Journal of Experimental and Clinical Medicine
https://dergipark.org.tr/omujecm

Research Article

J Exp Clin Med
2022; 39(1): 12-16
doi: 10.52142/omujecm.39.1.3

The prevalence of occupational accidents and diseases among 112 emergency medical workers and factors affecting it

Kevser TUNCER KARA[1,*], İrem BULUT[1], Ramazan GURGOZE[2], S. Erhan DEVECI[1] A. Ferdane OGUZONCUL[1]

[1]Department of Public Health, Faculty of Medicine, Fırat University, Elazığ, Turkey
[2]Department Emergency Medicine, Elazıg Provincial Health Directorate, Elazığ, Turkey

Received: 22.04.2021 • **Accepted/Published Online:** 06.06.2021 • **Final Version:** 01.01.2022

Abstract

Occupational health has been defined by the World Health Organization (WHO) as employees in all professions have complete physical, mental, and social well-being and maintain and develop this well-being. This study aimed to determine the prevalence of work-related risks, work-related diseases, occupational accidents, and diseases faced by 112 emergency medical workers and factors affecting it. This descriptive, cross-sectional study included 415 health personnel working in 112 emergency medical services in Elazig Province. It was found that 74.7%, 21.2%, and 6.3% of participants, throughout their professional life, have experienced at least one of the work-related risks, occupational accidents, and diseases, respectively. Female employees experienced more work-related diseases ($p<0.01$), work-related risks ($p<0.01$), and occupational accidents ($p<0.01$) than males. Being female was identified as a risk factor, and training on occupational health and safety issues was a protective factor.

Keywords: occupational accident, occupational disease, work-related risk, 112 EMW, occupational health

1. Introduction

Occupational health has been defined by the World Health Organization (WHO) as employees in all professions have a complete physical, mental, and social well-being, and also maintenance and development of this well-being (1). When this state cannot be achieved, work accidents and occupational diseases can occur (2). Occupational diseases can be led to exposure to chemical, physical, and biological risk factors. The work environment and condition may also play a role, together with other risk factors in developing these diseases characterized by a multiple etiology which is named work-related disease. In occupational disease, there is a direct cause-effect relationship between hazard and disease. In contrast, in work-related disease, the work environment contributes to developing the disease multifactorial and complex etiology as one of several factors (3). These emergencies are all different from each other because of the unique working environment of each profession. Therefore, healthcare providers need to protect their health while providing health care, one of the main areas of work. "Activities in health institutions where outpatient and/or inpatient diagnosis and treatment are done" have been classified as hazardous works in the world and Turkey (3). This danger reaches its highest level among 112 emergency medical workers (EMWs), and so they have difficulty maintaining their health while providing emergency service (4).

Ambulance services, which are one of the first and emergency services, aim to protect life, taking measures against unexpected dangers, speeding up the treatment, and timing the procedures correctly (5). 112 EMWs consist of a physician, nurse, ambulance and emergency care technician, emergency medical technician (EMT), and health officer in Turkey (6). The guide created by the Turkish Labor and Social Security Institution defined falls, bumps, percutaneous injury, exposure to body fluids, exposure to chemicals, stress, non-ergonomic applications that cause musculoskeletal disorders, traffic accident, violence, and oxygen tube burst as significant risks to 112 EMWs (6). The prevalence of these risks, and work-related diseases caused by them and the prevalence of occupational accidents and diseases and influencing factors should be clarified with further and comprehensive studies.

Therefore, this study was performed to determine the prevalence of work-related risks, work-related diseases, occupational accidents, and diseases encountered by 112 EMWs in Elazıg city center and the factors affecting it.

2. Material and Methods

2.1. Study design and study setting

We included 415 health personnel working in 112 emergency medical service (EMS) in Elazig Province in this descriptive, cross-sectional study. Ethical permission was obtained from Fırat University Rectorate Non-Interventional Research Ethics Committee (06.02.2020/03-01) and administrative approval from Elazig Provincial Health Directorate.

