Original Article

Association of Organisational Stress with Fatigue in Operating Room Nurses

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Abstract

Background: There are several factors that cause fatigue on working nurses. However, very limited research is available on association of organisational stress with fatigue in operating room nurses.
Aim: This was a descriptive and cross-sectional study which aimed to determine the association of the organizational stress with fatigue in operating room nurses (OR) nurses.
Method: The study was conducted with OR nurses working in a university hospital. Data were collected in April 2016 and response rate was calculated as 57.5%. Demographic variables related to nurses, Piper Fatigue Scale and the short form of the Organisational Stress Questionnaire were used for data collection.
Results: It was determined that organisational stress was triggering fatigue among OR nurses. Nurses found to feel fatigued, their affective, sensory and cognitive abilities were influenced. Working long hours also found to increase organizational stress scores in OR nurses.
Conclusion: In order to protect both OR nurses' and patients' health and promote safety organisational stress and fatigue of nurses should be evaluated by managers and protective measures should be taken.

Keywords: Nursing, operating room, organisational stress, fatigue

Introduction

Working in a stressful environment and being exposed to various work-related factors has several negative outcomes for individuals. It is a known fact that the continuous and intensive stress in the working environment causes extensive fatigue and several diseases by affecting human health both physiologically and psychologically (Ganster & Rosen, 2013; Virtanen et al., 2007).Fatigue is an outcome which is basically caused by work demands, environment and organizational issues and it extremely impairs one's physical and cognitive skills and performance (Rogers, 2008).Workload, limited or inadequate management support, interpersonal issues, shift work (Happel et al., 2013) choosing the profession unwillingly usually ends up with organizational stress (Happel et al., 2013; Karahan, Gurpiar & Ozyurek, 2007). Operating rooms are stressful working environments which are kept controlled access and require intensive working pace (Salem & Ebrahem, 2018). Constantly being in a tense environment, standing during work, being exposed to stressful conditions, responding to work demands of continuous attention and extensive skills, and working for long and intensive shifts are the important factors which affect operating room nurses. It is reported that nurses work under intensive stress and experience fatigue and emotional exhaustion (Fındık, 2015; Steege & Dykstra, 2016; Zahiri et

al., 2014). The level of burnout also found to be higher in surgical wards compared to other departments (Zahiri et al., 2014). Nurses fatigue makes them feeling tired and exhausted, interferes with their physical and cognitive abilities (Kingdon & Halvorsen, 2006). Stress is triggering factor on nurses' absenteeism, aggression, reduced productivity and efficiency at work (Komsuk, 2013). It was determined that some of the nurses (39%) experienced a high level of exhaustion and meanwhile this impaired their sleep quality (Hergul, Ozbayir & Gok, 2016). Lack of communication, lack of knowledge, workload, extra duties that are not included in job description, competition among OR nurses also provoke danger for patient safety (Registered Nurses' Association of Ontario, 2011). Canadian Health Association (2011) emphasizes that nursing fatigue is a critical factor and contributes with patient safety (Registered Nurses' Association of Ontario, 2011). There are limited research that specifically evaluates the organizational stress on the fatigue of the operating room nurses. Several studies found that evaluate the general effects of fatigue on nurses and investigate the factors that cause fatigue. According to the Welsh's (2009) study done with female medical-surgical nurses, fatigue, pain, and difficulty in sleeping were the most common symptoms experienced by nurses. Fatigue among OR nurses are also mentioned by Kawano (2008). It was reported that nurses which work in the surgical clinics were under risk of developing disease due to the stressors caused by their social environments, self-perception styles, work and physical environments (Karahan, Gurpiar & Ozyurek, 2007). Another study identified that operating room nurse were expected to efficiently work in critical conditions even they were tired (Aydemir & Yildirim, 2016). Fatigue should not be considered only as a physical symptom. It is very important to remember that fatigue experienced by nurses is a problem which causes negative outcomes for both patients and nurses themselves and it must be effectively solved. Steege & Rainbow (2017) reported that fatigue of nurses impairs their job satisfaction. In a study done with operating room nurses and surgeons, it was seen that job satisfaction of nurses was lower than that of surgeons (Flin, Yule, McKenzie, Paterson-Brown & Maran, 2006). Deficiencies in the teamwork configurations and especially communication problems may be potential causes of fatigue even independently from work-related factors. Lack of communication skills are reported among the fundamental causes of several mistakes and undesired events and it is projected that the efforts exerted to improve teamwork will eliminate the human-caused errors (Wahr et al., 2013). A study done among operating room nurses identified that an important majority of them were subject to negative reaction of surgeons and this condition negatively affected their performances (Koras, Ocalan & Solak, 2015). In another study, operating room nurses were found to have the least contact level of 10% with the consulting surgeon they worked with. In the same study, while surgeons expressed that there was a good teamwork in their work environment, operating nurses did not share the same feeling (Sexton, Thomas & Helmreich, 2000).

