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# Analysis of The Mechanisms of Injury, Classification and Associated Injuries of Pelvic Fracture in Patients Presenting to Tibebe Ghion Specialized Hospital Emergency Department, Bahir Dar, Ethiopia

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**BAHIR DAR UNIVERSITY**

**COLLEGE OF MEDICINE AND HEALTH SCIENCE**

**DEPARTMENT OF ORTHOPEDICS AND TRAUMATOLOGY**

**ANALYSIS OF THE MECHANISMS OF INJURY, CLASSIFICATION AND ASSOCIATED  
INJURIES OF PELVIC FRACTURE IN PATIENTS PRESENTING TO TIBEBE GHION  
SPECIALIZED HOSPITAL EMERGENCY DEPARTMENT, BAHIR DAR, ETHIOPIA**

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**A RESEARCH THESIS TO BE SUBMITTED TO BAHIR DAR UNIVERSITY COLLEGE OF  
MEDICINE AND HEALTH SCIENCE DEPARTMENT OF ORTHOPEDICS AND  
TRAUMATOLOGY IN PARTIAL FULFILMENT OF SPECIALITY CERTIFICATE TRAINING  
ON ORTHOPEDICS AND TRAUMATOLOGY**

**JULY, 2020**

**BAHIR DAR, ETHIOPIA**

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**JULY, 2020**

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## Declaration

The undersigned examining committee certify that the thesis presented by Dr Biruk Ferede entitled “analysis of the mechanisms, classification and associated injuries of pelvic fracture in patients presenting to Tibebe Ghion Specialized Hospital Emergency Department, Bahir Dar, Ethiopia, submitted to Bahir Dar university, collage of medicine and health science, department of orthopedics and traumatology in partial fulfillment of the requirements for specialty certificate training on orthopedics and traumatology compiles with the regulation of the university and meets the accepted standards with respect to originality and quality.

**Date of Submission:** \_\_\_\_\_

### Principal investigator:

Name-----

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## **List of Abbreviation**

DALYs -Disability adjusted life year (1 DALY = loss of 1 year of healthy life)

RTA-Road traffic accident

RTI-Road Traffic Injuries

SD-Standard Deviation

SPPS-Statistical Package for Social Science

PG -pelvic groups

NPG- Non pelvic groups range

RTC- Road traffic crashes

SPSS- Statistical package for social sciences

ZMH-Zewuditu Memorial Hospital

IQR-Interquartile

ED- Emergency Department

MVC- Motor Vehicle Collisions

TGSH-Tibebe Ghion Specialized Hospital

## **Abstract**

**Background:** The trauma, a world public health problem, has been a major reason of mortality and morbidity, as it affects over fifty million people today, an aggravated circumstance in urban centers, mainly due to the increasing number of vehicles and the aggressiveness in traffic which cause accidents with high energy and leading to an increase in the number of deaths and injuries. Among the orthopedic traumas, pelvic injuries are considered the 3<sup>rd</sup> reason of death due to car accidents; represent 20% to 25% of fractures in multiple traumatized patients. However the pattern of pelvic fracture is not known in our setting.

**Objectives:** The purpose of this study was to analyze the mechanism, classification and associated injuries in pelvic fracture in patients presenting to Tibebe Ghion Specialized Hospital Emergency Department (TGSH ED), Bahir Dar, Ethiopia.

**Methods:** A Retrospective cross sectional study was conducted on patients who were seen at emergency department TGSH, Bahir Dar University, Bahir Dar, Ethiopia with a diagnosis of pelvic fracture from January, 2019 GC- September, 2020 GC with a diagnosis of pelvic fracture. Diagnosis and documentation made by orthopedics residents were acceptable as reliable result from chart review. The data was collected using structured pretested data collection tools and analyzed using SPSS for windows version 20.0.

**Results:** In this study, a total of 64 cases with pelvic ring fracture were reviewed. Fifty-six (87.5%) were male and 8(12.5%) were female with male to female ratio of 7:1. The mean age of affected individuals was 31.93 years with standard deviation of 12.1. Fifty two (81.3%) patients

had associated injury of various type. The most common associated injury in this study were lower extremity 23(35.9%) and abdominal injuries 16(25.0%) and most of them (56.3%) had Tile A fracture comprising. Road terrific accident was the major cause of pelvic fracture accounting for 56.3% of cases followed by fall down (28.1%) and bullet injury (12.5%).

**Conclusion:** According to this study the most commonly affected with pelvic ring fracture was male with M: F ratio of 7:1. Commonly affected population was in productive age groups (15-35 years) and most of the Victims were due to road traffic accidents and more so pedestrians and passengers. Fall down from a height accounts also significant number. The majority of pelvic fracture patients in this study were diagnosed as Tile A fracture. Abdominal, lower extremity and ureteral injuries were the major associated injuries for these patients. .

**Keywords:** Pelvis, Fracture, Mechanism of Injury, Tibebe Ghion Specialized Hospital.

# **1. Introduction**

## **1.1 Background**

Trauma, a world public health unhealthiness, has been a serious reason behind of morbidity and mortality, as it affects over 50 million people nowadays, an aggravated circumstance in urban centers, mostly due to the growing number of cars and the aggressiveness in traffic which cause accidents with high energy and leading to an raising in the number of deaths and injuries (1).