* Correspondence: nurkev23@hotmail.com

2.2. Population and sample size

According to the data of Elazig Provincial Health Directorate dated 01.02.2020, 112 EMS employs 464 personnel, consisting of 18 physicians, 147 paramedics, 139 EMT, 23 paramedics, 5 nurses, and 132 ambulance drivers. Due to being on leave (30 persons) and not volunteering (19 persons), 415 (89.4%) health workers could be reached.

2.3. Data collection

The literature-based questionnaire consisted of four parts; the socio-demographic information, training status on occupational health and safety, the status of experiencing occupational accidents and diseases, and protection status from occupational accidents and diseases: socio-demographic part contained fill-in-the-blank and multiple-choice, and other sections optional questions (7-9). In socio-demographic information, age (also grouped as 20-30, 31-40, 41-50, > 50), gender, marital status, the working year, profession, academic education status was interrogated. Occupational accidents and diseases, prevention of those diseases, and the status of receiving training on personal protective equipment (PPE) were asked in the second section (about training on occupational health and safety). The risks leading to occupational accidents and diseases, the position of experiencing them, and work-related diseases were interrogated in the third part of the survey. The fourth part, which is protection status from occupational accidents and diseases, included questions about immunization status (hepatitis A, hepatitis B, influenza vaccine (annual regular), flu shot (not regular/at least once, tetanus), and use of PPE.

2.4. Outcome measures

The protection score (PS) was calculated by evaluating immunization status, and each of the subtitles of PPE usage as 1 point. The prepared survey was submitted online to 112 EMWs' phones in March 2020 via Google Docs. The reply form was then sent to the researcher by mail.

2.5. Data analysis

The data obtained from the study were evaluated with SPSS 22.0. According to the characteristics of the variables, percentage, mean, t-test, Mann Whitney U, Kruskal Wallis, chi-square, and logistic regression tests were used in statistical analysis. Means were given with standard deviation (mean ± SD), and statistical significance was accepted as $p<0.05$.

3. Results

The average age of the 112 EMWs involved in the study was 33.28 ± 8.85 (min: 20, max: 62). Of the participants, 66.0% were male, and 69.2% were married. 33.8% were EMT, 30.5% were nurse/health officers, and 37.8% were high school graduates. 81.9% have received training on occupational accidents and diseases and preventing them and PPE (Table 1). The participants' average working time was 9.15 ± 6.95 (min: 1, max: 31) years. In terms of work-related risk types, 35.2 % experienced fall/bump, 23.4% stress, 22.4% contact with body fluids, 19.3% traffic accident, 21.2% violence (3.9% physical, 17.3% verbal), and 5.1% experienced exposure to chemicals. Whereas 92.7% of violence victims did not apply for white code, 7.0% of those who had a work accident did not notify. Besides, 82.1% of those with occupational diseases were diagnosed with a herniated disc.

Table 1. Socio-demographic information

	n	%
Sex		
Female	141	34.0
Male	274	66.0
Marital Status		
Married	287	69.2
Single	123	29.6
Other	5	1.2
Profession		
EMT	140	33.8
Paramedics	66	15.9
Physicians	12	2.9
Nurse/health officer	126	30.5
Driver	70	16.9
Education Status		
High school	157	37.8
Associate degree	142	34.2
Undergraduate	105	25.3
Postgraduate	11	2.6
Occupational Accident Training		
Yes	340	81.9
No	75	18.1
Work Accident Prevention Training		
Yes	340	81.9
No	75	18.1
PPE Training		
Yes	340	81.9
No	75	18.1
Work related hazard, risk		
Yes	310	74.7
No	105	25,3
Occupational Accident		
Yes	88	21.2
No	327	78.8
Occupational Disease		
Yes	26	6.3
No	389	93.7

Female workers experienced more work-related diseases ($p<0.01$) and risks that will cause occupational accidents and diseases ($p<0,01$) than males. Also, they had more occupational accidents ($p<0.01$), more applied for occupational diseases ($p=0.032$), and were more diagnosed with those diseases ($p=0.027$) than males. No difference was found between female and male workers regarding immunization status ($p=0.533$) and taking any protective measures ($p=0.329$). However, the total protection score of female participants was higher than males ($p=0.008$). Those with the highest work-related risks were singles, and those with the least were married ($p=0.01$). No difference was seen in terms of marital status and the status of experiencing an occupational accident ($p=0.754$). Singles had more work-related diseases than married and divorced ($p=0.003$). When compared according to academic education groups, high

school graduates experienced fewer hazards and risks (p<0.01), work-related diseases (p<0.01), and occupational accidents (p=0.01). The high school graduate group's PS was significantly lower than the other groups (p<0.01).