In an operating room, there are several factors that can put the safety of a patient into danger. Communication problems, lack of leadership, adverse interpersonal relations, unsolved conflicts, deficiencies in planning and preparation and lack of attention are some of them (Sexton, Thomas & Helmreich, 2000). Managing stress and fatigue in employees work in OR is an important in preventing surgical errors and injuries (The American College of Obstetricians and Gynecologists, 2010). Therefore, for the well-being of patients and health employees, it is very important to investigate the fatigue of the operating room nurses caused by the work-related stress with larger sample groups, identify the factors that increases the fatigue and acquire the opinions of nurses to reach a better solution.

The aim of this study was to determine the association between organizational stress and fatigue in OR nurses.

Methods

Study Design and Sample

This study was a descriptive and cross-sectional that was conducted with OR nurses who were employed in a university hospital operating room in city of Bursa, Turkey. Data were collected by using a data collection form during April 2016. OR nurses who were volunteered to participate in to this study, not on sick leave or vacation were included. There were 80 nurses (universe of the study) eligible for this study. Meanwhile, 46 nurses responded to take a part in the study yielding a return-rate of 57.5%.

Ethical Consideration

Ethical permission was taken from University Ethical Committee for this study on 2016 (Ref No: 2016-6/2). OR nurses were informed about the study both verbally and in written. They were also informed that participation was voluntary.

Data Collection

Data were collected by handing the data collection forms to the OR nurses in closed envelopes and they asked to return them in the same manner after completing the forms. Their identity was protected by asking them to return filled questionnaires in closed envelopes and having them drop in to the box designed for this purpose.

The data collection tool included three sections; such as the demographic variables survey (19 questions), the Piper Fatigue Scale (PFS) the short form of the Organizational Stress Questionnaire (OSQ).

Piper Fatigue Scale

The content and construct validity of the PFS for Turkish population was done by Can (2001). In that analysis, Cronbach alpha was calculated as 0.94. PFS includes 22 questions in total and these questions are categorized under four sub-scale/dimensional headings, such as Behavioral/Severity with 6 items, Affective Meaning with 5 items, Sensory with 5 items, and Cognitive/Mood with 6 items. There are also 3 open-ended questions to obtain qualitative data. To obtain the total fatigue score, the average of the individual scores obtained from each of the 22 items is calculated. The following weights are assigned to the responses given for the questions: No: 0, Slight: 1-3, Fair: 4-6, and Strong Fatigue: 7-10.

The Organizational Stress Questionnaire

The Organizational Stress Questionnaire originally developed by Theorell et al.,1988) comprised of the second section of our data collection tool. Its' content and construct validity in Turkish language was done by Yildirim, Tasmektepgil & Uzum, 2011) who reported the Cronbach alpha as 0.79. This questionnaire (14 items) includes four subscales, such as Social Support with 6 items, Skill Use with 3 items, Work Demands with 3 items, and Making Decision with 2 items. Permission was taken for both instruments via e-mail from the authors who had done the reliability analysis.

Data analysis

The statistical software SPSS version 20.0 was used for the analysis of the collected data. Data were presented by using numbers and percentages, means and standard deviations (SD). Mann-Whitney U test, Kruskall-Wallis test and Spearman rho were used to statistically analyze of the data.

Results

Most of the nurses were female (87%), married (67%), and had at least a bachelor's degree in nursing (87%). Most of the nurses live with nuclear families or alone (82.6%) and 65.2% have at least one child. The ages of the older child ranges from 3.5 to 24 years (Mean: 10.18, SD: 5.30). Some of the nurses (15.2%) stated that they had an elderly/disabled individual living with them and 39.96% of OR nurses reported having several chronic diseases. OR nurses' average of the weekly working time is 43.83 hours (SD: 3.61) and more than half of them were working on rotating shifts (69.6%). Demographic variables of the OR nurses were presented in Table 1.

