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ORIGINAL ARTICLE

CLINICAL PROFILE AND PATTERNS OF EXTREMITIY FRACTURES IN ORTHOPEDICS DEPARTMENT IN TIKUR ANBESSA SPECIALIZED HOSPITAL

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ABSTRACT

Introduction: *Bone Fracture and other Musculoskeletal injures continue to be important causes of morbidity, disability and mortality both in the developed and developing countries. Around the world, 5.8 million people every year (1,600/Day) die from injuries.*

Objective*: The aim of this study was to assess the clinical profile and patterns of extremity fractures in patients visiting the Orthopedic Department of "Tikur Anbessa" Specialized Hospital (TASH) in Addis Ababa.*

Method*: Institution-based retrospective study was carried out. The study participants were extremity fracture patients who visited Orthopedic Department of TASH. The sample size was 354.Data was collected using structured checklist. Medical record numbers (MRNs) were obtained from health management information system (HMIS) record and daily morning sheet through systematic random sampling method. The data were analyzed using Chi-square ($\chi 2$) test.*

Results*: Study participant consisted 251(73.6%) male and 90 (26.4%). Most of the victims, 111 (32.6%), were between the age of 15 and 29 years. Lower extremity fracture (65.6%) was more common compared to upper extremity (34.7%). Femur was the most commonly fractured bone (23.7 %). The common patterns of fractures were transverse type (35.5 %). The leading cause of fractures was road traffic injuries (RTIs) (42.2%). The Cause of fracture and number of fracture were significantly associated with age ($p<0.05$).*

Conclusion*: The most commonly fractured single bone is the femur. Transverse factures were the commonest patterns of fracture. The leading cause of fracture was road traffic injury.*

Keywords*: Extremity, fracture, Patterns, "TikurAnbessa" Specialized hospital, TASH, Black Lion, Ethiopia*

INTRODUCTION

A fracture is a loss in the structural continuity of bone which results from injury, repetitive stress, or abnormal weakening of the bone (a pathological fracture). Most fractures are caused by sudden and excessive force, which may be direct or indirect (1). It is the most common pattern of orthopedic injuries, which affects all age group and frequently associated with other injuries (2). Fracture prevalence differs in different parts of the world and that the spectrum of fractures presenting to different hospitals may vary considerably (3).

Globally, injury continues to be an important cause of morbidity, disability and mortality both in the developed and developing countries. Around the world, 5.8 million people die every year, and about 16000 people die from injuries every day (4). Among persons aged 15 through 44 years, injuries account for 6 of the 15 leading causes of death. Road traffic injuries (17.5%), falls (12.2%), interpersonal violence (10.1%), and self -inflicted injuries (9.7%) are the main injury-related cause. RTA is the 10th leading cause of death and the 9th leading cause of the burden of disease (5).

The Global Burden of Disease (GBD) estimated that combined rates of extremity injury from falls and road traffic crashes ranged from 1000 to 2600/100,000 per year in most low-and middle-income countries (LMICs) compared with 500/100,000 per year in high income countries (HICs) (two to five times higher in LMICs) (6,7).

In developing countries some data indicates a huge burden of disability from musculoskeletal injuries. Some of these data come from individual country studies, such as a population-based survey showed that 0.83% of Ghanaians had an injury-related disability. The vast majority (78%) of such disabilities were due to extremity injuries. Hence; extremity injury related disability is alerting issue in developing countries (8).

Hospital based studies continue to show the effect of injury on the continuity of bone, and that it is a major cause of morbidity and mortality in Africa. For instance, in Nigeria out of patients treated for fracture and dislocation, lower limb and upper limb fractures occurred in over 70% and 20% of cases, respectively (9).

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Despite the increasing trend suggested by available data, bone injuries especially extremity injuries have not received the attention they deserve in most developing countries including Ethiopia (10). Therefore, the aim of this study was to investigate patterns of extremity fractures and to identify its mechanism of injury in "Tikur Anbessa" Specialized Hospital (TASH), Addis Ababa, Ethiopia.

