



Epidemiological Characteristics of Fatal Traumatic Accidents in Babol, Iran: A Hospital-Based Survey

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ABSTRACT

Objective: To determine the epidemiological characteristics of fatal traumatic accidents in patients referred to a hospital in Babol, Northern Iran.

Methods: This was a cross-sectional study being performed during a 1-year period including all the dead trauma patients referred to Shahid Beheshti Hospital of Babol. We included all those patients who were transferred to our center to trauma and injuries and passed away during the hospital stay. Those who died due to electrical shock, drowning and suffocation caused by hanging and poisoning were excluded from the study. Demographic information such as age, sex, marital status, education, employment, the type, location, and time of injury, injured parts of body and treatment methods, the cause, location and time of death were recorded.

Results: From the 92 dead patients, 76 were men (82.6%) and 16 were women (17.4%). The cause of death in 53 cases (57.6%) was head injury. Regarding the location, 30 patients (32.6%) died at the scene of the accident, 62 (67.4%) died in the hospital. The maximum rate of trauma occurred in the afternoon shift between the hours of 13:30 to 19:30. The head and face were the most damaged organs. Road traffic accidents were the most common cause of injury related mortality recorded in 81 patients (88.0%). Most of the accidents occurred in intercity roads in 27 people (33.3%) and the others in rural-urban roads. Pedestrians were the most common victims of road traffic accidents mortality being reported in 29 people (35.8%).

Conclusion: Road traffic accidents are among the most common cause of injury related mortality in our region. Increasing the public knowledge and improve the traffic law enforcement measures should be considered for decreasing the morbidity and mortality.

Keywords: Epidemiology; Injury-related mortality; Trauma; Road Traffic Accidents.

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Introduction

Trauma is referred to injury or shock into the body caused by sudden physical injury that violently

happens randomly [1]. Traumas classified into penetrating and blunt types [2]. Epidemiological studies have revealed that blunt trauma is more prevalent in both rural and urban regions while in rural areas

the incidence of penetrating trauma is higher when compared to urban areas [2,3]. Trauma is the first cause of death in the first four decades of life in developing countries [4,5] and currently is considered the third most common cause of mortality worldwide [6].

Trauma and injury is the leading cause of morbidity and mortality in developing countries where over 90% of the world's fatalities on the roads occur [5]. Iran is amongst the countries with high incidence of road accidents with high mortality and morbidity with 22918 road traffic fatalities (80% males, 20% females) recorded from 2007–2008 [5]. The crude mortality rate from accidental injury in rural areas of Islamic Republic of Iran is approximately 4.33 per 1000 and the number of deaths resulting from unintentional injuries is 5213 (10.7% of all deaths) [6]. The most common types of injuries are motorcycle accidents consisting 49.1% of all annual traumas [2]. The mortality rate was the highest rate of any country in the world for which reliable estimates were available in 2005 [6].

The types of trauma include accidents, falls from heights, shooting and stab wounds, burns, animal attack and self-mutilation. Determining the causes of trauma and mortality caused by trauma in each area can provide valuable information to the health authorities to make major decisions. In Northern Iran the quality of road is low and the load of traffic is very high due to heavy load of tourism in the area. Understanding the pattern of accidents and trauma in these areas is important for stockholders. Thus we performed this study in order to determine the causes of fatal accidents in patients referred to a single tertiary healthcare center in Babol, Northern Iran.

Materials and Methods

Study population

This was a cross-sectional study being performed during a 1-year period from January 2012 to January 2013 including all the dead trauma patients referred to Shahid Beheshti Hospital, a tertiary healthcare center affiliated with Babol University of Medical Sciences. The study protocol was approved by institutional review board (IRB) and medical ethics committee of Babol University of Medical Sciences. As we used the databases available in the hospital registry, no informed written consents was required for inclusion of the patients in the study. We included all those patients who were transferred to our center to trauma and injuries and passed away during the hospital stay. Trauma related mortality was defined as death attributable to trauma and injury from pre-hospital course to 40 days after trauma. Those who died due to electrical shock, drowning and suffocation caused by hangings and poisoning were excluded from the study.

