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Occupational fatigue and sleep quality among the physicians employed in the emergency service of a COVID-19 pandemic hospital

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Ethics Committee Approval
The study was approved by Noninvasive Clinic Ethical Committee of the Medical Faculty of Harran University (Decision No:18, Dated: 29th June 2020).
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

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No conflict of interest was declared by the authors.

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Abstract

Background/Aim: Outbreaks of infectious diseases, including the current COVID-19, are associated with major psychological distress and significant symptoms of mental illness. Healthcare workers may experience sleep problems, anxiety, depression, and stress when facing a major public health threat. This study aimed to assess the levels of occupational fatigue and sleep quality among the physicians working in the emergency service of a COVID-19 pandemic hospital.
Methods: This descriptive study was conducted in July 2020 in Şanlıurfa Province Mehmet Akif Inan Training and Research Hospital. The sample group included 194 physicians. The Introductory Information Form prepared by the researchers, the Occupational Fatigue Exhaustion/Recovery (OFER) Scale and the Pittsburgh Sleep Quality Index (PSQI) were used for data collection.
Results: The mean chronic fatigue subscale, mean acute fatigue subscale, mean recovery subscale, and mean Pittsburgh Sleep Quality Index scores were 65.30 (22.87), 69.03 (20.23), 43.93 (19.09), and 8.76 (3.20), respectively. Good and poor sleep quality levels were detected in 11.9% and 88.1% of the physicians, respectively. Sleep quality, gender, marital status, age, and anxiety status due to COVID-19 pandemic affected the occupational fatigue levels of the physicians (P<0.05).
Conclusion: Assessing and minimizing the levels of occupational fatigue and implementing interventions for increasing the quality of sleep among the physicians employed in the emergency department, which has a critical place in healthcare services, are necessary.

Keywords: Occupational fatigue, Pandemic, Physicians, Sleep quality

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Introduction

In the recent years, several infectious disease outbreaks such as the H1N1 influenza, the Ebola, particularly in West Africa and the Zika virus, seriously threatened the survival and improvement of humanity. Since December 2019, pneumonia emerged due to a novel coronavirus infection in Wuhan, Hubei Province, China, and became effective globally as a contagious infectious disease. On 31st January 2020, the World Health Organization (WHO) officially recognized the epidemic as a Public Health Emergency of International Concern (PHEIC) and suggested to name it "COVID-19" [1]. On 11 March, the WHO declared that the COVID-19 outbreak could be considered a "pandemic" since the virus increasingly spread worldwide [2]. Psychological factors play a vital role during any pandemic [3].

With its progression, the workload and pressure on the clinical staff to struggle against the pandemic also increased in parallel with the continuously amplified number of confirmed and suspected patients. The frontline healthcare professionals carry a high risk for infection while facing heavy workload. Because of the special and high-risk profession of the clinical frontline medical staff, they suffer an enormous psychological pressure that may affect sleep quality, as well as physical and mental health [4].

According to the previous studies that addressed the SARS and Ebola epidemics, the onset of a sudden and emergency life-threatening disease may induce extraordinary work pressure on the healthcare workers (HCWs) [5]. Doubtlessly, healthcare professionals were significantly burdened with the responsibility of combating against COVID-19. Certain healthcare professionals employed in the emergency, respiratory and critical care departments may experience sleep disorders, anxiety and depression [6].

Sleep quality is a key component of health. The clinical staff needs to achieve a good quality of sleep not only for performing well in treatment of the patients, but also for keeping their immune system strong to prevent infections [7]. The physical and psychological health of the medical staff are under risk during occupational performance under infectious circumstances, while anxiety and stress may also affect their sleep process adversely [8]. The impact of anxiety, stress and lessened perceived self-efficacy on sleep quality was shown in previous studies [9]. Numerous studies reported the adverse psychological reactions detected among the healthcare professionals during the SARS outbreak [11-13].

Studies report that the healthcare professionals had concerns about their families, friends and colleagues, a sensation of uncertainty and stigmatization regarding contagious infectious diseases while they reported reluctance for working or contemplating to resign. They also experienced high-level stress, anxiety, insomnia, and depression symptoms that may cause long-term psychological consequences [10-12]. Similar concerns about mental health, psychological adjustment and recovery of the healthcare professionals employed in treatment and critical care of the patients with COVID-19 are arising nowadays.

Humans are complicated physiological machines predisposed to error. The incidence of that error may increase due to fatigue, sleep deprivation and stress. Fatigue is the inability or unwillingness to continue performing effectively and may be caused by excessive workload, stress, sleep loss and circadian disruption. Fatigue and sleep deprivation are distinct entities. Fatigue is more responsible for the changes in performance than circadian rhythm disruptions and the grade of fatigue may vary depending on environmental conditions. Cognitive function may be deteriorated more compared with physical performance, and fatigued individuals manifest impaired learning and cognitive processes, memory defaults, and interpersonal dysfunction [13].

