychological diseases. Researchers have also demonstrated that fatigue and its different subscales are influenced by some parameters including job stress,[17] shift work,[35] and adverse work conditions in patient care.[5] In addition, job stress and fatigue can have undesirable impacts on nurses' physical and psychological health, eventually influencing important issues, such as efficiency and patient safety (medical errors caused by human errors).[5]

Table 4: Pearson's correlation between the scales of job content questionnaire and multidimensional fatigue inventory

Scales	General fatigue	Physical fatigue	Mental fatigue	Reduced motivation	Reduced activity
Psychological job demands	0.231**	0.012	0.031	−0.135*	−0.264**
Decision latitude	−0.12	−0.184**	−0.015	−0.181**	−0.211**
Social support	−0.107**	−0.062	−0.022	0.014	0.066
Physical job demands	0.222**	0.142*	−0.049	−0.071	−0.128*

**Significant correlation (P<0.001), *Significant correlation (P<0.05)

These results are in agreement with Hafezi's *et al*.[2] findings which showed the mean score PF, MF, and RM for the graduate students were close to those of our study (10.84 ± 2.92 vs. 10.5 ± 3.3, 9.83 ± 3.23 vs. 10.9 ± 2.2, and 9.9 ± 3.02 vs. 9.6 ± 2.4, respectively).

Based on other studies conducted on job stress and fatigue, we hypothesized that job stress was one of the important contributing factors in the prevalence of physical and psychological disorders and problems, such as physical, mental, and GF.[36] Therefore, the main aim of this study was evaluation of the relationship between job stress dimensions based on Karasek's model and different aspects of fatigue (GF, PF, MF, RA, and RM). According to Table 4 results and kind of correlation founded between job stress and fatigue dimensions, we can conclude these results are reasonable because high physical job demands increase activity and can finally lead to PF. Moreover, the combination of physical and psychological job demands can result in high GF.[37]

Based on the results presented in Table 4, negative relationships were found between decision latitude (control) and all dimensions of fatigue. Yet, decision latitude showed a stronger negative association with RA followed by RM and PF. These findings were in accordance with those of a previous study.[38] This implies that if nurses have more decision control on the task, they will have more motivation for doing their responsibilities. This, in fact, increases the nurses' physical activities for doing the job and improves their morale for doing their duties.

The current study findings also showed a negative correlation between social support and GF, PF, and MF. Nevertheless, only the relationship between social support and GF was statistically significant. This indicates that different dimensions of fatigue are related to individuals rather than other workplace conditions, such as coworker support and supervisor support. Therefore, social support and its subscales do not have an important effect on fatigue decrement.[17]

The results of Pearson's correlation test revealed that as physical job demand increased, RA and RM decreased, but the relationship was only significant regarding RA. In addition, a significant reverse relationship was observed between RA and RM and psychological job demand. These results were similar to those obtained in a previous study.[17] Based on these findings, it is highly necessary to find an answer to the following question: "Why does physical and psychological job demands increment lead to RM and RA decrement."

Most of the previous studies showed that decision latitude (control) in jobs led to an increase in motivation and activity. However, Hackman and Oldham reported that autonomy resulted in a decrease in intrinsic motivation and concluded that autonomy had a destructive effect on motivation.[39] Yet, this issue is more complicated because activity and motivation are under the influence of different aspects of job stress based on Karasek's model. Therefore, in jobs with critical situations where job demands (physical and psychological) and decision latitude are both high, job strain increases because individuals who are allowed to make decisions in critical and high-risk jobs have great concerns related to making certain and safe decisions and planning correctly for doing their jobs.[17] In such situations, individuals have to increase their activity and motivation for doing the job with high quality and low errors rate. Van Yperen and Hagedoorn also concluded in their study that high job demands led to fatigue.[17] In this respect, nurses are not exceptions because they are highly responsible for their patients' lives.[38,39]

In high-stress jobs with high physical and psychological job demands and low decision latitude, such as nursing, due to lack of time for recovery, the signs of fatigue may be more apparent compared to jobs with high job demands, and high decision latitude. Furthermore, if social support is low, the effects of job stress on fatigue will be more obvious.[17]

Van Yperen and Hagedoorn stated that in cases of low decision latitude, high job demands were associated with higher levels of fatigue. However, they found no significant relationship between high job demands and motivation.[17] Given the cross-sectional nature of the study and self-report method for data collection, the findings should be interpreted cautiously. This type of methodology for data collection has weak points such as recall bias, deception, and denial. However, in the present study by taking large sample size, we tried to modify these types of shortcomings.

Conclusions

Considering the effects of job stress on nurses' fatigue, it is necessary to develop a suitable interventional program for nurses in healthcare centers, especially hospitals, to decrease job stress and improve working conditions.

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Conflicts of interest

There are no conflicts of interest.

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