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Following Autopsy Results in Patients who died of Unintentional Trauma

ORIGINAL INVESTIGATION

Mahboub Pouraghaei[1], Bahram Samadi Rad[2], Shahryar Hashem Zadeh[3], Payman Moharramzadeh[1], Samad Shams Vahdati[4], Zahed Maghsudi[1]

ABSTRACT

Objective: Trauma is one of the major global health challenges and its mortality rate increases along with science and technology advancements and the development of industrial communities. Besides trauma mortality, years of life lost and health care costs are rising. Due to the high incidence of death from trauma in Iran, this study was aimed at identifying the prevalence and factors associated with injury to estimate the prevention methodology for the reduction of trauma-induced death.

Materials and Methods: In a descriptive study, 209 patients who died due to unintentional trauma and were dissected in the Medical Forensic Center of Tabriz (Iran) from May 2013 to May 2015 were studied. Patients' demographic information, type of trauma, and cause of death were collected.

Results: In the present study on 209 patients, 79% were males and 21% were females, with a mean age of 37.64±22.68 years. The most common mechanism of trauma in these patients was traffic accidents. In our evaluation of 209 patients with accidental trauma, head and neck (89%) and thorax (45%) were the most common injury sites. Other injury sites included the upper limb (43.1%), lower limb (35.9%), abdomen (24.4%), and pelvis (12.9%). The results of this study showed that the common trauma site was the head and neck and that the common cause of death due to trauma was brain injury.

Conclusion: Road traffic injury was the most common cause of unintentional trauma, and head injury was the most common cause of death in unintentional trauma. The most common life-threatening finding in patients who died due to unintentional trauma was loss of consciousness. Falling from heights was the next most common cause of trauma. Community education has the greatest impact on mortality reduction and injuries due to trauma.

Keywords: Autopsy, unintentional trauma, forensic medicine

[1]Department of Emergency, Tabriz University of Medical Science Tabriz, Iran

[2]Forensic Medicine, Legal Medicine Research Center, Legal Medicine Organization, Tehran, Iran

[3]Department of General Surgery, Tabriz University of Medical Science, Tabriz, Iran

[4]Department of Emergency, Tabriz University of Medical Science - Road Traffic Injury Research Center, Tabriz, Iran

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Correspondence
Samad Shams Vahdati MD, Department of Emergency, Tabriz University of Medical Science - Road Traffic Injury Research Center, Tabriz, Iran
Phone: +984133352078
e.mail:
sshamsv@yahoo.com

INTRODUCTION

Injury is one of the most common causes of death and disability worldwide and is a leading cause of death in both sexes. In general, unintentional injuries are the fifth leading cause of death and the sixth leading cause of disability globally (1). Currently, damage and costs resulting from trauma have become a major concern and problem for the health care system (2). Road traffic injuries alone cause 148 deaths per hour worldwide, and they are annually responsible for the deaths of 1.3 million people (3). In the United States of America in 2004, 184167 people died due to trauma injury, and majority died from damage caused by traffic accidents (4).

Trauma is the leading cause of death in people under 35 year of age, and males aged 15 to 24 represent the largest proportion of victims (5). Annually, over 45 million people suffer from moderate to severe disabilities resulting from unintentional trauma (1). More than 80% of damage caused by trauma is in undeveloped and low-income countries (3).

Types of injury in various causes of trauma are different. Central nervous system injuries and bleeding are common causes of death in trauma (6, 7). Over the past decades, many studies have been conducted, and various organizations have been developed to reduce mortality and morbidity from trauma events. According to studies, pre-hospitalization death is the most important cause of death in trauma patients (8). Types of trauma play a major role in managing and mobilizing health care systems against patient death. The main causes of premature death in trauma are due to head trauma, bleeding, and airway or lung problems (9). The aim of the present study was to evaluate the autopsy results in patients who died after unintentional trauma.

MATERIALS and METHODS

In a descriptive study, 209 patients who died from unintentional trauma including traffic accidents, falling from heights, being crushed by falling heavy objects, encounter with sharp objects, suffocation, and burning were stud-

ied by autopsy and dissection performed at the Medical Forensic Center of Tabriz (Iran) to determine the causes of death. This study was conducted in the Tabriz University of Medical Science from May 2013 to May 2015.