PATIENTS AND METHOD

Study area: The study was conducted in Tikur Anbessa Specialized Hospital (TASH, Black Lion) Department of Orthopedics, Addis Ababa, Ethiopia.

Study design: Institution-based cross-sectional study design was employed, with retrospective data collection form charts of patients with extremity fractures records from December 2016 to December 2017.

Source and study population: The source population was all fracture patients who visited Orthopedic Department in TASH beginning from December 2016 to December 2017. The study population was all extremity fracture patients presented to orthopedics department in TASH that fulfill the inclusion criteria. Extremity fracture patient charts that had incomplete data greater than 20% of the variables, charts which were lost from record office at the time of data collection and fracture in children resulting from birth trauma were excluded from the study.

Sample size determination: There was no published data on the prevalence of extremity fracture in all age groups in Ethiopia. Therefore, the estimated prevalence of extremity fracture is 50%. The minimum number of sample required for this study was determined by using single population proportion formula. Since the sample was taken from a relatively small population which was 2002, there was a need for sample size correction formula. As a result, 10% was added for incomplete data. Thus, the final sample size was set at 354.

Sampling procedure: The medical record number (MRN) of all patients with a diagnosis of fracture was collected from emergency and regular fracture clinic health management information system (HMIS) registration book of the hospital within study period. The inpatient registration book and daily morning sheets also were checked to avoid missing of some unregistered charts in HMIS of emergency and fracture clinic. During collection of MRNs of patients with fracture, extremity fracture patients were selected and then numbers were assigned, respectively, according to registration date in HMIS. According to the number of cases distribution in pediatric and adult age group, the sample size was determined proportionally for each age group. Systematic random sampling method (every 5^{th}MRN) was used to take sample in each age group. The initial starting MRN was identified by a simple random sampling method (lottery method) to take sample systematically in each group.

Data Collection Tool and Procedures: Data was collected using structured checklist which was adapted from previous literature. MRNs were obtained from HMIS record and daily morning sheet through systematic random sampling method to get the main file of the patient from patients chart room. Finally, based on the inclusion and exclusion criteria of the study, cards which had important variables for the study were used. Then, data regarding all variables were collected from the main card.

Data analysis and Interpretation: The data were checked after each data collection for its completeness. The data was entered onto Epi-Data version 4.2 and then exported to SPSS Version 21 for analysis. For categorical data, descriptive statistics like frequency and percentage were computed and presented by way of tables and graphs. Continuous variables were summarized using means, median, mode and standard deviation. Chi-square ($\chi 2$) test was applied to see if there was any association between the different categorical variables related to fracture. Statistically significant association was declared at p-values <0.05.

Ethical considerations: Ethical clearance was obtained from Research Ethics Review Committee (DRERC) of Department of Anatomy, School of Medicine, College of Health Science, Addis Ababa University and TASH Outpatient Department Director. Confidentiality of patient information was maintained through taking the data anonymously. After data collection, the raw data including personal identifiers was secured and was not accessed by anyone except the principal investigator and to keep confidentially.

RESULTS

Out of the total fracture patients (2,002) who visited orthopedic department in TASH, 354 extremity fracture cases were sampled in the present study. Of the 354 sampled cases, 341 had complete patient charts data and thus, data analysis was based on 341 cases. The study participants comprised of 251 (73.6%) males and 90 (26.4%) females resulting in a male to female ratio of 2.8:1 (Table-1). The median and the mode ages of participants' age were 24 and 35 years, respectively. Most of the injured 111 (32.6%) were between the ages of 15 and 29 years (Table-1).

Table 1: Age and sex distribution of patients with extremity fractures, Tikur Anbessa Specialized Hospital, Addis Ababa (N=2002).