Extensive studies were conducted on the role of long working hours and the duration of shifts on work-related fatigue. Sleep deprivation, physical exhaustion and disruption of circadian rhythm are considered major contributors to work-related fatigue [14]. It is also supposed to be associated with numerous subjective factors such as age, anxiety, caffeine intake, sleep patterns, and a recent life event [15].

The healthcare professionals that are directly employed in the treatment and critical care of the patients with COVID-19 carry risk for psychological distress and various symptoms of mental health complications. The progressively increasing number of the confirmed and suspected cases, abundant workload, widespread media coverage, deficiency of specific drugs and lack of adequate support may all contribute to the mental burden [16].

This study aimed to assess sleep quality and occupational fatigue status in the frontline medical staff struggling against the COVID-19 pandemic.

Materials and methods

The data of this descriptive study were collected between 1-15 July 2020 corresponding to 110th-125th days of the pandemic, considering the date 11 March 2020 on which the first case of COVID-19 was reported in Turkey. A progressive period of the pandemic was selected to evaluate the level of occupational fatigue and sleep quality more accurately. The study universe included 220 physicians that were currently employed in the emergency service because of the pandemic in the Şanlıurfa Mehmet Akif Inan Training and Research Hospital. No sampling method was implemented in the study. One hundred and ninety-four (88%) physicians who accepted to participate were surveyed.

The data were collected through an online questionnaire created on Google forms. After the doctors were informed about the questionnaire by the researchers, the questionnaire link was shared on the doctors' social media groups. The responses were kept confidential. The Introductory Information Form prepared by the researchers, Occupational Fatigue Exhaustion/Recovery (OFER) Scale that measures occupational fatigue level and Pittsburgh Sleep Quality Index (PSQI) that assesses the sleep quality of the physicians during COVID-19 pandemic period were used for data collection. Filling the data collection forms took 15 minutes. The Introductory Information Form consisted of 23 questions addressing age, gender, marital status, number of children, working duration, weekly working duration, exposure to COVID-19, status of using a protective equipment, being faced with a COVID-19 patient, experience of being suspected for COVID-19, experience of COVID-19

positivity in the family or co-working staff in the work-place, health problems, cigarette smoking and exercise status.

The Occupational Fatigue Exhaustion/Recovery Scale (OFER)

OFER was developed by Winwood et al. to measure occupational fatigue in 2005. The acceptable Cronbach's alpha coefficient values of the scale were 0.93, 0.82 and 0.75 for chronic fatigue, acute fatigue and recovery, respectively. The scale consisted of 15 items and three subscales, as follows: (1) Chronic fatigue including 1-5 questions, (2) acute fatigue including 6-10 questions, (3) and recovery including 11-15 questions. The questiones were on experience about fatigue at work and home within the last few months. The questions including negative statements were coded reversely and scoring was performed on this base. A seven-point Likert scale (ranging between 0-strongly disagree to 6-strongly agree) was used for scoring. No total score was obtained in the scale, the scores were calculated independently for each subscale (item scores /30x100). High scores obtained from the subscales of chronic and acute fatigue indicated increased occupational fatigue while high scores obtained from the subscale of recovery exhibited achievement recovery between the shifts. Scores of 0-25, 25-50, 50-75 and 75-100 revealed low, moderate/low, moderate/high fatigue and high grades of fatigue, respectively [17]. In our study, the Cronbach's alpha coefficient values of the scale were 0.85, 0.84 and 0.75 for the subscales of chronic fatigue, acute fatigue and recovery, respectively.

Pittsburgh Sleep Quality Index (PSQI)

PSQI is a sleep questionnaire designed to assess sleep quality and length and the presence and severity of sleep disturbance within the last month. The scale consists of 19 items and measures seven subscales of sleep quality including subjective sleep quality (C1), sleep latency (C2), sleep duration (C3), habitual sleep efficiency (C4), sleep disturbances (C5), use of sleep medications (C6), and daytime dysfunction (C7). Total PSQI score was obtained by summing the seven subscores and ranges between 0-21. PSQI total score definitively distinguishes well sleepers (PSQI total score≤5) from poor sleepers (PSQI >5) [18]. In the present study, the Cronbach's alpha coefficient of the scale was 0.80.

Statistical analysis

SPSS 22.0 software package program was used for statistical analysis. The descriptive statistics (number, percent, average) were used for normally distributed variables, and the t-test and variance analysis were performed among the independent groups. A correlation analysis was carried out; $P<0.05$ indicated significance.

