Post-Traumatic Stress Disorder among Emergency Medical Technicians and its Relationship with Occupational Stress and Depression: Post-Corona Screening, Zanjan, 2022

Maryam Asadi Aghajari[1], Elnaz Hashemzadeh[2], Sevda Fazlizade[3], Mansour Ojaghloo[4], Leila Ghanbari-Afra[5], Zeinab Ghahremani[6], Mohammad Abdi[7]*

[1]Department of Midwifery, Maragheh Branch, Islamic Azad University, Maragheh, Iran
[2]Department of Nursing, Tabriz university of Medical Sciences, Tabriz, Iran3 MSc of Psychiatric Nursing, Tehran Azad Medical University, Tehran, Iran
[4]Research Development Center, School of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran
[5]Trauma Nursing Research Center, Kashan University of Medical Sciences, Kashan, Iran
[6]Department of Psychiatric Nursing, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Iran
[7]Department of Emergency and Critical Care, School of Nursing, Zanjan University of Medical Sciences, Zanjan, Iran

Corresponding author: Mohammad Abdi
Address: Department of Emergency and Critical Care, School of Nursing, Zanjan University of Medical Sciences, Zanjan, Iran.
e-mail: mohammad2016@zums.ac.ir

> ABSTRACT

Objective: Emergency medical technicians (EMTs) are at risk of developing post-traumatic stress disorder (PTSD) as a result of seeing painful events involving suspected COVID-19 patients and being concerned about potentially infecting themselves and their families. Therefore, screening for these disorders is essential in the post-Corona era. This study aimed to investigate the prevalence of PTSD among EMTs and its relationship with occupational stress and depression when dealing with patients with suspected COVID-19.
Methods: This cross-sectional study was conducted on EMTs at Zanjan University of Medical Sciences using a convenience sampling method. Data were collected using a demographic information questionnaire, PTSD checklist, occupational stress questionnaire, and the Goldberg depression scale. The data were analyzed using SPSS software. Statistical tests such as Pearson correlation and logistic regression analysis were used to evaluate the data.
Result: 205 EMTs participated in this cross-sectional study. The mean and standard deviation of PTSD was 37.13±12.93 (17-85), and according to the cut-off (45), the prevalence of PTSD was 30.7%. There was a direct and significant association between the total PTSD and depression scores (r=0.435, p=0.001). Some occupational stress domains, such as demand (r=0.306, p=0.001), colleague support (r=0.149, p=0.033), and communication (r=0.293, p=0.001) had a significant association with PTSD. The domains of sadness in depression (OR=1.074, p=0.027) and demands in occupational stress (OR=1.872, p=0.029) were the most important predictors of PTSD. Among demographic variables, employment status was the most important protective factor for PTSD (OR=0.378, p=0.038).
Conclusion: PTSD affected one-third of EMTs, and it had a significant relationship with various dimensions of depression and occupational stress. Due to the chronic nature of these diseases, policymakers are advised to prioritize psychological screening of EMTs as part of the post-Corona policy.

Keywords: Post-traumatic stress disorder; Occupational stress; Depression; Emergency medical technicians; COVID-19.

Introduction

The COVID-19 pandemic can be stressful for everyone. In addition, there is a lot of tension in the community as a result of this anxiety and concern about an unknown disease [1]. These concerns are accompanied by a strong reaction from individuals who have direct contact with COVID-19 patients due to their responsibilities, such as physicians, nurses, and emergency medical technicians (EMTs) [2]. This stress can lead to self-harm or transmission to patients and their families [3]. Persisting with this stress can cause other mental disorders such as anxiety, depression, and post-traumatic stress disorder (PTSD) [4]. EMTs who are at the frontline of the containment chain against Corona are regularly confronted with distressing scenes concerning the plight of people struggling with the disease. Recalling these scenes can cause psychological damage in people, and when these symptoms become more severe, they may experience PTSD symptoms [5]. PTSD is caused by an unusual stress response [6]. During waking hours, this event repeats itself as a dream in the person's memory. The primary characteristics of this disorder are the symptoms of recurrence of experiences, avoidance, and vigilance [7]. During the COVID-19 pandemic, pre-hospital emergency personnel had contact with suspected COVID-19 patients. Additionally, EMTs frequently encounter circumstances where they fear contracting the disease [8]. Their second source of fear and concern was the trigger for the disease and the transmission of the disease. after experiencing something like this, a person's conscience torments him for years [9].