Characteristics		Frequency	Percent
Gender	Male	251	73.6%
	Female	90	26.4%
Age	0 – 14	103	30.2%
	15 – 29	111	32.6%
	30 – 44	55	16.1%
	45 – 59	27	7.9%
	60 – 74	27	7.9%
	>_ 75	18	5.3%

In this short review, lower extremity was the most common site of fracture (65.6%) compared to upper extremity (34.7 %). The most commonly fractured bone in the lower extremity was the femur 89 (23.7%), followed by tibia and fibula together 49 (13.0%). The least fractured bone was phalangeal bone 1(0.3%).

The femur was also the most affected bone in the skeleton of extremity. In the upper extremity, the most commonly fractured bone was the humerus, 36 (9.6%), followed by radius and ulna together 30 (8.0%) while the scapula was the least fractured bone which accounted for only 2 (0.5%) (Table 2 and Table 3).

Table 2: Frequency and pattern of upper extremity fractures, Tikur Anbessa Specialized Hospital, Addis Ababa (N=2002).

Fractured bones	Frequency	Percent
Scapula	2	0.5%
Clavicle	7	1.9%
Humerus	36	9.6%
Radius and Ulna	30	8.0%
Only Radius	22	5.9%
Only Ulna	23	6.1%
Carpal	3	0.8%
Metacarpal	4	1.1%
Phalangeal	3	0.8%
Total	130	34.7%

Table 3: Frequency and pattern of lower extremity fractures, Tikur Anbessa Specialized Hospital, Addis Ababa (N=2002).

Fractured bones	Frequency	Percent
Pelvic	48	12.8%
Femur	89	23.7%
Patella	7	1.9%
Only Tibia	39	10.4%
Only Fibula	4	1.1%
Tibia and Fibula	49	13%
Tarsal	3	0.8%
Metatarsal	6	1.6%
Phalangeal	1	0.3%
Total	246	65.6%

The majority of fractures were simple (closed) type, 282(82.7%), followed by compound (open) type 55 (16.1%). A total of 303(68.3%), had single fracture and multiple fracture patients accounted for 108 (31.7%).

The common pattern of fracture was transverse,121 (35.5%), followed by comminuted, oblique, mixed, spiral, and greenstick which accounted for 79 (23.2%), 67 (19.6%), 39 (11.4%), 22(6.5%), and 13 (3.8%), respectively (Table 4).

Table 4: Specific patterns of extremity fractures, Tikur Anbessa Specialized Hospital, Addis Ababa (N=2002).

Pattern	Frequency	Percent
Transverse	121	35.5%
Oblique	67	19.6%
Comminuted	79	23.2%
Greenstick	13	3.8%
Spiral	22	6.5%
Mixed*	39	11.4%

**multiple site fracture cases who had different patterns of fracture*

RTI was observed to be the leading cause of extremity fractures and accounted for 144 (42.2%) followed by fall accident, 101 (29%) (Table 5).

Table 5: The prevalence of causes of fracture, Tukur Anbessa Specialized Hospital, Addis Ababa (N=2002)

Causes	Frequency	Percent
Road traffic injury	144	42.2%
Falling down accident	101	29.6%
Gunshot injury	10	2.9%
Occupational related injury	10	2.9%
Sport related injury	19	5.6%
Assault / direct blow	40	11.7%
Pathological	15	4.4%
Others	2	0.6%
Total	341	100%

Out of 144 (42.2%) road traffic injury victims, pedestrians were the most vulnerable group and accounted for 62 (43.1%) followed by passengers and drivers:52 (36.1% and 30 (20.8%), respectively (Fig 1).