Total score obtained from OSQ was 44.28±4.06 (Range 36-54) and score obtained from PFS was 6,56± 1,93. Scores obtained from Subscales of OSQ were as follows; Social Support 20,80 (range 15-24), Skill Use 11,54 (Range 8-15), Work Demands 5,98 (Range 2-8) and Making Decision 5,98 (Range 2-8). According to mean scores obtained from subscales of the PFS, OR nurses' affective dimensions (7,30±2.24) mostly influenced and followed by sensory (6,71±2.05), behavior (6,17±2,02) and cognitive dimensions (5,70±2,16).Total score of PFS and scores of subscales were found to correlate with OSQ total score and social support, skill use and work demand subscales.

Associations of variables related to OR nurses' working conditions with their fatigue and organizational stress are presented in table 2. Duration of working hours per week positively correlated with skill use subscale of OSQ; sensory and cognitive subscale of PFS ($p<0.05$).

It was determined that some of the demographic variables of the nurses (e.g. age, gender, marital status, family type, number of children, educational level, income level) did not associate with total organisational stress scores ($p>0,05$). Having chronic disease found to interfere with

total OSQ score and workload subscale (p<0, 05) (Table 3).

More than half of the nurses reported feeling tired for months (52.2%) followed by for weeks (13%), for days (10.9%), for hours (6.5%), for minutes (2.2%). Most contributing factors to nurses' fatigue were demanding work (n=15), stress (n=10), working understaffed (n=9), factors related to working environment (n=9) and working overtime (n=5).OR nurses describe their fatigue as a concentrated stress, burnout, intense working, loss of motivation, not being able to rest and feeling of pain. Some of the nurses reported that "they are not being able to find a word to describe their fatigue".

Discussion

It was determined that some of the demographic variables of the nurses (eg. age, gender, marital status, family type, number of children, educational level, income level) did not associate with total organisational stress scores. Nurses who live in nuclear families or alone had high scores from Social Subscale of OSQ and result was significant. Having chronic disease found to interfere with total OSQ score and workload subscale. According to these results it can be said that working in OR increases the level of stress among nurses when combined with the presence of chronic diseases. This also contributes to OR nurses' fatigue. According to one study, older age usually correlates with job stress of OR nurses (Yildirim, Tasmektepgil & Uzum,2011). Age of the OR nurses did not have any influence on stress and fatigue in this study. Since the age of our study population found to be relatively young (35.39±6.29 years); it was assumed that being young and having limited responsibilities at home might have resulted with better tolerance to organizational strains at work.

Female gender and having chronic disease found to interfere with behavioral and affective subscales of PFS. According to one study ICU and OR nurses who are young, married and female complained from work stress (Salem & Ebrahem, 2018). Collaboration in the work environment, age, education, experience and years of employment were not significantly explain the resilience in OR nurses (Gillespie, Chaboyer, Wallis & Grimbee, 2007). In this study although there is no statistical significance, it was seen that the nurses who are single, female, having the nuclear type of family and having more children have higher scores both from total OSQ and PFS. These results can be linked to female nurses' plenty of responsibilities they have both at home and workplace. Especially the nurses with two or more children were feeling stressed at work and found their work demanding. It is assumed that large number of children triggers job-related stress of the nurses and therefore work intensity causes extra strain and fatigue on them. In another study, it was determined that domestic responsibilities were not related to the fatigue of nurses (Winwood, Winefield & Lushington, 2006). A recent study done on Turkish OR nurses also shows that sleep disorder (63%) is the most common problem (Hergul, Ozbayir & Gok, 2016). In this study, 13% of the nurses feel that they have a fatigue for several weeks while 52.2% of them feel that they have a fatigue for several months.

Job stress perceived by OR nurses in local hospitals was low compared to university hospitals in one recent study (Eskola et al., 2016) Since our study conducted with OR nurses who were employed in a university hospital, the findings are similar to Eskola et. al's study (2016). University hospitals usually have more complex cases than local hospitals, this could lead OR nurses to feel more stressed while working in OR. This issue may also apply to our study population in terms of type of hospital. Number of years in the nursing profession usually links to job stress according to research studies. Role in OR also contributes to higher job stress levels in anesthetic nurses rather than scrub nurses (Eskola et al, 2016). High to moderate levels of acute fatigue was found to be a common complaint among post anesthesia care nurses according to Hazzard et al., (2013) study. Working in OR usually is a primary cause of fatigue. Working in critical conditions, caring for unconscious patients and assisting the surgeons are some of causes for developing fatigue among OR nurses (Kawano, 2008). These results show that nurses who work in critical areas are exposed to severe stress and fatigue. Years of work as a nurse/OR nurse did not cause stress and fatigue on OR nurses in this study which is a distinctive form Eskola et al.' study (2016).