Those who received training on occupational accidents and diseases took more precautions than those who did not (p<0.01) and had higher PSs (p<0.01). Those who received training on the prevention of occupational accidents and diseases took more precautions than those who did not (p<0.01) and had higher PSs (p<0.01). It was also striking that those who received training on PPE took more precautions (p<0.01) and had higher PSs than those who did not (p=0.01). Participants were grouped as 20-30, 31-40, 41-50, > 50 by age. The 20-30 age group experienced more hazards and risks (p<0.01) and work-related diseases than other age groups (p<0.01). 41-50 age group was the group that took the most precautions (p=0.029). It was found that the PS decreased with increasing age (p=0.02, r=-0.114) but increased with an increasing number of keeping watch (p=0.031, r=0.106). All 112 EMWs with a rate of 21.2%, males 19.0 %, and females 25.5% were exposed to at least one type of violence. Although females were more often subjected to violence, this trend was not statistically significant (p=0.122). Singles have experienced more violence than any other marital status (p=0.02), besides the graduate education group was exposed to more violence compared to other education groups (p=0.01) and the 20-30 age group compared to other age groups (p=0.047). Age, marital status, profession, academic education status, and working year were evaluated by logistic regression analysis to determine risk factors for exposure to work-related risks. Being a female, young age, advanced academic education, and increasing working year were determined as a risk factor, and being a driver as a protective factor (Table 2).

Table 2. Risk factors for exposure to work-related hazards and risks

	B	p	OR	CI
Sex	-0.649	**0.009**	2.261	1.278-4.167
Age	-0.074	**0.006**	0.929	0.882-0.979
Marital Status (Ref=Married)				
Single	-1.696	0.166	0.183	0.017 2.017
Other	-1.229	0.332	0.293	0.024-3.504
Profession (Ref=EMT)				
Paramedics	-0.653	0.192	0.520	0.195-1.389
Physician	-0.879	0.163	0.415	0.121-1.429
Nurse	-1.036	0.253	0.355	0.060-2.098
Driver	-1.608	**<0.001**	0.200	0.094-0.428
Education status	0.703	**<0.001**	2.020	1.439-2.836
Working year	0.065	**0.018**	1.068	1.011-1.127

Risk factors for experiencing work-related diseases were identified as being a female and having higher academic education (Table 3).

Table 3. Risk factors for experiencing work-related diseases

	B	p	OR	CI
Sex	-0.560	**0.003**	2.024	1.379 3.374
Age	-0.023	0.394	0.977	0.926-1.031
Marital Status (Reference =Married)				
Single	0.407	0.735	1.502	0.143-15.800
Other	0.682	0.575	1.977	0.183-21.357
Profession (Ref=EMT)				
Paramedics	0.575	0.181	1.777	0.766-4.120
Physician	0.311	0.534	1.365	0.512-3.637
Nurse	0.505	0.489	1.657	0.396-6.929
Driver	-0.659	0.083	0.517	0.245-1.090
Education status	0.584	**<0.001**	1.793	1.351-2.379
Working year	0.047	0.101	1.048	0.991-1.108

The logistic regression analysis of age, gender, marital status, profession, academic education status, and the working year was assessed to reveal risk factors for occupational accidents. Being a female, advanced academic education status, and increasing working year observed as a risk factor, and being a driver found to be a protective factor (Table 4).

