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Abdominal Injury outcomes and Associated Factors Among Patients Visited to Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia.

Shitahun, Agaje

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**BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCE
DEPARTMENT OF SURGERY**

**ABDOMINAL INJURY OUTCOMES AND
ASSOCIATED FACTORS AMONG PATIENTS
VISITED TO TIBEBE GHION SPECIALIZED
HOSPITAL, BAHIR DAR, ETHIOPIA.**

BY; Dr. SHITAHUN AGAJE

**December 2020,
Bahir Dar, Ethiopia**

BAHIR DAR UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCE
DEPARTMENT OF SURGERY
ABDOMINAL INJURY OUTCOMES AND
ASSOCIATED FACTORS AMONG PATIENTS
VISITED TO TIBEBE GHION SPECIALIZED
HOSPITAL, BAHIR DAR, ETHIOPIA.

A THESIS RESULT SUBMITTED TO THE DEPARTMENT OF SURGERY,
COLLEGE OF MEDICINE AND HEALTH SCIENCE, BAHIRDAR UNIVERSITY,
IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE
CERTIFICATE OF GENERAL SURGERY.

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December 2020

Bahir Dar, Ethiopia

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Declaration

This is to certify that the thesis result entitled “Abdominal Injury Outcomes and Associated Factors among Patients visited Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia”, submitted in partial fulfillment of the requirements for certificate specialty in General Surgery of Department of SURGERY, Bahir Dar University. It is a record of original work carried out by me and had never been submitted to this or any other institution to get any other degree or certificates. The assistance and help I received during the course of this investigation have been duly acknowledged.

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DEPARTMENT OF SURGERY

Approval of thesis for defense

I hereby certify that I have supervised, read, and evaluated this thesis titled “Abdominal Injury Outcomes and Associated Factors among Patients visited Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia, prepared under my guidance. I recommend the thesis be submitted for oral defense.

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Approval of Ethical Review Board

We hereby certify that we have examined this thesis work entitled Abdominal Injury Outcomes and Associated Factors among Patients visited to Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia. We recommend and approve the thesis proposal a degree of “Certificate of specialty in General Surgery of Department of SURGERY, Bahir Dar University” as ethically sound and scientifically organized.

Board of reviewers

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Reviewer's name	Signature	Date

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ABSTRACT

BACKGROUND: The abdomen is the second most affected body region following the head in trauma patients. The most common abdominal injuries are blunt and commonly injured organs are the spleen and bowels. The overall mortality rate among abdominal trauma patients greatly vary from country to country which ranges 4 % to 25.8%.

This study aimed to assess the of abdominal injury outcomes and associated factors among patients with abdominal injuries visited Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia, 2020

Method: A cross sectional institutional based study was conducted in TGSB from October 1 to 31/2020. All charts of abdominal injured patients who visited the hospital from January 1, 2019 to October 31/ 2020 were included in this study. A total of 163 patients' chart diagnosed as abdominal injury were included. Data were entered in Epi Data version 4.6.0, and exported to SPSS version 23 for analysis. Descriptive statistics like frequency tables, graphs and charts used to describe the variables, and logistic regression analysis was performed. Those variables at Binary logistic regression with p-value<0.2 were moved to multivariable logistic regression model and finally Adjusted Odds Ratio with 95%CI and P-value <0.05 declared as statistically significant.

Result: a total of 163 patients' chart diagnosed as abdominal injury investigated in this study; the majority were males and sustained blunt abdominal trauma. The study found that 88.3 % of abdominal injury outcome were discharged with Improved and 11.7% died. Age (AOR: 3.46; 95% CI: 1.04, 11.96), sex (AOR: 4.75; 95% CI: 1.34, 16.82), residency (AOR: 5.86, 95% CI 1.65, 20.88) and presence of complications (AOR: 0.28; 95% CI: 0.09, 0.92) were factors significantly associated with abdominal injury outcomes.

Conclusion: The study found that 88.3 % of abdominal injury outcome were discharged with improved. Blunt abdominal trauma was the leading mechanism of abdominal injury and spleen was the most frequently injured organ. Ages < 40 years, being male, being rural resident, and had complications were significantly associated with abdominal injury outcome. Further research shall be multicenter facility and prospective follow up study.

Key words: Abdominal injuries, Trauma, blunt, penetrating, Outcome

Table of contents

ACKNOWLEDGEMENTS	V
Abstract	VI
Table of contents	VII
List of tables.....	IX
LIST OF FIGURES	X
LIST OF ABBREVIATIONS/ACRONYMS.....	XI
1. Introduction	1
1.1. Background of the Study	1
1.2. Statement of problem	2
1.3. Significance of the study	3
1.4 objective of the study.....	4
1.4.1 General objective	4
1.4.1. Specific objectives	4
2. Literature review	5
2.1. Prevalence of abdominal injury.....	5
2.2. Etiology of abdominal injuries	5
2.3. Management of abdominal injury	6
2.4. Outcomes of abdominal injuries.....	6
2.5. Factors associated with abdominal injury outcomes	7
2.5.3. Clinical profiles	8
2.5.5. Abdominal organs injured	9
3. Methods and Materials	11
3.1. Study Design and period	11
3.2. Study setting	11
3.3. Source population and study population	11
3.3.1. Source population:	11
3.3.2. Study population:	11
3.4. Eligibility criteria.....	11
3.5. Sample Size Determination and Sampling procedures.....	12
3.6. Sampling procedures	12
3.7. Variables of the study.....	14
3.7.1. Dependent variables	14

3.7.2. Independent variables	14
3.8. Operational definitions	14
3.9. Data Collection Instruments and Procedure	14
3.10. Data quality control measures	15
3.11. Data Processing and analysis.....	15
3.12. Ethical consideration	15
3.13. Plans for Dissemination of Finding	16
4. RESULTS.....	17
5. Discussion	29
6. Conclusion.....	32
7. REFERENCES.....	33
7. Annexes	36

LIST OF TABLES

Table 1: Socio-demographic characteristics of the abdominal injuries patients visited, at TGSH, Bahir Dar, Ethiopia, 2020	18
Table 2:-Distribution of abdominal injury patients according to their management, complication, hospital stay and final Outcomes at TGSH, 2020 (N= 163).....	23
Table 3: Distribution of patients according to the type of surgical procedure performed at TGSH, 2020 (N= 73)	24
Table 4: Distribution of patients according to postoperative complications at TGSH, 2020 (N = 36)	25
Table 5:-Bi-variable and multivariable factors associated with abdominal injury outcomes for patients treated at TGSH, 2020.....	27

