

Epidemiology of Trauma with Analysis of 138.352 Patients: Trends of a Single Center

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Abstract

Introduction: The analysis of the epidemiology of trauma is important to determine the needs of hospitals and develop treatment strategies. This study aimed to investigate the epidemiology of trauma in a hospital sample that accepts a large number of trauma patients.

Methods: Between 2009 and 2015, trauma patients admitted to the hospital emergency department were retrospectively screened according to the ICD-10 system. The trauma mechanisms were grouped as falls on the level/from height, injury by object, pedestrian/cyclist injuries, vehicle collisions, penetrating stab injuries, gunshot wounds, and assault. Age, gender distribution of patients, and death information were recorded. In the analysis of the data, t-test and chi-square test were used for the comparison with descriptive statistics. $P < 0.05$ was accepted as significant.

Results: In the study, 138,352 patients (mean age 25.7 ± 19.8 years, age range 0–113, male/female ratio: 1.81) were analyzed. Falls on the level/from height was the most prominent cause of trauma ($n=76,636$, 55.4%). Male gender was predominant in all injury mechanisms and in all age group except over 60 years ($p < 0.001$). The most common injury mechanisms that resulted in death were falls on the level/from height, vehicle collision, and pedestrian/cyclist injury with mortality rates of 0.09, 0.08, and 0.07, respectively ($p < 0.001$).

Discussion and Conclusion: Our study found that in emergency service trauma applications, fall-crash and traffic accidents were the two most common mechanisms. The frequency of trauma mechanisms should be considered in the emergency service continuous training programs. Social measures for trauma mechanisms leading to more deaths and trainings of people based on age-gender, where trauma mechanisms are more common, will reduce the morbidity and mortality rates caused by trauma.

Keywords: Epidemiology; mortality rate; trauma.

Epidemiology is the study of health and disease in populations, the study of the patterns, causes, and effects of health and disease conditions in populations. It is the cornerstone of public health, and shapes policy decisions and targets for preventive healthcare. The rationale of epidemiology offers that effective control of disease must be

planned by within individual countries; however, injury has a different impact in every community regardless of demographics [1–3].

Trauma is a major cause of death and a worldwide problem with wide-ranging consequences for individuals [4, 5]. Analyzing the epidemiology of trauma helps to develop treat-

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ment strategy, to reduce disability, to provide better care, to prevent mortality, and to establish a precise intervention system. However, the disregard of trauma epidemiology limits the improvement of these trauma management systems [6, 7].

We aimed to examine the epidemiology of trauma within a local community in Turkey through data from one emergency center.

Materials and Methods

We designed a descriptive cohort study conducted at a tertiary education and research hospital. The local Ethics Committee approved the study (UEAH-2015-87). The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

This study is a retrospective analysis of the prospectively collected register of patients held by the hospital records. The hospital register codes the mechanism of trauma using the International Classification of Disease version 10 (ICD-10). Trauma patients were selected by ICD-10 codes related with trauma. Trauma patients admitted to emergency department between January 1, 2009, and Dec 31, 2015, were included in the study. The mechanisms of trauma were consolidated into seven broad categories: falls on the level/from height, injury by object, pedestrian/cyclist injuries, vehicle collisions, penetrating stab injuries, gunshot wounds, and assault. Cases relating to poisoning, burns, chemical injury, drowning, and suicide were excluded. The following data was collected for each patient: basic demographic data (age and gender), mechanism of trauma, and death.

Statistical Analysis

Statistical calculations were performed using IBM SPSS 22 (IBM SPSS, USA). Variables are expressed as mean±standard deviations (SD) or as medians (interquartile range) depending on their distribution. Categorical variables were expressed as frequencies and percentages. The chi-square test was used to compare continuous parametric variables. The t-test was used to compare parametric variables with normal distribution. The statistical results were presented with a 95% confidence interval. The differences were considered statistically significant if the P-value was less than 0.05.

Results

A total of 149.582 trauma patients were reviewed for eligibility. After exclusion of 11.230 patients, 138.352 patients were enrolled in the study. The mean age was 25.7±19.8

years (range 0–113), and male to female ratio was 1.8:1. The age and gender distribution were investigated, and they are summarized in Figure 1. Male gender was predominant in all age groups except over 60 years.