Study protocol

The data was collected by means of a standard data gathering form including three sections; the first consisted of demographic information such as

age, sex, marital status, education, employment, the second included the type, location, and time of injury, injured parts of body and treatment methods, and the third part consisted of the cause, location and time of death. The first and second section data were received by trained individuals before admission to the ICU, the emergency and other departments from the patient or the patient's companions and the third part of the check list was completed according to the physician's information. For recording the information regarding to the pre-hospital death, the assistance was taken from the information in for ensics and phone calls of the patients relatives.

Statistical Analysis

This was a cross-sectional study and we included all the patients who were found eligible for the study. Thus the study population was equal to sample size. The data was prospectively entered into a computer database and was further analyzed by statistical package for social sciences (SPSS Inc., Chicago, Illinois, USA) version 20.0. Data are presented as mean±SD and proportions as appropriate. Tables and figures were used to demonstrate the epidemiological characteristics of the accident mortality.

Results

From 11,393 patients who referred to our center during 2012 due to trauma, 92 (0.81%) died. From these 92 patients, 76 were men (82.6%) and 16 were women (17.4%). The mean age of the patients was 45.77±33.23 years. There was no significant difference between men and women regarding age (44.72±23.56 vs. 50.75±22.21 years; $p=0.351$). Among the patients there were 71 (77.2%) married. About 30 (32.6%) patients were illiterate and agriculture was the most common field of study among the patients being reported in 19 (20.6%). The mortality rate was the result of 91 road traffic accidents. Traumatic brain injury (TBI) was the most common cause of death among the study population being reported in 53 (57.6%) patients. The causes of mortality are summarized in Figure 1.

The average time to transfer the patients from the incident site to the hospital was 44.65±39.98 minutes. The average duration of dead hospitalization was 3.46±1.05 days. The average survival time in patients from their entering time to hospital until the death time was 3.56±2.45 days. Due to the death location of the patients, 30 patients (32.6%) died at the scene of the accident and 62 (67.4%) in the hospital. In the afternoon shift between the hours of 13:30 to 19:30 was the most common time of road trauma accidents leading to mortality and life casualties (Figure 2). The injured parts in traumatic patients leading to death are very different however the head and face was the most common involved sites (Table 1). Road traffic accidents were found to be the most common causes of injury related mortality (88.0%). The mechanisms

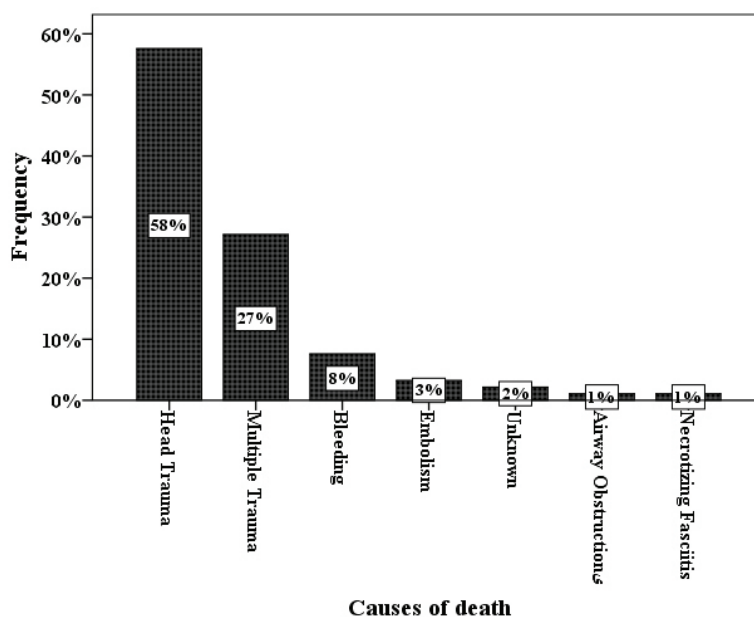


Fig. 1. Causes of death in 92 trauma-related mortality in Babol Shaahid Beheshti hospital during 2012.

