

# The Relationship between Occupational Stress and Depression in Emergency Medical Technicians: Post-Corona Consideration

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## Abstract

**Background:** The COVID-19 pandemic caused depression by creating constant occupational stress. Depression can be one of the most important complications after corona.

**Aim:** The present study was performed with aim to investigate the relationship between occupational stress and depression in emergency medical technicians (EMTs) when facing the patients with suspected COVID-19 after corona peak.

**Method:** This cross-sectional correlational study was conducted with the participation of 205 EMTs at Zanjan University of Medical Sciences, Zanjan, Iran, 2022. Sampling was done using convenience methods. Data collection tools included a demographic information form, Goldberg depression scale, and House and Rizzo's Work Stress Scale.

**Results:** The mean of occupational stress and depression were  $45.80 \pm 6.480$  (Range 15-75) and  $34.92 \pm 19.21$  (Range 0-90), respectively. Occupational stress has a positive and significant relationship with depression ( $r=0.189$ ,  $p=0.009$ ). Also, Logistic regression showed the level of education ( $OR=0.577$ ,  $p=0.029$ ) and employment status ( $OR=0.647$ ,  $p=0.050$ ) were identified as protective of occupational stress and the number of children ( $OR=0.433$ ,  $p=0.021$ ) identified as a protective factor of depression in EMTs when facing patients with suspected COVID-19.

**Implications for Practice:** This study showed that occupational stress is related to increased depression in EMTs. In addition, some demographic factors protect these disorders. Therefore, it is suggested to pay more attention to psychological symptoms and influencing factors in EMTs post-COVID-19 era. Also, psychological recovery skills should be improved in continuing professional development policy.

**Keywords:** COVID-19, Depression, Emergency Medical Technicians, Occupational Stress

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## Introduction

COVID-19 is a public health emergency and an international issue rapidly affected many countries (1,2). Due to the rapid spread of Covid-19 and the physical impact and high lethality of the disease, it poses a threat to human life and public health. In addition, this disease can have varying degrees of impact on the mental health of the population and in the long term lead to mental disorders (3). For instance, the SARS disease, an epidemic disease that occurred in China many years ago, led to many psychological effects (3,4). Therefore, it is predicted that the spread of Covid-19 will also cause psychological reactions like tension, anxiety, and fear, which eventually lead to psychological disorders such as stress, depression, and suicide (3). Meanwhile, the medical staff is in direct contact with this disease. So far, thousands of medical workers have died from this disease, and many are also suffering from its complications (5). In addition to the risk of contracting the disease, the medical staff faces great mental pressure regarding transmitting this disease to their relatives. This was also evident in the outbreak of SARS and Ebola (6,7). The tension and fear of losing one's life or those around you, or even blaming oneself for the loss of relatives, causes a lot of mental-psychological challenges in the personnel, especially the emergency medical technicians (EMTs) (8).

EMTs, at the frontline of the fight against Covid-19, are more vulnerable to the disease because they are in close contact with the disease and can spread it among colleagues and family members (3). EMTs are the first people in the chain to deal with COVID-19 when the condition of having corona is not yet known for a person, and one can suspect COVID-19 only from the patient's outward symptoms (9). The insecurity itself created occupational stress for these employees since the beginning of the Corona outbreak (10,11). Occupational stress occurs when the expectations of a person are more than the scope of its options and abilities. Continuous occupational stress can cause physical diseases (asthma, blood pressure, and heart diseases) and reduce the quality of life (12). Long-term occupational stress causes mental illnesses such as depression (13). Depression has multiple internal and external causes, and demographic characteristic might play an important role in terms of internal factors reasons (14). Occupational stress and depression can affect the professional performance of healthcare providers. Therefore, ignoring these mental disorders can harm to patients, increase costs and affect the personal lives of healthcare workers (12,15).