Nurses who work in a stressful and demanding environment like an OR usually have an increased level of stress.

Table 1. Demographic Variables of the Participants

Demographic Variables of Nurses	***Number(n)***	***Percentage (%)***
Age *(Mean±SD)*		
35.39±6.29 **(**Range:23-49 years)		
Gender		
Female	40	87
Male	6	13
Marital status		
Married	31	67.4
Single	15	32.6
Educational level		
Vocational school	6	13.1
Undergraduate (BSN)	34	73.9
Graduate (Msc)	6	13
Income level		
High	4	8.7
Fair	39	84.8
Low	3	6.5
Family type		
Nuclear/ living alone	38	82.6
Number of children		
None	16	34.8
One	18	39.1
Two	12	26.1
Having chronic illness		
Yes	17	36.96
No	29	63.04
Occupation at workplace		
Head Nurse	4	8.7
Circular/Scrub Nurse	42	91.3
TOTAL	**46**	**100**
Nursing experience (years)	***Mean ± SD***	***(Min- Max)***
As a nurse (years)	13.12±7.40	1-26
As an OR nurse	11.37±7.49	1-26
Hours worked /per week		
Working hours per week	43.83± 3.61	40-50
Working hours in last week	44.70±4.41	40-50

Table 2. Association of OR nurses' working conditions with organisational stress and fatigue

		Occupational Stress Questionnaire and Subscales				
Variables related to OR nurses' working conditions		**Occupational Stress Questionnire (Total)**	**Social Subscale**	**Skill Subscale**	**Workload Subscale**	**Decision Subscale**
	n	**Mean±SD** ***p value***	**Mean±SD** ***p value***	**Mean±SD** ***p value***	**Mean±SD** ***p value***	**Mean±SD** ***p value***
Occupation in OR						
Head nurse	4	43.25 ± 2.06	14.25 ± 1.71	9.50 ± 2.08	12.75 ± 1.50	6.75 ± 1.50
Sircular/ scrub nurse	42	44.38 ± 4.20	15.29 ± 2.19	10.64 ± 1.38	12.50 ± 1.61	5.95 ± 1.55
		Z=0.704, p=0.481	Z=0.809.p=0.418	Z=1.217.p=0.224	Z=0.266.p=0.790	Z=1.005.p=0.315
TOTAL	**46**					
	(Mean±SD)					
Nursing experience(years)	13.12±7.40	0.222, p=0.139	-0.121. p=0.424	0.191. p=0.203	0.278. p=0.061	0.099. p=0.514
Nursing experince in OR (years)	11.37±7.49	0.226, p=0.131	-0.078. p=0.606	0.111. p=0.464	0.184. p=0.222	0.220. p=0.141
Working hours per week	43.83±3.61	0.146, p=0.333	-0.041. p=0.788	0.305*. **p=0.039**	0.146. p=0.333	0.103. p=0.498
Working hours in the last week	44.70±4.41	0.315*, **p=0.033**	0.227. p=0.129	0.291*. **p=0.050**	0.154. p=0.306	0.153.p=0.312
		Piper Fatigue Scale and Subscales				
		Piper Fatigue	**Behavioral**	**Affective**	**Sensory**	**Cognitive**

	n	Scale (Total)	Subscale	Subscale	Subscale	Subsacale
Occupation in OR						
Head nurse	4	99.25 ± 65.87	27.50 ± 17.94	27.75 ± 19.99	21.50 ± 14.34	21.75 ± 11.84
Sircular/ scrub nurse	42	148.64 ± 38.20	37.93 ± 11.39	37.36 ± 10.04	34.74 ± 9.21	35.43 ± 12.57
		Z=1.384.p=0.166	Z=1.113.p=0.266	Z=-.587.p=0.557	Z=1.854.p=0.064	Z=1.893.p=0.058
TOTAL	**46**					
	(Mean±SD)					
Nursing experience(years)	13.12±7.40	0.112 p=0.457	0.268 p=0.710	0.194 p=0.196	-0.059 p=0.695	-0.101 p=0.504
Nursing experince in OR (years)	11.37±7.49	-0.009 p=0.951	0.150 p=0.319	0.095 p=0.528	-0.174 p=0.249	-0.182 p=0.226
Working hours per week	43.83±3.61	0.274 p=0.065	0.106 p=0.484	0.248 p=0.097	0.312* **p=0.035**	0.328 **p=0.026**
Working hours in the last week	44.70±4.41	0.396****p=0.006**	0.203 p=0.176	0.358* **p=0.017**	0.351***p=0.017**	0.503****p=0.000**

