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**ORIGINAL ARTICLE**

# PATTERNS OF TRAUMA IN PATIENT SEEN AT THE EMERGENCY CLINICS OF PUBLIC HOSPITALS IN MEKELLE, NORTHERN ETHIOPIA

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## ABSTRACT

***Background****: Injuries are a neglected health problem in developing countries. Ethiopia has a high incidence of road traffic accidents and trauma constitutes about half of surgical emergencies among patient seen at health facilities. The objective of this study was to determine the pattern of trauma among patient seen at emergency outpatient departments of public hospitals in northern Ethiopia*

***Methods:*** *Retrospective data on patient seen at the hospitals during a one-year period (January 1, 2013 - December 31, 2013) was collected. The source population was all patients who visited the emergency OPD of two public hospitals in Mekelle, Tigray.*

***Results****: The 16-25 year old age group was the most commonly affected age group, accounting for 38.5% followed by the 26-35 year old group (21.4%) of the cases. Males were more frequently involved than females ((74.3%) vs 25.7%). Eighty- three per cent of the patients were from urban areas. Interpersonal violence (31%), accidental falls (19.2%) and Road Traffic Accidents (RTA) (14.1%) were the most common causes of injury. The Head (33.5%) was the most commonly involved part of the body.*

***Conclusion:*** *This study indicates a high burden of trauma in the study area and the need for interventions to control the problem. Given the morbidity and mortality associated with trauma, trauma registry system will be beneficial in Tigray and perhaps for the whole country.*

***Keyword:*** *Traffic accidents, trauma, Mekelle, Tigray*

## INTRODUCTION

Globally, injury from trauma is the seventh leading cause of death, accounting for 5.8 million deaths 2010, accounting for, 1 in 10 global deaths and disability of millions. The three leading causes of trauma are road traffic incidents (1.3 million), suicide (844,000), and homicide (600,000) (1-4). Violence is known to cause severe mental and physical impairment and even death. It erodes the sense of safety and security so essential to the well-being of families and communities (3). Violence accounts for 14% of deaths among males and 7% of deaths among females (5). Trauma remains the most common cause of death for all individuals between the ages of 15 and 44 years (1,5). Trauma is known to represent a huge economic burden in countries worldwide (6-8). In 2005, in the United States injuries were estimated to have cost 406 billion dollars in medical and work loss costs (7).

Injuries are a neglected health problem in developing countries. In Ethiopia, trauma constitute about half of surgical emergencies (9,10). Every year nearly 2000 people die due to road accidents in Ethiopia. Of these, 48% are pedestrians, 45% passengers and 7% drivers. Over 400 to 500 Million Ethiopian Birr is lost yearly as a result. As stated by the Road Traffic Authority, the fatality rate is around 136 per 10,000 vehicles, which is very high compared to the 2 to 3 fatality rates per 10,000 vehicles in countries with highly developed road safety activities. The cost to the country's economy is also significant (11). The issue of trauma in general and RTA in particular is likely to hamper national growth and development (12). Trauma is one of the most important causes of morbidity and mortality among the non-communicable diseases (13, 14).

Central to the eradication of poverty is productive input from youth. Previous studies done in the Gon-

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dar and Addis Ababa have shown that it is the young and productive age group that is commonly affected by traumatic injuries (10,15, 16). Objective evidence defining the scope and patterns of trauma in other regions of the country are needed. In particular, no such studies have been performed in hospitals in Tigray, though it is believed the burden of trauma is high in surgical departments. Such research can provide the required framework for policy formulation by government and nongovernment organizations, insurance companies, city municipality, Road traffic Authority and the police, as well as help hospitals prioritize and allocate resources for emergency services. This study was conducted to assess the overall burden of trauma and its causes and describe the age groups affected in Mekelle, Tigray.

## MATERIALS AND METHODS

A one year retrospective study (January 1, 2013 - December 31, 2013) was performed using a pretested semi-structured data collection forms. The international classification of diseases (ICD10) was used to categorize the causes of trauma. The source population was all patients who visited the emergency outpatient department (OPD) of two public hospitals in Mekelle, Tigray, a city located in the northern part of Ethiopia. The total number of patients who visited these hospitals during the study period was more than 10,000. The sample size of 618 reports was calculated assuming a prevalence of 27% among emergency department patients based on a study conducted in Addis Ababa, Ethiopia (10), a 95% confidence level, and 80% power.