Among the orthopedic injuries, pelvic injuries are considered the third common cause of death due to car accidents; represent 20% to 25% of fractures in multiple traumatized patients, their incidence ranges from 3% to 8% of all bone fractures and encompass a multi spectrum of injuries, from low-energy osteoporotic fractures to high-energy disruptions of the pelvic ring(1, 2).

Usually, pelvic injury cause by road traffic accident, falls, and pedestrians hit by motor vehicles. It tends to occur in bimodal distribution of these injuries with younger males sustaining high-energy pelvic ring injury with other body part injuries, and old age female suffering low-energy ring injury with no associated injuries (3, 4).

Female account for Around 70% of pelvic ring injury(5). Most male patients sustaining high-energy pelvic ring and also sustain associated genitourinary injuries more commonly than females whereas females predominated sustain low-energy trauma (6).

It is observed that up to 60% of the deaths occur in the area of the accident itself and about 90% of the cases, there are concomitant lesions, which represents a negative prognostic factor in relation to morbidity and mortality(1).

Fractures of the pelvic ring are part of the routine of traumatology. The accompanying traumatic lesions commonly require neurosurgeries, abdominal surgeries, colostomies, cystectomies, drains and prolonged hospitalization that impair orthopedic treatment. Pelvic fracture is a big health problem in our country and it's a major cause of morbidity and mortality. The outcomes are increased hospitalization, increased direct patient costs, and mortality(7). They also contribute to overcrowding and resource mismanagement in the ED (7-10).

Analysis of the mechanism of injury, classification and associated injuries in pelvic fracture is not studied so far in TGSH. The classification of pelvic fractures need adequate plain films), along with thin-cut computed tomography scans. For this reason the study area is TGSH ED as it reflects picture of the whole Amhara region.

Due to the absence of Emergency medical services in our country (11) families and other responsible body may be less successful in bringing patients to the hospital in a timely fashion than emergency medical services in other countries (especially western) (12).

## **1.2 Statement of the Problem**

Worldwide trauma is considered a public health problem as it results to increase in morbidity, mortality and disability. This translates to increase in health care expenses and decrease productivity due to suboptimal functional outcome. Road traffic accidents are reported to be the main cause of injury (13).

Pelvic fractures increase the risk for mortality primarily because of hemorrhage caused by direct injury to adjacent vasculature (venous and arterial) from bone fragments, damage of vessels by shear forces, and osseous bleeding (14).

Pelvic ring fracture exerts a heavy economic burden on the society. This burden is related to health system costs incurred by society in managing the injury. Indirect costs resulting from productivity losses due to individual disability and premature mortality, due to occurrence of higher dependency time spent by family members accompanying patients when seeking care (15), and admission to the ED adding to the problems of ED overcrowding, intangible costs (psychological pain to the family and loved ones)(7).

### **1.3 Significance of the Study**

Identifying the commonest mechanisms, classification and associated injuries of pelvic fracture will help in further prevention and decreasing mortality and morbidity and guide treatment. It will also help in identifying which demography is more affected with which type of injury. Up to my knowledge is concerned no study on pelvic fracture exists in this region and this study will give a baseline for further study and highlight the severity of pelvic fracture in this region.

## 2. Literature Review

Global burden of disease in 1990 estimated 50.5 million deaths occurred yearly worldwide. Of these, 5.1million people died following injury (16).Worldwide, 1.2 million people die in road crashes annually and 20-50 million more people survive with injuries. For each death from trauma, three victims suffer permanent disability (17).

By end of 2020, WHO projects 8.4 million people will die annually following injury. Road traffic accidents being third to ischemic cardiovascular disease and major depression as the commonest causes of mortality and morbidity world-wide. Fifth with in the developed countries for mortality and second with in the developing countries (13, 16, 18, 19).

Low and middle income countries account for 85% of deaths and 90% of disability adjusted life years lost annually (18). The key unintentional injury-related causes of DALY's lost annually include road traffic injuries and falls (13). The worldwide burden of injuries is disproportionately concentrated with in the low and middle-income countries with unintentional injuries accounting for over 9% total DALY's, often occurring in countries with the weakest evidence to guide intervention strategies, the fewest resources and least developed infrastructure to effect change (20-22). World health organization (WHO) 2004 region estimates Africa DALY's 2743 per 100,000 (20).

Annually, the common number of injuries resulting in restriction of activities is 30.6 million. 13.4 million of those are severe to require bed rest. This translates into 1.54 million acute hospitalizations for an median duration of 7.1 days and about 45000 deaths over one year period (23, 24). The overall fracture incidence in the Scottish population over 12 years is 11.13 in 1000



annually (25). Within the US 15.3 million fractures occur annually. Fractures account for 53% of all hospital discharges in the US (26).

Among the Scottish population above 65 years old, the fracture incidence is 23.3 per 1000 p.a, which compares to outcome in England and Australia (27, 28). In a review on adult fractures by Charles and Ben, there was a large variation in England and Wales fracture incidence for cause not fully understood. There was also over diagnosis of fractures by inexperienced doctors who cover the accident and emergency department and an underestimate from the orthopedic clinic as most fracture patients referred for follow up, default. The information from having been from a single hospital could explain the skewed results (29)

In Kingdom of Saudi Arabia the socio demographic characteristics of 1050 patients with different sort of trauma were analyzed and therefore the result was mean age was  $25.3 \pm 16.8$  years (range 1–80), Most (45.1%) of the patients were at age of 18–30 years, males accounted for 64.3% of the patients and quite half (60.6%) of the patients were from urban areas (30). In West Africa the common age was 34.3 years, with extremes of 10 years and 75 years (31). With a sex ratio of 2.03, 34 women and 69 men (31).The circumstances of occurrence were, in order of frequency, Road traffic accidents (79%), work-related accidents (17%), defenestration (3%) and domestic accidents (1%). At the epidemiological level, the foremost affected age group is between 20 and 29 years old with 25.24%. There's a relationship between age and the circumstances of occurrence ( $p = 0.02$ )(31).