LIST OF FIGURES

Figure 1: conceptual framework for abdominal injuries outcomes and of associated factors among patients visited, to TGSH Bahir Dar, Northwest Ethiopia, 2020 adopted from different(23, 25, 33)..	10
Figure 2:-Sampling procedures for abdominal injuries outcomes and of associated factors among patients visited, to TGSH Bahir Dar, Ethiopia, 2020	13
Figure 4: Causes of blunt (n=103) and penetrating (n=60) abdominal injury patients visited from January 1/2019 to October 31/ 2020, at TGSH, Bahir Dar, Ethiopia.....	20
Figure 5: Identified solid organ injury TGSH, 2020:	21
Figure 6: Identified hollow organ injury TGSH, 2020	22
Figure 3: Outcome of abdominal injury patients visited from January 1/2019 to October 31/ 2020 at TGSH, Bahir Dar, Ethiopia.	25

LIST OF ABBREVIATIONS/ACRONYMS

BAT	Blunt Abdominal Trauma
BDU	Bahir Dar University
DCL	Damage Control Laparotomy
DVT	Deep Venous Thrombosis
ETB	Ethiopian Birr
GBD	Recent Global Burden of Disease
HAI	Hospital Acquired Infection
Hrs	Hours
HVI	Hollow Viscus Injury
PAT	Penetrating Abdominal Trauma
RTA	Road Traffic Accident
SOI	Solid Organ Injury
SSI	Surgical Site Infection
TGSH	Tibebe Ghion Specialized Hospital
WHO	World Health Organization
Wks	Weeks

1. INTRODUCTION

1.1. Background of the Study

Injury have traditionally been defined as physical damage to a person's body or body part caused by an acute transfer of energy (mechanical, thermal, chemical, electrical or radiation energy)(1, 2).

Abdominal trauma / injury: an injury that causes physical damage to the abdomen or its content and diagnosed by physical examination or by other investigation, modalities(3).

Abdominal injury/trauma may be blunt (without breaching posterior fascia of abdominal wall) or penetrating (with penetration to the abdominal cavity)(4). Injuries to the stomach, duodenum, small intestine, and colon are common in penetrating trauma and relatively rare in blunt trauma(1).

Abdominal wall, Solid organ (liver, spleen, pancreas, kidneys), Hollow viscus (stomach, small intestine, colon, ureters) are parts of abdomen (1, 4, 5).

The abdomen is the second most affected body region following the head. No abdominal organ is safe from injury(4). Solid organs are injured more in blunt abdominal trauma.(5)

1.2. Statement of problem

Injury becomes life threatening community health problem associated with significant morbidity, disability and mortality worldwide(6).According to WHO trauma kills more than 5.8 million people every year an accounts for 16% of the global burden of diseases(7, 8). It is the commonest cause of mortality in the first forty years of life and is the third most common cause of death overall. Approximately, 90% of injury related mortality occurred in low and middle income countries for under 45 years of age(9).World over, injury is predicted to be the seventh leading cause of mortality by 2030(7, 10, 11).In Africa, mainly Sub-Saharan Africa, injury related mortality and morbidity is very high specifically, in low and middle-income countries from which road traffic injury takes the lion share(11). Trauma in developing countries has been on the increase, a situation perpetuated by rising road traffic collisions without adequate safety precautions, terrorism and firearms proliferation(11). Some of the victims of trauma may have life threatening conditions requiring urgent surgical intervention and/or intensive care. Recent Global Burden of Disease (GBD) showed that mortality related with injury in Sub-Saharan Africa is estimated to be 14.6/100000 persons in 2020 as compared to 97/100000 persons worldwide (8).

The overall mortality rate among abdominal trauma patients greatly vary from country to country which ranges 4 % from south India to 25.8%, in Egypt(3).

In Ethiopia, Epidemiological studies showed that the pattern and outcomes of injury is variable in different regions of the country and prevalence of injury ranges from 25%at study conducted in University of Gondar(12) to 55.5% from multicenter study conducted in Amhara regional state Referral Hospitals(13).

From a five -year's retrospective study conducted in Dilla University Teaching and Referral Hospital, Ethiopia: abdominal injury accounts 11.4 % of all injury(14).Abdominal injuries have remained a challenge to surgeons with an ever-present desire to improve on the outcome of the management.

Abdominal trauma affects predominantly younger people and is a leading cause of mortality within this age group, with an expected increase of its prevalence(15).Abdomen is the most frequently injured body region(4)and about 25% of all abdominal trauma cases require abdominal exploration(16).Blunt and penetrating traumas are the main types

of abdominal injuries(17). Penetrating abdominal trauma (PAT) is mostly diagnosed reliably and easily, whereas the majority of abdominal injuries occur due to blunt abdominal trauma (BAT) is often missed because clinical signs are less obvious.

In Ethiopia, despite government efforts to reduce most common abdominal trauma by expanding hospitals, abdominal trauma death increasing alarming rate and constitute around half of all surgical emergencies(13). On the other hand, lack of sufficient data leads to underestimation of abdominal trauma burden(18). Thus, death rate due to abdominal injury was greatly varying from 4% to 25.8%(3, 8) and the reason is unknown. In addition to this, in Ethiopia, there is no outcomes of abdominal trauma and its associated factors and national database abdominal or other injury registry for health planners and policy makers who are in need of the national outcomes of abdominal injury. Therefore, the aim of this study will be to assess the outcomes of abdominal trauma and associated factors among patients with abdominal injuries visited Tibebe Ghion Specialized Hospital, Bahir Dar, Ethiopia.

1.3. Significance of the study

Only few studies are conducted in our country and there is no a research paper done on the subject matter in our hospital. Hence, the importance of an accurate data regarding abdominal trauma outcomes and associated factors is undisputable.

The result may contribute the health management at higher levels to develop strategies to alleviate this problem. The outcome of appreciating relevant outcomes of abdominal trauma and associated factors in the population is central to any preventive and control program aimed at reducing the burden of those complications. Furthermore, the output of this study can serve as a base line for further studies.

Thus to design effective management strategies, there is need of findings about the outcomes of abdominal trauma and associated factors.

1.4 objective of the study

1.4.1 General objective

- ✓ To assess abdominal injury outcomes and associated factors among patients visited, TGSB Bahir Dar, Ethiopia, 2020

1.4.1. Specific objectives

- ❖ To determine abdominal injuries outcomes among patients visited TGSB in Bahir Dar, Northwest Ethiopia,2020
- ❖ To identify factors associated with abdominal injury outcomes of patients visited TGSB in Bahir Dar, Northwest Ethiopia,2020

2. LITERATURE REVIEW

2.1. Prevalence of abdominal injury

Abdominal trauma prevalence is significantly high worldwide and the abdomen is the second most affected body region following the head(19).Abdominal trauma vary from civilian & military practices. In civilian practice, approximately 20% of trauma injuries requiring surgery involve the abdomen; blunt trauma is more common than penetrating and usually follows a road traffic crash. Blunt trauma accounts for 80–90 % of the trauma seen in most civilian trauma centers(12).

