



Original communication

The investigation of the impacts of major disasters, on the basis of the Van earthquake (October 23, 2011, Turkey), on the profile of the injuries due to occupational accidents



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ARTICLE INFO

Article history:

Received 3 April 2015

Received in revised form

19 June 2015

Accepted 28 June 2015

Available online 6 July 2015

Keywords:

Occupational accidents

Earthquakes

Injuries

Occupational health

Work safety

ABSTRACT

The purpose of this study is to identify the impacts of major disasters, on the basis of the Van earthquake (October 23, 2011, Turkey), on the profile of the injuries due to occupational accidents. In this study, we evaluated 245 patients of occupational accidents who were admitted to emergency services of Van city hospitals in the 1-year periods including pre-earthquake and post-earthquake. We determined that there was a 63.4% ($P < 0.05$) increase in work-related accidents in the post-earthquake period compared to the pre-earthquake period. Also, injuries due to occupational accidents increased 211% ($P < 0.05$) in the construction industry, the rate of injuries due to falls from height increased 168% ($P < 0.05$), and the rate of traumas to the head and upper limbs increased 200% ($P < 0.05$) and 130% ($P < 0.05$), respectively, in the post-earthquake period compared to the pre-earthquake period. We determined that the ignoring of measures for occupational health and safety by employers and employees during conducted rapid construction activities and post-earthquake restoration works in order to remove the effects of the earthquake increased the number of work accidents. In this study, the impact of disasters such as earthquakes on the accidents at work was evaluated as we have not seen in literature. This study emphasizes that governments should make regulations and process relating to the post-disaster business before the emergence of disaster by taking into account factors that may increase their work-related accidents.

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1. Introduction

According to Article 1 of the 2002 Protocol of Occupational Health and Safety Policy (1981) of the International Labour Organization (ILO), "the term 'occupational accident' covers an occurrence arising out of, or in the course of, work which results in fatal or non-fatal injury".¹ The legal definition of occupational accident varies according to country: all accidents that have occurred in workplaces, without the need for another definition, are considered occupational accidents in some countries (including the United Kingdom, Botswana, and Myanmar); accidents occurring during business execution were accepted as occupational accidents in

some other countries (such as Norway and Sweden); whereas sudden and unexpected events and/or activities involving workplace violence have been referenced in some definitions of occupational accidents in laws of the United States and some other countries.² The ILO has developed the definition of occupational accident as an event unplanned in advance, unknown and which could not be controlled, and around which damage could be caused. An occupational accident was defined as "the event is unplanned in advance, and causing personal injury, property damage and production stoppage" by the World Health Organization (WHO).³

In Turkey, the definition of occupational accident is quite extensive in Article 13 of the Social Security and General Health Insurance Law, which entered into force in 2006. The definition of occupational accident includes the accidents that occurred in work time, accidents that depend on the work being carried out, accidents that occurred due to duty outside the workplace, accidents

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that occurred during breastfeeding permission time, and accidents that occurred during transportation between one's dwelling and workplace, and it is defined as an event that causes physical or mental disabilities immediately after the accident or later.⁴

According to the ILO data, an average of 313 million occupational accidents occur every year in industrial production worldwide. 350,000 people died due to occupational accidents occurred in 2013.⁵ It was reported that 1 person in 10 employees in the developed industrial countries is exposed to occupational accidents every year. In some businesses, this rate increases to 1 person in 3 employees.⁶ Hämäläinen et al. who have studied on the global estimates of occupational accidents reported that the total number of occupational accidents and fatal work-related diseases have increased, but the fatality rates per 100,000 workers have decreased.^{7,8}

In Turkey, 74,181 occupational accidents occurred in 2012; 744 workers died, 2036 workers were injured, and 1,645,431 workdays were lost in these accidents.⁹

Turkey has faced major natural disasters for centuries due to its location in the world and its geological structure. These disasters have caused significant loss of life and property and negatively affected the socioeconomic development in Turkey. Earthquakes, among natural disasters affecting Turkey, were defined as the most dangerous kind, with maximum life and property loss.¹⁰ However, in the earthquake (magnitude: 7.2) that occurred on October 23, 2011, in Tabanlı Village of Van (Turkey), 2262 buildings were destroyed, 601 people died, and 4152 people were injured. Subsequently, 17 days after the first earthquake, on November 9, 2011, a second earthquake (magnitude: 5.6) occurred in Edremit Village of Van; 25 buildings were destroyed, 40 people died, and 30 people were injured.¹¹ After the earthquakes, major construction activities were initiated in Van province and district, primarily for the construction of temporary housing and then the construction of permanent housing.¹² Some of the people who resided in Van had gone to other provinces, for some of their dwellings were destroyed, and others were psychologically affected by the earthquake. However, some people came as workers to Van from other provinces because the starting of construction activities following the earthquake revealed new business opportunities.

