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Assessment of organisational stress levels and associated factors among resident doctors: The case of Kocaeli province

Asistan hekimlerin örgütsel stres düzeyleri ve ilişkili faktörlerin değerlendirilmesi: Kocaeli ili örneği

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ABSTRACT

Aim: The aim of this study was to evaluate the working conditions and organisational stress levels of resident doctors in Kocaeli province and to determine stress-related factors.

Methods: This cross-sectional study was conducted between June 1, 2017, and September 30, 2017, and aimed to reach all resident doctors (n=350) in the province. Sociodemographic characteristics, sleep duration, working life parameters, and needle stick injury experience were collected with a questionnaire. Organisational stress levels were evaluated using the Doetinchem Organisational Stress Questionnaire, which consists of four main headings and 15 subscales. It consists of 15 subscales. The relationships between independent variables and stress levels were analysed. p<0.05 was considered statistically significant.

Results: The mean age of the resident doctors was 28.7±2.4 years, the daily sleep duration was 6.4±1.0 hours, the number of monthly night duties was 6.0±3.5, and the weekly working time was 67±623.7 hours. The median VOS-D (Q1–Q3) scores for excessive workload and inability to leave the workplace were found to be 3.89 (3.44–4.22) and 3.33 (2.67–3.67), respectively. Stress scores on the scales were higher among resident doctors working in surgical medical sciences, working more than 65 hours per week, having more than seven night duties per month, being female, and experiencing NSI. The highest median stress score for excessive workload was found among resident doctors, those with more than seven night duties per month, and those working in surgical medical sciences, with median scores of 4.11 (3.78–4.56) and 4.11 (3.78–4.44), respectively.

Conclusion: Resident doctors experience significant stress due to excessive workload, role conflict, inability to leave the workplace and limited participation in decision-making processes. Improving the working conditions of resident doctors and addressing organisational stress factors are essential for their health and safety.

Keywords: Job stress; medical residency; occupational accidents; workload

ÖZ

Amaç: Bu çalışmada, Kocaeli ilindeki asistan hekimlerin çalışma koşullarını, organizasyonel stres seviyelerini değerlendirmeyi ve stresle ilişkili faktörleri belirlemeyi amaçlanmıştır.

Yöntemler: Bu kesitsel çalışma 1 Haziran 2017 ile 30 Eylül 2017 tarihleri arasında yürütülmüş olup, ildeki tüm asistan hekimlere (n=350) ulaşmak hedeflenmiştir. Sosyodemografik özellikler, uyku süresi, çalışma yaşamına ait parametreler ve kesici-delici alet yaralanması yaşama durumu hazırlanan soru formu ile toplanmıştır. Organizasyonel stres seviyeleri dört ana başlık, 15 alt ölçekten oluşan Doetinchem Organizasyonel Stres Anketi kullanılarak değerlendirilmiştir. 15 alt ölçekten oluşur. Bağımsız değişkenler ile stres seviyeleri arasındaki ilişkiler analiz edilmiştir. p<0,05 istatistiksel olarak anlamlı kabul edilmiştir.

Bulgular: Asistan hekimlerin yaş ortalaması 28,7±2,4 yıl, günlük uyku süresi 6,4±1,0 saat, aylık gece nöbeti sayısı 6,0±3,5 ve haftalık çalışma süresi 67,6±23,7 saat olarak bulunmuştur. Aşırı iş yükü ve işyerinden ayrılamama için VOS-D medyan (Q1–Q3) puanları sırasıyla 3.89 (3.44–4.22) ve 3,33 (2.67-3.67) olarak bulunmuştur. Ölçeklere ait stres puanları, cerrahi tıp bilimlerinde görev yapan, haftada 65 saatten fazla çalışan, aylık gece nöbeti sayısı yediden fazla olan, kadın ve kesici delici alet yaralanması yaşayan asistan hekimler arasında daha yüksek bulunmuştur. Bu gruplar arasında istatistiksel olarak anlamlı farklılıklar saptanmıştır. Aşırı iş yükü için stres medyan puanı en yüksek olan asistan hekimler, aylık gece nöbeti sayısı yediden fazla olanlar ve cerrahi tıp bilimlerinde çalışanlar olup medyan puanları sırasıyla 4.11 (3,78-4,56) ve 4.11 (3,78-4,44) olarak saptanmıştır.