However, in the American urban civilian practice penetrating trauma is more common than blunt trauma, gunshot wounds being more frequent than stab wounds. In the UK, stab wounds predominate. In military practice, penetrating abdominal wounds are greater than blunt with a high mortality from the high velocity missile/bullet/fragment wounds(20)..

2.2. Etiology of abdominal injuries

Blunt abdominal trauma may be due to motor vehicle accidents, falls, assaults, injury during recreational activities and industrial accidents. It is often associated with other injuries in the multiply injured patient. Penetrating injuries are due to gunshots, stabs with knives, missiles and other implements(21).

A study done on patterns of penetrating abdominal injury Khartoum, Sudan, Stab wound is the commonest mode of trauma seen in 83.5% of patients(22).

Study done in Nigeria 30% and Tanzania road traffic accident most common abdominal injury. Similarly from studies in Ethiopia (at Tikur Anbesa,38%(6),Yirgalem(23)and, Dilla 47.3%(14))road traffic accident was the most common mechanism of abdominal injuries.

Study done in Kenya(24) and Sudan(22) revealed that abdominal stab injury the commonest one. Similarly, study in Addis Ababa Stab injury of abdominal the most common (35.7%) followed by road traffic accident(20.9%) (25).

2.3. Management of abdominal injury

Penetrating injuries are due to gunshots, stabs with knives, missiles and other implements. Some of these injuries may require operative intervention(12, 22). In recent times, many abdominal injuries especially those involving solid organs are managed none operatively. This has been made possible by the invention of imaging techniques like ultrasonography, computerized tomography (CT) scan and magnetic resonance imaging (MRI) which shows the site and extent of injury. The injured organ can then be observed over time as it heals (12, 20, 22, 25, 26).

Study done in Tanzania revealed that management of patients with abdominal trauma ranging from surgical exploration to selective non-operative management and Splenectomy was the most frequently intra- abdominal surgical procedure performed in 74.1% of case(26). Indications for surgical intervention were penetrating injury to the abdomen, clinically tender abdomen with signs of peritonitis, patients hemodynamically unstable or in shock on admission or during another surgical procedure, bowel evisceration, and obvious bleeding from the stomach, or rectum. Patients with uncontrollable abdominal bleeding and multiple intra-abdominal or associated extra abdominal injuries, or both requiring long surgical procedures underwent damage control laparotomy (DCL) (27)

A study done in Tanzania showed (58.6%) patients were treated surgically with a negative laparotomy rate of 7.8% and 51.0% patients with blunt trauma, were treated conservatively (26).

None operative management is the standard of care for blunt hepatic and splenic injuries with successful rate of more than > 96 % of all patients. Although surgery is nowadays only applied in about one third of splenic injury patients, these numbers might further decrease by intensified application of interventional radiology and modern coagulation management(28).

2.4. Outcomes of abdominal injuries

The improvement from abdominal injury in different study greatly vary from country to country and ranges from 74.2% study in Egypt (3) to 96% study in India (8).

A study in Afghanistan showed, overall mortality was 12.8% and that means improvement from abdominal injury was 87.2% (27), in Tanzania 82.1% (26), from and in Pakistan (death rate 10%) (29), in Nigeria (92.1%) (30), study in Qatar (91.7%) (5) and in Addis Ababa, (91.5 %)(25).

A study done in Tanzania shows abdominal trauma complication rates were 20.7% with the most common complication was SSI, hypovolemic shock, and anemia (26).

A study done in Nigeria showed haemorrhagic shock, sepsis, Surgical Site Infection (SSI) and pulmonary embolus were common complications. Surgical site infection constituted 42.9%, entero-cutaneous fistula 21.4%, Wound dehiscence 21.4%). from the group who developed complications (30). From study in Addis Ababa shows, SSI and shock were common complications (25).

2.5. Factors associated with abdominal injury outcomes

2.5.1. Socio demographic distribution of abdominal injury

Sex: From study in Nigeria shows the occurrence of abdominal injuries male to female ratio was 3.4:1 (21) and in Addis Ababa 6.2:1 (25). Female gender was risk factors that predict mortality

Age: from study conducted in Dilla the majority of 196 (52.1%) victims were in the age range of 20-40 years (14). And A study done in Tanzania (26) and Saudi Arabia shows young people are commonly affected and from a study in Afghanistan showed age > 34 year were significantly associated with death rate (27).

Risk factors that predict mortality include female gender, the presence of shock on arrival, delay in treatment and associated head trauma. Gunshots are usually associated with a much higher morbidity and mortality compared to knife wounds (17, 31)

The mortality rate from abdominal trauma depends on the organ involved, time to therapy, how many other organs are involved and type of abdominal injury (17, 32). When the patient is brought promptly to a trauma center, a 5% mortality rate can be expected. The majority of deaths occur within the first 24 hours of injury (17).

The study conducted in Dilla shows (6%) death of abdominal trauma and the death in rural dwellers was more (69.6%) compared to the one who lives in Urban (30.4). The majority of deaths occurred in students 6(20.1%) and who are male (52.2) when compared to the other groups. Besides, the mortality of cases was very high in low socioeconomic status when compared to middle and high socioeconomic status(14).

2.5.2 Other factors

A study done in Tanzania shows mortality was associated with extra abdominal injuries, delay to hospital presentation and severity of injury(26).

A study in Afghanistan showed, mine work and bullet injury, length of stay, time since injury > 5 hr, and presence of associated injuries were significantly associated with death (27).

A study done in Nigeria showed haemorrhagic shock, sepsis and pulmonary embolus were the causes of death after abdominal trauma(21).

2.5.3. Clinical profiles

The main consequences of abdominal trauma are haemorrhage and sepsis. Early deaths following abdominal trauma are usually attributable to haemorrhage. Sepsis is the most common cause in deaths occurring more than 48 hours after injury. Thus, the first priority for the surgeon performing a laparotomy for abdominal trauma is haemorrhage control and prevention of spilling of visceral contents from visceral injuries is the second priority. In selected patients, definitive repair is delayed until after a period of intensive resuscitation following damage-control surgery. The diagnosis or exclusion of hollow viscus injuries can be problematic. Excluding the general principles of trauma laparotomy and definitive intra- abdominal procedures, the article discussed the clinical assessment and decision- making which would ensure that injuries are not missed during laparotomy and thus decrease mortality(20).