Recent studies have explicitly addressed the lack of knowledge about the psychological complications caused by COVID-19 and the need to investigate these complications. They have also made a point of screening medical staff for post-corona mental health disorders (16-18). Considering the mentioned consequences, it is very important to identify personnel at risk for occupational stress and depression, especially EMTs. In this regard, Magnavita reported that the prevalence of depression in anesthesia personnel working during the Covid era was 51% (19). Micali et al. (2022) also reported that 27% of the healthcare workers have a high level of occupational stress and 62% of them had an average level of occupational stress with little control and emotional exhaustion (20). Moreover, Zhang et al. (2020) reported very high occupational stress and depression in the medical staff who worked during the Covid era; they recommended screening personnel for these disorders (21). The studies carried out during the Covid-19 pandemic, after Corona and the peaks of the pandemic were not specifically discussed. The long-term effects of occupational stress have also not been investigated in the literature (20-24). In view of the lack of research on the relationship between occupational stress and post-corona depression, it is needed to perform more studies in this area. Nishihara et al. (2022) introduced a knowledge gap in mental disorders examination after the coronavirus peak (22). Due to the need to assess post-coronavirus occupational disorders and the lack of studies in this area, as well as to identify the number of EMTs at risk of occupational stress and explore its relationship with depression, therefore, the present study was conducted with aim to investigate the relationship between occupational stress and depression in EMTs when facing patients with suspected COVID-19 after corona peak.

## Methods

This cross-sectional correlational study was conducted in the Emergency Medical Services of Zanjan University of Medical Sciences from April to July 2022. This period was after the sixth peak of Corona in Iran. The studied population included EMTs working in the urban and road pre-hospital emergency centers of Zanjan University of Medical Sciences, and sampling was done using

convenience methods. The sample size was calculated as 200 people with a confidence level of 95%,  $\alpha=0.05$ ,  $\beta=0.80$ , and  $r=0.193$  based on the study by Lee et al. (25). To prevent attrition rate, 40% was added to the sample size. Thus, 256 pre-hospital samples were invited to the study, but 35 samples did not accept the invitation and 16 submitted incomplete questionnaires. Finally, 205 questionnaires were examined (response rate was 80%). The inclusion criteria were: working for at least one month during the outbreak of covid-19 (26) and having at least 5 occupational exposures to a suspected coronavirus patient (one who has at least two of the five symptoms of the coronavirus, including dyspnea, fever, cough, sputum, and decreased arterial blood saturation) (9). The exclusion criteria were an unfortunate event threatening the health of the personnel, history of psychological disorders, use of psychiatric drugs, and unwillingness to continue the study.

The tools used in the current study included the demographic information form, Goldberg depression scale and House and Rizzo's Work Stress Scale.

**The demographic information form:** It consisted of the research participants' characteristics including age, gender, education, marital status, number of children, employment status, work experience, and smoking.

**Goldberg depression scale:** Quoted from Magnavita, this scale was first designed by Ivan K. Goldberg (1972) and its different versions were updated over time (27). The main form of this scale has 18 questions with scores ranging from 0 to 90. Each of the statements of this questionnaire is scored on a 5-point Likert scale from very high (5), high (4), moderate (3), low (2), very low (1) and not at all (0). A higher score indicates more depression. This instrument classifies the total depression score into six levels: healthy (0-9), possibility of depression (10-17), borderline depression (18-21), mild-to-moderate depression (22-35), moderate-to-severe depression (36-53) and major depression ( $\geq 54$ ). When the sum of the scores exceeds 21, mental health specialists should be consulted for a more detailed examination and the level of treatment required should be determined. The face and content validity of this questionnaire was confirmed by Amini and et al., and Cronbach's alpha of 0.84 was reported to confirm its reliability (28). The Cronbach alpha coefficient of the reliability test in the present study was 0.966.

**House and Rizzo's Work Stress Scale:** This questionnaire was designed by Rizzo and House (1970) and has been used for years; it is one of the most reliable and common occupational stress questionnaires (29). The main form of this questionnaire has 15 questions with the scores ranging from 15 to 75. Questions 1 to 3 and 12 to 13 are graded on a 5-point Likert scale from always (5) to never (1). But the questions 4 to 11, as well as questions 14 and 15, are reversely scored. A higher score indicates more occupational stress. This instrument classifies the total occupational stress score into three levels: low (15-30), normal (31-45) and High (46-75). The validity and reliability of this questionnaire were approved in the study by Rasouli et al., and the Cronbach's alpha coefficient of the questionnaire was mentioned as 0.79 (30). In the present study, this questionnaire was approved by 10 members of the academic staff of Zanjan and Qom University of Medical Sciences in terms of content and face validity. In terms of reliability, Cronbach's alpha was calculated as 0.81.