Sonuçlar: Asistan hekimler, aşırı iş yükü, rol çatışması, işyerinden ayrılamama ve karar alma süreçlerine sınırlı katılım nedeniyle önemli ölçüde stres yaşamaktadır. Asistan hekimlerin, çalışma koşullarının iyileştirilmesi ve örgütsel stres faktörlerinin ele alınması, sağlık ve güvenlikleri için elzemdir.

Anahtar Sözcükler: İş stresi; iş yükü; mesleki kazalar; tıp asistanlığı

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INTRODUCTION

Stress is defined by Lazarus as a state that occurs when the demands of the internal and external environment exceed an individual's ability to cope (1). The National Institute for Occupational Safety and Health (NIOSH) also defines organizational stress as the harmful physical and emotional responses that occur when job demands do not align with an employee's abilities, resources, or needs (2). When workplace stressors go undetected or unmitigated, they can become chronic, thereby contributing to negative health outcomes (3).

Workplace stress and negative consequences caused by stressors are of increasing importance for healthcare professionals working under high levels of responsibility and workload. Among healthcare professionals, resident doctors need to simultaneously provide medical care and undergo specialty training while working long hours in hospitals characterized by organizational complexities and numerous stressors. (4,5). The burden on resident doctors has intensified in recent years due to the growing demand for health services in society as a result of neoliberal health reforms. Resident doctors frequently deal with psychological issues in addition to more conventional pressures such as workload, job ambiguity, role conflict, and restricted involvement in decision-making processes. Mobbing, extended and continuous work hours, patient mortality exposure, high patient expectations, information overload, career instability, inadequate learning settings, workplace violence, and medical liability concerns are among these. (6-10). Field studies conducted in T**ü**rkiye show that resident doctors commonly encounter most of the hospital-related stressors (11, 12).

The presence of all these stressors has negative effects on mental health and is also associated with needlestick and sharp injury (NSI). A study conducted abroad shows that depression, anxiety, and burnout are common among resident doctors, and their occurrence has been associated with working conditions (13). The results of a meta-analysis study abroad reveal that high workload, long working hours, role ambiguity, and deterioration of work-life balance are the strongest predictors of high stress levels and burnout in physicians (14). In a study conducted in Türkiye, a high number of monthly night duties and heavy daily patient loads, short examination time, low income, exposure to mobbing and violence were found to be significantly associated with burnout and poor sleep quality among physicians. In the same study, exposure to mobbing stands out as an independent variable that increases burnout, especially in female physicians (15). Anxiety, depression and burnout are more common in general surgery residents with high working hours (16). In a field study conducted among employees from different health professions in Türkiye, it was reported that the most common frequency of NSIs was observed among resident doctors and this situation was related to workload and work stress (17).

This study aims to examine the working conditions and organizational stress levels of resident doctors and to determine the level of factors contributing to stress.

MATERIAL AND METHODS

Study design

This is a cross-sectional study conducted between June 1, 2017, and September 30, 2017 in two hospitals providing specialty training in medicine in Kocaeli, T**ü**rkiye. The population of the study consisted of resident doctors (n=67) working at Kocaeli University Faculty of Medicine Hospital (KUMF) (n=283) and Derince Training and Research Hospital (DTRH). It was aimed to include the entire study population, and no sampling method was applied. This study was approved by the Kocaeli University Non-interventional Clinical Research Ethics Committee (Decision No: KU GOAKAEK 2017/9.30, Date: 12.04.2017).

Variables and data collection tools

The dependent variable of the study is the level of organizational stressors. Independent variables included gender, age, marital status, parental status, sleep duration, medical specialty, number of monthly night duties, weekly working hours, duration of residency training, years of practice as a doctor, and exposure to NSIs.

In this study, medical specialties are dichotomized into two groups: surgical medical sciences and non-surgical medical sciences. Non-surgical medical sciences cover basic medical sciences and internal medical sciences.

The number of monthly night duties was divided into four groups based on national and international regulations. These groups included physicians with no night duties; those with 1–7 night duties per month, in line with Canadian regulations allowing a maximum of seven duties per month for resident doctors (18); those with 8–10 night duties per month, consistent with Turkish legislation stating that night duties may not occur more frequently than once

every three days (4); and those with 11 or more night duties per month. In addition, seven-night duties per month were accepted as the threshold value for pairwise comparisons, and a binary variable was created based on this threshold.

