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Original article

Epidemiology and short-term mortality in traumatic patients admitted to Shariati Hospital in Iran between 2012 and 2013

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ABSTRACT

Purpose: Trauma is an inevitable part of the health burden in every country. Both the preventive and rehabilitative aspects of traumatic injuries are expensive. Since most of the injuries happen in low- and middle-income developing countries, a judicious allocation of the limited resources to the most cost-efficient strategies is necessary. The present study was designed to report the causes of trauma, injured body regions, trauma severity scores and the one year survival rate of a randomly selected sample of trauma patients in a major referral hospital in Tehran, Iran.

Methods: We chose and analyzed a random subgroup of traumatic patients admitted during the one-year period of May 2012 to May 2013 to Shariati Hospital, a major University Teaching Hospital in Tehran, Iran. Patients who stayed at the hospital for less than 24 h were excluded. In total, 73 traumatic patients were registered. The mean age was (40.19 ± 20.34) years and 67.1% of them were male.

Results: In general, the most common cause of injury was falls (47.9%), followed by road traffic crashes (RTCs, 40.8%). Assault and exposure to inanimate mechanical forces each were only associated with 5.6% of all injuries. The only cause of injury in ages of more than 65 years was fall. The most common cause of injury in ages between 15 and 45 years was RTCs. During the study, two deaths occurred: one was at ICU and the other was at home. The most commonly injured body region was the head (23.8%), followed by the elbow and forearm (19%), hip and thigh (15.9%), and multiple body regions (14.3%). The mean abbreviated injury score was 2.23 ± 1.02 ; injury severity index was 7.26 ± 7.06 ; and revised trauma score was 7.84, calculated for 38 patients.

Conclusion: Prevention strategy of traumatic injury should focus on falls and RTCs, which are respectively the most common cause of trauma in older aged people and young males.

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1. Introduction

Trauma is an inevitable part of every country's health burden. It often happens suddenly, thus necessitates an effective emergency system, and can affect any part of the human body, therefore involves different specialties in medicine. Trauma has not been a major health-threatening problem until the new century; rather, its mechanisms have been transshaped by the advances of technology. New technologies lead to new occasions for trauma occurrence, and

this trend will not be discouraged until we harbor new preventive strategies.

Prevention of trauma is particularly important due to its high costs and serious adverse effects on both life expectancy and quality of life.^{1–4} Both preventive and rehabilitative aspects of traumatic injuries are expensive. Since most of the injuries happen in low- and middle-income developing countries,^{5–8} a judicious allocation of the limited resources to the most cost-efficient strategies is necessary. A prerequisite to this planning is an informed and holistic view of the causes and health consequences of trauma in each individual country.

Iran is a developing country with a substantial annual rate of traumatic injury. Reports from the Forensic Medicine Organization of Iran showed an annual average of 24,000 deaths (i.e. 3 persons

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per hour) and approximately 240,000 injuries from traffic crashes. According to previous studies,^{9,10} in the year 2011 Iran had one of the greatest fatality rates from road traffic crashes (RTCs), and the morbidity rate of RTCs was estimated to be about ten times higher than those reported from other countries.

This study was a pure epidemiological investigation and aimed to report the causes of trauma, frequently injured body regions, along with trauma severity scores and the one year survival rate of a randomly selected sample of trauma patients in a major referral hospital in Tehran.

2. Materials and methods

The present study was a prospective, descriptive and analytical study conducted on 73 patients with multiple traumas, aged between 17 and 96 years in Shariati Hospital during May 2012 to May 2013. Shariati Hospital is a university teaching hospital affiliated to Tehran University of Medical Sciences, Tehran, Iran. The study was confirmed by the institutional review board of Tehran University of Medical Sciences. Informed consent was obtained from all participants.

Injured patients were eligible for inclusion if they were admitted to Shariati Hospital and stayed there for at least 24 h. Those brought in deceased or transferred to another hospital or died within 24 h were not included. In order to choose a random sample of the eligible subjects, we only included patients who were admitted in the days of the month determined by $6n + 1$ formula. It means our study evaluated eligible patients admitted in the first, seventh, thirteenth, etc. days of this period of time. In total, 73 traumatic patients (67.1% male and 32.9% female) were registered. The mean age (SD) was (40.19 ± 20.34) years.

Data were collected using both medical records and direct interview with patients. In the first step, related data were extracted, containing the variables of age, gender, type of injury and injured body region, initial vital signs including systolic and diastolic blood pressures, temperature, respiratory rate and heart rate and also Glasgow coma scale (GCS) of the patients at admission. Patients were followed up for one year through telephone calls. In the second step, trauma scores such as abbreviated injury score (AIS), injury severity score (ISS), and revised trauma score (RTS, a physiologic scoring system that is made up of three categories: GCS, systolic blood pressure and respiratory rate) were calculated for 38 out of 73 patients.