This research was carried out after being approved by the Vice-Chancellor of Research and Technology of Zanjan University of Medical Sciences and with permission from the Ethics Committee. The ethical standards of the Institutional and National Research Committee and the 1964 Declaration of Helsinki were observed in this study. Also, the informed written consent was obtained from all personnel. Before completing the questionnaire, necessary explanations were given regarding the confidentiality of information and non-disclosure of personal information. Two researchers referred to the emergency centers and invited EMTs to participate in the study. In case of accepting to participate in the study, a printed questionnaire was provided to them. Due to job quarantine and the possibility of doing missions while completing the questionnaire, it was tried to distribute the questionnaires by coordinating and setting the time in advance. Also, during the mission, the researcher kept the questionnaires, and after the personnel returned from the mission, she would give them to complete.

The collected data were analyzed with SPSS software (version 21). The Kolmogorov Smirnov and Shapiro-Wilk tests were applied to check the normality of data that was non-normal, therefore, nonparametric tests were used for analysis. Considering the limitations of using software with SEM-CB capabilities, such as SmartPLS and WarpPLS, we used Spearman's correlation test to investigate the relationship between occupational stress and depression, which was appropriate for the purpose of

the research (31). Also, Logistic Regression test was used to check predictor variables.  $p < 0.05$  was considered statistically significant.

## Results

A total of 193 male (91.40%) and 12 female (5.90%) with mean age of  $34.90 \pm 7.87$  years participated in this study (Table 1). The mean of total score of occupational stress was  $45.80 \pm 6.48$  (15-75), and nine (4.39%), 88 (42.92%), and 108 (52.69%) of ETMs suffered from low, normal, and high levels of occupational stress, respectively. The mean of total score of depression was  $34.92 \pm 19.21$  (0-90) in the range of 5-90. Moreover, 23 (11.20%) of ETMs were healthy, and 20 (9.80%), 10 (4.90%), 43 (21%), 71 (34.6%), and 38 (18.5%) classified in the levels of possibility of depression, borderline depression, mild-to-moderate depression, moderate-to-severe depression, and major depression, respectively.

**Table 1. The factors related to occupational stress and depression in EMTs**

Factors	N(%)	Occupational Stress		Depression	
		Mean±SD	Test results	Mean±SD	Test results
<b>Gender</b>					
Male	193(94.10)	35.13±19.37	$p=0.841^*$	45.82±6.42	$p=0.512$
Female	12(5.90)	31.64±18.06	$z=-0.190$	45.61±7.96	$z=-0.650$
<b>Number of children</b>					
0	101(52.70)	46.65±6.07		37.24±20.14	
1	37(21)	45.83±6.33	$p=0.501^{**}$	39.02±19.19	$p=0.031$
2	36(18)	45.82±7.08	$z=2.321$	36.27±15.46	
3	16(7.80)	44.09±8.36		20.0±14.50	$z=14.220$
≥4	1(0.50)	46.10±6.50		35.86±19.23	
<b>Marital status</b>					
Single	63(30.70)	45.89±6.16	$p=0.812$	36.62±21.40	$p=0.461$
Married	142(69.30)	45.78±6.66	$z=-0.230$	34.53±18.14	$z=-0.732$
<b>Level of education</b>					
Diploma	2(1.00)	47.00±5.65		28.00±5.65	
Technician	98(47.80)	46.37±5.47	$p=0.021^{**}$	36.68±19.0	$p=0.370$
Bachelor	83(40.50)	44.99±7.64	$z=9.050$	34.82±20.87	$z=3.091$
MSc	12(5.90)	40.57±6.45		28.42±18.69	
PhD	10(4.90)	47.79±7.42		28.50±14.728	
<b>Employment status</b>					
Conscription law's conscripts	12(5.90)	47.00±3.38		36.12±20.99	
Temporary-to permanent	24(11.70)	46.59±7.42	$p=0.884^{**}$	28.35±18.30	$p=0.292$
Hiring Private company	63(30.70)	45.48±5.69	$z=1.160$	36.78±18.90	$z=4.910$
Contractual	47 (22.90)	45.92±7.21		39.58±21.61	
Permanent	59(28.80)	45.12±6.80		34.60±17.15	
<b>Smoking</b>					
No	198(96.60)	45.78±6.53	$p=0.883^*$	34.91±18.83	$p=0.912$
Yes	7(3.40)	46.21±5.23	$z=-.243$	35.28±30.14	$z=-0.113$
<b>Age</b>					
Mean±SD	34.90±7.87	$r=-0.020,$ $p=0.700$		$r=-0.009, p=0.900^{***}$	
<b>Work experience</b>					
Mean±SD	10.60±7.97	$r=-0.030,$ $p=0.960$		$r=-0.06, p=0.390^{***}$	

\*Mann–Whitney U test, \*\* Kruskal Wallis Test, \*\*\*Spearman

The findings showed that occupational stress has a positive and significant relationship with depression ( $r=0.189, p=0.009$ ) (Table 2).