Weekly working hours were divided into three groups based on relevant legislation and regulations: ≤45 hours per week, reflecting the maximum weekly working time stipulated in Turkish legislation (19); 46–65 hours per week, defined on the basis that night duty work, permitted up to 80 hours per month under Turkish regulations, corresponds to approximately 20 hours per week (20); and 66–80 hours per week, in accordance with the upper limit established by the Accreditation Council for Graduate Medical Education for first-year resident doctors (21). In addition, 65 hours per week was set as the threshold for pairwise comparisons, and an additional binary variable was defined accordingly.

In this study, the Doetinchem Organizational Stress Questionnaire (VOS-D) was used to evaluate the organizational stressors in the working environment of resident doctors (22). The scale scores were calculated by the average of the responses to the four and five-point Likert-type questions. The questionnaire was adapted into Turkish by Türk in 1997 and was accepted as valid and reliable. (Cronbach's alpha: 0,69–0,88) (23). VOS-D consists of a total of 15 subscales within four main headings that evaluate workplace stressors. These main headings are; stress factors, social variables, psychological stressors, and health complaints. Stress factors include excessive workload, role ambiguity, role conflict, responsibility, inability to leave the workplace, limited participation in decision-making processes, lack of belief in the necessity of the job and uncertainty about the future. Social variables include insufficient support parameters from supervisors and colleagues. Psychological stress factors include psychological complaints, job anxiety, and job dissatisfaction. The health complaints in the questionnaire are categorized as either occasional or permanent. High scores on the subscales indicate a higher perception of the relevant stressor and health complaint. The subscales in VOS-D were not designed to be collected to form a single total stress score, and the scores were evaluated separately because each subscale represents a different dimension of organizational stress. In this study, the Cronbach's alpha coefficients of the scales were found to be above 0.50 and their reliability was considered sufficient.

Data collection

The data collection process was first conducted at DTRH and later completed at KUMF. The researchers collected the data through a questionnaire, during the working hours of the participants at the workplace, by face-to-face interview method, based on the participant statement.

Statistical analysis

Categorical variables (gender, marital status, parental status, sleep duration categories, hospital worked, medical field worked, number of night duties per month and weekly working hours) are presented as numbers and percentages. Continuous variables (age, sleep duration, number of monthly night duties, weekly working hours, duration of resident doctor (years), duration of physician experience (years)) were summarized with mean ± standard deviation, median, minimum, and maximum values. The normality of continuous variables was evaluated with the Kolmogorov–Smirnov test. Since it was determined that the VOS-D subscale scores did not conform to the normal distribution, the Mann–Whitney U test was used to compare the continuous variables between two independent groups. All analyses were performed using the SPSS Statistics for Windows (Statistical Package for the Social Sciences package program version 15.0, IBM Corp., Armonk, N.Y., USA) and the p≤0.05 value was considered statistically significant.

RESULTS

Sociodemographic characteristics, working life data, and sleep characteristics of individuals were presented in Table 1. It was determined that 50.5% of the participants were male, 43.3% were married, and their mean age was 28.7±2.4 years. The mean number of monthly night duties of resident doctors was 6.0±3.5, and the mean weekly working hours was 67.6±23.7 (Table 1).

Differences in median scores of the 15 subscales were observed between certain groups and are presented together with their p-values in Tables 2–6. An analysis of median VOS-D subscale scores by gender revealed that female resident doctors had higher scores than their male counterparts in the role ambiguity and occasional health problems subscales (Table 2). It was determined that the median score values of resident doctors working in surgical medical sciences were higher in the subscales of excessive