The data was entered into the EPIINFO and transferred to, cleaned, recoded and analyzed using SPSS version 16. Frequency distribution and percentages were used to describe categorical variables. Chi-square test was used to determine associations between the categorical variables.

## RESULTS

Table 1 provides demographic information on the cases. The most commonly affected age group was those from 16 to 25 years (38.5%) followed by the 26 -35 year age group (21.4%). Males were more frequent than females (74.3% vs 25.7%). The majority of patients (83%) were from urban areas. The most common causes (Table 2) were assault (31.2%) and accidental falls (19.2%). Exposure to inanimate mechanical forces (inanimate objects coming in contact with the body and causing trauma, but not related to assault) constituted 22.7% and exposure to animate mechanical forces (animal bites and collisions) 14.6%. Road traffic accidents were the cause in 14.1% and burns in 2%. Assault, which accounted for the largest share among the causes, was inflicted by stones in 29.9% and sticks in 13.4% of the cases. Most of the injury caused animals was due to dog bites (87%). Among parts of the body most affected, head injuries predominated (33.5%) followed by the knee and the lower leg affected in 10.6% of the cases (Table 3).

Table 1. Distribution of patients by socio-demographic factors

| Characteristics | Number | % |
|---|---|---|
| **Age group** | | |
| ≤5 years | 51 | 8.5 |
| 6-15 years | 97 | 16.1 |
| 16-25 years | 232 | 38.5 |
| 26-35 years | 129 | 21.4 |
| 36-45 years | 45 | 7.5 |
| ≥46 years | 48 | 8.0 |
| **Sex** | | |
| Female | 154 | 25.7 |
| Male | 446 | 74.3 |
| **Place of residence** | | |
| Urban | 502 | 83,7 |
| Rural | 98 | 16,3 |

There were statistically significant associations between the cause of trauma and sex, age, address of the patients (whether residing in or out of Mekelle) and the affected part of the body (Table 4). The common causes of trauma among the females were assault (22.9%,n=35) and exposure to animate mechanical forces and poisoning (22.9%, n=35). Among the males, the most frequent causes were assault (34.6%, n=150) followed by exposure to inanimate mechanical force (25.4%, n=110). The difference between males and females was statistically highly significant ($p < 0.0001$).

Table 2 Distribution by Causes

| **Cause of Trauma** | Number | % |
|---|---|---|
| **Road Traffic Accident** | **85** | **14.1** |
| Pedestrian | 15 | 17.6 |
| Vehicle occupant | 52 | 61.2 |
| Not specified | 14 | 16.5 |
| Other | 4 | 4.7 |
| **Accidental Fall** | 116 | 19.2 |
| Level of fall | | |
| Same level | 51 | 44.0 |
| High level | 30 | 25.9 |
| Furniture | 5 | 4.3 |
| Tree | 3 | 2.6 |
| Building | 3 | 2.6 |
| Unspecified | 21 | 18.1 |
| Other | 3 | 2.6 |
| **Burns** | **12** | **2.0** |
| Exposure to ignitable substance | 2 | 16.7 |
| Hot fluid | 4 | 33.3 |
| Hot solid | 1 | 8.3 |
| Hot air & gas | 1 | 8.3 |
| Not specified | 4 | 33.3 |
| **Inanimate mechanical force (non-assault)** | **137** | **22.8** |
| Sharp material | 71 | 51.8 |
| Striking an object | 61 | 44.5 |
| Contact with non-powered tool | 3 | 2.2 |
| Explosion | 2 | 1.5 |
| **Animate mechanical forces & poisoning** | **88** | **14.6** |
| Bitten by animal | 83 | 94.3 |
| Struck by animals | 5 | 5.7 |
| Specify the animate exposure | | |
| Dog | 76 | 86.4 |
| Others | 12 | 13.6 |
| **Assault** | **187** | **31.1** |
| Gun discharge | 1 | 0.5 |
| Explosives | 1 | 0.5 |
| Pushing from high place | 4 | 2.1 |
| Motor vehicle | 1 | 0.5 |
| Sexual assault | 2 | 1.1 |
| Drugging | 3 | 1.6 |
| Strangulation | 3 | 1.6 |
| Sharp object | 28 | 15.0 |
| Blunt object | 28 | 15.0 |
| Stick | 25 | 13.4 |
| Stone | 56 | 29.9 |
| Unspecified | 35 | 18.7 |