Inclusion criteria were unintentional trauma leading to death, dying at the trauma scene or during transfer to an emergency medical center, and dying during hospitalization or during transferring to other medical centers. Dissection was performed in the Medical Forensic Center of Tabriz (Iran) to determine the cause of death. Exclusion criteria were intentional trauma and when trauma was not the leading cause of death. Patients' demographic information, type of trauma, and cause of death were collected.

This study protocol was approved by the Ethics Committee of the Tabriz University of Medical Sciences.

Statistical analysis

Statistical analysis was performed on the SPSS software package version 15.0 for windows (SPSS Inc.; Chicago, IL, USA) and descriptive statistical methods were used for statistical analysis. The mean± standard deviation (SD) was used to present quantitative data and qualitative data were demonstrated as frequency and percentage (%).

RESULTS

Of 209 patients who died from unintentional trauma, 166 (79.43%) were males and 43 (20.57%) were females. The male to female ratio was 1:0.25. The mean age of patients was 37.64±22.68 years, and the minimum and maximum ages of patients were 2 months and 89 years, respectively. The age range of 21 to 30 years had the highest mortality rate, and that of 81 to 90 years had the lowest mortality rate (Figure 1).

Road traffic injuries (74%), falling from heights (13%), burning (8%), crush by heavy objects (3%), suffocation (1%), and contact with sharp objects (0%) were the most common causes of unintentional trauma in patients. In total, 116 (55.5%) patients were transferred to emergency centers by emergency services and 93 (44.5%) patients were transferred by non-medical staff.

The prevalence of damage to different parts of a patients' body in trauma were head and neck damage in 186 (89%) patients, thoracic damage in 94 (45%) patients, upper limb damage in 90 (43.1%) patients, lower limb damage in 75 (35.9%) patients, abdominal damage in 51 (24.4%) patients, and pelvic damage in 27 (12.9%) patients. The prevalence of life-threatening findings, based on hospital assessment that required emergency action to protect life, was according to Table 1.

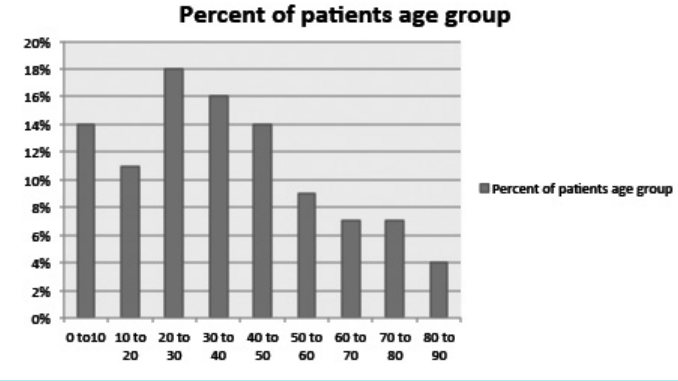

Figure 1. Percentage of patient age groups

Based on the above findings, emergency treatment including intravenous fluid for 184 (88%) patients, intubation in 185 (88.5%) cases, blood transfusions in 61 (29.2) cases, surgery in 55 (26.3%) cases, chest-tube embedding in 44 (21.1%) cases, splint decisions in 35 (16.7%) cases, and pelvic fixation in 8 (3.8%) were performed. Surgical procedures performed included 41 cases of intracranial hematoma craniotomy for evacuation and removal of skull fragments, 4 cases of hepatorrhaphy, 4 cases of splenectomy, 3 cases of thoracotomy for the control of bleeding, 1 case of thoracotomy and open cardiac massage, 1 case of splenectomy with simultaneous nephrectomy, and 1 case of simultaneous splenectomy.

Types of injuries that cause death according to the forensic report are mentioned in Table 2.

According to a forensic report about intracranial hemorrhage, 54 cases had subarachnoid hemorrhage, 52 cases had subdural hemorrhage, 31 cases had intra-cerebral hemorrhage, 28 cases had epidural hemorrhage, and 8 cases had intra-ventricular hemorrhage. The most common mode of intracranial hemorrhage was

Table 1. Prevalence of life-threatening findings

Prevalence / Findings	Prevalence frequency
Loss of consciousness	180 (86.1%)
Hemothorax	42 (20.1%)
Significant superficial bleeding	35 (16.7%)
Intra-abdominal hemorrhage	21 (10%)
Pneumothorax	17 (8.1%)
Rupture of abdominal solid components	17 (8.1%)
Hip fracture	15 (7.2%)
Vertebral fracture	14 (6.7%)

Table 2. Prevalence of injuries that cause death according to a forensic report

Prevalence / Injuries	Prevalence frequency
Head injury	124 (59.3%)
Multi trauma	22 (10.5%)
Hemorrhagic shock	20 (9.6%)
Septic shock	11 (5.3%)
Abdominal viscera damage	10 (4.8%)
Respiratory failure	8 (3.8%)
Spinal cord injury	7 (3.3%)
Skeletal injury	4 (1.9%)
Vascular damage	2 (1%)
Cardiac injury	1 (0.5%)

subarachnoid hemorrhage, and the incidence of intra-ventricular hemorrhage was the least.