Table 1. Participants' personal, working life and sleep characteristics

Characteristics		Mean±SD	Median	Min	Max	n	%
Age (years)		28.7±2.4	28	25,0	40,0		
Sleep duration (hours)		6.4±1.0	6	3,0	9,0		
Years of practice as a doctor (years)		4.2±2.8	4	0	16		
Duration of residency training (years)		2.1±1.4	2	0	7		
Number of night duty per month		6.0±3.5	6	0,0	15,0		
Weekly working hours		67.6±23.7	64	28	140		
Gender	Male					146	50.5
	Female					143	49.5
Marital status	Married					125	43.3
	Single					161	55.7
	Divorced					3	1.0
Number of children	None					241	83.4
	1 child					46	15.9
	2 children					2	0.7
Daily sleep duration	7 hours					155	53.6
	≥7 hours					134	46.4
Hospital of employment	DTRH					57	19.7
	KUMF					232	80.3
Type of medical discipline	Non-surgical medical sciences					171	59.2
	Surgical medical sciences					118	40.8
Number of monthly night duty	None					43	14.9
	1-7					139	48.1
	8-10					89	30.8
	≥11					18	6.2
Weekly working hours	≤45					67	23.2
	45-64					85	29.4
	65-80					64	22.1
	≥80					73	25.3

n: Number, SD: Standard deviation, min: Minimum, max: Maximum, %: Percent
DTRH: Derince Training and Research Hospital, KUMF: Kocaeli University Faculty of Medicine Hospital

workload, responsibility and role conflict than those working in non-surgical medical sciences. Resident doctors working in non-surgical medical sciences had higher the median scores on role ambiguity subscale (Table 3). It was found that the median score values of the subscales of excessive workload, responsibility, lack of colleague support and psychological complaints were higher among resident doctors with eight or more night duties per month compared to other group (Table 4). The median score values of the VOS-D subscales of excessive workload, responsibility, role conflict, inability to leave the workplace, inability to participate in work decisions, lack of supervisor support, job anxiety, psychological complaints, and sometimes health complaints were found to be higher among resident doctors working more than 65 hours a week (Table 5). The median score values of resident doctors who had at least one NSI experience in the last year were found to be higher in the subscales of excessive workload, responsibility, role conflict, lack of supervisor support, lack of co-worker support, and psychological complaints (Table 6).

DISCUSSION AND CONCLUSION

The results of sociodemographic characteristics and working conditions obtained in field studies and reports conducted in various places and time periods of Türkiye show significant similarities with the results of this study (24-26). This similarity in terms of gender distribution, marital

Table 2. The relationship between gender and organizational stress levels

Scales	Gender	Medyan	Q1	Q3	U	p
Excessive workload	Male	4.00	3.56	4.22	10281.000	0.824
	Female	3.89	3.44	4.22		
Role ambiguity	Male	2.50	2.00	3.00	8990.000	***0.040***
	Female	2.75	2.25	3.00		
Responsibility	Male	3.00	2.50	3.50	9639.000	0.257
	Female	3.00	2.50	3.50		
Role conflict	Male	3.00	2.67	3.67	9729.500	0.311
	Female	3.00	3.00	3.67		
Inability to leave the workplace	Male	3.33	3.00	3.67	9864.500	0.409
	Female	3.33	2.67	3.67		
Lack of participation in business decision-making	Male	3.00	2.50	3.50	10086.500	0.608
	Female	3.00	2.50	3.50		
Lack of belief in the necessity of work	Male	2.00	1.67	2.33	9394.000	0.133
	Female	2.00	1.33	2.33		
Uncertainty about the future	Male	2.25	1.75	2.50	8899.500	***0.029***
	Female	2.25	2.00	2.75		
Lack of chief support	Male	2.40	2.20	2.80	9694.500	0.292
	Female	2.60	2.20	3.00		
Lack of support from colleagues	Male	2.00	1.60	2.20	9062.500	0.050
	Female	2.20	1.80	2.40		
Lack of job satisfaction	Male	2.33	2.00	3.00	10257.000	0.796
	Female	2.33	2.00	3.00		
Worrying about work	Male	2.25	2.00	2.75	10192.000	0.725
	Female	2.25	2.00	2.75		
Psychological complaints	Male	2.27	2.00	2.64	9794.500	0.363
	Female	2.36	2.00	2.73		
Occasional health complaints	Male	10.00	4.00	14.00	8621.000	***0.010***
	Female	12.00	8.00	16.00		
Persistent health complaints	Male	3.00	0.00	6.00	9319.000	0.102
	Female	3.00	0.00	10.00		

Data are presented as median (Q1–Q3). U: Mann–Whitney U test, Q1: 25th percentile, Q3: 75th percentile. A p value < 0.05 was considered statistically significant.

status, and having children supports the generalizability of the findings of the study.