Mannn Whitney U test, X2=Kruskall Wallis test, [a]=Spearman rho, *=p< 0.05, ** =p<0.01

		Occupational Stress Scale and Subscales				
Demographic variables of OR nurses		**Occuptional Stress Scale (Total)**	**Social Subscale**	**Skill Subscale**	**Workload Subscale**	**Decision Subscale**
	Mean ±SD	**Spearman Rho p value**	**Spearman Rho p value**	**Spearman Rho p value**	**Spearman Rho p value**	**Spearman Rho p value**
Age (Range:23-49 years)	35.39±6.29	0.184 [a], p=0.221	-0.125 [a] , p=0.406	0.188[a] , p=0.211	0.211 [a] , p=0.159	0.019 [a] , p=0.902
	n	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***
Marital status						
Married	31	Z=-0.024,p=0.981	Z=-1.282, p=0.200	Z=0.192,p=0.848	Z=-1.710, p=0.087	Z=-0.266, p=0.790
Single	15					
Gender						
Female	40	Z=-1.081, p=0.280	Z=-0.182, p=0.856	Z=0.985, p=0.325	Z=-0.582,p=0.560	Z=-0.572, p=0.567
Male	6					
Type of Family						
Nuclear/ living alone	38	Z=-0.946, p=0.344	Z=-2.099, **p=0.036**	Z=0.208, p=0.835	Z=-0.654, p=0.513	Z=-0.389, p=0.698
Large	8					
Number of children owned						
One	18	Z=-0.213, p=0.832	Z=-0.494, p=0.622	Z=1.057, p=0.290	Z=-1.457, p=0.145	Z=-0.861, p=0.389
Two and over	12					
Education Level						
Vocational School	6	Z=-.426, p=0.670	Z=-.545, p=0.585	Z=-.685, p=0.494	Z=-.839, p=0.401	Z=-.404, p=0.686
BSN+ Msc	40					
Income level						
Good	4	χ^2 = 2.835,df=2 p=0.242	χ^2 = 1.548,df=2 p=0.461	χ^2 = 0.874,df=2 p=0.646	χ^2 = 2.739,df=2 p=0.254	χ^2 = 2.089,df=2 p=0.352
Fair	39					
Bad	3					
Having chronic illness						
Yes	17	Z=-1.976, **p=0.048**	Z=-0.668, p=0.504	Z=1.281, p=0.200	Z=-2.115, **p=0.034**	Z=-0.270, p=0.787
No	29					

		Piper Fatigue Scale and Subscales				
		Piper Fatigue Scale (Total)	**Behavioral Subscale**	**Affective Subscale**	**Sensory Subscale**	**Cognitive Subsacale**
	Mean ±SD	***Spearman Rho p value***	***Spearman Rho p value***	***Spearman Rho p value***	***Spearman Rho p value***	***Spearman Rho p value***
Age (Range:23-49 years)	35.39±6.29	0.100 [a], p=0.508	0.223 [a], p=0.136	0.183 [a], p=0.223	-0.030 [a], p=0.843	-0.095 [a], p=0.530
	n	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***	**Test/ *p value***

Marital status						
Married	31	Z=-0.516, p=0.606	Z=-1.338, p=0.181	Z=-0.506, p=0.613	Z=.833, p=0.405	Z=-.270, p=0.787
Single	15					
Gender						
Female	40	Z=-1.925, p=0.054	Z=-1.961, **p=0.050**	Z=-1.882, p=0.060	Z=1.045, p=0.296	Z=-0.82, p=0.935
Male	6					
Type of Family						
Nuclear/ living alone	38	Z=-.377, p=0.706	Z=-0.145, p=0.885	Z=-.538, p=0.591	Z=-.363, p=0.717	Z=-.131, p=0.896
Large	8					
Number of children owned						
One	18	Z=-.699, p=0.485	Z=-1.252, p=0.211	Z=-.985, p=0.338	Z=-.276, p=0.783	Z=-.170, p=0.865
Two and over	12					
Income level						
Good	4	χ^2 =2.835, df=2	χ^2 =1.548, df=2	χ^2 =0.874, df=2	χ^2 =2.739, df=2	χ^2 =2.089, df=2
Fair	39	p=0.242	p=0.461	p=0.646	p=0.254	p=0.352
Bad	3					
Education Level						
Vocational school	6	Z=-.734, p=0.463	Z=-1.144, p=0.253	Z=-.491, p=0.623	Z=-.686, p=0.493	Z=-.261, p=0.794
BSN+ Msc	40					
Having chronic illness						
Yes	17	Z=-1.616, p=0.106	Z=-2.451, **p =0.014**	Z=0.-2.352,**p=0.019**	Z=-.866, p=0.854	Z=-.820, p=0.412
No	29					
TOTAL	**46**					