**Table 3- Distribution by region of the body affected**

| Region of injury | Number | % |
|---|---|---|
| Head | 202 | 33.5 |
| Knee and lower leg | 64 | 10.6 |
| Ankle and foot | 28 | 4.6 |
| Neck | 12 | 2.0 |
| Thorax | 19 | 3.2 |
| Abdomen | 14 | 2.3 |
| Lower back, lumbar spine & pelvis | 30 | 5.0 |
| Shoulder and upper arm | 18 | 3.0 |
| Elbow and forearm | 44 | 7.3 |
| Wrist and hand | 61 | 10.1 |
| Hip and thigh | 20 | 3.3 |
| Unspecified | 91 | 15.1 |

**Table 4: Causes of trauma by background characteristics**

| | **Road traffic accident** | **Accidental fall** | **Inanimate mechani-cal force** | **Animate mechanical forces & poisoning** | **Burn** | **Assault** | **p-value** |
|---|---|---|---|---|---|---|---|
| Sex | | | | | | | |
| | | | | | | | < |
| Female | 22 (14.4) | 32 (20.9) | 24 (15.7) | 35 (22.9) | 5 (3.3) | 35 (22.9) | 0.0001 |
| Male | 54 (12.5) | 66 (15.2) | 110 (25.4) | 46 (10.6) | 7 (1.6) | 150 (34.6) | |
| Age group | | | | | | | |
| | | | | | | | < |
| <5 years | 7 (14.6) | 14 (29.2) | 17 (35.4) | 6 (12.5) | 3 (6.2) | 1 (2.1) | 0.0001 |
| 6-15 years | 6 (6.2) | 16 (16.7) | 27 (28.1) | 30 (31.2) | 2 (2.1) | 15 (15.6) | |
| 16-25 years | 27 (12.0) | 29 (12.8) | 49 (21.7) | 21 (9.3) | 3 (1.3) | 97 (42.9) | |
| 26-35 years | 19 (15.1) | 19 (15.1) | 26 (20.6) | 10 (7.9) | 4 (3.2) | 48 (38.1) | |
| 36-45 years | 6 (13.3) | 7 (15.6) | 6 (13.3) | 6 (13.3) | 0 (0.0) | 20 (44.4) | |
| >45 years | 11 (22.9) | 13 (27.1) | 10 (20.8) | 8 (16.7) | 0 (0.0) | 6 (12.5) | |
| Place of residence | | | | | | | |
| Urban | 56 (11.4) | 83 (16.9) | 120 (24.4) | 64 (13.0) | 10 (2.0) | 158 (32.2) | 0.138 |
| Rural | 18 (18.9) | 15 (15.8) | 14 (14.7) | 17 (17.9) | 2 (2.1) | 29 (30.5) | |
| Address | | | | | | | |
| Outside | 21 (19.8) | 19 (17.9) | 13 (12.3) | 19 (17.9) | 2 (1.9) | 32 (30.2) | 0.023 |
| Inside | 55 (11.4) | 79 (16.4) | 122 (25.3) | 62 (12.8) | 10 (2.1) | 155 (32.1) | |
| Region of injury | | | | | | | |
| | | | | | | | < |
| Head & neck | 24 (11.3) | 31 (14.6) | 22 (10.4) | 6 (2.8) | 1 (0.5) | 128 (60.4) | 0.0001 |
| Lower extremity | 17 (15.6) | 18 (16.5) | 31 (28.4) | 31 (28.4) | 2 (1.8) | 10 (9.2) | |
| Trunk | 13 (21.3) | 8 (13.1) | 14 (23.0) | 2 (3.3) | 3 (4.9) | 21 (34.4) | |
| Upper extremity | 19 (15.7) | 28 (23.1) | 38 (31.4) | 13 (10.7) | 5 (4.1) | 18 (14.9) | |
| Unspecified | 3 (3.5) | 13 (15.1) | 30 (34.9) | 29 (33.7) | 1 (1.2) | 10 (11.6) | |

Cases in the ≤5 years age group were mostly due to exposure to inanimate mechanical forces (35.4%, n = 17) followed by falls (29.2%, n=14). Patients in the 6-15 year age group mainly comprised cases due to exposure to animate mechanical forces and poisoning (31.2%, n=30) and to inanimate mechanical forces (28.1%, n=27).