From study in Addis Ababa, the mortality rate was significantly associated with hypotension systolic blood pressure<90mmHg (25).

2.5.4. Types of abdominal injuries

The pattern and presentation of abdominal trauma vary according to places and the structure of the present health system. From study in Saudi Arabia(4) and Tanzania (79.2%) (33) study blunt abdominal trauma is the dominant type of abdominal injury. Contrary to this, a study done in Kenya, at Kenyatta National Hospital, Nairobi, penetrating abdominal injuries giving a ratio close to 2:1 blunt abdominal injuries(24).

From study in Addis Ababa, the mortality rate was significantly associated with blunt abdominal injury (25)

2.5.5. Abdominal organs injured

A study in Afghanistan showed, liver is the organ most commonly injured in blunt abdominal trauma followed by spleen, gut, retroperitoneal hematoma and other organs(29). Another study in the same country, which was done in penetrating abdominal injury, showed, small bowel injury (46.3%) most frequent abdominal lesion. Small and large bowel injuries were the most frequent in the blast groups, stomach injury in stab wounds (27).

Hemoperitonium, Splenic laceration, perforated bowel, perforated stomach, Lacerated liver were the common intra-operative findings from study done in Tanzania(26). A study done on patterns of penetrating abdominal injury Khartoum, Sudan, solid organ injuries found in 22.9%, hollow viscous injuries reported in 86.9% of the patients(22).

Study conducted in Addis Ababa depicted, commonly injured was Small intestine (35, 43.8%) in penetrating trauma and Spleen (17, 34.7%) common in blunt abdominal trauma(25).

Commonly associated extra-abdominal injuries were soft tissue injury including retroperitoneal hematoma (20%), head injury (14%), and hemothorax (14%). Associated orthopedics injuries were mainly rib fractures in (20%).

Conceptual framework

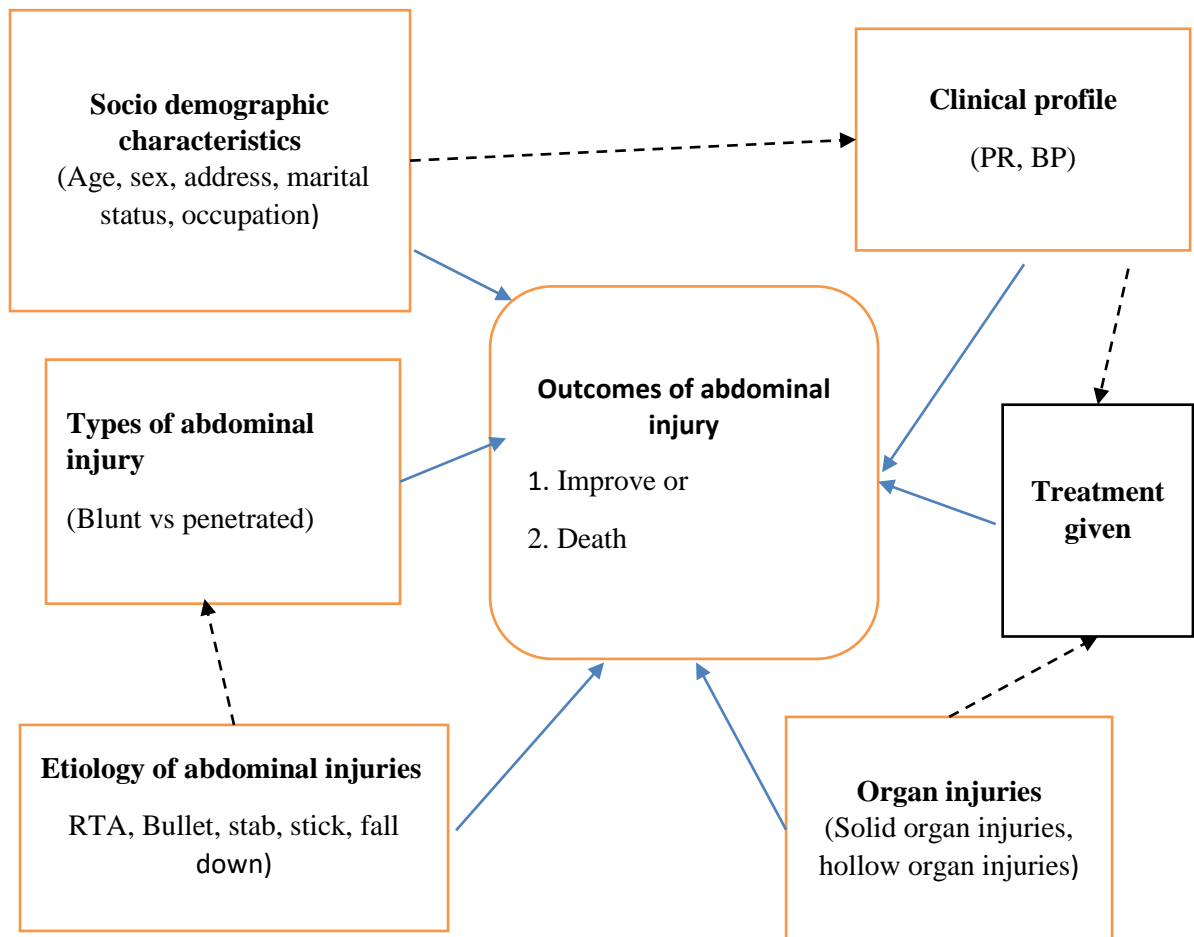


Figure 1: conceptual framework for abdominal injuries outcomes and of associated factors among patients visited, to TGSB Bahir Dar, Northwest Ethiopia, 2020 adopted from different(23, 25, 33)

3. METHODS AND MATERIALS

3.1. Study Design and period

A cross sectional institutional based study was conducted in TGSB from October 1 to 31/2020. All charts of patients with diagnosis abdominal injured who visited the hospital from January 1, 2019 to October 31/ 2020 were included in this study.

3.2. Study setting

This study was conducted at TGSB is a specialized teaching hospital under Bahir Dar university collage health science and medicine, Bahir Dar, Ethiopia. Bahir Dar, city located at a distant of 505 kilometers in the Northwest direction from Addis Ababa (capital city of Ethiopia). TGSB a tertiary level hospital established since 2011 E.C and serving about 7 million people and has more than 500 beds. The hospital has a mix of varied health professionals composed of subspecialist, specialist, residents, general practitioners, nurses, midwife, medical laboratory professionals, pharmacists, anesthesia professionals, mental health specialists, radiographers, biomedical engineer, and other supporting staff.