All the patients were categorized into four age groups of ≤ 15 years, 16–45 years, 46–65 years, and >65 years for further analysis. We also calculated frequencies and proportions for categorical variables, and means for continuous variables. Statistical analysis was performed using Statistical Package for the Social Sciences Version 18.

3. Results

In general, the most common cause of injury was falls (47.9%), followed by RTCs (40.8%). Assault and exposure to inanimate mechanical forces each comprised 5.6% of all injuries. In males, the most common cause of injury was RTCs (35.2%) followed by falls (19.7%). Conversely, in females the most common causes were falls (28.2%) and RTCs (5.6%), respectively. Furthermore, assaults and exposure to inanimate mechanical forces as an injury cause were only seen in males (Figs. 1 and 2).

Regarding the relationship between causes of injury and age, the only cause of injury in >65 years group was falls. The most common cause of injury in 16–45 years group was RTCs (54%) followed by falls (30%), while that in 46–65 years group was falls (69%) and RTCs (23%, Fig. 1).

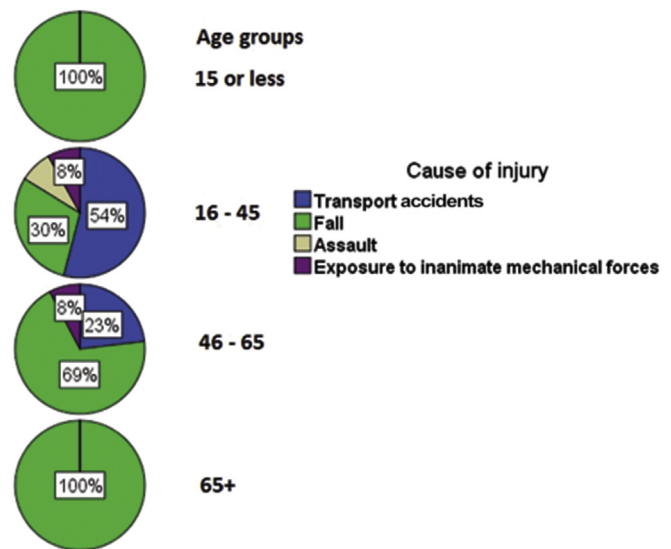


Fig. 1. Causes of injury in different age groups.

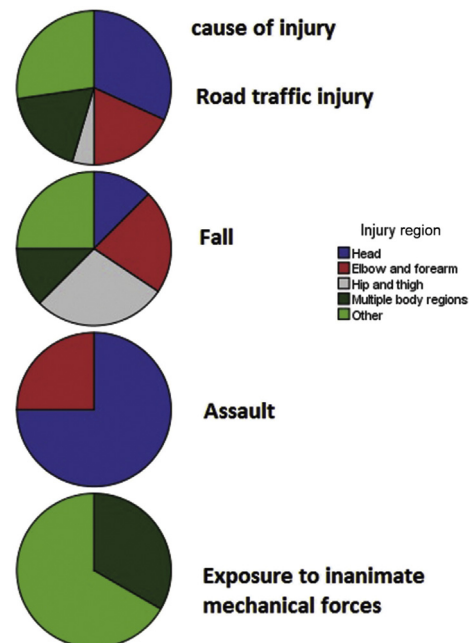


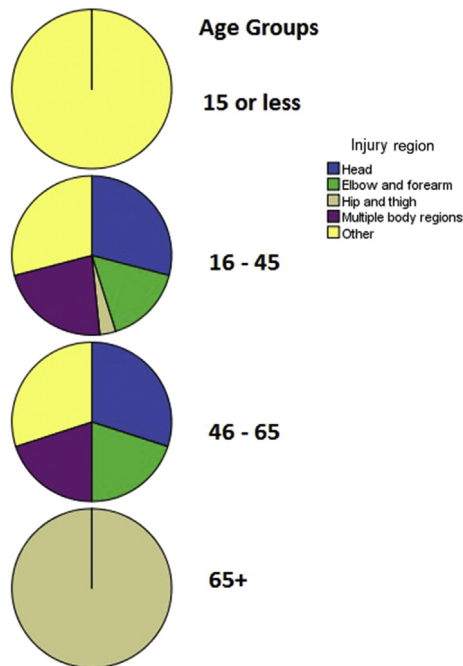
Fig. 2. Injured body regions in different causes of injury.

Our study showed the most commonly injured body region was head (23.8%), followed by elbow and forearm (19%), hip and thigh (15.9%), and multiple body regions (14.3%, Table 1). In further analysis of regions of injury by causes of injury, RTCs and assault were most associated with head injury. Falls were most associated with hip and thigh injury and exposure to inanimate mechanical forces was associated with other regions including neck, trunk, upper limb, knee and lower leg (Fig. 2).