**Table 2. The correlation between occupational stress and depression in EMTs based on spearman test**

Depression		Occupational Stress						
		Demand	Control	Communication	Role	Manager Support	Colleague Support	Total Score
Disappointment	<i>r</i> *	0.183	0.033	0.285	0.044	0.085	0.033	0.158
	<i>p</i> -value	0.009	0.636	0.000	0.527	0.223	0.639	0.024
Inability in decision making	<i>r</i>	0.184	0.030	0.244	0.129	0.023	-0.101	0.100
	<i>p</i> -value	0.008	0.665	0.000	0.064	0.746	0.148	0.153
Sadness & lack of interest in life	<i>r</i>	0.185	0.119	0.318	0.221	0.090	-0.092	0.196
	<i>p</i> -value	0.008	0.088	0.000	0.001	0.198	0.188	0.005
Total Score	<i>r</i>	0.198	0.097	0.321	0.188	0.082	-0.088	0.189
	<i>p</i> -value	0.004	0.166	0.000	0.007	0.245	0.207	0.009

\**r*: Correlation Coefficient

Also, Logistic regression analysis showed the level of education (OR=0.577,  $p=0.029$ ) and employment status (OR=0.647,  $p=0.050$ ) as protective of occupational stress and the number of children (OR=0.433,  $p=0.021$ ) identified as the most important protective factor in EMTs when facing tge patients with suspected covid-19 (Table 3).

**Table 3. The relationship between demographic characteristics with occupational stress and depression in EMTs based on logistic regression**

Variabels	Occupational Stress				Depression			
	<i>p</i> -value	OR*	95% CI**		<i>p</i> -value	OR*	95% CI**	
			Lower	Upper			Lower	Upper
Age	0.178	0.918	0.811	1.040	0.616	1.049	0.869	1.268
Gender	0.663	0.760	0.221	2.615	0.613	0.647	0.120	3.491
Marital Status	0.784	0.895	0.405	1.979	0.489	1.594	0.426	5.958
Number of children	0.625	1.117	0.718	1.738	0.021	0.433	0.213	.879
Education	0.029	0.577	0.527	1.033	0.606	0.881	0.543	1.428
Occupation	0.050	0.647	0.597	1.038	0.234	1.282	0.852	1.930
Occupational experience	0.147	1.089	0.971	1.222	0.881	0.987	0.830	1.174
Smoking	0.922	1.081	0.226	5.164	0.826	0.773	0.078	7.640

\* Odds Ratio \*\* Confidence Interval

## Discussion

As evidenced by the findings of the present study, most participants suffered from high occupational stress and moderate to severe depression. Occupational stress also had a positive and significant relationship with depression. Logistic regression analysis identified educational level and employment status as protectors of job stress and number of children as the most important protective factor of depression in patients suspected to coronavirus. Most of the EMTs had high occupational stress in dealing with Covid-19 patients. In this regard, Magnavita et al. (2020) (19), Rodriguez et al. (2020) (32) and Zare et al. (2021) (33) reported that occupational exposure during the COVID-19 era will lead to high levels of occupational stress among medical staff.

Occupational stress is a situation which is resulted from the interaction between people and work and leads to changes in the physical and mental state (34). There are various sources of occupational stress in medical staff, including direct and constant contact with patients' pain and suffering, staff shortages, working conditions (35), multiple tasks, high work volume, inadequate support system (36), and rotation. The existence of work shifts and the resulting sleep disturbance, physical problems, the complexity of care services (37,38), conflict between work and family life, and lifestyle disturbance (38,39) resulted in medical workers being exposed to more physical, psychological and social stress than other professions (38).