Table 4. Risk factors for experiencing occupational accidents

	B	p	OR	CI
Sex	-1.046	**<0.001**	2.849	0.196-0.629
Age	-0.053	0.134	0.949	0.886-1.016
Marital Status (Ref= Married)				
Single	-0.388	0.747	0.679	0.064-7.148
Other	-0.293	0.810	0.746	0.069-8.120
Profession (Ref=EMT)				
Paramedics	-0.481	0.348	0.618	0.226-1.689
Physician	-0.854	0.159	0.426	0.129-1.399
Nurse	-0.289	0.727	0.749	0.147-3.801
Driver	-0.935	**0.045**	0.393	0.157-0.980
Education status	0.311	0.063	1.365	0.983-1.896
Working year	0.085	0.019	1.088	1.014-1.168

4. Discussion

The prevalence of work-related risks, work-related diseases, occupational accidents, and diseases encountered by 112 EMWs in Elazıg city center and the factors affecting it were evaluated in this study. Most of the EMWs were EMTs and nurses. Being a woman was determined as a risk factor and getting an education as a protective factor. Our participants' average age was 33.28, and in one research to determine the profile of emergency workers in Spain, this was the same decade, like our study results (9). Again, our study revealed in parallel with the same research that most of the workers were male and married (9). This finding has suggested that 112 EMSs are preferred by the younger age group and males due to the massive working conditions.

Most of the 112 EMWs in this study have received informational training about prevention and awareness of occupational accidents and diseases, and PPE's use still leads to occupational accidents and diseases. Some were not reported from occupational accidents. In Onal's recent study that we mentioned above, the rate of having a traffic accident in the ambulance was found like our results (10). Despite the high rate of training at least once in a lifetime, work-related risks and occupational accidents also occurred in this researcher's study group. Therefore, it has been thought that periodic evaluation of EMWs' training and practices, periodically giving the necessary training, identifying difficulties in implementation, encouraging EMWs to implement, and the diligent work of occupational health and safety inspectors in the field is required (11). We, moreover, believe that it would be beneficial to carry out further and comprehensive studies for more effective reporting of work accidents. In the current study, the frequency of verbal violence was higher than physical violence. Females were exposed to at least one type of violence more than males. Most of the violence victims did not apply for the white code. Singles and younger age group were remarkably more exposed to violence. These results revealed the requirement for a detailed investigation of risk factors for violence and taking necessary measures. In a study by Gulen et al., patient-related violence was evaluated, and the frequency of physical violence and verbal violence by health workers was higher than in our study (12). In the literature data, this variation in rates may have resulted from the different regions where the studies were conducted.

The herniated disc was the most common of the work-related diseases found in our study. In another recent study, low back pain was associated with the activity limitation in ambulance workers (8). It has even been reported that the work and physical conditions' seriousness are the most critical stressors (13). Concerns about working conditions have appeared to be a major risk factor for health complaints (14). In a study conducted in the USA, examining occupational health and safety for EMWs, it was found that all workers should be subjected to a special training program according to their position. It was also emphasized that a system operated with trained and experienced human resources positively affected practical work in cooperation in all institutions related to occupational health and safety (7). We think that effective models should be applied by adapting to our country and that this may have beneficial and positive results for our country.

In the current study, female workers experienced approximately two times more work-related diseases and risks causing occupational accidents and diseases than males. They, again, about two times more than males, both applied for occupational diseases and were diagnosed with those diseases. There was no difference between males and females in terms of having any immunization and taking protective measures. However, the total PS of female workers was higher than males. Although females did not act differently regarding implementing at least one of the measures, they had high PSs. This means that women experienced more risk, despite more protection. In the literature, in various studies, it has been mentioned that the increasing female population in health workers changes the psychosocial dynamics, and it increases the danger (2).

In this study, those who received training on occupational accidents and diseases, prevention of them, and PPE took more precautions than those who did not, and their PSs were also higher. Those trained in all subjects were acting more carefully, which showed the positive effect of vocational education. As academic education progressed, rates of exposing to risks and experiencing work-related diseases increased. We have predicted that the self-confidence created by academic education, causing carelessness, yielded these results.