Pelvic fracture constitutes 3% of skeletal injuries (32). Its incidence amongst polytrauma individuals ranges from 25% to 30%, it is one of the most common causes of mortality in polytrauma individuals and these rates have been found to be within the range of 16-19% in such patients (32, 33). The foremost common reason of death in these patients is hemorrhagic shock

or coagulopathy (60-65%), thus control of hemorrhage is of utmost importance. Additional causes of death are sepsis in pelvic hematoma and acute renal failure(34).

In the study conducted in Taiwan hospitalization due to pelvic fractures during 2000–2011 were from 17.17 to 19.42 per 100,000 (4). Females had a high incidence than males, and the elderly (aged 65 years or more) were noted to have a significantly increased incidence (35). Within the contrary to this study a study done in Brazil which enrolled 79 patients 69.6% of patients were males, aged between 14 and 87 years (mean  $41.0 \pm 18.9$  years) (7).And it showed that the foremost common cause of injury was trampling in 36 cases (45.6%), falls from height in 24 (30.4%), accidents involving motorcyclists in 15 (19.0%) car accidents in 4 (5.1%) (36).

A cohort study conducted in Miami US between 1990 and 2007 showed average age of patients with a pelvic ring injury was 64.5 years (standard deviation [SD]: 25.6 years) and 69.7% were female(5).

Also in a comparative study conducted in UK comparing pelvic and non-pelvic groups (PG and NPG) there was a male predominance concerning the percent of patients that sustained the injuries and within the PG population, the patients that have sustained a pelvic injury were mostly younger and male (57.8%) (3). However, within the NPG group, the patients that were injured were predominantly older and more often of male gender (59.5%) (3).It also stated that the most common cause of injury as traffic crashes with an incidence of 62.9% followed by falls, 30.6% (3). In contrast, over half of NPG patients (50.9%) sustained a fall and only 29.7% were involved in an RTC (3).Indeed, car collisions remain the leading cause of pelvic fractures accounting for 44% to 64% of those injuries (3) and in Taiwan, 62% of hospitalized pelvic fractures were caused by transport accidents(35).

In one study a multicenter review, of the 312 pelvic fracture patients was conducted and showed associated injuries, 63% had injury to the bladder or urethra, 35% had associated head injuries, 24% had nerve injuries, and 20% had intestinal injuries (37). In cases of high-grade injuries, Thoracic-abdominal associated injuries can occur in 80%. And others local lesions like, vagina, nerves, sphincters and rectum (18–64%) bladder, urethra (1.6-25% of cases), soft tissues injuries (STI) up to 72% (38). These injuries should be strongly suspected particularly in individuals with perineal hematoma or large soft tissue disruption (38).

A case series of 348 patients admitted due to pelvic fractures revealed that only 32 patients (9%) had an isolated pelvic fracture (35). In the study done in Taiwan, as high as 25.8% of hospitalized pelvic ring fractures were isolated pelvic ring fractures (35). The incidence of abdominal injuries was 16.5%, and, in severe pelvic fractures, the incidence of associated intra-abdominal injuries was 30.7% (35).

In study done at Brazil the types of Pelvic fractures were A, B and C (Tile) in 45, (61.6%) 15 (20.5%) and 13 (17.8%) patients, respectively (36). Six cases could not be classified. Of the 79 patients, 7 (8.9%) underwent angiography / embolization within the first 6 hours of admission, 18 underwent early external fixation in the operating theater, and four were submitted to peritoneal packing (36).

Another study conducted in Uzbekistan showed 99 patients (34.7%) with type A injury, 106 patients (37.2 %) were in type B and 80 patients with (28.1%) were in type C (24). And among 285 patients, 202 patients (70.9%) had polytrauma injuries while 114 patients (40.4%) had traumatic shock of different levels of severity (39). 205 patients (71.93%) among 285 of this study were treated by operative interventions (39)

A study conducted in Taiwan revealed longer duration of stay in health care center (average 17.86 days versus 12.95 days), and a greater medical expenditure (average US\$4120.86 versus US\$2678.09) were noted in the unstable (Tile B and C) pelvic fracture categories as compared with the Tile A pelvic fracture subgroup (35).

As per comparative study conducted in UK more patients with pelvic injuries were admitted to an ICU compared with the control group (24.5% vs. 11.7%) ( $P < 0.001$ )(3). Their mean total hospital stay was fifteen days, which was significantly longer than that of the control group 8 days and the three-month cumulative mortality rate in the patients with pelvic ring injuries was 14.2% (1,586 patients), but only 5.6% (7,465 patients) of the NPG patients died within the initial three months after the injury (3).

According to the study done in Uzbekistan average hospital stay of patients was about 12.95 days (8.7 days-17.2 days (24). And the mortality was found to be 9.1 % (26 patients), of which 19 patients were male and seven of them were female (24). 13 patients died within 1 to three days of arrival, 7 patients within 4 to 10 days and 6 patients after 10 days of their arrival within the hospital(39).