Ethics

The study was approved by the Noninvasive Clinic Ethics Committee of the Medical Faculty of Harran University (Decision No:18, Dated: 29 June 2020). The institutional approval of the study was obtained from Mehmet Akif Inan Training and Research Hospital while informed consent was taken from each participant.

Results

The sociodemographic characteristics of the participants are presented in Table 1. The study included 31.4% female and 68.6% male participants, with an overall mean age of 32.1 (5.79) years. Of the physicians, 43.8% had an occupational experience of 0-5 years, 29.9% smoked and 66.5% did not exercise. The flexible shift scheduling was supported by 84% of the physicians and the mean weekly working duration was 46.94 (12.18) hours.

Table 1: The sociodemographic characteristics of the emergency physicians (n=194)

Descriptive features		Number	Percentage (%)
Your Gender	Male	133	68.6
	Female	61	31.4
Marital Status	Married	118	60.8
	Single	76	39.2
Age	24-32	102	52.6
	33-54	92	47.4
Having a child	Yes	87	44.8
	No	107	55.2
Occupational experience	0-5 years	85	43.8
	6-10 years	63	32.5
	11-31 years	46	23.7
Do you support flexible shift scheduling?	Yes	163	84.0
	No	31	16.0
Your weekly work duration	0-40 hours	77	39.7
	40 -80 hours	117	60.3
Have you any health problems?	Yes	28	14.4
	No	166	85.6
Do you smoke cigarettes?	Yes	58	29.9
	No	136	70.1
Do you exercise?	Yes	65	33.5
	No	129	66.5

The experience of the study participants related with COVID-19 was presented in Table 2. Among the participants, 88.1% reported meeting with a COVID-19 patient while 61.9% were suspected for COVID-19, and 94.3% feared carrying the COVID-19 virus home.

Table 2: The experience of emergency physicians regarding COVID-19

Occupational Characteristic		Number	Percentage
Have you ever met with a COVID-19 positive patient?	Yes	171	88.1
	No	23	11.9
What is your contact status?	Low	46	23.7
	Moderate	86	44.3
	High	62	32.0
Did you experience suspicion of having COVID-19?	Yes	120	61.9
	No	74	38.1
Did the presence of COVID-19 positive healthcare staff make you feel anxious or fearful?	Yes	119	61.3
	No	75	38.7
Did you fear carrying the virus home?	Yes	183	94.3
	No	11	5.7

The mean scores obtained from the Occupational Fatigue/Exhaustion/Recovery and Pittsburgh Sleep Quality Index Scales by the emergency physicians are presented in Table 3. Mean chronic fatigue subscale, acute fatigue subscale, recovery subscale and Pittsburgh Sleep Quality Index scores were 65.30 (22.87), 69.03 (20.23), 43.93 (19.09) and 8.76 (3.20), respectively. Poor and good sleep quality levels were detected in 88.1% and 11.9% of the physicians, respectively.

Table 3: The mean scores of the physicians according to the occupational fatigue exhaustion/recovery scale and Pittsburgh sleep quality index scales

	Obtainable Min-Max	Received Min-Max	$\bar{X}$(Ss)
Chronic Fatigue	0-100	6-100	65.30 (22.87)
Acute Fatigue	0-100	16-100	69.03 (20.23)
Recovery	0-100	6-83	43.93 (19.09)
PSQI	0-21	2-18	8.76 (3.20)

The comparison between some variables of the emergency physicians based on Occupational Fatigue Exhaustion/Recovery and Pittsburgh Sleep Quality Index Scales is presented in Table 4. Females, those in the 24–32-year age group and single participants had significantly higher and lower scores in the subscales of chronic fatigue and recovery, respectively ($P<0.05$). Those experiencing fear and concerns due to the presence of COVID-19 positive hospital staff at their workplace had significantly higher and lower scores in the subscales of acute fatigue and recovery, respectively ($P<0.05$). Those with a poor sleep quality obtained significantly higher

scores from the subscales of chronic and acute fatigue and significantly lower scores in the recovery subscale (P<0.05).

Table 4: Comparison of between occupational fatigue exhaustion/recovery and variables