Martínez-Caballero *et al.,* reported that COVID-19 caused PTSD in emergency medical services (EMS) personnel, including physicians, nurses, and EMTs [10]. Other studies investigated PTSD among emergency staff before COVID-19 [11, 12]. Ntatamala *et al.,* found a high frequency of PTSD in ambulance personnel in 2019 [11]. According to Khazaei *et al.,* the rate of PTSD in pre-hospital emergency personnel was 22% in 2018 [12]. Based on these findings, several studies highlighted the necessity of investigating mental disorders, particularly PTSD, among healthcare providers in the post-pandemic period, and it is a post-Corona knowledge gap [13-15].

Failure to promptly recognize the symptoms of this condition can have various detrimental effects on the well-being of employees, including personal, social, economic, and physiological dimensions. It may have a negative impact on individuals' quality of life and contribute to decreased focus and attention [16]. Given that healthcare providers, particularly EMTs, have ongoing contact with high-risk patients, prioritizing the monitoring and treatment of PTSD in these groups is essential. The smallest mistake in a patient's diagnosis, treatment, or timely transfer leads to irreversible consequences for the patient [17]. Time is a crucial factor in the work of EMTs. In some patients, such as hypoxia, myocardial infarction, stroke, and severe trauma, only a few minutes remain for the transfer [18]. Once this critical golden period has passed, the patient's life is in danger. Any event that disrupts the rescuers' attention impacts the patient transfer cycle. Mental disorders can impair the ability to concentrate and lengthen the patients' transfer time [19]. Therefore, personnel screening in the post-Corona era is essential [13-15].

The challenge becomes even more significant when PTSD, functioning as a stressor, leads to occupational stress and subsequently, gives rise to chronic symptoms such as depression [20]. Depression is associated with slowed behavior, reduced motivation, emotional numbness, poor performance, and a variety of psychological problems [21]. This issue poses a major challenge in the prehospital emergency service, where speed and agility are critical factors [22]. Depression is one of the most serious post-pandemic complications [23]. Therefore, continuous monitoring of healthcare personnel, identification of risk factors, and professional skills training in dealing with these conditions are quite effective. The new concept of professionalism, which encompasses lifelong learning and continuing professional development [24], helps us understand this issue better. Given the significance of this topic, the paucity of research in this area [13-15], and the identification of vulnerable personnel, the researchers were prompted to investigate PTSD among EMTs and its relationship with occupational stress and depression after the sixth peak of COVID-19.

Materials and Methods

In this cross-sectional study, participants were prehospital staff members working in urban and road prehospital emergency centers affiliated with Zanjan University of Medical Sciences (Zanjan, Iran). From April 2022 to July 2022, after the sixth peak of the COVID-19 pandemic in Iran [25], the sample was carried out using the convenience sampling method. According to a study by Iranmanesh *et al.,* [26], the sample size was estimated at 180 (α=0.05, β=0.80 and sampling error=0.05, prevalence of PTSD=94%). To prevent attrition risk, all Zanjan EMTs were invited to participate in the study, which increased the sample size up to 40%. Thus, 256 pre-hospital samples were invited to participate in the

study. Out of the total number of invitations sent, 35 individuals declined to participate, and 16 people returned incomplete questionnaires. As a result, 205 questionnaires were eligible for examination, yielding a response rate of 80%.

The Inclusion criteria were no history of mental illness, at least one month of work experience during the pandemic [6], and at least five occupational exposures to a suspected Coronavirus patient (the one with at least two of the five symptoms of the Coronavirus, including dyspnea, fever, cough, sputum, and decreased arterial blood saturation) one month ago [27]. The exclusion criteria included a history of mental disorders and an unwillingness to continue the research.