Injury mechanisms are summarized in Table 1. Falls on the level/from height was the most prominent cause of trauma (n=76.636, 55.4%). The mean age of the patients was different between injury mechanisms. Especially age of patients with gunshot wounds, vehicle collision, and assault was over 30 years, and they were older than the patients with other injury mechanisms (p<0.001) (Fig. 2). Male gender was predominant in all injury mechanisms, and male to female ratio was 9.9 in patients with gunshot wounds as the highest value at all (p<0.001).

A total of 225 (0.16%) patients died due to related trauma.

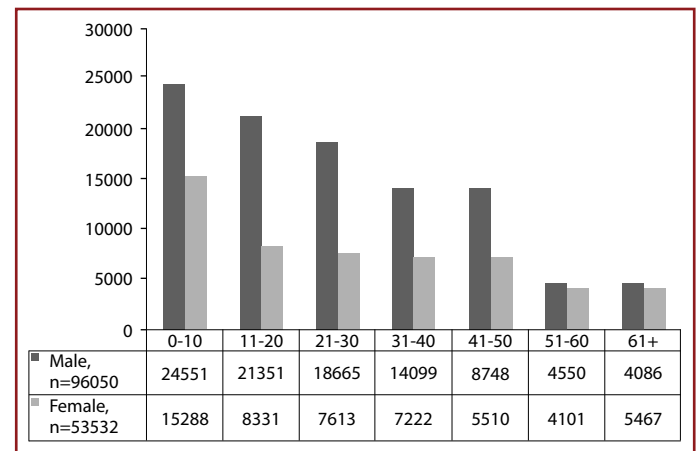


Figure 1. Demographic characteristics of the trauma patients.

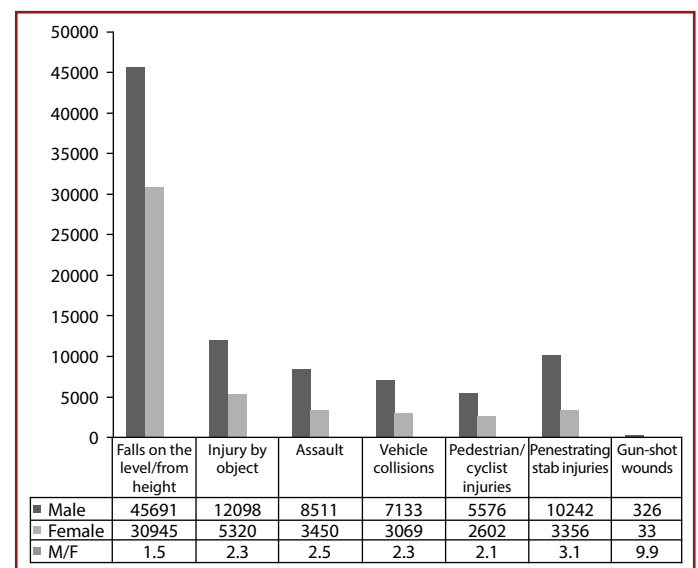


Figure 2. Demographic characteristics of the trauma patients according to injury mechanisms.

Table 1. Injury mechanisms of the trauma patients

| | Falls on the level/from height | Injury by object | Assault | Vehicle collisions | Pedestrian/cyclist injuries | Penetrating stab injuries | Gun-shot wounds | p |
|--|--------------------------------|------------------|-----------------|--------------------|-----------------------------|---------------------------|-----------------|--------|
| n (%) | 76.636 (55.4) | 17.418 (12.6) | 11.961 (8.6) | 10.202 (7.4) | 8.178 (5.9) | 13.598 (9.8) | 359 (0.3) | N/A |
| Age, years mean±SD | 23.9±22.2 | 22.9±17.3 | 30.4±12.6 | 31.1±14.9 | 29.2±18.7 | 29.2±14.7 | 33.5±12.1 | <0.001 |
| Gender M/F (Ratio) | 45691/30945 (1.5) | 12098/5320 (2.3) | 8511/3450 (2.5) | 7133/3069 (2.3) | 5576/2602 (2.1) | 10242/3356 (3.1) | 326/33 (9.9) | <0.001 |
| Deceased n (% of the related trauma mechanism/% of all deaths) | 71 (0.09/31.6) | 3 (0.004/1.3) | 1 (0.001/0.4) | 62 (0.08/27.6) | 53 (0.07/23.6) | 14 (0.02/6.2) | 21 (0.03/9.3) | <0.001 |

SD: Standard deviation; M: Male; F: Female.