3.3. Source population and study population

3.3.1. Source population:

All patients' charts of with diagnosis of abdominal injury who visited TGSB from January 1/ 2019 to October 31 /2020 GC were source population.

3.3.2. Study population:

All patients' chart diagnosed with abdominal trauma by physical examination or by other investigation modalities and admitted to surgical ward at TGSB from January 1, 2019 to October 31/ 2020

3.4. Eligibility criteria

Inclusion criteria: all abdominal trauma patients' charts visited TGSB with complete documentations.

Exclusion criteria: All patients referred to other hospitals.

All patients 'charts/cards discharged against medical advice.

3.5. Sample Size Determination and Sampling procedures

The sample size was calculated by using single population proportion formula by taking (P=11.4 % abdominal injury admission prevalence accounts from a study done Della (14) and considering level of significance ($\alpha = 5\%$), 5% marginal error

$$(n = [Z_{\alpha/2}]^2 p (1 - p)/w^2)$$

Where; - n= minimum sample size

$Z_{\alpha/2} = 1.96$ (for 95% of CI)

p = Abdominal injury admission prevalence of all trauma patients, (14) (P = 11.4 %) from study done Dilla

w = marginal error = 0.05 (5%)

$$n = \frac{(1.96)^2 \times 0.114 (0.886)}{(0.05)^2} = 155$$

This yields a sample size of 155.

Considering incomplete charts of 5%, =155X 10% = 16

Then; total sample=155+16 = 171 January 1/2019 to October 31/ 2020 GC.

Therefore, about 171 patients' charts diagnosed with abdominal trauma by physical examination or by other investigation, modalities at TGSH were taken as sample population in this study.

3.6. Sampling procedures

All clinical records of patients who have been diagnosed to have abdominal injury and visited TGSH, from January 1/ 2019 to October 31/ 2020 were used to collect data for achieving the objective of the study. A full Coverage survey of 22 months period of records were employed to get minimum required sample size of 171.

From January 1, 2019 to October 31/ 2020 a total of 169 patients were visited as case of abdominal trauma based on clinical or radiological evidence at TGSH, from which 163 Patients' charts/cards met inclusion criteria and had complete documentation from 163

charts included in this study. Two cases of charts were referred to other hospital and four charts had no completed documentation.

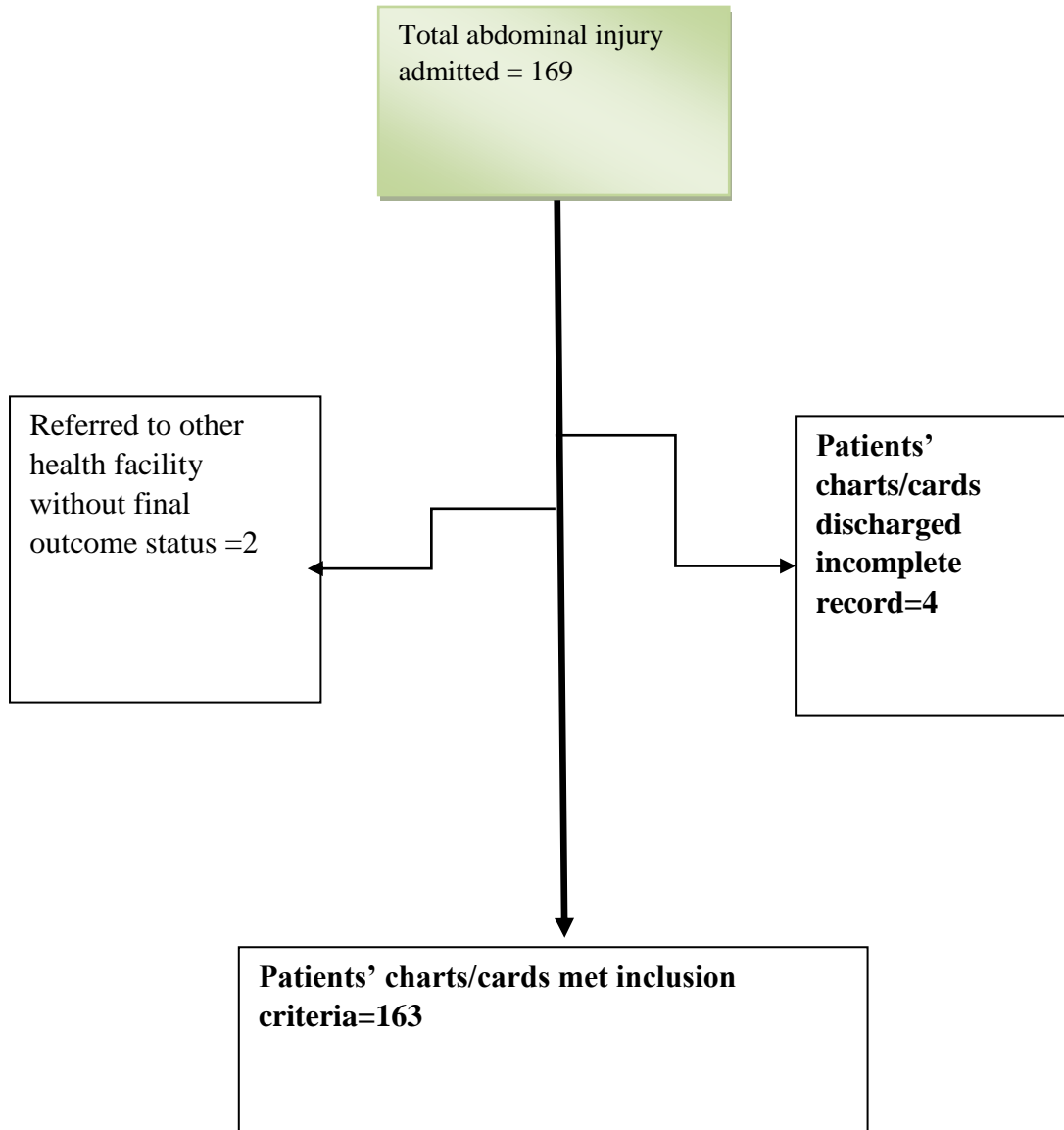


Figure 2:-Sampling procedures for abdominal injuries outcomes and of associated factors among patients visited, to TGSB Bahir Dar, Ethiopia, 2020

3.7. Variables of the study

3.7.1. Dependent variables

Outcome of abdominal injury as “Improved or Death”