Previous studies conducted both globally and in Türkiye have shown that a substantial proportion of resident doctors sleep less than the recommended seven hours; the present study yielded similar findings (27-29). Given the sleep duration recommended by the American National Sleep Foundation (NSF), most resident doctors are deprived of an important physiological need, such as sleep due to their working conditions (30). It is considered that sleep cycle disorders that occur in these processes may affect the circadian rhythm and make it difficult to achieve a physiologically healthy sleep, even if the time allocated to sleep is sufficient.

According to the Turkish Medical Association (TMA)'s nationwide 2015 report, 42.0% of residents work in the field of surgical specialty. In addition, the distribution of resident doctors by specialty in the present study was very similar to that reported previously (26). Both the 2010 and 2015 reports of TMA stated that there is a high number of resident doctors who work an average of more than 85 hours a week (26,31). Field studies conducted globally and in Türkiye reveal that the frequency of resident doc-

Table 3. The relationship between type of medical discipline and organizational stress levels

Scales	Type of medical discipline	Medyan	Q1	Q3	U	p
Excessive workload	Non-surgical medical sciences Bilimleri Surgical medical sciences	3.78 4.11	3.33 3.78	4.22 4.44	6662.000	***<0.001***
Role ambiguity	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.75 2.50	2.25 2.00	3.25 3.00	7536.500	***<0.001***
Responsibility	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.75 3.25	2.25 3.00	3.25 3.75	6032.000	***<0.001***
Role conflict	Non-surgical medical sciences Bilimleri Surgical medical sciences	3.00 3.33	2.67 3.00	3.67 4.00	7820.000	***<0.001***
Inability to leave the workplace	Non-surgical medical sciences Bilimleri Surgical medical sciences	3.33 3.33	2.67 2.67	3.33 3.67	9171.000	0.180
Lack of participation in business decision-making	Non-surgical medical sciences Bilimleri Surgical medical sciences	3.00 3.00	2.50 2.50	3.50 3.50	9789.500	0.658
Lack of belief in the necessity of work	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.00 2.00	1.67 1.33	2.33 2.00	8000.500	***0.002***
Uncertainty about the future	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.25 2.25	2.00 1.75	2.75 2.50	8090.000	***0.004***
Lack of chef support	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.60 2.40	2.20 2.20	3.00 2.80	9317.500	0.579
Lack of support from colleagues	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.00 2.10	1.80 1.80	2.20 2.40	9291.500	0.249
Lack of job satisfaction	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.33 2.33	2.00 1.67	3.00 2.67	8164.000	***0.005***
Worrying about work	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.25 2.25	2.00 2.00	2.50 2.75	9233.500	0.215
Psychological complaints	Non-surgical medical sciences Bilimleri Surgical medical sciences	2.27 2.36	2.00 2.00	2.55 2.73	8984.500	0.130
Occasional health complaints	Non-surgical medical sciences Bilimleri Surgical medical sciences	12.00 10.00	8.00 6.00	16.00 14.00	9144.500	0.130
Persistent health complaints	Non-surgical medical sciences Bilimleri Surgical medical sciences	3.00 3.00	0.00 0.00	9.00 6.00	9603.000	0.471

Data are presented as median (Q1–Q3). U: Mann–Whitney U test, Q1: 25th percentile, Q3: 75th percentile. A p value < 0.05 was considered statistically significant.

tors working more than 45 hours a week is high and this is a global phenomenon (23, 32- 35). Evidence from the present study and previous research conducted across diverse geographical settings suggests that resident doctors may experience supervisory pressure to sacrifice rest periods and to underutilize working-hour limits stipulated by regulations.

Compared to other professional groups, the organizational stressors of resident doctors are excessive workload, role ambiguity, inability to participate in decision-making processes, lack of colleague support and health problems became evident (36-40). Field studies conducted around the world show that excessive workload is an important cause of burnout in physicians (14,34,41). The prominence of burnout among resident doctors may be attributed to the unique stressors of the training process, including high workload, clinical responsibilities, and the need for rapid decision-making within limited time frames.

Numerous studies have demonstrated that stress exposure, burnout, and mental and physical health problems are more prevalent among female resident doctors than among their male counterparts (25,27,42,43). In their study, Mete et al. observed that emotional exhaustion was more common among female physicians (41). This study and other studies in the literature are similar to gender inequality, negative hierarchy in the workplace, increased stress factors, or inability to cope with stress, which may cause health complaints to be more common in women than in men.