More patients died due to fall on the level/from height, vehicle collision, and pedestrian/cyclist injury with mortality rates of 0.09%, 0.08%, and 0.07%, respectively (p<0.001). Mortality rates in the patients with injury by object and assault were the lowest of all the mechanisms, 0.004% and 0.001%, respectively.

Discussion

Trauma constitutes an important and rising worldwide problem. The number of injuries other than violence is rising as the country industrializes. The expansion of transportation and industrialization causes an increase in the number of trauma cases, for example, motor vehicle accidents, people falling, object crashing, or penetrating injury at industrial sites [1, 2]. Trauma incidence and trends vary worldwide. Actually, trauma data collected by national statistics use ICD code, which is taxonomy with limited descriptions of injury severity [1]. In this study, we reviewed admissions of 149.582 trauma patients between 2009 and 2015. The number of cases reviewed can be accepted as sufficient, but this is the data of single center; therefore, it may not be generalized to other countries. In this study, ICD diagnostic code system is used to search the patient's records for the trauma like national statistics worldwide.

The abbreviated injury scale (AIS) dictionary has a greater level of detail with a severity score between 1 and 6. It has over 2000 injury codes and allocates to the every injury [8]. These scores have to be summated into the injury severity score (ISS) for each individual patient [9]. In most of studies, AIS/ISS taxonomy has been used to define injury incidence. Severe injury is mentioned if ISS is more than 15. In Europe, most of trauma admissions were not severe and have lower ISS (range 4–9) mostly due to isolated limb fractures in children or the elderly (falls). The annual rates of death and severe injury (ISS>15) vary in Europe from 25 to 52.2 per 100.000 [10, 11]. We evaluated epidemiology of trauma with limited descriptions of injury severity. Main obligatory issue for this was the nature of our retrospective study design.

The reported mortality rate of injury in 2000 was 83 per 100.000 of the population worldwide. The highest mortality rates from injury have been documented in the low-income nations in Eastern Europe, and the lowest rates in North America and Western Europe [12]. In our study, we detected higher mortality rate (0.16%) than reported ratio for worldwide.

Most of the trauma patients who visit emergency, had hospitalizations and fatalities, are persons under 45 years

of age. After 65 years, patients are at higher risk of injuries needing hospitalization or resulting in fatality. Trauma increases after the age of 60 due to the body weakening and lack of activities [8]. The trauma distribution of according to age shown in our study is similar with that of other studies.

There is changing frequency about gender according to the age as a risk factor for trauma. Reports showed that up to age 65 years, male gender is a risk; after that age, female gender is a risk factor [10, 11]. Moshiro et al. [13] and WHO [12, 14] stated that motor vehicle accidents and falls seem more often with men than with women. In our study, we detected gunshot wounds (9.9 fold) and penetrating stab injuries (3.1 fold) more often in men than women.

In low- and mid-income nations, which make up 85% of the world, 11% of all handicap balanced life years are because of injury. Especially, understanding the study of disease trending of injury investigates hazard factors, to create treatment technique, to decrease incapacity, to avoid mortality. In any case, the absence of injury the study of disease transmission information restrains the development of these injury administration frameworks [5, 6].

A large portion of the injury instruments in our information were blunt injury, fall-down wounds, and vehicle-related injury (90.8%). Thus in general, fall-down wounds and vehicle-related injury will prevail [15, 16]. Motor vehicle injuries are among the most noteworthy driving reasons for death and inability and are a noteworthy reason for injury patients in general wellbeing. Smashed driving, sleepy driving, and imprudent driving are a few instances of the reasons for engine vehicle mishaps, and every one of them is unmistakable in young fellows and women in general [17]. Fall-down wounds are additionally among the most elevated driving reasons for obtuse injury; these kinds of wounds are brought about via inconsiderateness or self-destructive aims. The damage systems referenced above are medical issues that can be counteracted by wellbeing instruction by advancing a sheltered situation and proceeding with wellbeing training [18, 19]. In our study, fall-crash and traffic accidents were the two most common mechanisms with ratio of 68% of all trauma patients.

Conclusion

In conclusion, as we continue to use more efficient diagnostic methods and tools to provide more efficient and higher quality patient care, we must advance to evaluate the epidemiology of trauma to better prevent it, and more effectively manage it.

Ethics Committee Approval: Umraniye Education and Research Hospital, Ethical Committee (19.11.2015, UEAH-2015-87).

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