This study found that ambulance drivers experienced fewer risks and occupational accidents than other professions. In another study, being a doctor or other medical worker was riskier for developing occupational or work-related diseases than being a paramedic, EMT, or a driver (10). This finding is like our study results. It may have resulted from the fact that ambulance drivers are at less risk and lack an active healthcare provision role. As the working years increased, the increase of experiencing risks and occupational accidents has been considered the natural effect of time passed away.

This study's limitation is that data included in the present study were obtained by the survey method, so they are based on the study participants' statement. If there were an occupational health and safety file for EMWs and saved in this file, all the situations, personal information, and training received would be completely objective. There was no such data. Therefore, all data were obtained from the participants through questionnaires. Our study's strength is that all the province health workers that can reflect 112 EMWs across Turkey are included regardless of the occupational groups.

In this study to determine the prevalence of work-related risks, work-related diseases, occupational accidents, and diseases, and factors affecting it that 112 EMWs in Elazig Province encountered, it was established that 74.7% of the personnel experienced work-related hazards and risks, 21.2% work accidents, and 6.3% experienced occupational diseases. Being a female was determined as a risk factor and receiving training on occupational health and safety issues as a protective factor. It was observed that there were unreported work accidents and situations of violence. Therefore, efforts to eliminate the hazards and risks encountered should be made, and occupational health and safety training should also be repeated periodically. As the next step, occupational safety inspectors must serve on the field and even make notifications easy for employees.

Conflict of interest

None to declare.

Acknowledgments

None to declare.

References

1. WHO. Regional strategy on occupational health and safety in sear country. New Delhi: WHO Publications; 2005.
2. Peckham TK, Baker MG, Camp JE, Kaufman JD, Seixas NS. Creating a future for occupational health. Annals of Work Exposures and Health. 2017;61(1):3-15.
3. Franco G. Lavoro e salute: la work-related disease [Work and health: work-related disease]. G. Ital. Med. Lav. 1986 Jan;8(1):27-35.
4. Occupational Health and Safety Law. 2012 [Available from: http://www.mevzuat.gov.tr/MevzuatMetin/1.5.6331.pdf.
5. Onal O. Sterilization Disinfection in Ambulance and First Responder. 4 National Sterilization Disinfection Congress. 2005:344-74.
6. Bulut A. Determination of OHS Risks and OHS Guideline for 112 Emergency Ambulances Ministry of the Labour and Social Security, Directorate General of Occupational Health and Safety Thesis for Occupational Health and Safety Expertise. Ankara, 2016.
7. Toyoda H, Kubo T, Mori K. Occupational safety and health system for workers engaged in emergency response operations in the USA. J. Occupational Health. 2016;58(6):260-70.
8. Aasa U, Barnekow-Bergkvist M, Angquist KA, Brulin C. Relationships between work-related factors and disorders in the neck-shoulder and low-back region among female and male ambulance personnel. J. Occupational Health. 2005;47(6):481-9.
9. Martínez-Isasi S. R-LMJ, Vázquez-Santamariña D., Abella-Lorenzo J., Castro Dios D. J., Fernández García D. Emergency medical technician profile in Spain. Revista espanola de salud publica. 2017;91.
10. Onal O. Occupational risk situation of health staff that is working at the emergency health stations. Journal of Contemporary Medicine. 2015;5 239-44.
11. Faller EM, Bin Miskam N, Pereira A. Exploratory study on occupational health hazards among health care workers in the Philippines. Ann. Glob. Health. 2018;84(3):338-41.
12. Gulen B, Serinken M, Hatipoğlu C, Ozasır D, Sonmez E, Kaya G, et al. Work-related injuries sustained by emergency medical technicians and paramedics in Turkey. Turkish Journal of Trauma and Emergency Surgery. 2016;22(2):145-9.
13. Sterud T, Hem E, Ekeberg O, Lau B. Occupational stressors and its organizational and individual correlates: a nationwide study of Norwegian ambulance personnel. BMC Emergency Medicine. 2008;8:16.
14. Aasa U, Brulin C, Angquist KA, Barnekow-Bergkvist M. Work-related psychosocial factors, worry about work conditions and health complaints among female and male ambulance personnel. Scandinavian Journal Of Caring Sciences. 2005;19(3):251-8.