A study done at Tikur Anbessa specialized Hospital showed the incidence of RTA to be 36.8% out of which pelvic injury was 11.4%(8).Similarly in a study at Zewuditu Metassebia Hospital (ZMH) showed 31 pelvic injuries out of 522 enrolled individuals 31/ 522 (5.9%) and it also make up (7%) of all skeletal fractures 31/417 (7%)(9).Which is equivalent to the study in Taiwan (35).

In another study done at Tikur Anbessa specialized hospital between January and March 2013, 2 hundred and fifty (36.23 %) of the patients were road traffic injury victims among which 230

road traffic accident victims were enrolled and studied during the period under the study(40). Different categories of fractures were sustained by 177 (78.0 %) of the victims of which lower limb fracture accounted for (64 (36.2 %) while pelvic fracture injuries 9 (5.1 %) (40).

In a study which study incidence of road traffic injury (RTI) at the Emergency Department of Tikur Anbessa Specialized Teaching Hospital the most of victims were pedestrians which accounts for 94 people (71.7%), followed by passengers which consist of 17 people (13%) and drivers which make 16 people (12.2%), and the remaining were assistants of the drivers and People living in urban areas accounted for 74% of the road traffic injury (8). Similarly the study done at ZMH the most of cases were pedestrians (69%) living in Addis Ababa (88%), and the road traffic injuries was foremost often caused by an automobile (78%) (9).The median age (interquartile range [IQR]) was 28 (22–24) years, and 69% were male (9). As to the study in Tikur Anbessa specialized hospital the mean age of trauma patients (40.35years, SD 17.92 years) trended towards being lower than that of non-trauma individuals (45.16 years, SD 18.09 years,  $p = 0.09$ ) (19). Overall, relative to medical patients, trauma patients were more likely to be male ( $p < 0.01$ ) (41).

Out of 690 trauma patients who treated at Adult Emergency Department of Tikur Anbessa Specialized Hospital between January and March 2013, 250 (36.23 %) of the patients were RTA victims among which 230 road traffic accident victims were enrolled and studied during the period under the study(18). The study participants comprised of 165 (71.7 %) men and 65 (28.3 %) women, resulting in a male to female ratio of 2.6:1. The patients' ages ranged from 14 to 80 years with the mean and standard deviations of 32.15 and  $\pm 14.38$  years respectively. The median was 26 and the mode was 25 years. The modal age group was 14–25 years, accounting for 107 (46.5 %) patients (40).

In study which assessed CT scan and x-ray patterns of pelvic fracture in adults in Tikur Anbessa Specialized Hospital, Addis Ababa University, Addis Ababa, Ethiopia a total of 80 cases with pelvic ring fracture were reviewed. From all of the cases studied in the study 58(72.5) were male and 22(27.5) were female with male to female ratio of 2.64:1(42). The mean age of affected individuals was 30.61 years with standard deviation of 12.8 and the foremost common age group affected by pelvic fracture was between 15-25 years (43.8%) followed by 26-35 years(35%)(42). The lower age in the study was 17 years and the upper age was 73 years and those between 46-55 years were found to be the least (2.5%) and Those of patients who were between 36-45 years and those above 65 years were 12.5% and 6.3% respectively.(42) Road terrific accident was the major mechanism of pelvic fracture accounting for 76.3% of cases followed by fall from a height. Of those involved in RTA the most affected people were both passengers and pedestrians (30%) each followed by drivers (16.3%).(42)

In another study assessing the cause, classification and associated injuries of pelvic ring fracture in patients visiting to Tikur Anbessa Specialized Hospital Emergency Department, Addis Ababa, Ethiopia From total of 60 patients enrolled 35 patients were males (58.33%) and twenty five patients were females (41.67%).Age ranges from13-75 years with a mean of 31.3 years (SD  $\pm$  14.8) and mode and median of 22 and 25.5years respectively(43). Out of the sixty patients there was associated injury in 14 patients (23.33%) of mechanisms injury involved abdominal, urethral, bladder, vertebral body with transverse process fracture with no nerve injury and vertebral body with transverse process fracture with nerve injury accounting 4(28.6), 3(21.4%), 2(14.3%), 1(7.1%) and 4(28.6%) respectively(43).Most of patients with associated injuries are those who have unstable pelvic fracture and most of them have unstable type of fracture comprising 88.3%(43). In other study B2 Tiles classification was the foremost common fracture

type accounting 25% followed by C1 22.5%. Tiles B3 accounts for 20% and Tiles A2 accounts for 11.3%. Tiles C3 accounts for 6.3% and Tiles A1 and A3 which accounts 2.5% each. In this study no Tiles B1 pattern was detected.(42)

### **3 Objective**

#### **3.1 General Objectives**

- To assess the mechanism, type and associated injuries of pelvic fractures in patients presenting to Tibebe Ghion Specialized Hospital Emergency Department, Bahir Dar, Ethiopia.

#### **3.2 Specific Objectives**

- To assess the demographic feature of pelvic fractures among patients at the Emergency Department of Tibebe Ghion Specialized Hospital.
- To assess the common mechanisms of pelvic fractures among patients at the Emergency Department of Tibebe Ghion Specialized Hospital.
- To assess common associated injuries of pelvic fracture among patients at the Emergency Department of Tibebe Ghion Specialized Hospital.
- To assess the commonest pattern of pelvic fractures among patients at the Emergency Department of Tibebe Ghion Specialized Hospital.
- To assess the length of hospital stay and outcome of pelvic fractures among patients at the Emergency Department of Tibebe Ghion Specialized Hospital.