Two researchers visited the pre-hospital emergency centers to personally invite EMTs to participate in the study. The questionnaires were given to the personnel who signed the written informed consent form. The questionnaires were printed out and filled out with a pen. If the personnel was on a mission, the researchers would wait until they returned to the emergency centers outside the hospital. The pre-hospital emergency shifts in Zanjan were 24 hours in the city and 48 hours on the road. Therefore, the staff was present throughout the day during their work shift.

The instruments that were utilized in this study were a demographic information questionnaire, post-traumatic stress disorder checklist, Goldberg depression scale, and occupational stress questionnaires. The demographic questionnaire dealt with the participant's age, sex, education, marital status, number of children, employment status, and length of employment.

The Post-Traumatic Stress Disorder Questionnaire

The Post-Traumatic Stress Disorder Checklist is a valid and reliable questionnaire for determining post-traumatic stress disorder. Goudarzi *et al.,* verified the validity of this Checklist in an Iranian population, with a Cronbach alpha coefficient of 0.87 [28]. The questionnaire consisted of 17 questions and three domains, including re-experiencing (5 questions), emotional numbness and avoidance (7 questions), and excessive arousal (5 questions). Each question was scored on a five-point Likert scale from 1 to 5. The range of scores was 17 to 85. The PTSD cut-off point was 45 [6].

Goldberg Depression Scale

The original version of this scale has 18 questions. Each of the items of this questionnaire is graded on a five-point Likert scale: very high (5), high (4), medium (3), low (2), very low (1), and not at all

(0). This questionnaire has a score range of 0-90. This questionnaire divides depression into three categories: disappointment, inability in decision making, and sadness and lack of interest in life [29]. A higher score indicates more depression. The face and content validity of this questionnaire was confirmed by 25 experts. Aminpoor *et al.,* reported a Cronbach's alpha of 0.84 [29].

Occupational Stress

The original version of this scale has 15 questions ranging from 15 to 75. This questionnaire has six dimensions including control, demand, manager support, academic support, communication, and role. The validity of the questionnaire was confirmed in the study by Rasouli *et al.,* and its reliability coefficient with Cronbach's alpha was reported as 0.79 [30]. In the present study, the form and content validity of the questionnaire was verified by ten academic members of Zanjan and Qom Universities of Medical Sciences. The Cronbach alpha coefficient of the reliability test was 0.81.

Statistical Analysis

Data were analyzed using SPSS software version 21.0 (IBM Corp., Armonk, NY, USA). The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to check the normality of the data. The Cronbach's alpha values for PTSD, occupational stress, and depression were 0.956, 0.689, and 0.966, respectively. Since the sample size was large (more than 30), the parametric test was applied. The relationship between post-traumatic stress disorder, depression, and occupational stress was determined using Pearson's correlation tests. In addition, a binary logistic regression test was used to calculate predictor variables. Age, sex, marital status, number of children, level of education, employment status, and work experience were selected as demographic variables, based on a review of previous similar studies. According to the purpose of the study, which was studying depression, occupational stress, and its dimensions were entered into the model, as additional variables. In the present study, the target variable (PTSD) was binary, with two possible values: 0 (<45 points) or 1 (>45 points). In all cases. $p<0.05$ was considered statistically significant.

Results

205 EMTs participated in this cross-sectional study. The demographic information of the participants is shown in Table 1. The mean of total PTSD was 37.13±12.93 (range=17-85), and according to the cut-off (45), 30.7% of EMTs were diagnosed with PTSD.