3.7.2. Independent variables

- Socio demographic characteristics Age of patient, sex, Marital Status of patient, Place of residence
- Clinical profile vs.(PR, BP), Types of abdominal injury (Blunt vs penetrated), Organ injuries (solid organ injuries, hollow organ injuries), Etiology of abdominal injuries (RTA, Bullet, stab, stick, fall down), Complications (SSI, wound dehiscence, HAI), Treatment option (conservative or non-operative or surgical), Concomitant injuries other than abdomen, Time of hospital arrival, Hospital stay and Procedures applied

3.8. Operational definitions

- ✓ The **word Trauma and injury** is used interchangeable in this study.
- ✓ Abdominal trauma/ injury outcomes operationalized as :
 - **Improvement, when** either operatively managed or conservative treatment with supportive management of patients' chart were documented with a clinical diagnosis of stable vital sign and/or documented as improved at discharge summary sheet and discharged from the hospital.
 - **Death** –Patients' chart documented on death summary as death.
- ✓ **Conservative (Non-operative management)**-Means management of patients with without surgery with NGT suction, IV fluids etc.
- ✓ **Operative management**-Means surgical exploration of the abdomen.

3.9. Data Collection Instruments and Procedure

Structured data extraction checklists prepared through reviewing varieties of literatures.

The first part of the questionnaire consists of issues related to the personal information of included the age, sex, place of residence. The second part is concerned with the types and causes of abdominal injury. Hospital stay, Treatment given, Procedures Applied, complications, Outcome of abdominal injuries.

The target study populations were first identified from registration books of surgical unit and operation theatre. Then the patients' medical records were retrieved and data was collected using a pre-prepared standard checklist from the chart.

3.10. Data quality control measures

The structured data extraction checklists, prepared in English version. Two days training was given for data collectors, supervisors regarding, and practical exercise on patient chart review.

Pre-testing of the preliminary review of checklist was made at Felege Hiwot comprehensive specialized hospital at 5% of sample, corrected, and reformatted accordingly. Checked the completeness and consistency of each checklist with close supervision. All the collected data were checked & rechecked and necessary correction was made each day.

3.11. Data Processing and analysis

Data were entered in Epi data version 4.6.0 and exported to SPSS version 23 for analysis. Descriptive statistics like frequency tables, graphs and charts used to describe the variables.

Crude and adjusted odds ratio was used to know and ascertain any association between the independent and dependent variables. Logistic regression was performed to assess the presence of any association between each independent variable and dependent variable. Those variables at Binary logistic regression which show statistical association at a p value < 0.2 move to multivariable logistic regression model for the dependent variables to control potential confounding variables. Finally, variables Adjusted Odds Ratio (AOR) with 95% CI and P-value less than 0.05 was declared as statically significant in this study.

3.12. Ethical consideration

Ethical clearance was obtained from Institutional Review Board (IRB) of BDU College of Medicine and Health Science, and was communicated to TGSH. The data found in the patient chart was kept secured or confidential and the personal identifiers such as name was not extracted. Information was used as aggregated after analysis of whole data.

Finally, after the whole process of data collection, the questionnaire was kept safe throughout the whole process of the research work until the paper published.

3.13. Plans for Dissemination of Finding

After the whole process of the research work, hard and soft copy of the result of the study submitted to Bahir Dar University College of Medicine and Health Sciences, Department of surgery. Formal defense of the paper considered as one mechanism of dissemination and utilization of the result. Finally, the research will be published in recognized journal to be available for those who could benefit from the study.

4. RESULTS

During the period from January 1/2019 to October 31/ 2020 a total of 169 patients were visited as case of abdominal trauma based on clinical or radiological evidence at TGSB, from which 163 Patients' charts met inclusion criteria and had complete documentation from 169 included samples.

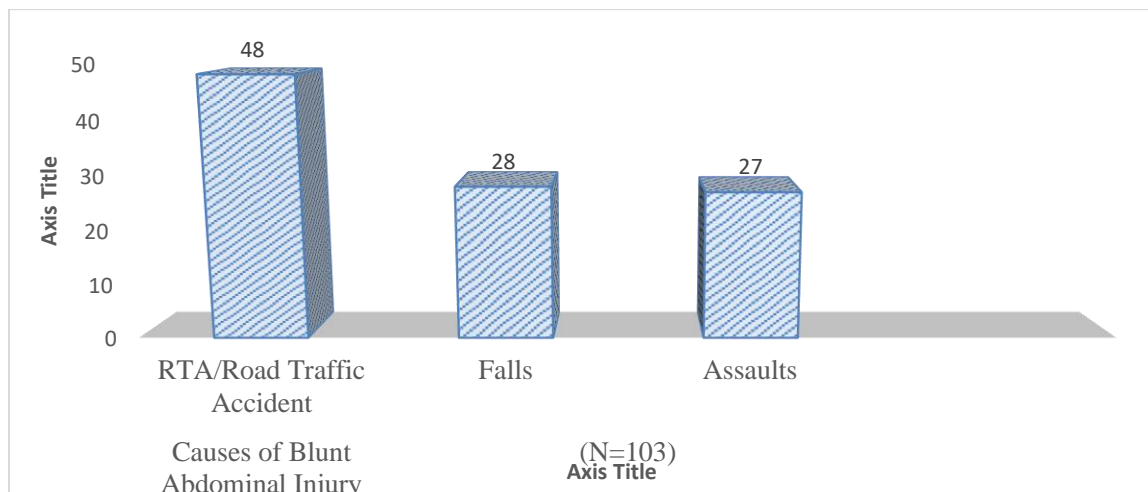
Socio-demographic characteristics: Among the study patients 123 (75.5%) were males and 40 (24.5%) were females giving a M: F ratio of 3:1. The most commonly affected age group, accounting for 106 (65.0%), was the 20-40 years followed by >40 years 31(19%). The mean and SD of ages of study participants was 32.2 (± 12.93). In this study, the youngest and the oldest trauma victims were 4 years and 75 years old respectively. The majority of the cases experiencing trauma were rural dwellers 93(57.1%) compared to urban dwellers who were 70(42.9%). More than half of the study participants were married, 95(58.3%), whereas there was only one widowed abdominal trauma victim. Regarding occupation majority, 65(41.7%) were farmers', followed by students, 30(18.4%) and 28(17%) were traders respectively. (Table 1)

Table 1: Socio-demographic characteristics of the abdominal injuries patients visited, at TGSB, Bahir Dar, Ethiopia, 2020