Table 4. The relationship between the number of monthly night duties and organizational stress levels

Scales	Number of monthly night duty	Medyan	Q1	Q3	U	p
Excessive workload	≤7	3.78	3.22	4.22	5977.500	***<0.001***
	≥8	4.11	3.78	4.56		
Role ambiguity	≤7	2.50	2.00	3.00	9176.500	0.411
	≥8	2.50	2.00	3.00		
Responsibility	≤7	3.00	2.25	3.25	6755.500	***<0.001***
	≥8	3.25	2.75	3.75		
Role conflict	≤7	3.00	2.67	3.67	8425.500	***0.053***
	≥8	3.33	3.00	3.67		
Inability to leave the workplace	≤7	3.33	2.67	3.33	8179.500	***0.021***
	≥8	3.33	3.00	3.67		
Lack of participation in business decision-making	≤7	3.00	2.50	3.50	7994.500	0.009
	≥8	3.00	2.50	3.50		
Lack of belief in the necessity of work	≤7	2.00	1.67	2.33	8527.500	0.072
	≥8	2.00	1.33	2.00		
Uncertainty about the future	≤7	2.25	1.75	2.75	8746.000	0.145
	≥8	2.25	1.75	2.50		
Lack of chef support	≤7	2.40	2.20	2.80	8496.500	0.069
	≥8	2.60	2.20	2.80		
Lack of support from colleagues	≤7	2.00	1.60	2.20	8092.500	0.015
	≥8	2.20	1.80	2.40		
Lack of job satisfaction	≤7	2.33	2.00	3.00	9034.500	0.301
	≥8	2.33	1.67	2.67		
Worrying about work	≤7	2.25	2.00	2.50	8575.500	0.087
	≥8	2.25	2.00	2.75		
Psychological complaints	≤7	2.27	2.00	2.55	7833.500	0.005
	≥8	2.45	2.09	2.82		
Occasional health complaints	≤7	12.00	8.00	16.00	9403.500	0.625
	≥8	12.00	6.00	16.00		
Persistent health complaints	≤7	3.00	0.00	9.00	9175.500	0.396
	≥8	4.00	0.00	9.00		

Data are presented as median (Q1–Q3). U: Mann–Whitney U test, Q1: 25th percentile, Q3: 75th percentile. A p value < 0.05 was considered statistically significant.

Studies have been carried out around the world reveal that stress levels are very high in physicians working in a surgical specialty, especially among stressors, and that excessive workload is higher in physicians working in a surgical specialty (26,41,44). Önsüz et al. revealed that work-related burnout levels are high among surgical assistants in our country (24). In a study conducted by Sahasrabuddhe et al. using the Perceived Stress Scale, they found that the highest stress values were found among resident doctors working in gynaecology and orthopedics (26). Tanner et al. determined that the first three branches with high future uncertainty, which is an important stress factor for resident doctors, are in the fields of neurology, internal medicine, and anaesthesia. In the same study, they found that social stress factors are also high in non-surgical medical sciences (8). In this study, the direction and level of the relationship between the stressor and the disciplines are consistent with the literature, and the high workload in surgical branches, the strict hierarchical structure and the belief that the workload of the chiefs is mandatory for a good education may explain this situation. The relatively higher job satisfaction observed among surgical residents may be related to the immediate outcomes of surgical care and the confidence gained through technical expertise.

Table 5. The relationship between weekly working hours and organizational stress levels