Table 1. Demographic characteristics of the studied sample (n=205)

Variables		Value N (%)
Sex	Male	193 (94.1)
	Female	12 (5.9)
Number of Children	Without Child	101 (52.7)
	With child/children	104 (47.3)
Marital status	Single	X 61 (30)
	Married	142 (70)
Level of education	Diploma	2 (1.1)
	Technician	97 (51.3)
	Bachelor	69 (36.5)
	MSc	7 (3.7)
	PhD	14 (7.4)
Employment status	Permanent contract	83 (40.48)
	temporary contract	122 (59.52)
Smoking	No	198 (96.6)
	Yes	7 (3.4)
Age, mean±SD	Year	34.90±7.87
Work Experience, mean±SD	Year	10.60±7.97

Table 2. Relationship between PTSD and occupational stress and depression

Relationship between PTSD and occupational stress and their dimensions							
PTSD	Occupational stress						
	Demand	Control	Manager Support	Collage support	Communication	Role	Total
Re-experiencing	p=0.001, r=0.285	p=0.095, r=-0.117	p=0.568, r=0.040	p=-0.097, r=0.167	p=0.001, r=0.282	p=0.148, r=-0.101	p=0.279, r=0.076
Emotional numbness and avoidance	p=0.001, r=0.269	p=0.635, r=-0.033	p=0.181, r=0.094	p=0.276, r=-0.076	p=0.001, r=0.249	p=0.843, r=-0.014	p=0.025, r=0.156
Excessive arousal	p=0.001, r=0.307	p=0.755, r=-0.22	p=0.407, r=0.057	p=0.026, r=0.205	p=0.001, r=0.249	p=0.412, r=-0.058	p=0.105, r=0.113
Total	p=0.001, r=0.306	p=-0.59, r=-0.398	p=0.306, r=-0.205	p=0.033, r=0.149	p=0.001, r=0.293	p=0.412, r=-0.058	p=0.68, r=0.128
Relationship between PTSD and depression and their dimensions							
PTSD	Depression						
	Disappointment		Inability in decision making		Sadness & lack of interest in life		Total
Re-experiencing	p=0.001, r=0.288		p=0.001, r=0.361		p=0.001, r=0.390		p=0.001, r=0.388
Emotional numbness and avoidance	p=0.001, r=0.354		p=0.001, r=0.360		p=0.001, r=0.421		p=0.001, r=0.422
Excessive arousal	p=0.001, r=0.317		p=0.001, r=0.323		p=0.001, r=0.405		p=0.001, r=0.399
Total	p=0.001, r=0.347		p=0.001, r=0.375		p=0.001, r=0.436		p=0.001, r=0.435

There was a direct and statistically significant correlation between PTSD total score and depression and its dimensions (r=0.435, p=0.001). As shown in Table 2, there was a significant relationship between some occupational stress domains, including demand (r=0.285, p=0.001), colleague support (r=0.149, p=0.033), and communication (r=0.293, p=0.001).

Furthermore, the domains of sadness in depression (OR=1.074, p=0.027) and demands in occupational stress (OR=1.872, p=0.029) were the most important predictors of PTSD. Each increase in sadness and demands score, increased the odds of PTSD by 1.074 and 1.872, respectively. Among the demographic variables, employment status (OR=0.378, p=0.038) was the most important predictor of PTSD. In permanent contract employment personnel, the odds of PTSD were reduced by 0.378 (Table 3).

Discussion

According to the present study, one-third of EMTs suffered from PTSD. In addition, there was a direct and significant correlation between the total score of PTSD and depression, as well as its dimensions.

Table 3. Analyze the demographic characteristics, domains of occupational stress, and depression to predict PTSD based on logistic regression

Variables	OR[a]	95% CI[b] for OR		*P* value
		Lower	Upper	
Age	1.048	0.891	1.232	0.570
Sex	2.086	0.476	9.130	0.329
Marital status	0.773	0.293	2.040	0.603
Number of children	0.991	0.567	1.733	0.975
Level of education	0.979	0.643	1.492	0.923
Employment status	0.378	0.205	0.434	0.038
Work experience	0.990	0.853	1.149	0.894
Smoking	1.429	0.195	10.491	0.726
Demand	1.872	1.066	3.285	0.029
Control	0.946	0.517	1.731	0.858
Communication	1.149	0.701	1.882	0.583
Role	1.018	0.634	1.633	0.943
Manager support	1.663	0.923	2.998	0.091
Collage support	0.704	0.372	1.332	0.280
Disappointment	1.078	0.896	1.297	0.427
Inability in decision making	0.905	0.720	1.136	0.388
Sadness & lack of interest in life	1.074	1.008	1.145	0.027