		Chronic Fatigue	Acute Fatigue	Recovery
Gender	Female	70.76 (22.15)	70.60 (18.21)	40.81(19.69)
	Male	62.80 (22.83)	68.32 (21.12)	45.36 (18.71)
	P-value	0.024 *	0.468	0.124
Age	24-32	68.52 (22.59)	69.90 (18.73)	44.34 (19.22)
	33-54	61.73 (22.76)	68.07 (21.83)	43.47(19.00)
	P-value	0.039 *	0.532	0.753
Marital status	Married	62.14 (21.95)	68.24 (21.07)	46.18 (18.71)
	Single	70.21(23.52)	70.26 (19.01)	40.43 (19.27)
	P-value	0.016 *	0.500	0.040 *
Did the presence of Covid positive healthcare staff make you anxious or fearful?	Yes	67.39 (22.71)	72.57 (18.21)	41.14 (17.49)
	No	62.00 (22.86)	63.42 (22.04)	48.35 (20.74)
	P-value	0.110	0.002 *	0.010 *
PSQI	Good sleep quality	47.68 (20.55)	52.75 (22.14)	56.37(18.98)
	Poor sleep quality	67.68 (22.16)	71.22 (18.98)	42.26 (18.69)
	P-value	0.001 *	0.001 *	0.001 *

* Significant with P<0.05, the t-test

Discussion

The physicians that participated in our study obtained moderate-high, moderate-high and moderate-low scores in chronic fatigue, acute fatigue and recovery subscales, respectively, in the OFER Scale. High and very high levels of occupational fatigue were detected in 78.8% and 42.2% of the physicians, respectively, in a study in China, and physicians working in the tertiary-care hospitals had high levels of fatigue [19]. In Taiwan, the level of fatigue among the physicians and nurses were higher than those of the administrative medical staff, with a fatigue prevalence rate of 30.9% [20]. The medical sector has a stressful working environment by nature. Particularly, the physicians who have critical importance since they work in the emergency department, and healthcare personnel who make the first contact with the patients feel this stress more intensely. Thus, an elevated level of occupational fatigue is an estimated consequence during the pandemic.

In the present study, the participants with poor sleep quality obtained higher scores from the chronic and acute fatigue subscales, and lower scores from the subscale of recovery. Similarly, studies conducted on occupational fatigue report that those with poor sleep quality have higher fatigue [21-23]. In our study, good and poor sleep quality levels were found in 11.9% and 88.1% of the physicians, respectively. Another study conducted on the physicians in Turkey determined that 24.3% and 75.7% had good and poor quality of sleep, respectively [24]. The mean sleep duration was 6.01 hours in our study. However, an adult should sleep at least 7 hours to achieve adequate sleep. Therefore, elevated fatigue is an inevitable consequence among the emergency physicians who sleep poorly and less than what is considered healthy.

In this study, females obtained higher scores from the subscale of chronic fatigue. Studies show that gender has no impact on the occupational fatigue [25, 26]. Many healthcare professionals feel a severe emotional and physical pressure in presenting healthcare services under pandemic circumstances. Besides, they have to consider the education of their children who cannot attend their schools properly, cook meals and do more intense house chores, as well as meet the increasing needs of hygiene. The level of occupational fatigue among the female healthcare professionals increases because of these mentioned circumstances during the pandemic.

Physicians between the ages of 24 and 32 years had higher scores in the chronic fatigue subscale. The level of occupational fatigue was higher among the young healthcare professionals in numerous other studies [20, 27]. This may result from the lower tolerance level and different perception of life among the young subjects, called the “Z Generation” who prefer to socialize via the internet.

We found that single individuals obtained higher and lower scores from the subscales of chronic fatigue and recovery, respectively. Some studies report that marital status is effective on occupational fatigue [27, 28] whereas some other studies disagree [19, 29]. Particularly during the pandemic, the deficiency of familial and spousal support induces a stress factor on the single physicians and thus, being a single physician may contribute to an increase in occupational fatigue.

The physicians who experienced fear and anxiety due to the COVID-19 positive healthcare staff in their hospital obtained higher and lower scores from the subscales of acute fatigue and recovery, respectively. Similarly, high levels of anxiety were encountered in the healthcare staff who provide healthcare service to COVID-19 patients in other studies carried out in a pandemic hospital [30, 31]. Another study conducted in Turkey reported that healthcare professionals experienced anxiety of being infected with COVID-19 and feared transmitting the disease to their families [32]. The increased anxiety among the front-line emergency department staff is an expected consequence because of their concerns for being infected through direct contact with suspected or confirmed COVID-19 patients. A high level of occupational fatigue among the healthcare professionals is acceptable due to the brilliant struggle against the complications of a first-encountered disease.

Conclusion

COVID-19 is very contagious, and it spreads rapidly. Frontline physicians have critical importance in this process and exert intense efforts. They present a brilliant healthcare service with a full effort to protect themselves and their families, and their workload progressively increases. Under these circumstances, their occupational fatigue inevitably rises. The female, single and young physicians, as well as the those with a poor quality of sleep and concerns due to the presence of COVID-19 positive co-workers in their hospitals had higher levels of occupational fatigue.

Assessing and minimizing the levels of occupational fatigue and implementing interventions for increasing the quality of sleep among the physicians employed in the emergency department, which has a critical place in healthcare services, are necessary.

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