Scales	Weekly working hours	Medyan	Q1	Q3	U	p
Excessive workload	<65	3.44	3.00	3.89	3832.500	***<0.001***
	≥65	4.00	3.67	4.44		
Role ambiguity	<65	2.50	2.25	3.00	7204.500	0.696
	≥65	2.75	2.00	3.00		
Responsibility	<65	2.50	2.00	3.25	4608.000	***<0.001***
	≥65	3.00	2.75	3.50		
Role conflict	<65	3.00	2.33	3.33	5621.000	0.002
	≥65	3.17	3.00	3.67		
Inability to leave the workplace	<65	3.00	2.33	3.33	5312.500	***<0.001***
	≥65	3.33	3.00	3.67		
Lack of participation in business decision-making	<65	2.50	2.50	3.00	5648.500	***0.002***
	≥65	3.00	2.50	3.50		
Lack of belief in the necessity of work	<65	2.00	1.33	2.33	7401.000	0.951
	≥65	2.00	1.67	2.33		
Uncertainty about the future	<65	2.25	2.00	2.75	6766.500	0.260
	≥65	2.25	1.75	2.75		
Lack of chef support	<65	2.20	2.00	2.60	5076.500	***<0.001***
	≥65	2.60	2.20	3.00		
Lack of support from colleagues	<65	1.80	1.60	2.20	5672.500	***0.003***
	≥65	2.20	1.80	2.40		
Lack of job satisfaction	<65	2.33	2.00	3.00	7193.500	0.681
	≥65	2.33	2.00	3.00		
Worrying about work	<65	2.00	1.75	2.50	8618.500	***0.016***
	≥65	2.25	2.00	2.75		
Psychological complaints	<65	2.18	1.91	2.55	8415.500	***0.007***
	≥65	2.36	2.00	2.73		
Occasional health complaints	<65	10.00	6.00	14.00	8531.500	***0.011***
	≥65	12.00	6.00	16.00		
Persistent health complaints	<65	3.00	0.00	6.00	9941.500	0.604
	≥65	3.00	0.00	9.00		

Data are presented as median (Q1–Q3). U: Mann–Whitney U test, Q1: 25th percentile, Q3: 75th percentile. A p value < 0.05 was considered statistically significant.

In addition to the fact that weekly working hours and the number of monthly night duties are related factors, it is known that both variables are higher among resident doctors who have just started training. According to the study by Önsüz et al., role ambiguity and responsibility stress are higher in those who work five or more night duties (25). The highest stress levels are observed in the first year of residency (27, 43). In this study, the number of monthly night duties and high levels of stressors among resident doctors with high weekly working hours were found to be consistent with the literature. Circadian rhythm disturbances triggered by intense night duty cycles may limit the physiological adaptation capacity of the individual, increasing both sensitivity to stressors and reducing their ability to cope with stress.

An association between the NSI experience and stress and fatigue is a common fact (17,44,45). In this study, a relationship was found between organizational stress level and NSI experience, supporting similar findings in the literature. These findings may be interpreted that organizational stress not only affects mental health, but is also a determining risk factor on physical health and occupational safety parameters.

Table 6. The relationship between NSIs and organizational stress levels

Scales	NSI experience	Medyan	Q1	Q3	U	p
Excessive workload	No	3.78	3.22	4.11	7018.500	***<0.001***
	Yes	4.00	3.67	4.44		
Role ambiguity	No	2.50	2.00	3.00	10078.500	0.766
	Yes	2.50	2.00	3.00		
Responsibility	No	2.75	2.25	3.25	6908.000	***<0.001***
	Yes	3.00	2.75	3.50		
Role conflict	No	3.00	2.67	3.33	7686.500	***<0.001***
	Yes	3.33	3.00	3.67		
Inability to leave the workplace	No	3.33	2.67	3.67	9637.500	0.347
	Yes	3.33	3.00	3.67		
Lack of participation in business decision-making	No	3.00	2.50	3.50	9436.500	0.213
	Yes	3.00	2.50	3.50		
Lack of belief in the necessity of work	No	2.00	1.33	2.33	9488.000	0.247
	Yes	2.00	1.50	2.00		
Uncertainty about the future	No	2.25	1.75	2.50	9600.500	0.326
	Yes	2.25	2.00	2.75		
Lack of chef support	No	2.40	2.00	2.80	8426.000	***0.008***
	Yes	2.60	2.20	3.00		
Lack of support from colleagues	No	2.00	1.60	2.20	8476.500	***0.010***
	Yes	2.10	1.80	2.40		
Lack of job satisfaction	No	2.33	2.00	3.00	9924.500	0.603
	Yes	2.33	2.00	3.00		
Worrying about work	No	2.25	1.75	2.50	8555.000	***0.013***
	Yes	2.25	2.00	2.75		
Psychological complaints	No	2.27	1.91	2.55	8879.500	***0.046***
	Yes	2.36	2.00	2.73		
Occasional health complaints	No	10.00	6.00	14.00	9595.000	0.324
	Yes	12.00	6.00	16.00		
Persistent health complaints	No	3.00	0.00	6.00	9941.500	0.604
	Yes	4.00	0.00	10.00		

Data are presented as median (Q1–Q3). NSI: Needlestick and sharp injury, U: Mann–Whitney U test, Q1: 25th percentile, Q3: 75th percentile. A p value < 0.05 was considered statistically significant.