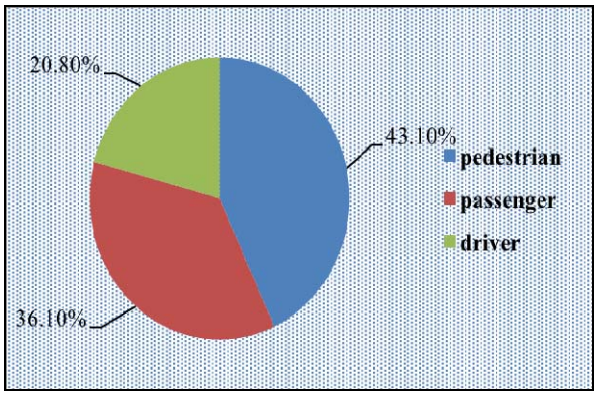

Figure 1: Victim groups by RTI in patients with fractures, Tukur Anbessa Specialized Hospital, Addis Ababa (N=2002).

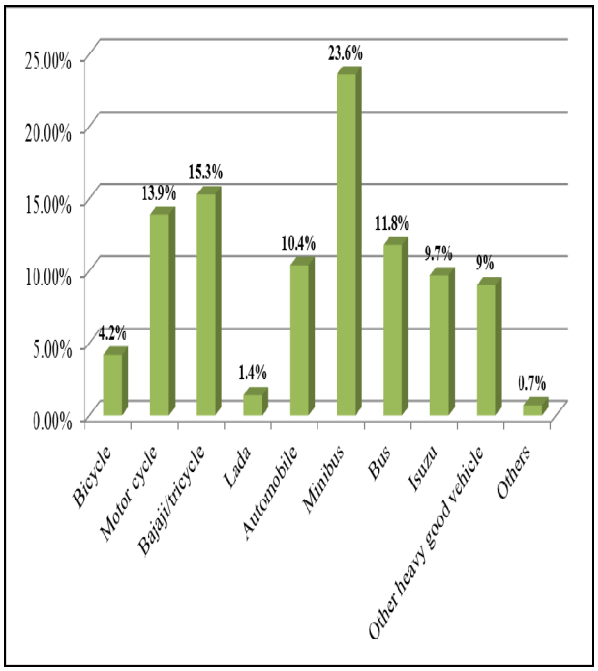

Figure 2: Frequency of the types of vehicles that are involved in road traffic injury, Tukur Anbessa Specialized Hospital, Addis Ababa (N=2002).

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The causes of fracture in the various age-groups were significantly different. Out of 144 road traffic injury patients, the most common types of vehicle involved in road traffic injury was the minibus 34 (23.6 %), followed by 'Bajaji'/Tricycle, 22(15.3%) %) (Figure- 2).

DISCUSSION

The results of this simple review revealed that lower extremity fractures (65.6%) were significantly higher compared to upper extremity (34.7%).This observation is in agreement with a study conducted in Karnataka, India, where lower extremity fractures (60%) were more common compared to upper extremity (31%)(12).

However, the finding of the present study were inconsistent with reports of a study carried out in Munipar, India, where upper extremity fractures (58.6%) were more common compared to lower extremity (41.83%) (13). One reason for the difference may be the fact that the common cause of fracture in the current study was RTIs in contrast to a study conducted in Munipar, India, where the most common causes were falling down accidents. In falling down accidents, the upper limb may be used as a defense or protection scheme to minimize the severity of injury.

The present study also contradicts the reported data of the investigation conducted in Wolaita, Southern Ethiopia, where upper limb fracture was more common (46.4%) than lower limb fracture (37.5%) (11). This inconsistency may be due to the fact that, in the study in Wolaita, most of the RTIs were attributed to motorcycles and Bajaji/Tricycles where as in the current study the most common RTI involved Minibuses. Moreover, the sample size used in the study in Wolaita was smaller compared to that in the present study. In the study in Wolaita, RTIs were also the common cause of fracture.