Z= Mannn Whitney U test, χ^2 = Kruskall Wallis test, [a]=Spearman rho

Demanding work, working understaffed, factors related to working environment and working overtime were identified as the most contributing factors to nurses' fatigue in this study.

Since only a few nurses responded to this question and study sample was limited, it is hard to generalize the outcomes to all OR nurses. However, the outcomes of our study show that fatigue is an important problem among the OR nurses and this is related to the job stress to a certain extent. One recent study shows that OR nurses experienced a low or infrequent level of stress at job which is not congruent with the results of our study in terms of job strain (Eskola et al, 2016).This could be because of cultural differences, along with population size and the country in which the study was conducted. Since working understaffed is a common and draining problem in nursing profession in Turkey, OR nurses' fatigue could be linked to shortage of nurses and working overtime. The length of time worked in the last week positively correlated with job stress and fatigue scores of the nurses. Also, length of time worked per week and the last week also influenced the scores obtained from skill use subscale of OSQ. Working long hours may have people get distracted and make errors with a higher risk. This is an important point that must be specifically considered by hospital managements. The fatigue of a health care worker compromises both patients' safety and his/her health. A systematic review shows that nurses who work shifts 12 hours or longer have higher risk of making errors (Clendon & Gibbons, 2015). Shift work, especially night shifts, was found to correlate with nurses' maladaptive fatigue (Winwood, Winefield & Lushington, 2006). Participants in our study group were assigned to work in two different shifts (8 hours/ 16 hours). Long hours, especially 16-hour shifts, should be evaluated as a triggering factor for nurses' fatigue in this study. OR nursing requires a high level of caution and patience during working. Length of working hours per week was found to have an influence on OR nurses sensory and cognitive dimensions. As the time length at work increases, nurses are more likely to feel fatigued and their concentration during working deteriorates. In addition to its intensive working pace, being in a closed environment results in increased levels of fatigues problems among OR nurses. Continuously working with an intensive working pace and not having satisfactory resting periods are potential causes that create chronic fatigue among nurses.

A Sweedish study with OR nurses shows that licensed practical nurses have lower stress recognition scores compared to registered nurses and physicians (Göras, Unbeck , Nilsson& Ehrenberg, 2017) and emotional exhaustion and depersonalisation were more common among operating room nurses who were not supported by their managers (Fındık, 2015).

Especially in the working environments which are lack of team-work and where the employees are not effectively involved in the decision-making process, the nurses may feel that they are not supported and subject to more stress due to their excessive work demand. It was found that the social support felt by nurses in the work environment is related with the cognitive subscale scores in the PFS in our study. Skill use and work demand subscales of OSQ positively correlates with behavioral and affective domains of the PFS.

In addition to the physical factors caused by the working environment, lack of clear job definitions and having conflicts negatively affects the nurses with a rate of 53.3% (Demir, 2013). Especially the negative attitudes of the physicians and the thought of not being supported satisfactorily lays the groundwork for the nurses to feel that they are not considered as valuable. ICU's, surgical wards and OR's are the most common working places in the hospitals where destructive physician behaviors take place (İnce, 2014).

This study reveals that the feeling of being invaluable and stress were the negative feelings experienced by the OR nurses. Since the fatigue and job stress influence their motivation, performance and future expectations, it is necessary to foresee these factors which both cause severe negative outcomes for patient safety and affect physical and psychological health of the nurses.