This study has some limitations. Causal relationships cannot be established due to cross-sectional research design. In addition, the fact that the data was collected through self-report may have led to recall bias. Physical competence of the working environment or physical risk factors were not included among the independent variables. However, reaching 83% of all resident doctors in the province and the involvement of resident doctors from different and many specialties are the strengths that increase the value of the study.

In this study, it is seen that the level of organizational stress factors detected among resident doctors may differ significantly according to individual and professional characteristics. It is noteworthy that among resident doctors working in the field of surgical medicine, who have longer weekly working hours and have more frequent night duties, the stressors of excessive workload, responsibility, role conflict and lack of social support are felt more. Similarly, the higher levels of stress and psychological complaints in resident doctors with NSI indicate a relationship between organizational stress and health risks related to working conditions. In addition, comparisons with other occupational groups show that resident doctors have higher

Table 7. Comparison of VOS-D scores of different occupational groups

Scales		Medical specialization students. Kocaeli		Forensic Experts (36)	Nurse (37)	Factory workers. Ankara (38)	Factory workers. İzmir (23)	Bank employees (39)	Pilot (40)
		Mean	Medyan	Mean	Mean	Mean	Mean	Mean	Mean
Stress factors	Excessive workload	3.87	3.89	3.13	3.47	3.16	3.16	3.11	3.01
	Role ambiguity	2.56	2.50	2.08	2.21	2.24	2.08	1.87	1.46
	Responsibility	3.00	3.00	3.73	3.39	2.85	3.06	-	4.15
	Role conflict	3.17	3.00	2.16	2.93	3.65	2.55	2.45	3.94
	Inability to leave the workplace	3.17	3.33	-	3.25	2.94	2.99	-	2.93
	Lack of participation in business decision-making	2.90	3.00	-	2.64	2.42	2.39	2.38	2.78
	Lack of belief in the necessity of work	1.94	2.00	1.75	1.65	1.49	1.42	1.53	1.02
	Uncertainty about the future	2.25	2.25	2.22	2.53	2.51	2.68	1.28	2.17
Social variables	Lack of chef support	2.51	2.60	2.22	2.33	2.29	2.09	1.95	2.41
	Lack of support from colleagues	2.50	2.00	1.93	2.01	2.17	1.81	1.85	2.09
Psychological stresses	Lack of job satisfaction	2.41	2.33		2.31	2.49	2.24		2.38
	Worrying about work	2.34	2.25		2.05	3.24	1.70		3.35
	Psychological complaints	2.63	2.27		2.14	1.76	1.98		1.88
Health complaints	Occasional health complaints	11.98	12.00			8.08	5.36		
	Persistent health complaints	5.83	3.00			1.15	1.47		

scores in many stress dimensions, suggesting that this may be related to the structural working conditions specific to the residency process. It is seen that there is a need to regulate working conditions in order to protect resident doctors from work accidents, to reduce their exposure to stressors, and to protect their mental health.

In two hospitals where the study was carried out, readjusting the night duty schecules of resident doctors and ensuring that the number of employees is appropriate by making clinic-specific workload calculations may contribute to reducing stressors. In addition, it may be useful to strengthen communication and team management skills by organizing clinical training programs to reduce stress caused by lack of manager and colleague support. It would be a valuable activity to identify and solve situations that create disadvantages for female physicians. Considering the relationship between NSI and stress level, strengthening occupational health and safety practices in these hospitals, activating incident notification systems, and conducting regular trainings on occupational safety may offer a significant contribution.

It can be assumed that the problems with the working conditions of resident doctors are not only specific to institutions, but may also be related to the structural features of the health system. It may be beneficial to examine the weekly working hours and the number of night duties assigned to resident doctors, whether they comply with national and international standards, and to warn the managers of the health institution that does not provide working conditions in accordance with the standards. Stress and burnout indicators may be valuable to measure the organizational stress levels of resident doctors at regular intervals. Offering training programs that include health risks and are mandatory to attend to resident doctors, and realizing that resident physicians have the right to work in healthy and safe conditions, may contribute to the process of reducing stressors.

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