In this article, we chose the earthquake (magnitude: 7.2) that occurred on October 23, which caused more damage, as the reference point. We retrospectively evaluated the injuries due to occupational accidents that occurred in Van province in the 1-year periods pre-earthquake and post-earthquake. The aim of this study was to identify the impacts of major disasters, on the basis of the Van earthquake (October 23, 2011, Turkey), on the profile of the injuries due to occupational accidents.

2. Material and methods

In this study, we retrospectively reviewed the hospital documents of patients admitted to emergency services of 2 Van city hospitals (Van Regional Training and Research Hospital and Dursun Odabas Medical Center of Yuzuncu Yil University) with injuries due to occupational accidents in the pre-earthquake period (between October 24, 2010, and October 23, 2011) and post-earthquake period (between October 24, 2011, and October 23, 2012). Those with injuries due to occupational accidents in the pre-earthquake period were defined as "Group 1," whereas those with injuries due to occupational accidents in the post-earthquake period were defined as "Group 2." The patients of occupational accidents were respectively evaluated according to age, gender, month and season the occupational accident occurred, sector, accident type, trauma localization, duration of hospitalization in the emergency

department, prognosis, and imperfection types causing to accidents at work Group 2.

While the injuries and deaths that occurred at work during the earthquake were included in the definition of occupational accidents, in the present study, these injuries and deaths unfortunately could not be evaluated because of deficiencies of medicolegal inquiries. During emergency intervention applied for mass injuries and mass casualties that occurred in the earthquake, the medicolegal inquiry about the type of events and localization of events had been ignored due to clutter associated with a lack of forensic experts in the region.

In the classification of types of accidents at work, injuries due to falls from heights, penetrating or perforating injuries, and injuries due to electrocutions were evaluated in each of these types of injuries their own separate class. Injuries due to compressions between two objects, injuries due to remaining below an object, blunt injuries in transport accidents, and injuries with impact of blunt objects or with splashes of blunt objects were evaluated in an "other blunt traumas" class. Finally, injuries due to burns, poisonings, asphyxias, and other causes were described as "other injuries."

We used a chi-square test to statistically evaluate the obtained data. The statistical significance levels were set at 5%.

3. Results

In 2 years, including the pre-earthquake and post-earthquake periods, 245 injuries occurred due to occupational accidents. Of them, 93 (38%) were in Group 1 and 152 (62%) in Group 2 ($P < 0.05$). Thus, the rate of injuries due to occupational accidents increased 63.4% in the post-earthquake period compared to the pre-earthquake period. All of patients involved males in both periods. The mean age of Group 1 was 33.5 ± 10.4 (min: 18, max: 60) years, and that of Group 2 was 32.2 ± 11.9 (min: 17, max: 59) years. The patients in Group 1 were concentrated in the 31–40 years of age range ($n = 33$; 35.5%) ($P < 0.05$), whereas the patients in Group 2 were concentrated in the 21–30 years of age range ($n = 60$; 39.5%) ($P < 0.05$) (Fig. 1). There was no statistically meaningful age distribution between the 2 groups ($P > 0.05$).

When we evaluated the distribution of the patients by month and season, we saw that 45.2% of the patients in Group 1 ($n = 42$) were injured in summer months ($P < 0.05$) and 30.3% of cases in Group 2 ($n = 46$) were injured in the first 2 months of autumn of 2012 ($P < 0.05$) (Fig. 2). The proportional change in the seasonal distribution of occupational accidents was statistically meaningful ($P < 0.05$).

Out of the occupational accidents causing injury to patients in Group 1, 47.3% occurred in the industry sector and 37.6% were in the construction sector ($P < 0.05$). In Group 2, most of the accidents occurred in the construction sector (71.7%) ($P < 0.05$). In the post-earthquake period, occupational injuries increased 211% in the construction sector and 129% in the transport sector, while decreasing by 45% in the industry sector and 57% in other sectors ($P < 0.05$) (Fig. 3).

In Group 1, most of the injuries occurred due to other blunt traumas ($n = 34$; 36.6%), followed by injuries due to falls from heights ($n = 22$; 23.7%) and other injuries ($n = 22$; 23.7%) ($P < 0.05$) (Fig. 4). However, in Group 2, most of the injuries occurred due to falls from heights ($n = 59$, 38.8%), followed by injuries due to other blunt traumas ($n = 50$, 32.9%) ($P < 0.05$). In the post-earthquake period, compared to the pre-earthquake period, injuries due to falls from heights increased 168% ($P < 0.05$), penetrating or perforating injuries increased by 131% ($P < 0.05$), injuries due to other blunt traumas increased by 48% ($P > 0.05$), and injuries due to electrocutions increased by 17% ($P > 0.05$), while other injuries decreased by 60% ($P < 0.05$).

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