## **4. Methods**

### **4.1 Study Area**

The study was conducted in the department of orthopedics and traumatology in TGSH, Bahir Dar, Ethiopia. Bahir Dar, one of the tourist destination areas of the country, is the capital city of Amhara national regional state located 565 km northwest of Addis Ababa. TGSH is one of the biggest teaching hospitals in Ethiopia which was established in 2018 G.C. The hospital serves for more than five million populations in the catchment area (ARHB 2015). The hospital has more than 500 beds. It serves 2000 patients per day in both inpatient and outpatient services. Department of orthopedics has both inpatient and outpatient services. There are 66 beds in the inpatient, total of 8 orthopedic surgeons (2 of them are on fellowship) and 35 orthopedic specializing residents. Operations are done 4 days in a week as elective case and daily for emergency cases. The department have its own major operation room with two operating tables.

### **4.2 Study Design**

Institutional based retrospective cross-sectional study was conducted at Department of Orthopedics and Traumatology, TGSH, Bahir Dar, Ethiopia.

### **4.3 Population**

#### **4.3.1 Source Population**

Patient's seen at TGSH Emergency Department (ED) from January, 2019 G.C- September, 2020 G.C.

### **4.3.2 Study Population**

Patients presenting to TGS ED from January, 2019 GC- September, 2020 GC with a diagnosis of pelvic fracture. From patients registered with pelvic fracture at the orthopedic morning session register sheets.

## **4.4. Inclusion and Exclusion Criteria**

### **4.4.1 Inclusion Criteria**

All patients present with pelvic fractures TGS ED was included in the study irrespective of sex.

### **4.4.2. Exclusion Criteria**

Patients with pelvic fracture whose clinical data and chart could not retrieved and whose chart retrieved but with incomplete clinical information.

## **4.5. Sample size determination and sampling technique**

All patients registered with pelvic fracture during the study period and who met the inclusion criteria was included. The orthopedic morning sheets used to list all pelvic fracture cases.

## **4.6 Study period**

Study period was from November 1, 2020 GC to November 30, 2020 G C.

## **4.7 Methods of Data Collection**

The orthopedics morning session registration book was used to get the card numbers of patients who were treated with a diagnosis of pelvic fracture during the study period. After getting the

card numbers, patient charts were retrieved from record and documentation office. Data was collected by principal investigator and entered into SPSS for Windows version 20.0.

#### **4.8 Measurement Variables**

- Pelvic fracture,
- Age,
- Sex,
- residence of patient
- Etiology (mechanism of injury),
- Type of injury and
- Associated injuries.

#### **4.9 Data processing and analysis**

The collected data on prepared check list was entered, after being encoded and analyzed using SPSS version 20 statistical package. Data cleaning was performed to check accuracy, consistency and missed values. Any logical and consistency error identified during data entry was corrected after revision of the original completed check lists. The cleaned and edited data was analyzed by the SPSS version 20 and results generated in frequencies, tables and figures of different variables.

#### **4.10 Data Quality Assurance:**

Pre-testing of data collection tools and technical training was taken for data collectors regarding the objectives of the study, significance of the study, method of data collection, the check list

and how to review chart and fill the data. The collected data was reviewed and checked for completeness before data entry; the incomplete data was discarded.

#### **4.11. Ethical Considerations**

Ethical clearance for this study was obtained from ethical review board of Bahir Dar University College of Medicine and Health Science and supporting letter was written by the Department of Orthopedics and Traumatology to the concerned office. Informed consent from the patients was not taken since retrospective chart review was used. Information from patient records was used only for the purpose of this research. Confidentiality kept during the study and will be kept during dissemination of the results.

#### **4.12. Dissemination of the Results**

The study result will be submitted to Bahir Dar University College of Medicine and Health Science Department of Orthopedics And Traumatology and a copy of the result will be given to all responsible body and effort will be made to present the results at scientific conferences and to publish in a national or an international journal.

#### **4.13. Operational Definition**

Types of pelvic fracture- this study used the tile classification system for data collection and analysis.

- Tile A- both rotationally and vertically stable
- Tile B- Rotationally unstable; vertically stable
- Tile C- Rotationally and vertically unstable

## 5. Results

### 5.1 Demographic status of patients with pelvic ring fracture.

In this study, a total of 76 patient charts were collected but only 64 charts were found to meet the inclusion criteria. From 64 cases evaluated 56(87.5) were male and 8(12.5) were female with male to female ratio of 7:1. The mean age of affected individuals was 31.93 years with standard deviation of 12.1. As showed in Table 5.2, the most common age group affected by pelvic ring fracture was between 26-35 years (40.6%) followed by 15-25 years(34.4%). The minimum age in the study was 15 years and the maximum age was 65 years and those between 56-65 years found to be the least (2%). Those who were between 36-45 years and those between 46-55 years were 4.7% and 17.2% respectively.