[a]Odds Ratio; [b]Confidence Interval

However, some domains of occupational stress, including demand, colleague support, and communication were significantly associated with PTSD. Furthermore, the most important predictors of PTSD were sadness and lack of interest in life in the depression domain and the demand in the occupational stress domain. Among demographic variables, employment status was the most important predictor of PTSD.

In the study by *Eiche et al.,* the rate of post-traumatic stress disorder was high, which was consistent with the findings of the present study [31]. Besides, Wang *et al.,* reported that nursing staff experienced PTSD when interacting with patients with COVID-19 [32]. Li *et al.,* conducted a review of the published literature and reported that the prevalence of PTSD among healthcare professionals was 21.5% [33]. One of the reasons for the high prevalence of PTSD disorder is the depth and severity of the COVID-19 crisis impact on the current situation. When it comes to patients, EMTs are on the frontline. EMTs are under severe stress due to high workloads, longer working hours, and other professional characteristics of prehospital emergencies [34]. The EMTs experienced a considerable deal of fear and concern due to the high and unexpected increase in patients with an unknown disease at the beginning of Corona outbreak. Another concern was that their colleagues might contract COVID. All of these factors, over time, can lead to tension, arousal, and the recall of unpleasant memories, which are PTSD symptoms [35, 36].

The present study showed a direct and significant association between the total PTSD score and depression as well as their dimensions. However,

some domains of occupational stress, including demand, colleague support, and communication had a significant association with PTSD. These findings supported the findings of Sharifi Fard *et al.,* [37] and Liu *et al.,* [38]. The association between PTSD and depression is reciprocal, and each can effectively cause the other [33]. The persistent nature of both disorders may explain why PTSD is associated with depression. The chronic nature of these two disorders shares physiological commonalities between them. For instance, the proposed synaptic connectivity model for PTSD is based on the impaired stress response, which causes a persistent threat paradigm and chronic stress pathology (CSP). The synaptic dysconnectivity model provides a framework for investigating and comprehending the biological predispositions and pathophysiology of PTSD. A synaptic and network-based model of PTSD describes a vicious cycle of chronic stress pathology and proposes a dual pathology model that links stress-related synaptic loss in the prefrontal cortex and hippocampus to amino acid-based pathology and stress-related synaptic gain in the underlying cortex, including the core cortex and presumably the basolateral amygdala monoamine-based pathology [39]. This mechanism is comparable to that of depression [40].

Additionally, the dimensions and symptoms of PTSD, such as unpleasant recollections of past events and emotional numbness and avoidance, are comparable to those of depression, disappointment, inability to make decisions, and sadness and lack of interest in life. All of these symptoms are associated with the slowness of behavior that

occurs in depression [41-43]. The present study indicated that PTSD was strongly predicted by the disappointment domain. Desperation leads to isolation and false perceptions, and consequently, a person becomes pessimistic about the individuals around them. Finally, by contemplating the bitter memories of the past, they try to avoid experiences that closely resemble the symptoms of PTSD [36]. This slowness and emotional numbness might be attributed to poor communication skills, lack of support from colleagues, and unfulfilled work demands. According to the findings of this study, these three dimensions of occupational stress were significantly associated with PTSD. However, PTSD had no significant association with total occupational stress score, which could be due to the acute nature of occupational stress. Among demographic variables, employment status was the most important predictor of PTSD. The temporary employment situation results in a permanent mental disorder for the individual, consistent with the chronic nature of PTSD. This issue had an additional impact on the COVID-19 crisis. One of the main concerns of the temporary workers was what would happen to their professional careers if they contracted the disease. Are they supported? As seen in this crisis, 89-day contracts were signed with employees in critical condition, but these contracts were not renewed once the Coronavirus peak had subsided. This lack of support for medical staff had serious consequences. The most important of which was fear of contract failure. This fear created great tension in each employee. Fear was identified as the primary cause of PTSD [39].