Nurses usually prefer to help their colleagues whenever they need help to combat fatigue (Steege & Dykstra, 2016). This method could sound as a favorable action at a glance, but it is not a sufficient solution neither for nurses nor for the health care organizations. Consequently, factors that cause fatigue among OR nurses should be identified properly to combat this problem. Developing effective strategies could help improve both patients' and health workers' safety. Unlike the hospital wards, ORs are different and more specialized working environments which make impossible for nurses to help each other even they want to do so. This is also not the case during night shifts where a limited number of nurses are on duty. This could cause OR nurses get even more stressed while working and feel fatigued afterwards.

Organizational Stress Questionnaire and Piper Fatigue Scale total scores were correlated which means organizational stress associates with OR nurses' fatigue. It was determined that number of the hours worked has an influence on OR nurses fatigue, affective, sensory and cognitive abilities. Feeling of tiredness and effect of organizational stress should be considered by management of the hospitals since fatigue of nurses' compromise both working nurses' and patient safety.

Conclusion

The present study demonstrates that working long hours and overtime contributes to OR nurses fatigue. Impaired cognitive and sensory abilities of nurses could lead them to make serious mistakes during working and also detoriate both nurses' and patients' safety. Repating similar quantitative studies with large groups or designing qualitative research on this issue could also clarify nurses' feelings on this topic.

Organizational Stress Questionnaire and Piper Fatigue Scale total scores were correlated which means organizational stress associates with OR nurses' fatigue. It was determined that number of the hours worked has an influence on OR nurses fatigue, affective, sensory and cognitive abilities. Feeling of tiredness and effect of organizational stress should be considered by management of the hospitals since fatigue of nurses' compromise both working nurses' and patient safety.

Limitations of the study

This study was conducted with OR nurses who were employed in a university hospital's operating room. For this reason, findings of this study cannot be generalized to all OR nurses.

Conflicts of interests

Authours declare that there are no conflicts of interests for this study.

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References

Aydemir I, Yildirim T. (2016) Determination of Operating Room Surgical Team Attitudes Related to Non-Technical Skills. *Mehmet Akif Ersoy University Social Sciences Institute Journal*, 8(15), 66-84.

Can G. (2001) *Evaluation of The Effect of Fatigue on Functional Quality of Life in Cancer Patients* (Unpublished Msc. Thesis), Istanbul: Istanbul University Health Sciences Institute.

Clendon J, Gibbons V. (2015) 12 h shifts and rates of error among nurses: A systematic review. *International Journal of Nursing Studies*, 52,1231–42.

Demir B. (2013). *Evaluation of anxiety and stress among nurses who work in closed environments (*Unpublished Masters' thesis) İstanbul, Turkey: İstanbul Bilim University Health Sciences Institute.

Eskola S, Ross M, McCormak B, Slater P, Hahtele N, Suominen T. (2016) Workplace culture among operating room nurses. *Journal of Nursing Management*, 24, 25–34.

Fındık, U. (2015) Operating room nurses' burnout and safety applications. *International Journal of Caring Sciences*, 8(3),610-617.

Flin R, Yule S, McKenzie L, Paterson-Brown S, Maran N. (2006) Attitudes to teamwork and safety in the operating theatre. *Surgeon*, 4(3),145-51.

Ganster DC, Rosen CC. (2013) Work Stress and Employee Health: A Multidisciplinary Review. *Journal of Management*, 39(5),1085-122.

Gillespie BM, Chaboyer W, Wallis M, Grimbee P. (2007) Resilience in the operating room: developing and testing of a resilience model. *Journal of Advanced Nursing*, 59(4), 427-38.

Göras C, Unbeck M, Nilsson U, Ehrenberg A. (2017) Interprofessional team assessments of the patient safety climate in Swedish operating rooms: a crosssectional survey. *BMJ Open.* 7, e015607.

B, Dwayer T, Searl-Reid K, Burke KJ, Caerchione CM, Gaskin CJ. (2013) Nurses and stress: recognizing causes and seeking solutions. *Journal of Nursing Management*, 21,638–47. doi: 10.1111/jonm.12037.

Hazzard B, Johnson K, Dordunooi D, Klein T, Russell B, Walkowiak P. (2013) Work- and Nonwork-Related Factors Associated With PACU Nurses' Fatigue. *Journal of Perianesthesia Nursing*, 28(4),201-20.

Hergul FK, Ozbayir T, Gok F. (2016) Patient safety in the operating room: A systematic review. *Pamukkale Medical Journal*, 9(1), 87-98.

İnce S.(2014)The effect of physician behaviors on the coping with stress mechanisms of the nurses. *HEMAR-G Journal*.16(2),41-53.