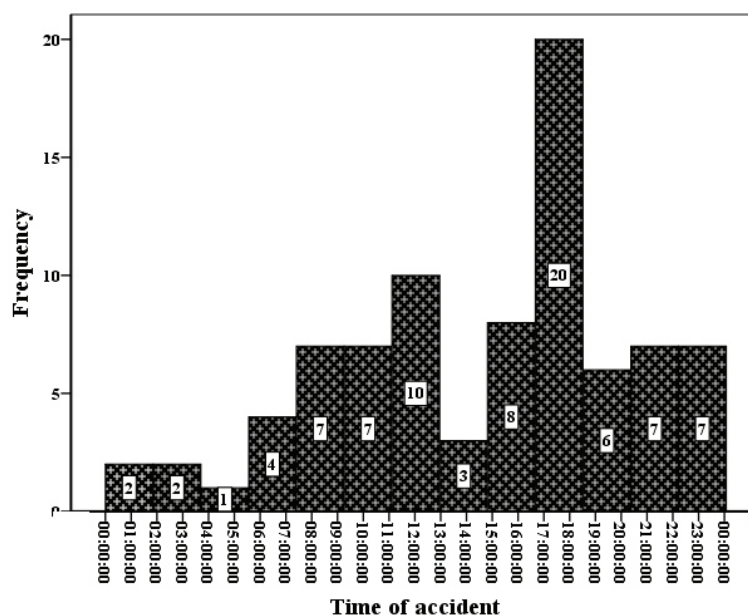


Fig. 2. Time distribution of trauma in 92 trauma-related mortality in Babol Shaahid Beheshti hospital during 2012.

Table 1. Frequency of injured organs trauma in 92 trauma-related mortality in Babol Shaahid Beheshti hospital during 2012.

Injured organ	N (%)
Head	71 (77.2%)
Face	47 (51.1%)
Leg	25 (27.2%)
Chest	16 (17.4%)
neck	14 (15.2%)
Abdomen	11 (12.0%)
Basin	8 (8.7%)
Thigh	6 (6.5%)
Cervical	4 (4.3%)
Sternum	3 (3.3%)
Loin	1 (1.1%)

Table 2. Mechanism of trauma in trauma in 92 trauma-related mortality in Babol Shaahid Beheshti hospital during 2012.

Mechanism of trauma	N (%)
Road traffic accidents	81 (88.0%)
Falling from height	5 (5.4%)
Heavy object falling	2 (2.2%)
Stab wounds	1 (1.1%)

in the intercity roads (33.3%) and lowest accidents occurred in rural-urban roads (9.9%). Most of the victims of road traffic accidents were pedestrians being recorded in 29 (35.8%) patients followed by car drivers in 20 (24.7%), motorcyclist in 16 (19.8%), center rear seat in 11 (13.6%), cyclist in 2 (5.2%), left rear seat in 1 (1.2%), the right rear seat in 1 (1.2%)

of injury related mortality is summarized in Table 2. Most road traffic accident related mortality occurred

and behind the motor in 1 (1.2%).

Falling from the height was responsible for injury related mortality in 5 (5.43%). Head trauma following falling objects was responsible for 2 (2.17%) injury related mortality in our series. Another cause of injury related mortality was stab wounds during fighting being recorded in 1 (1.08%) patients. In terms of safety considerations, 12 patient (70.5%) of the motorcycle riders were without a helmet, and 1 was (5.8%) with the helmet. In the same way, 24.2% drivers and 54.5% passengers were not fastening their seat belts. There is no information about the other patients. Regarding the route of transfer, 69 patients (75.0%) were taken by an ambulance, 19 (20.7%) by personal automobile and 4 (4.3%) by the air ambulance. In this study, the deceased were transferred to hospital with the average radius of 50 km.

Discussion

Trauma is now considered the fourth cause of mortality worldwide [5]. In the current study we tried to describe the epidemiological characteristics of fatal road traffic accidents. Several studies have previously addressed the same issue in different geographical regions [2,7-11].

Karami and colleagues [8] reported the epidemiology of road traffic accidents in Qom province. The majority of victims were between the ages of 16-30 years old [8]. In the present study the number of men were 76 (82.6%) and 16 (17.4%) were women. Their mean age was 45.77 ± 33.23 . One of the reasons of more accidents in men is that they participate more in social activities and the nature of their jobs and also considering the peak of employment in the age group of 24-50 years old. The mean age of the other studies is similar with our study. The largest study in this field being recently published, studied a total of 538,588 drivers (91.83% male, sex ratio of almost 13:1). Among them 423,932 (78.71%) were uninjured; 224,818 (41.74%) had a diploma degree. Grade 2 driving license represented the highest proportion of all driving licenses (290,811, 54.00%). The greatest number of accidents took place at 12:00-13:59 (75,024, 13.93%). They reported a significant association between type of accident and sex, education, license type, time of accident, final cause of accident, driver's error as well as duration between accident and getting the driving license (all $p < 0.001$) [7].