The main limitation of this study was the sudden pre-hospital emergency missions. Therefore, the researcher had to wait as long as possible for the EMTs to fill out the questionnaires in their spare time. Another limitation was that we were unable to predict when the Corona crisis just finished. Thus, we attempted to collect samples after the sixth peak, when the prevalence of the COVID pandemic was beginning to decline. Although we were unable to conclude from our findings that PTSD was exclusively related to Corona, we attempted to strengthen the certainty of our research by using the inclusion criteria. However, upon reviewing the EMS, we found that most of the missions a month ago were centered around patients with suspected COVID-19.

Post-traumatic stress disorder affected one-third of EMTs, and it was highly correlated with most domains of depression and occupational stress. Due to the chronic nature of these disorders, it is recommended to the authorities that the psychological screening of EMTs be one of the priorities of pre-hospital emergency protocols in the post-Coronavirus era. In addition, affected staff members should be provided with training courses on psychological healing. Among the demographic variables, the employee's employment status was the most important predictor of PTSD. Therefore, it is recommended that healthcare personnel have job security during these crises.

Declaration

References

1. Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG. COVID stress syndrome: Concept, structure, and correlates. *Depress Anxiety*. 2020;**37**(8):706-14.
2. Barzilay R, Moore TM, Greenberg DM, DiDomenico GE, Brown LA, White LK, et al. Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Transl Psychiatry*. 2020;**10**(1):291.
3. Almaghrabi RH, Alfaraidi HA, Al Hebshi WA, Albaadani MM. Healthcare workers experience in dealing with Coronavirus (COVID-19) pandemic. *Saudi Med J*. 2020;**41**(6):657-60.
4. Shevlin M, McBride O, Murphy J, Miller JG, Hartman TK, Levita L, et al. Anxiety, depression, traumatic stress and COVID-19-related anxiety in the UK general population during the COVID-19 pandemic. *BJPsych Open*. 2020;**6**(6):e125.
5. Alzahrani A, Keyworth C, Wilson C, Johnson J. Causes of stress and poor wellbeing among paramedic students in Saudi Arabia and the United Kingdom: a cross-cultural qualitative study. *BMC Health Serv Res*. 2023;**23**(1):444.
6. Sadat Z, Abdi M, Aghajani M. Prevalence of Posttraumatic Stress Disorder and Related Factors Among Patients Discharged From Critical Care Units in Kashan, Iran. *Arch Trauma Res*. 2015;**4**(4):e28466.
7. Aron CM, Harvey S, Hainline B, Hitchcock ME, Reardon CL. Post-traumatic stress disorder (PTSD) and other trauma-related mental disorders in elite athletes: a narrative review. *Br J Sports Med*. 2019;**53**(12):779-84.
8. Zare S, Mohammadi Dameneh M, Esmaeili R, Kazemi R, Naseri S, Panahi D. Occupational stress assessment of health care workers (HCWs) facing COVID-19 patients in Kerman province hospitals in Iran. *Heliyon*. 2021;**7**(5):e07035.
9. Beach SR, Schulz R, Donovan H, Rosland AM. Family Caregiving During the COVID-19 Pandemic. *Gerontologist*. 2021;**61**(5):650-60.
10. Martínez-Caballero CM, Cárdaba-García RM, Varas-Manovel R, García-Sanz LM, Martínez-Piedra J, Fernández-Carbajo JJ, et al. Analyzing the Impact of COVID-19 Trauma on Developing Post-Traumatic Stress Disorder among Emergency Medical Workers in Spain. *Int J Environ Res Public Health*. 2021;**18**(17).
11. Ntatamala I, Adams S. The Correlates of Post-Traumatic Stress Disorder in Ambulance Personnel and Barriers Faced in Accessing Care for Work-Related Stress. *Int J Environ Res Public Health*. 2022;**19**(4).
12. Khazaei A, Navab E, Esmaeili M, Masoumi H. Prevalence and Related Factors of Post-Traumatic Stress Disorder in Emergency Medical Technicians; a Cross-sectional Study. *Arch Acad Emerg Med*. 2021;**9**(1):e35.