Another major issue causing occupational stress for employees during the COVID-19 epidemic was transmission of dangerous and deadly Corona disease (33). The medical staff were afraid of contracting this contagious disease. In addition, they feared being carriers of this disease and transmit it to their families. This problem imposes a great burden on healthcare providers (33). Even thinking that they have caused the disease to pass on to their relatives and cause their death is very distressing and has many psychological effects (40). All these challenges will have devastating effects on the personnel health. Therefore, these issues should be taken into consideration in the post-corona era (16-18). This problem has other stress mechanisms in EMTs. They are faced with suspected patients who do not yet have a definite diagnosis of corona. The lack of definitive diagnosis causes double concern (8). Sometimes the call is made by the patient and the family for other reasons, such as heartache, headache, weakness, and lethargy, and after the initial examination, emergency medical personnel suspect corona (41). A non-communicable disease was initially considered, but after examining the personnel, they suspected COVID (9). This issue causes anxiety in the EMTs, and they will be doubtful and worried about being a carrier. On the other hand, EMTs directly refer to patients' homes, where a person may be a carrier but has not been diagnosed, because the home environment is not controlled like a hospital. These issues create mental challenges for the personnel and over time will leave their destructive effects on their mental health.

The persistence of occupational stress will cause depression (13). Depression can be the most serious side effect after corona. In this regard, the present study showed that most of the participants had moderate to severe depression. Pranav Srikanth et al. in their research (2022) reported that 35% of the staffs had a major depressive disorder during covid-19 pandemic (42). Also, in the study by Manzanares et al. (2022), up to 25% of nursing professionals had depression. Also, the most important causes of depression can be unpleasant experiences, individual-social failures, physical and mental deprivations, communication problems, mental illnesses, stress, anxiety, etc. The emergence of these factors greatly accelerated during the Corona period (43).

According to the findings of the present study, occupational stress has a positive and significant relationship with depression. In this regard, the study of Yoshizawa et al. (2016) showed that occupational stress is related to depression (44). Also, Sriharan et al. (2020) confirmed the relationship between continuous occupational stress and depression (45). Constant stress causes depression through physiological mechanisms (16). Chronic stress disposal induces reduced hippocampal volume and diminished expression of neurotrophic factors and inhibits neurogenesis occurring in the dentate gyrus in the adults' brain. In the psychological stress-induced rat model of depression, levels of total zinc and mRNA expression of zinc transporting-associated proteins decreased in the hippocampus, while zinc functioned as a cofactor for enzymes that are critical for biochemical processes, especially in the brain (46). On the other hand, stress is a factor causing an imbalance in a person's physical and mental state, and by creating psycho-physical problems, it reduces a person's efficiency in various dimensions of work, social and family life, and leads to depression (47). Of course, the prevalence of stress and depression have two-way effects, and the presence of one can cause the other in the long run (14,48). Therefore, effective policies should be considered by the authorities in order to reduce these two issues in the personnel. One of the solutions in this field is to improve the individual skills of the personnel to psychological recovery. Typically, these skills are improved in continuing professional education courses.

Logistic regression in the present study showed educational level and employment status to be effective in predicting occupational stress in emergency medical personnel when dealing with Covid-19 patients. The study of Kakemam et al. (2019) reported that the level of nurses' education is a protective factor against occupational stress (49). Hasan et al. (2018) also reported education as an effective factor in occupational stress (50). Therefore, improving education is considered an effective and protective factor against occupational stress because it is usually associated with increasing age, changing employment status, and marriage. In fact, people who have advanced education can pass employment exams and are considered employees in medical sciences (51). The field of emergency medicine is one of the fields where employees can study while working. Naturally, a better employment situation is associated with a reduction in stress levels (12).

Also, logistic regression in the present study identified the number of children as a protective factor in predicting depression for EMTs when facing covid-19 patients. Having a child causes more frequent meetings between parents and children. On the other hand, parents become more engaged in their

daily lives and try harder to improve themselves and their children. Being involved in these activities reduces isolation and loneliness and finally depression (52).

The main limitation of the present study was the unpredictability of the end of Corona when screening for depression and work-related stress. We therefore collected the data after the sixth peak of Corona (April 2022). We cannot certainly say that work and depression are exclusively related to Corona, but we attempted to increase the certainty of our research through inclusion criteria. However, when we assessed the emergency medical services (EMS), most of the missions were related to Corona.

### **Implications for practice**

The results of this study showed that most of the EMTs who face patients suspected of having COVID-19 have high occupational stress and moderate to severe depression. Also, occupational stress has a positive and significant relationship with depression. Encountering covid-19 patients was a stressful factor for EMTs. On the other hand, some demographic factors were recognized as protective of occupational stress and depression. Therefore, paying attention to psychological factors such as occupational stress and depression and the influencing factors in emergency medical personnel should be one of the priorities of the post-coronavirus era. It is also necessary to improve the individual skills of personnel to psychological recovery in the form of continuing professional education classes.

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### **Conflicts of interest**

The authors declared no conflict of interest.

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