*Table 5. 1: sex distribution in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.*

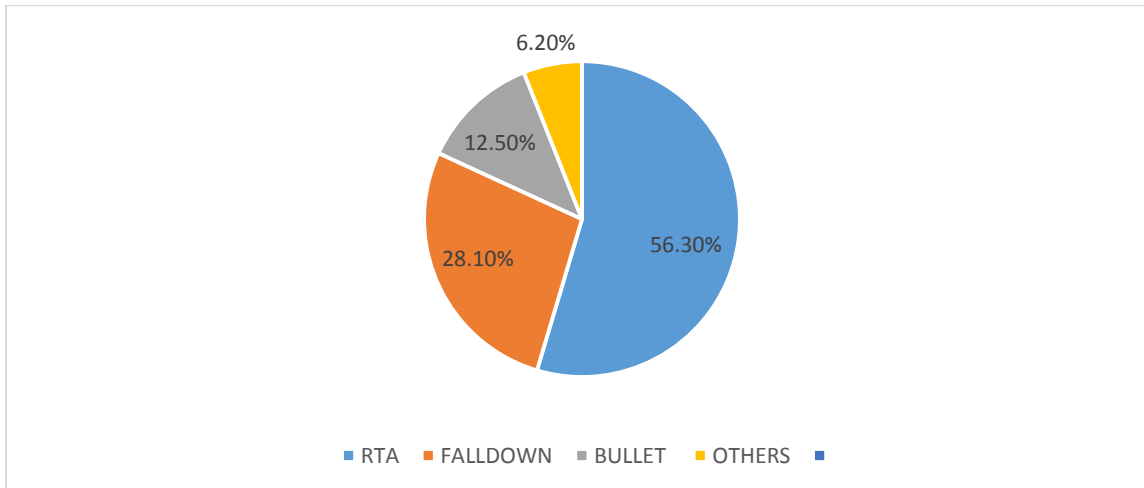
Gender	Frequency	Percent
Male	56	87.5
Female	8	12.5
Total	64	100.0

*Table 5. 2: age range in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.*

Age ranges	Frequency	Percent
15-25	22	34.4
26-35	26	40.6
36-45	3	4.7
46-55	11	17.2
56-65	2	3.1
Total	64	100.0

## 5.2 Mechanism of Injury

Road traffic accident was the major cause of pelvic fracture accounting for 56.3% of cases followed by fall down (28.1%) and bullet injury (12.5%). From those involved in RTA the most affected people were passengers (37.5%) followed by pedestrian (15.6%). From patient presented with fall down accident those presented with fall from height account majority (62.5%) and those with present with object fall on patient account 37.5%. From 36 patients presented with RTA 18 patients were with Tile A fracture, 14 were with Tile C fracture and only 4 present with Tile B fracture.



*Figure 5. 1 Mechanism of injuries in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.*

**Table 5. 3 mechanisms in each type of fracture types in pelvic ring fracture in TGSB, Bahir Dar, Ethiopia.**

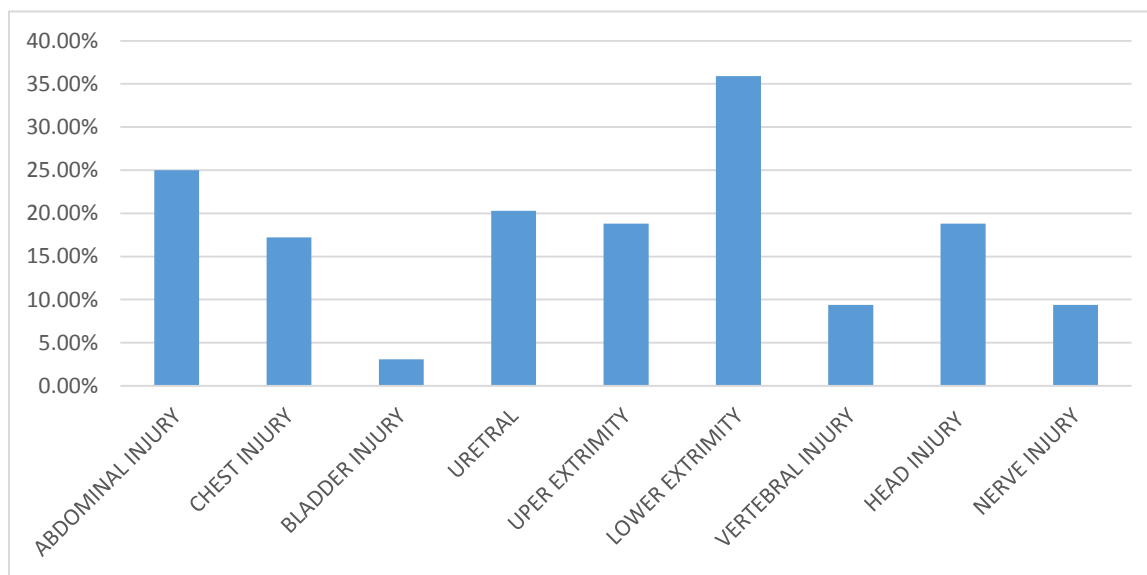
Type of fracture	Mechanism				Total
	RTA	Fall down	Others	Bullet	
Tile A	18	8	2	8	36
Tile B	4	4	0	0	8
Tile C	14	6	0	0	20
Total	36	18	2	8	64

### **5.3 Associated Injuries**

Out of the sixty-four 52(81.3) patients had associated injury of various type. The most common associated injury in this study was lower extremity 23(35.9%) and abdominal injuries 16(25.0%). Other involved as following chest 11 (17.2%), bladder 2(3.1%), urethral 13(20.3%), upper extremity 12(18.8%), vertebral injury 6(9.4%), head injury 12(18.8%) and nerve injury 6(9.4%). Majority of patients with associated injuries are those tile a 28 and Tile C 16 cases. From those presented with associated injury RTA account 30 cases followed with fall down 16 and bullet 6.