We found that in the afternoon shift between the hours of 13:30 to 19:30 was the most common time of road trauma accidents leading to mortality and life casualties. Heydari *et al.*, [12] reported two noticeable increases in the number of commissions and deaths especially for intra-city roads: one from 4-7 to 8-11 AM and the other from 8-11 to 12-15 o'clock. The first coincides with beginning of the work-day (especially for workers and clerks) and opening of schools. The second is at the time of coming back

from work and the closing of schools. The morning and afternoon rush hours thus increase traffic density on the roads, hurry and the probability for collision [13]. These are consistent with our findings. In an epidemiological study of road traffic accidents (RTAs) in Nepal, Mishra *et al.*, [13] reported that 61.67% of RTA victims were passengers and drivers and 29.16% were pedestrians. In another study by Markogiannakis *et al.*, [14], motorcyclists, car occupants, and pedestrians constituted 60.8, 28.7, and 10.5% of RTAs, respectively. In a study from the United Arab Emirates, Eid *et al.*, [15] reported that 63 percent of RTAs were vehicle occupants and 36% were pedestrians and motorcyclists. In our study, the occupant group comprised the largest portion of the traffic injuries (69%) and motorcyclists and pedestrians accounted for 15 and 16% of RTIs, respectively. Hematabadi *et al.*, [16] studied 433 patients, of whom 345 were hospitalized and 33 died either before or after arriving at the hospital. 69% of injured patients were vehicle occupants. Mean and median of ISS were higher for pedestrians, who accounted for 49% of the deaths. Head injury was the most common injury and injury to upper and lower extremities was the most common cause of admission. A significant difference in lower extremity injuries between vehicle occupants and nonoccupants was found. Sex and age group did not have a significant effect on mortality. Mortality was significantly higher in pedestrians ($p < 0.001$) when data were analyzed based on road user type. The differences in the severity of injuries among road user types can be attributed to differences in the study setting; for instance, rural versus urban roads, time, social and cultural factors, and different inclusion or exclusion criteria. It has been suggested that trauma surveillance systems should be applied in developing countries in order to decrease the mortality rate of the road traffic accidents [17].

Another study reported the causes and severity of injuries leading to the death in trauma patients conducted by Taghipour *et al.*, [18], vehicle accidents on pedestrians with (39.8%) abundant were the most common cause of traffic incidence in terms of type of accident which was similar to the present study. The cause is lack of proper information and education in schools and the media has a significant role in pedestrian deaths, especially in children and adolescents. Charbotel *et al.*, [19] found that about one-third of motorcycle riders use helmet, few of passengers (less than one third of the front passengers) fastened their seat belts and none of the riders used safety devices [19]. In this study, 8 people fastened their seat belts and 1 person used a helmet.

In 2010, Taghipour *et al.*, [18] concluded that scalp, face, trunk, and the upper and lower extremities were the most common sites of injury in Yazd. Bener *et al.*, [20] in 2009 found these results that the injury rate in the head and neck is more than the other parts. Shams Vahedi and co-workers [10] found that of

181 mortality cases of road traffic accidents during 2013 new year holidays in North West of Iran, 71 (39.2%), 66 (36.5%), 16 (8.8%) and 11 (6.1%) subjects had limb, head and neck, abdominal, and spinal cord injuries respectively. 16 cases (8.8%) did not have any organ damage. In final diagnosis, a limb fracture was noticed in 32 cases (17.7%) and skull fractures in 5 subjects (2.8%) as the first and second causes [10]. In the present study, scalp and face, and among the organs the upper limb and bilateral had the highest abundant. Not fastening of seat belts or using of helmets in motorcycle riders is one of the main causes of death in accidents due to head trauma.

In conclusion, road traffic accidents are among

the most common cause of injury related mortality in our region. Increasing the public knowledge and improve the traffic law enforcement measures should be considered for decreasing the morbidity and mortality.

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