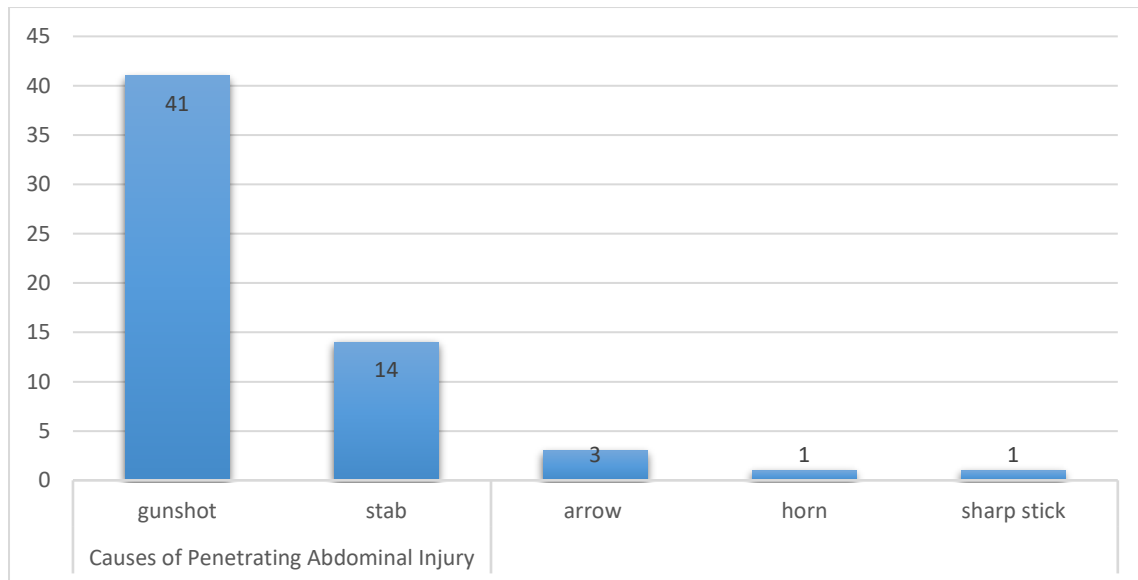
characteristics		Number	Percent
Residency	Urban/Town	70	42.9
	Rural	93	57.1
Sex	Male	123	75.5
	Female	40	24.5
Age(in years)	Age <20	26	16.0
	20-40	106	65.0
	>40	31	19.0
Marital status	Married	95	58.3
	Single	67	41.1
	Widowed	1	.6
Occupation	Farmer	68	41.7
	Student	30	18.4
	Trader	28	17.2
	office worker	15	9.2

Housewife	5	3.1
Driver/assistant	5	3.1
Daily laborer	11	6.7
Pensions	1	.6

Types and causes of abdominal injuries: In this study, the majority of abdominal injury patients sustained blunt abdominal trauma 103 (63.2%) and the remaining 60(36.8%) had penetrating injuries. (Table 2).Road traffic accident was the commonest mechanism of blunt abdominal injury 46.6%,followed by fall from height and fall of heavy object (27.2%) and assaults(25.2%).The penetrating abdominal trauma(n=60) was mainly due to gunshot 68.33% and stab (23.33%) wounds. Majority of clients were presented with extra abdominal injury 94(57.7%) and limbs, chest and head were mainly affected extra abdominal injury parts.



A)



B)

Figure 3: Causes of blunt (n=103) and penetrating (n=60) abdominal injury patients visited from January 1/2019 to October 31/ 2020, at TGSH, Bahir Dar, Ethiopia

Solid organ injury (SOI) was found in 95 (58.3%) cases and hollow viscus injury (HVI) was observed in 68 (41.7%) cases. Most common solid organ injured was spleen 38(40.0%) followed by liver 23 (24.21%) and kidney 14 (14.73%). Among 38 patients with splenic injury, splenectomy was done in 18 patients.(Figure 5).

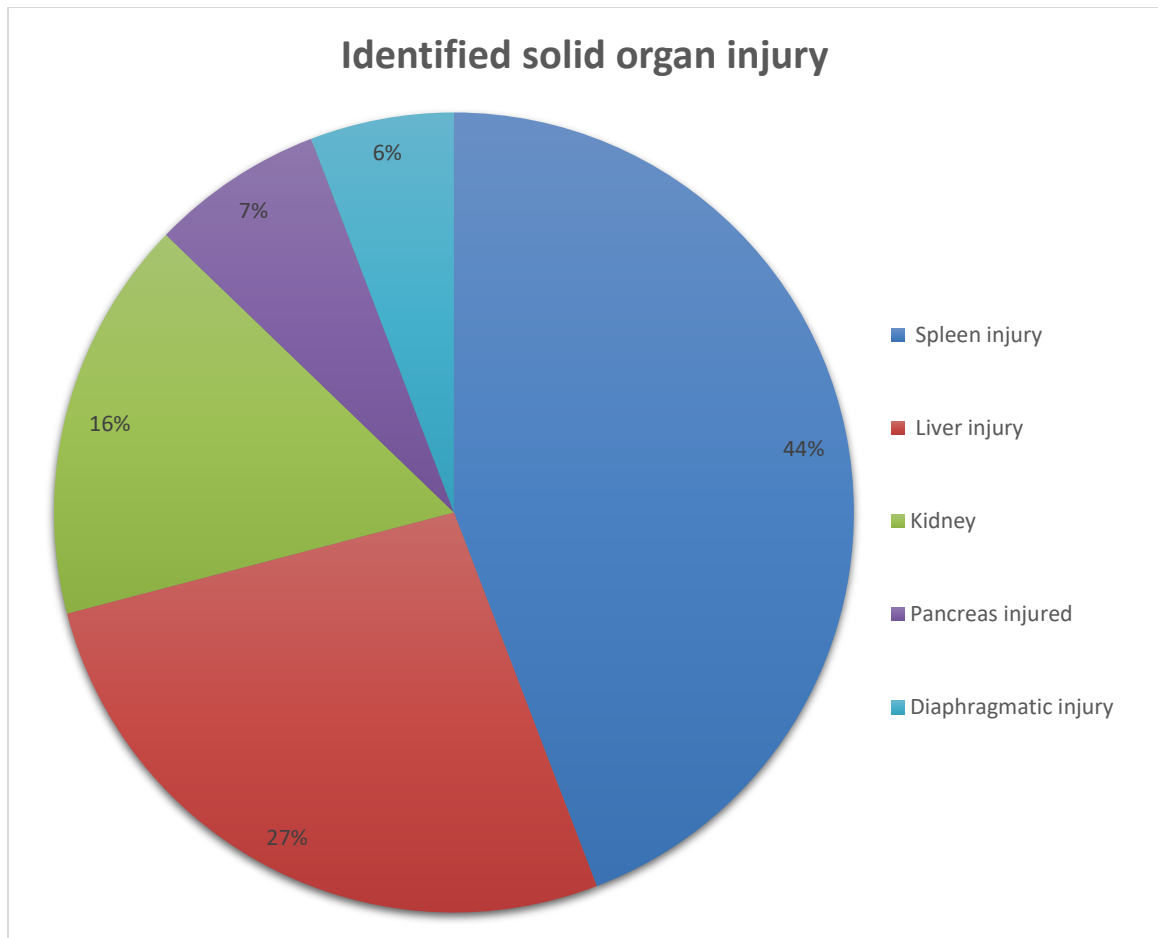


Figure 4: Identified solid organ injury TGSB, 2020:

Most common hollow viscous injured in the present study was small bowel 26 (38.23%) followed by large bowel 22 (32.35%). Figure 6).