13. Magnavita N, Soave PM, Antonelli M. Prolonged Stress Causes Depression in Frontline Workers Facing the COVID-19 Pandemic-A Repeated Cross-Sectional Study in a COVID-19 Hub-Hospital in Central Italy. *Int J Environ Res Public Health*. 2021;**18**(14).
14. Al Maqbali M, Al Sinani M, Al-Lenjawi B. Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis. *J Psychosom Res*. 2021;**141**:110343.
15. Wu Y, Wang J, Luo C, Hu S, Lin X, Anderson AE, et al. A Comparison of Burnout Frequency Among Oncology Physicians and Nurses Working on the Frontline and Usual Wards During the COVID-19 Epidemic in Wuhan, China. *J Pain Symptom Manage*. 2020;**60**(1):e60-e5.
16. Rice VJ, Liu B, Schroeder PJ. Impact of In-Person and Virtual World Mindfulness Training on Symptoms of Post-Traumatic Stress Disorder and Attention Deficit and Hyperactivity Disorder. *Mil Med*. 2018;**183**(suppl_1):413-20.
17. Coxon A. Stress and Mental Well-Being in Emergency Medical Dispatchers. *The Mental Health and Wellbeing of Healthcare Practitioners: Research and Practice*. 2021:41-53.
18. Lawn S, Roberts L, Willis E, Couzner L, Mohammadi L, Goble E. The effects of emergency medical service work on the psychological, physical, and social well-being of ambulance personnel: a systematic review of qualitative research. *BMC Psychiatry*. 2020;**20**(1):348.
19. Boland LL, Kinzy TG, Myers RN, Fernstrom KM, Kamrud JW, Mink PJ, et al. Burnout and Exposure to Critical Incidents in a Cohort of Emergency Medical Services Workers from Minnesota. *West J Emerg Med*. 2018;**19**(6):987-95.
20. Kim JI, Park H, Kim JH. The mediation effect of PTSD, perceived job stress and resilience on the relationship between trauma exposure and the development of depression and alcohol use problems in Korean firefighters: A cross-sectional study. *J Affect Disord*. 2018;**229**:450-5.
21. MacNamara A, Kotov R, Hajcak G. Diagnostic and symptom-based predictors of emotional processing in generalized anxiety disorder and major depressive disorder: An event-related potential study. *Cognit Ther Res*. 2016;**40**(3):275-89.
22. Saberian P, Tavakoli N, Hasani-Sharamin P, Aghili M, Baratloo A. Accuracy of stroke diagnosis using FAST (Face, Arm, Speech, Time) tool by emergency medical service dispatchers and technicians and its impact on transport time. *Archives of Neuroscience*. 2020;**7**(1).
23. Shanbehzadeh S, Tavahomi M, Zanjari N, Ebrahimi-Takamjani I, Amiri-Arimi S. Physical and mental health complications post-COVID-19: Scoping review. *J Psychosom Res*. 2021;**147**:110525.
24. Drude KP, Maheu M, Hilty DM. Continuing Professional Development: Reflections on a Lifelong Learning Process. *Psychiatr Clin North Am*. 2019;**42**(3):447-61.
25. Organization WH. WHO health emergency dashboard; 2021. *WHO Coronavirus Disease (COVID-19) Dashboard [Internet] https://covid19 who int [cited 2020 Nov 10] Available from[Google Scholar]*. 2020.
26. Iranmanesh S, Tirgari B, Bardsiri HS. Post-traumatic stress disorder among paramedic and hospital emergency personnel in south-east Iran. *World J Emerg Med*. 2013;**4**(1):26-31.
27. Akkoyunlu Y, Cetin G, Bolukcu S, Okay G, Ogun H, Durdu B, et al. The successful management of an elderly Covid-19 infected patient by plasmapheresis. *Transfus Apher Sci*. 2020;**59**(6):102924.
28. Goudarzi M. validation and reliblityof the Mississippi Scale for Posttraumatic Stress. *J Psychol*. 2003;**2**(7):153-77.
29. Aminpoor H, Afshinfar J, Mostafaei A, Ostovar S. Validation of Goldberg's Depression Scale in academic and non-academic peoples. *Ann Biol Res*. 2012;**3**(9):4564-73.
30. Rasouli Z. Investigating the relationship between job stress and burnout with productivity of pilots. *Journal of Army University of Medical Sciences of the Islamic Republic of Iran*. 2012;**10**(2):133-7.
31. Eiche C, Birkholz T, Jobst E, Gall C, Prottengeier J. Well-being and