**Table 5. 4 : associated injury in each type of fracture types in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.**

Associated Injuries	TPYE OF FRACTURE			Total
	TILE A	TILE B	TILE C	
Yes	28	8	16	52
No	8	0	4	12
Total	36	8	20	64



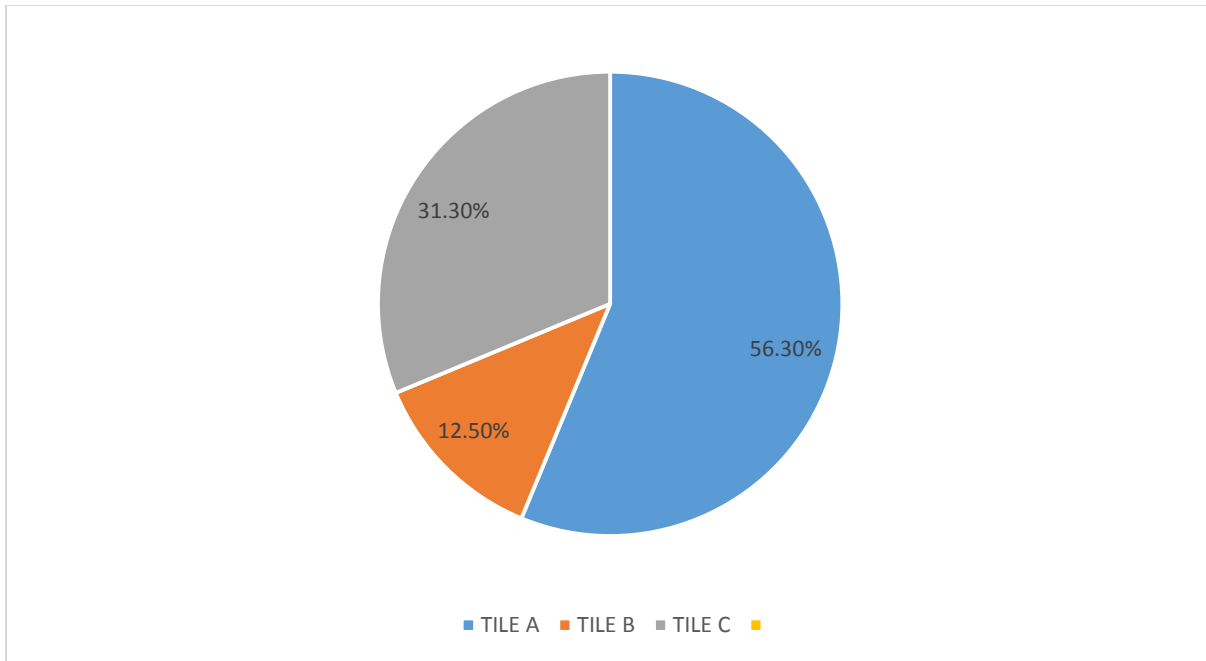
**Figure 5. 2: associated injury in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.**

#### **5.4. Types of pelvic fracture and management**

Out of the sixty-four enrolled patients most of them have Tile A fracture comprising 56.3%. Tile C pelvic fracture 20(31.3%) and Tile B 8(12.5%) comprise unstable fracture. See fig 6.2. Thirty four (53.1%) patients with pelvic fracture managed with nonoperative intervention while twenty



(31.3%) patients were referred to higher center. Majority of patient 24/36 with Tile A fracture managed non-operatively whereas patients with Tile C most 12/20 referred to higher center.



**Figure 5. 3 : Types of fractures in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.**

**Table 5. 5 intervention in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia**

Interventions	Frequency	Percent
Non Operative	34	53.1
Surgical	10	15.6
Referred	20	31.3
Total	64	100.0

## 5.5 length of stay and outcome

Length of hospital stay (from ED to discharge) ranges from 1-120 days with mean of 12.08 days (SD  $\pm$  25.12 days) and with a mean of time presentation to ED is 17.98 hours (SD  $\pm$  27.69 hours) and range of presentation to ED was from 1-144 hours. From 64 case seen majority 36(56.3%) were recovered, 22(34.4) referred, 4(6.3%) went against medical advice. There were 2(3.1%) deaths in this study both of them were in the ICU and had polytrauma, one of them has hospital acquired pneumonia and one of patients died after a total of 10 days in the hospital staying , other died after stayed for 2 days, the fracture type in both patients was Tile A.

*Table 5. 6: outcome in pelvic ring fracture in TGSH, Bahir Dar, Ethiopia.*

Outcome	Frequency	Percent
Recovered	36	56.3
Death	2	3.1
Referred	22	34.4
Went against medical advice	4	6.3
Total	64	100.0

## 6. Discussion

The age distribution of pelvic fracture patients in TGSH was a mean of 31.93 years with male predominance (87.5%) which is in line with that of a study done in Saudi Arabia (mean 30 years and male (64.3%) (23) and bit lower than west Africa mean age (34.3 years) sex ratio (2.03) (44) but lower and reverse to the study done in Miami (64.5 years  $\pm$  25.6 years) and 69.7% were female (5) this could be explained in this study men might be more responsible for heavy work load and travel long distance for working . Additionally in Miami fracture in old female might be due to osteoporosis and age related diseases. According to this study most fracture 36(56.3%) were due RTA which is in line with studies done in UK 62.9% (3), Tanzania 80%(45) , west Africa 79% (31) and Taiwan (62%)(35). However, in Brazil the most common mechanisms of injury was trampling in 36 cases (45.6%), falls from height in 24 (30.4%), accidents involving motorcyclists in 15 (19.0%) car accidents in 4 (5.1%) (36).