DISCUSSION

Unintentional trauma is as a major global concern and health problem. About 90% of injuries leading to mortality are due to unintentional trauma (10). Road traffic accidents and falling are common causes of unintentional trauma (11, 12). This descriptive study was conducted to describe common causes of unintentional trauma leading to mortality according to forensic reports in our region (Tabriz, Iran). Based on the findings of this study, road traffic injuries were the most common cause of death in unintentional trauma. Falling from heights, burning, crush by heavy objects, suffocation, and contact with sharp objects were the next common causes of death in unintentional trauma, respectively.

Loss of consciousness was the most common finding in patients who died due to unintentional trauma. According to forensic report, head injury was the most common cause of death in these patients. Based on the forensic report after head injury, multitrauma, hemorrhagic shock, septic shock, abdominal viscera damage, respiratory failure, spinal cord injury, skeletal injury, vascular damage, and cardiac injury were the next most common causes of death in unintentional trauma patients, sequentially.

In a similar study performed in Canada, 108 patients who died due to trauma and were autopsied. In total, 72% of the patients were males and 28% were females. The median patient age was 39 years within the range of 2 to 90 years (13). In an epidemiological study of road traffic accidents in India, 83% of victims were males and 17% were females. The mean victim age was 31.5 years and the highest numbers of victims were in the 20 to 29 year age group (14). Based on the result of our present study, the mean patient age was 37.64±22.68 years with a range of 2 months to 89 years, 79.43% were male, 20.57% were female, and 21 to 30 year-olds had the highest mortality rate. The results of the present study were almost identical with the results of the cited studies.

In a comparative study of clinical and autopsy findings of 100 patients who died from trauma, 83% were males and 17 were females. Road traffic accident (65%) was the most common cause of mortality in trauma patients. Falling from heights (17%) and crush by objects on the body (4%) were the next most common causes of death, respectively (15). In a study of 4016 trauma patients in Sanandaj (Iran), 68.6% of patients were males and 31.4% were females. According to this study, road traffic accidents were the most common causes of trauma, and this study suggested that the prevention of these events would require careful planning by city and transportation authorities (16).

In a study conducted in Urmia (Iran) about motorcycle-induced trauma in terms of the areas damaged, head trauma (64.5%), lower limb injuries (41%), upper extremity injuries (21.7%), and thoracic/abdominal trauma (32%), were the next most common trauma sites (17). In the present study, head and neck damage (89%) was also the most common damage in patients. As well, head injury (59.3%) was the most common cause of death. Thoracic damage (45%), upper limb (43.1%), lower limb (35.9%), abdomen damage (24.4%), and pelvic damage in 27 (12.9%) were the other next most common damage seen in the present study, sequentially.

Finally, the results of the present study were almost similar to those of previous studies. According to various types of unintentional trauma and the costs to the health care system, community education and prevention of trauma with appropriate distribution of relief systems have the greatest impact on mortality reduction and injuries due to trauma. Improvement of equipment and more careful clinical examination will help to reduce cases of mismanagement.

CONCLUSION

Based on this study, road traffic injury was the most common cause of unintentional trauma and head injury was the most common cause of death in unintentional trauma. The most common life-threatening finding in patients who died due to unintentional trauma was loss of consciousness. Falling from heights, burning, and crushing by heavy objects were the next most common causes of trauma, and lower limb injuries, upper extremity injuries, and thoracic/abdominal trauma were the next most common trauma damage sites.

Ethics Committee Approval: This study protocol was approved by the Ethics Committee of Tabriz University of Medical Sciences.

Informed Consent: We obeyed as a Tabriz Uinversity of medical science and legal medicine organization in rules in keeping data as a secret one.

Peer-review: Externally peer-reviewed.

Authors' Contributions: Conceived and designed the experiments or case: MP, BSR. Performed the experiments or case: MP, SHZ. Analyzed the data: SSV. Wrote the paper: SSV, ZM, PM. All authors have read and approved the final manuscript.

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