



ORIGINAL ARTICLE

## Evaluation of the deaths secondary to entrapment under the debris in the Van earthquake<sup>☆</sup>

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Received 20 July 2012; revised 24 January 2013; accepted 14 February 2013

Available online 31 March 2013

### KEYWORDS

Earthquake;  
Entrapment under the debris;

**Abstract** *Introduction:* An earthquake occurred on October 23, 2011 at 13:41 in the Van city of Turkey. According to the Kandilli Observatory and Earthquake Research Institute, the magnitude of this earthquake was measured as 7.2 on the Richter scale. The earthquake caused deaths and injuries due to entrapment under the debris. This study has been planned in order to evaluate

<sup>☆</sup> This research has been presented as a poster presentation in the 22th International Academy of Legal Medicine Congress held between the dates July 5–8, 2012.

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Peer review under responsibility of Forensic Medicine Authority.



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Crush syndrome;  
Death;  
Autopsy

the features of these deaths and to discuss the obtained data comparatively with the literature.

*Materials and methods:* External examination of the corpses and autopsy reports drawn up for Van Attorney Generalship in the city center were evaluated retrospectively.

*Results:* Totally 51 deaths secondary to the entrapment under the debris were analyzed. Twenty-seven cases (52.9%) were females and 24 cases (47.1%) were males. All the deaths occurred in houses or workplaces. The causes of deaths were as follows: head trauma together with visceral organ laceration in 30 cases (58.8%), mechanic asphyxia in 14 cases (27.5%) and the crush syndrome in seven cases (13.7%). Deaths due to the crush syndrome occurred after victims' were rescued alive after having been under the debris.

*Conclusion:* Traumatic findings are usually generalized and extensive in deaths related with earthquakes. Multiple fractures of cranial bones, ribs, extremities and injuries of visceral organs and major vessels are determined in the external examination. On the other hand, forensic pathologists should not disregard the diagnosis of the crush syndrome in traumatic deaths, especially if the trauma is secondary to the entrapment under the debris following an earthquake.

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## 1. Introduction

Turkey is a country located on a seismic belt. Earthquake is the most important fatal natural disaster.<sup>1</sup> An earthquake occurred on October 23, 2011 at 13:41 in the Van city of Turkey. The epicenter of the earthquake was Tabanlı, which is 17 km away from the Van city center and according to the Kandilli Observatory and Earthquake Research Institute the magnitude of this earthquake was measured as 7.2 on the Richter scale. The human losses comprised 239 dead and 1100 injured people; and a great number of houses and workplaces were destroyed.<sup>2</sup>

Earthquake is associated with numerous deaths in crowded city regions and in buildings with weak structural quality. The injuries resulting in death are usually penetration wounds and involve multi-systems. The mortality rate increases due to the crush syndrome and related complications.<sup>3</sup> Chest trauma is an important risk factor for death in the earthquakes.<sup>4-8</sup> The crush injury of the chest, which is a life threatening injury, can lead to pulmonary parenchymal damage and multiple fractures.<sup>9,10</sup>

The aim of this study has been to evaluate the deaths secondary to the entrapment under the debris following the earthquake which was one of the largest on the scale in the country's history.

## 2. Materials and methods

External examination of the corpses and autopsy reports drawn up for Van Attorney Generalship in the city center were evaluated retrospectively. Deaths secondary to entrapment under the debris in the earthquake were analyzed. Van city of Turkey is nowadays a critical region of terrorism having counties located far from each other and the city center. Thus, this study has been planned to cover the data of only deaths that occurred in the city center. Deaths which had occurred in the counties or villages and the deaths for which death certificates had been drawn up in the district hospitals could not be included in the study. The number of deaths evaluated and presented in this study as a forensic medicine view of point is 51 (21.33%). These 51 deaths were the ones for which postmortem external examinations had been performed among totally 239 deaths resulting from the earthquake. Due to the following

conditions after the earthquake: disorganization, technical problems, disallowance to step into the court house after its moderate destruction, obligation of the forensic experts serving in a tent for 4 months, movement of the central court house to a prison building out of the city center and still providing service in the prison building, only one autopsy was able to be performed after the medico-legal postmortem (external) examinations of the corpses in all 51 deaths. Therefore, postmortem external examinations were performed in 50 cases and complete autopsy was performed only in one case. The causes of death for these 50 cases were determined through considering the findings from the scenes of incidence, external examination and hospital records. All the cases have been analyzed according to the parameters of sex, age, death place, and zone - characteristics of the traumatic lesion and cause of death. The statistical analysis was performed by using SPSS 16.0 Packet Program.

## 3. Results

Totally 51 deaths secondary to entrapment under the debris were evaluated. Twenty-seven cases (52.9%) were females and 24 cases (47.1%) were males. The age range was between 1 and 72 years. The mean age was calculated as 27.39 (sd = 17.92) whereas the median was 27.00. Age could not be identified in 2 (3.9%) cases. Eighteen of the cases were in the childhood period (between 1 month and 17 years). The sex distribution of the cases based on the age groups has been

**Table 1** Age groups - sex distribution of the cases that died in the earthquake and were evaluated in this study.

Age groups	Sex		
	Female	Male	Total
0-10	4 (7.85%)	3 (5.88%)	7 (13.72%)
11-20	7 (13.72%)	4 (7.85%)	11 (21.57%)
21-30	5 (9.80%)	6 (11.76%)	11 (21.57%)
31-40	4 (7.85%)	5 (9.80%)	9 (17.64%)
41-50	2 (3.92%)	2 (3.92%)	4 (7.85%)
51 and above	5 (9.80%)	2 (3.92%)	7 (13.72%)
Unknown age	0 (0.0%)	2 (3.92%)	2 (3.92%)
Total	27 (52.94%)	24 (47.05%)	51 (100.00%)

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