In this study 36(56.3%) of pelvic fractures were caused by RTA which was similar with that of the study made in Taiwan (62%)(35), and Addis Ababa 65%(43).

Among the cases of RTA majority of victims were passengers which accounts 66.7% followed by pedestrian 10 (27.8%) and drivers 2(5.6%) which is similar with study done at Addis Ababa RTA accounts for 19 people (49%) followed by pedestrian 15 (38%) and drivers 5 (13%) (43) but different from another study made in Addis Ababa majority of victims were pedestrians which accounts for 94 people (71.7%), followed by passengers which consist of 17 people (13%) and drivers which constitute 16 people (12.2%), and the rest were assistants of the drivers (8). The reason for this deference may be due to difference in study time and sample size.

In the present study in TGSB 18.8 % of pelvic fractures were isolated pelvic fractures which is similar with the study in Taiwan (25.8%)(35). However, lower than study done in Addis Ababa 75% of pelvic fractures were isolated fracture(43). This might be explained by RTA in Addis Ababa due to low energy accident but in this study accident might be occurred in cross county road with high speed.

The incidence of abdominal injuries account 16 (25.0%), which was in line to study done in Taiwan (16.5% -30.7%)(35) and study done at Addis Ababa 4/14(28.6%)(43).

In current study Tile A fracture comprising 56.3%, Tile C pelvic fracture 20(31.3%) and Tile B 8(12.5%).however, in study done in Addis Ababa Tile C fracture account 31/60(51.7%), Tile B 22/60(36.7) and Tile A 7/60(11.7).this might be due to majority of case in Addis Ababa might be referred from different part of county for open reduction and internal fixation since it is the only city were fixation can be done.

## **7. Conclusion**

According to this study the most commonly affected with pelvic ring fracture was male with M:F ratio of 7:1. Commonly affected population was in productive age groups (15-35 years) and most of the victims were due to road traffic accidents and more so pedestrians and passengers. Fall down from a height accounts also significant number.

The majority of pelvic fracture patients in this study were diagnosed as Tile A fracture.

Abdominal, lower extremity and urethral injuries were the major associated injuries for these patients.

## **8. Recommendation**

- Improving the condition of the road network and vehicles to reduce the high prevalence of traffic accidents.
- Reevaluating a traffic accident prevention policy, the technical control of vehicles,
- Implement mandatory rule to use of the seat belt for drivers and passengers.
- Reevaluating driving license training program.
- Behavioral change on both driver and passenger.
- Comforting work places to prevent slippage to prevent fall down accident and compliance with safety standards in the workplace.
- Educating pedestrians about road safety standards like traffic light.
- Implement Gunshot Violence prevention policy.

## **9. Limitation of the study.**

- Poor recording system of the patient charts that makes difficulty of getting adequate information
- Some of patient charts were lost, hence, it was difficult to include more patients for this study.
- Relatively small number of sample size.

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## Appendix I: Research questionnaire

### Check list

To be filled by investigator by reviewing charts of patients to determine common mechanisms, associated injuries and types of pelvic fracture.

#### Annex 1. CHECK LIST

Check list to collect data on retrospective analysis of the cause, classification and associated injuries of pelvic fracture.

S.NO	The study variables	Response	
Card number	.		
<b>1. Socio-demography of the participants</b>			
1.1.	Sex	1. Male 2. Female	
1.2.	Age	.	
1.3.	Area of residency (region)		
<b>2. History of the trauma patient who attended in the emergency ward</b>			
2.1.	Duration of presentation in hours or days		
2.2.	Length of hospital stay in days		
2.3.	Presence of chronic medical condition	1. Yes 2. NO	If no skip to Q.No.2.5

2.4.	Types of chronic medical condition	1. Diabetes Mellitus 2. Cardio vascular disease 3. Asthma 4. Old stroke 5. Others (specify)
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2.5.	mechanism of injury	1. Road traffic Accident 2. Violence 3. Fall down 4. Other(specify)
2.6.	If RTA	1. Driver 2. Passenger 3. pedestrian
2.7.	If fall down	1.object fall on patient 2.patient fall from what height
2.8.	Identified pelvic Injury	1. Closed 2. compound
2.9.	Is it	1. Pure pelvic fracture 2. Intrapelvic -abdominal injury
2.10.	Types of pelvic fracture	Tile classification 1.A 2.B 3.C

2.11.	Is there an associated injury	1.yes 2.no	If no skip to 2.12
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2.12.	What are the associated injuries	1. Abdominal injury 2. Pelvic injury 3. Urethral injury 4. Bladder 5. Vertebral body or transverse fracture (sacral) 6. Nerve injury
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2.13.	The types of intervention given	1. Non operative approach 2. Surgical management 3. Referred
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2.14.	Is there complications	1.yes 2.no	If no skip to 2.15
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2.15.	If Complications	1. Wound sepsis /pin site infection 2. Pneumonia 3. Atelectasis 4. DVT 5. PTE 6. Other specify)_____
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2.16.	Patients outcomes	1. Recovered 2. Death 3. Referred 4. Went against medical advice
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