PTSD in German emergency medical services - A nationwide cross-sectional survey. *PLoS One*. 2019;**14**(7):e0220154.

32. Wang YX, Guo HT, Du XW, Song W, Lu C, Hao WN. Factors associated with post-traumatic stress disorder of nurses exposed to corona virus disease 2019 in China. *Medicine (Baltimore)*. 2020;**99**(26):e20965.

33. Li Y, Scherer N, Felix L, Kuper H. Prevalence of depression, anxiety and post-traumatic stress disorder in health care workers during the COVID-19 pandemic: A systematic review and meta-analysis. *PLoS One*. 2021;**16**(3):e0246454.

34. Dianti M, Azizi Fini I. Knowledge, attitude, and performance of emergency medical technicians related to forensic issues in Kashan, 2017. *Iranian Journal of Emergency Care*. 2017;**1**(3):38-47.

35. Sun L, Sun Z, Wu L, Zhu Z, Zhang F, Shang Z, et al. Prevalence and risk factors of acute posttraumatic stress symptoms during the COVID-19 outbreak in Wuhan, China. *MedRxiv*. 2020;**10**(2020.03):06.20032425.

36. Kozyra M, Zimnicki P, Kaczerska J, Śmiech N, Nowińska M, Milanowska J. Veterans suffering from post-traumatic stress disorder–literature analyzing: symptoms, statistics and therapies. *Journal of Education, Health and Sport*. 2020;**10**(8):40-8.

37. Sharifi Fard F, Nazari N, Asayesh H, Ghanbari Afra L, Goudarzi Rad M, Ghodrati M. Evaluation of Psychological Disor-ders in Nurses Facing Infected Covid-19 Patients in 2020. Qom University of Medical Sciences Journal. 2021; 15 (2): 76-83.

38. Liu CH, Zhang E, Wong GTF, Hyun S, Hahm HC. Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for U.S. young adult mental health. *Psychiatry Res*. 2020;**290**:113172.

39. Abdallah CG, Averill LA, Akiki TJ, Raza M, Averill CL, Gomaa H, et al. The Neurobiology and Pharmacotherapy of Posttraumatic Stress Disorder. *Annu Rev Pharmacol Toxicol*. 2019;**59**:171-89.

40. Holmes SE, Abdallah C, Esterlis I. Imaging synaptic density in depression. *Neuropsychopharmacology*. 2023;**48**(1):186-90.

41. Stander VA, Thomsen CJ, Highfill-McRoy RM. Etiology of depression comorbidity in combat-related PTSD: a review of the literature. *Clin Psychol Rev*. 2014;**34**(2):87-98.

42. Wuthrich F, Nabb CB, Mittal VA, Shankman SA, Walther S. Actigraphically measured psychomotor slowing in depression: systematic review and meta-analysis. *Psychol Med*. 2022;**52**(7):1208-21.

43. Saeidi M, Safaei A, Sadat Z, Abbasi P, Sarcheshmeh MSM, Dehghani F, et al. Prevalence of Depression, Anxiety and Stress Among Patients Discharged from Critical Care Units. *J Crit Care Med (Targu Mures)*. 2021;**7**(2):113-22.