Karahan A, Gurpiar K, Ozyurek P. (2007) Internal organization stress resources among service sector: determination of stress resources for surgical nurses employed within the hospitals in the centrum of Afyonkarahisar. *Journal of Economic and Social Research*, 3(1),27-44.

Kawano Y.(2008) Association of job related stress factors with psychological and somatic symptoms among Japanese hospital nurses: Effect of departmental environment in acute care hospitals. *Journal of Occupational Health*,50,79-85.

Kingdon B, Halvorsen F. (2006) Perioperative nurses' perceptions of stress in the workplace. *AORN Journal*, 84(4):607-14.

Komsuk D.(2013) *Evaluation of sleep problems among OR nurses' burnout* (Unpublished master thesis*)* Eskişehir, Turkey: Eskişehir Osmangazi University Health Sciences Institute.

Koras K, Ocalan D, Solak O. (2015) Effects of Surgeons' Nervous Behaviors on the Operating Room Nurses. *Gümüşhane University Health Sciences Journal*, 4(4),502-515.

Registered Nurses' Association of Ontario. (2011) *Preventing and Mitigating Nurse Fatigue in Health Care Healthy Work Environments Best Practice Guideline*. Toronto, ON: Registered Nurses' Association of Ontario. pp: 65. ISBN: 978-1-926944-45-6.

Rogers, A. (2008) The effects of fatigue and sleepiness on nurse performance and patient safety. In: Hughes, R. (Ed.), *Patient Safety and Quality: An Evidence- Based Handbook for Nurses. Rockville*, MD, USA: Agency for Healthcare Research and Quality, Department of Health and Human Services, pp:1403.

Salem EA, Ebrahem SM. (2018) Psychosocial work environment and oxidative stressamong nurses'. *J Occup Health*, 60,182-91.

Sexton JB, Thomas EJ, Helmreich RL. (2000) Error, stress, and teamwork in medicine and aviation: cross sectional surveys. *BMJ*, 32,745-49.

Steege LM, Dykstra JG. (2016) A macroergonomic perspective on fatigue and coping in the hospital nurse work system. *Applied Ergonomics*, 54, 19-26.

Steege LM, Rainbow JG. (2017) Fatigue in hospital nurses-'supernurse' culture is a barrier to addressing problems: A qualitative interview study. *International Journal of Nursing Studies*, 67:20–28. doi: 10.1016/j.ijnurstu.2016.11.014.

The American College of Obstetricians and Gynecologists (2010) Women's' Health Care Physicians Committee Opinion No. 464. Patient safety in the surgical environment. *Obstet Gynecol*, 116,786–90. ISSN: 1074-861X.

Theorell T, Perski A, Akerstedt T. Sigala F, Ahlberg-Hultén G, Svensson J, Eneroth P. (1988) Changes in Job Strain in Relation to Changes in Physiological State. *Scand J Work Environ Health*, 14,189–96.

Virtanen M, Honkonen T, Kivimaki M, Ahola K, Vahtera J, Aromaa A, Lönnqvist J. (2007) Work stress, mental health and antidepressant medication findings from the Health 2000 Study. *Journal of Affective Disorders*. 98(3),189-97.

Wahr JA, Prager RL, Abernathy JH 3rd, Martinez EA, Salas E, Seifert PC, Nussmeier NA (2013) American Heart Association Council on Cardiovascular Surgery and Anesthesia, *Council on Cardiovascular and Stroke Nursing, and Council on Quality of Care and Outcomes Research.Erratum in* 128,1139-69

Welsh D. (2009) Predictors of depressive symptoms in female medical-surgical hospital nurses. *Issues in Mental Health Nursing*, 30(5), 320-26.

Winwood PC, Winefield AH, Lushington K. (2006) Work-related fatigue and recovery: the contribution of age, domestic responsibilities and shiftwork. *Journal of Advanced Nursing*, 56(4),438–49.

Yildirim Y, Tasmektepgil Y, Uzum H. (2011) Adaptation of Organisational Stress Questionnaire-Short Version (Validity and Reliability Study). *Selçuk University Journal of Physical Education and Sport*, 13(1),103–8.

Zahiri M, Mahboubi M, Mohammadi M, Khodadadi A, Mousavi SH, Jalali A.(2014) Burnout among nurses working in surgery and internal wards at selected hospitals of Ahvaz. *Tech J Engin & App Sci*. 4(3),79-84.