In analysis of the injury regions by age group, we found that head, regions other than head and extremities, and multiple body regions were the most common in age group ≤ 15 years, 16–45 years and 46–65 years while the only injury region in patients more than 65 years was hip and thigh (Fig. 3).

Table 1
Injured body region.

Injured body region	Frequency	Percent (%)	Valid percent (%)
Head	15	20.5	23.8
Neck	1	1.4	1.6
Thorax	4	5.5	6.3
Abdomen, lower back, lumbar spine and pelvis	5	6.8	7.9
Shoulder and upper arm	1	1.4	1.6
Elbow and forearm	12	16.4	19.0
Wrist and hand	5	6.8	7.9
Hip and thigh	10	13.7	15.9
Knee and lower leg	1	1.4	1.6
Multiple body regions	9	12.3	14.3
Total of valid	63	86.3	100.0
Missing system	10	13.7	
Total	73	100.0	

**Fig. 3.** Injured body region in different age groups.

In calculating trauma scores for 38 out of 73 patients, the mean AIS was 2.23 ± 1.02 , the mean (SD) ISS was 7.26 (7.06) and RTS was 7.84.

Only 58 out of 73 patients could be followed up for one year; the remaining 15 were lost to follow-up. From admission of the first patient to the last followed one, two deaths happened (mortality rate was 3.7%): one was at ICU and the other was at home.

4. Discussion

According to the results of some previous extensive works about the epidemiology and burden of trauma, males were more frequently injured than females; most of the victims were young; and falls as well as RTCs were the main etiologies of injury constituting more than half of the causes of human injury.^{7,11–17} These results were generally in concordance with those of our study. However, the mean age of our patients was higher than that reported by Rasouli et al⁷ in Iran during 2009–2011 on 2,991,624 traumatic patients (40.19 years vs. 26.5 years) and they had a higher proportion of male victims than our results (72.7% vs. 67.1%). In our study, the most common cause of injury was fall, followed by RTCs,

and then assault and exposure to inanimate mechanical forces which were equally frequent. But in their study, the most common cause was RTCs (31.9%) followed by hit (25.5%) and fall (10.9%). One possible explanation of this difference in the causes of injury could be the different age patterns in the two studies. Our patients were older and more vulnerable to falls than RTCs and hits which are seen more in young people. In addition, our study was done on a very small group of traumatic patients admitted to Shariati Hospital. The other important reason for a lower prevalence of road traffic injuries in our study is the location of the hospital in the center of Tehran, the capital of Iran. Meanwhile, most RTCs occur on the roads out of the city and intercity and the patients refer to other hospitals such as Haftom-e Tir which is located at the entrance of the city.

In males, the most common cause of injury was RTCs (35.2%) followed by falls (19.7%), assaults (5.6%) and exposure to inanimate mechanical forces (5.6%); while in females the two most common causes were falls (28.2%) and RTCs (5.6%) respectively. These results are in agreement with similar studies previously done in Iran.^{7,11}

In patients aged between 15 and 45 years, RTCs (54%), falls (30%), assault (8%) and exposure to inanimate mechanical forces (8%) were respectively the most common causes of injury. In patients aged between 46 and 65 years, the most common cause was falls (69%), RTCs (23%) and exposure to inanimate mechanical forces (8%). The only cause of injury in all the patients older than 65 years was falls.

Burns and suicide were not seen in the list of causes of injury in Shariati Hospital because there are two groups of specific traumatology hospitals in Tehran, one for burn admission including electricity injuries and the other for toxicology and suicide. Our national study showed that burns were the second common type of injury in Iran.^{18,19}

The most injured body regions of our study were similar to those of the study conducted by Tsatsanidis et al.¹² Head was the most commonly injured body region in young age groups and hip and thigh in older age groups, which points to different mechanisms of injury in young and older age groups; the head was the most injured body region in RTCs and assaults, while hip and thigh were most injured in falls. These results also emphasize the importance of protection of the head, especially in motorcycle riders who have a very high risk of severe trauma to the head. Furthermore, a high rate of elbow, forearm, hip and thigh trauma following falls, especially in older women, alarms us as to the lack of geriatrics screening and prevention care in Iran.

In conclusion, falls and road traffic injuries are respectively the most common causes of traumatic injuries in older aged people and young males. Our study emphasizes the importance of strategies to prevent these types of injuries. The major limitation of our study is that the sample size was relatively small, and many other less probable causes of injury such as burn, suicide, drowning, and intoxication were not seen. Therefore future injury epidemiological studies with larger sample sizes are recommended.

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