Causes in the 16-45 year age group were primarily assault, and in the oldest age group >45 years were accidental falls (27.1%, n=13) and road traffic accidents (22.9%, n =11). Head and neck area was the most commonly affected region in cases with assault (P < 0.0001).

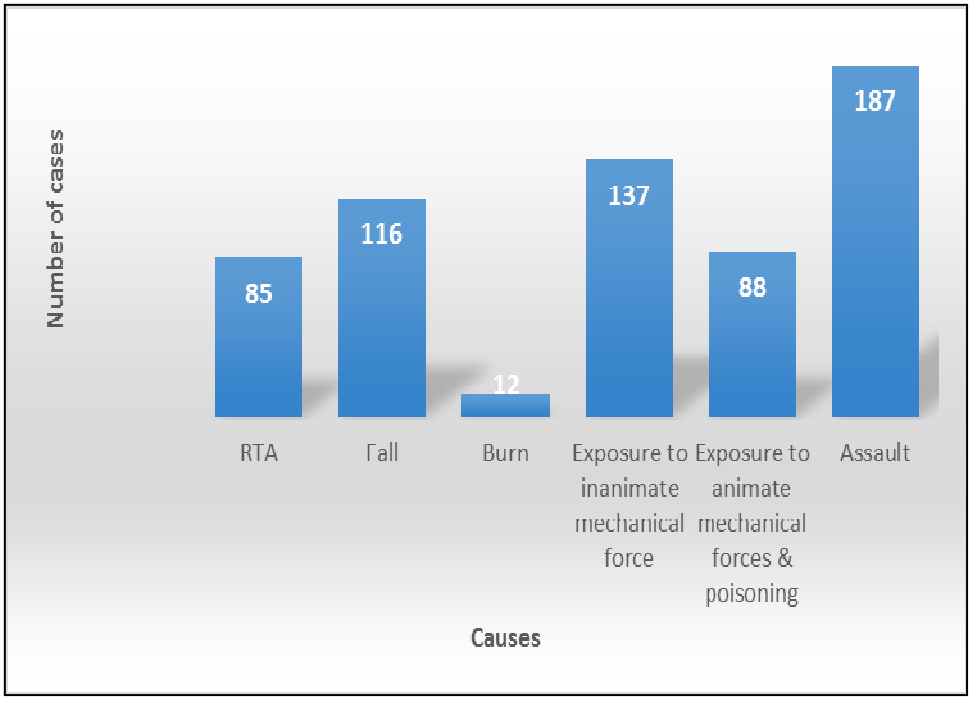


Figure 1: The distribution of patient by causes of trauma

## DISCUSSION

The result of this study are similar to those done elsewhere in Ethiopia (15,17). While considerable numbers of trauma visits were related to traffic accidents, the greatest numbers were due to interpersonal violence and falls. Interpersonal violence was also found to be a more common cause for trauma than vehicle accidents in a study from South Africa (18). Falls were found to be the commonest causes for unintentional injury in a study done in Addis Ababa, though road traffic accidents were the most common cause for admission (10).

Interpersonal violence can be a manifestation of the culture and socio economic status among the population. In 1996, the Forty-Ninth World Health Assembly has declared violence as a major and growing public health problem. We recommend that future studies should focus on characterizing and defining the extent of the problem, identifying the causes, formulating and testing means of intervention and prevention.

In our study accidental falls were predominantly associated with patients at the extremes of age, children and elderly. These age groups are vulnerable to such accidents. The high incidence of fall in the study area may be related to safety of the environment, or occupation or policy related. This requires clarification in future studies (14).

We observed that the head is the most commonly affected body part in trauma from all causes, and this is consistent with our anecdotal clinical impression that head trauma is the most frequent cases of death on the surgical wards and in intensive care units. Future studies should focus on head injury in this particular region and should try to define the extent of the problem and means of improving the pre-hospital care more structured management schemes within the hospital to address this problem well in time.

Finally, given the morbidity and mortality associated with trauma, we recommend that a trauma registry system would be of benefit for the national health care system and provide a means of monitoring progress in this important area.

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