Our investigation revealed that the most commonly fractured bone in the extremity was femur (23.7%), followed by tibia and fibula together (13%). In the upper extremity, humerus was the most commonly fractured bone (9.6%). This finding is in line with reports of studies conducted in India and Nigeria (12, 14) as well as with a reported data of the investigation in TASH, Ethiopia (15, 16). However, the prevalence of femur fracture in the current study was higher. Patient referrals to TASH was much higher during the current investigation than that during the earlier studies carried out in TASH in 2009 and 2010 (15, 16).

The majority of fractures were simple (closed) type, 282(82.7%), a total of 303(68.3%), had single fracture and common pattern of fracture was transverse,121 (35.5%). These facts encourage to plan for day-case surgery using IM locking nails, hence avoiding admissions.

Furthermore, fractures were observed to occur more in males (73.65%) compared to females (26.4 %) resulting a ratio of 2.8:1. This ratio was comparable to that reported by a study conducted in Munipar, India; where male to female ratio was 2.7: 1(13). The possible explanation for the high prevalence of fracture in males may be their high activity levels and linkage in high-risk activities. Most of the victims were between the ages of 15-29 (32.6%).

This finding is consistent with a study carried out in kashan, Iran, where the most affected groups were between the ages of 15-29 (43.2%) (17). The possible reason for this finding may be the fact these age group represents the most productive and reproductive age group and therefore, economically and socially active, participating in higher levels of economic and high-risk activities. However, the prevalence of fractures in the current study for this age group was relatively small compared to that reported in the Iran study. The reason for the difference in the findings may be the use of a relatively smaller sample size in the current study compared to the study conducted in Iran.

In our study, the most common causes of extremity fractures in all age group was RTI (42.2%) followed by falling down accidents (29.6%). This finding is in agreement with a reported data of investigations carried out in Nigeria (9, 21) and in India (19, 20), where RTI was identified as the most common cause of extremity fractures. However, the prevalence of RTI in the current study was smaller as compared to that reported by the Nigerian study (72%), (73.2%) and the Indian study (59.72%), (62%). The possible explanation for this discrepancy may be the difference in sample size, (smaller in the present study), in the number of people actively involved in motor vehicle related activities and in the number of motor vehicle. On the other hand, the prevalence of RTIs in the present study was higher as compared to that reported by the study carried out in Wolaita , Southern Ethiopia, (35.4 %) (11). The current study was conducted in TASH, a tertiary hospital for the country and sample size used was larger.

In the present investigation, most of the victims of RTI were pedestrians (43.1%), followed by passengers (36.1%). This finding is consistent with a reported data of an investigation conducted in Kenyatta national hospital, Kenya (23). However, the finding of the current study contradicts results of a study carried out in Pakistan, where drivers (68%) followed by passengers (32%) were the most affected population groups (22). The high prevalence of RTIs observed in pedestrians, in the present study, may reflect the low level of community awareness on road traffic safety and road use. In addition, the absence of pedestrian walkways in most of the roads in Addis Ababa, Ethiopia, may have contributed to the higher vulnerability of pedestrians to motorized vehicles. Therefore, educating the public on RTIs and safe use of the roads is critical.

Moreover, the types of vehicle that were mostly involved in road traffic injury in the present study were minibuses (23.6%) followed by Bajaji/tricycle/ (15.3%). This finding is in agreement with a study carried out in Kenyatta national hospital, Nairobi, Kenya, where minibuses also were the type of vehicle mostly involved in RTIs (23). The possible reason for this may be to the fact that, in these two cities, the majority of people use minibuses as the main transportation means.

Conclusion: Transverse femur fracture was a commonest, hence day-case based surgery using IM locking nails is highly recommended to avoid long stays and hospital admission. The leading cause of fracture across all age groups was RTI (road traffic injury) and most of the victims were young male pedestrians. Public awareness on traffic rules and regulations should be enhanced in the schools as well as in the media to minimize this problem.

National, multicenter, prospective and randomized studies with large sample size should be conducted in order to influence decision and policy makers further. Furthermore, health professionals working in the hospitals should properly and completely document patients' medical information.

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