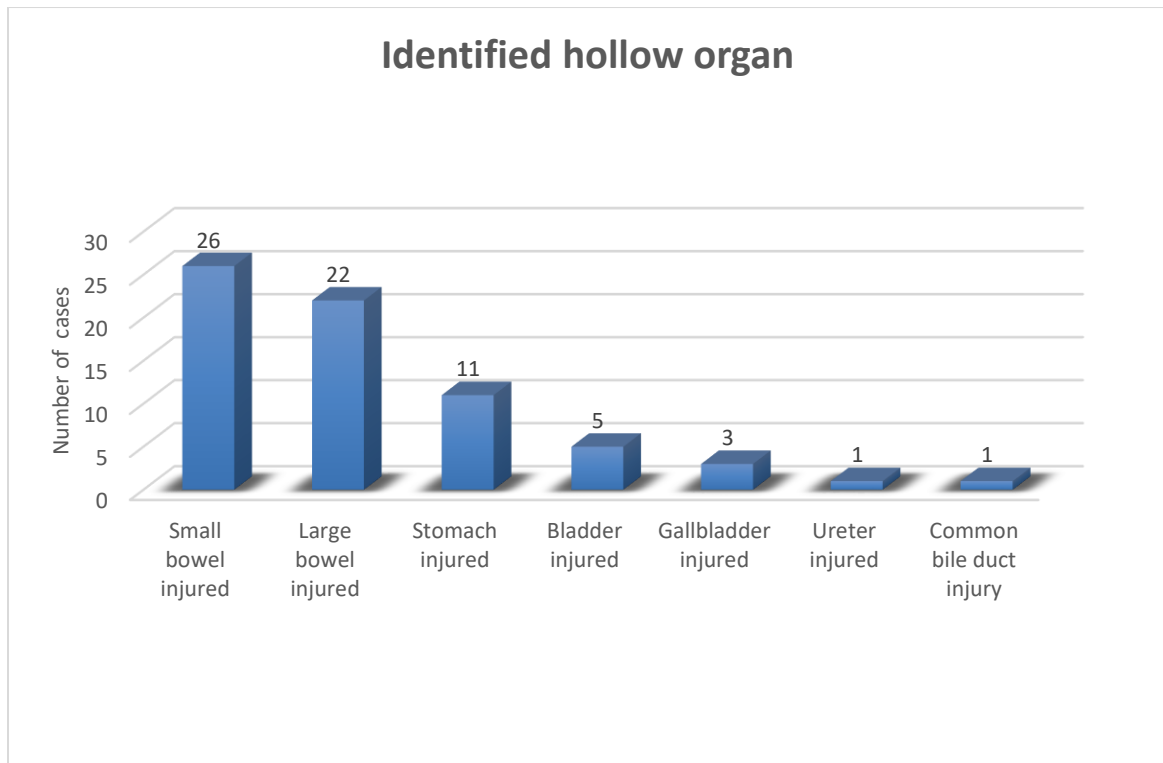


Figure 5: Identified hollow organ injury TGSB, 2020

From, total 163 ninety-four (57.7%) had concomitant extra abdominal injury. Among the study group, 90(55.2%) patients were managed conservatively and the remaining 73 (44.8%) patients were managed surgically. Among 103 patients with blunt abdominal injury, 78 (75.3%) patients were managed conservatively. Among 60 patients with penetrating trauma 51 (85%), patients were managed surgically. Out of 51 patients who were managed surgically, 18 (35.3%) patients had small resection and anastomosis and large bowel resection was done in seven cases. In this study, shortest duration of hospital stay was one day and longest duration was 60 days. In this study mean duration of hospital stay is 8.37 days with SD 9.18days. 144 (88.3%) patients were discharged with improvement and the remaining 19 patients among the study population expired leading to overall mortality of (11.7%) (Table 2).

Table 2:-Distribution of abdominal injury patients according to their management, complication, hospital stay and final Outcomes at TGSB, 2020 (N= 163)

Variables	Label	Number	Percent
Treatment Given	Conservative	90	55.2
	Surgical management	73	44.8
Types of Abdominal Injury	Blunt	103	63.2
	Penetrating	60	36.8
Complications Occurred	No	127	77.9
	Yes	36	22.1
Presence of Extra abdominal Injury	Yes	94	57.7
	No	69	42.3
Presence of solid organ injury	Yes	95	58.3
	No	68	41.7
Time of hospital arrival	< 6 hrs.	94	57.7
	≥ 6hrs.	69	42.3
Hospital stay	≤ 7 days	106	65

	>7 days	57	35
Outcomes of client	Discharged with Improvement	144	88.3
	Death	19	11.7

Table 3: Distribution of patients according to the type of surgical procedure performed at TGSH, 2020 (N= 73)

characteristics		Number	Percent
Procedures applied for	Repair	26	16.0
those surgically managed	Resection/anastomosis	17	10.4
(N=73)	Colostomy	16	9.8
	splenectomy	15	9.2
	Lavage only	10	6.1
	Ileostomy	5	3.1
	Nephrectomy	3	1.8
	Cholecystectomy	2	1.2

In the study group 36 (22.1%) were having complications (Table 4). Commonest operative complications was surgical site infection 23 (14.1%) followed by shock 15 (9.2%) and HAI 3 (8.0%).

Table 4: Distribution of patients according to postoperative complications at TGSH, 2020
(N = 36)

Variables	Label	Number	Percent
Type Complications	SSI	23	14.1
Occurred(n=36)	Shock Occurred	15	9.2
	HAI	13	8.0
	Fistula	1	.6

Outcome of abdominal injury: in this study overall the outcome of abdominal injury as discharged with improvement were 144 (88.3%) (95% CI: 82.8 –93.2) and 19 (11.7%).

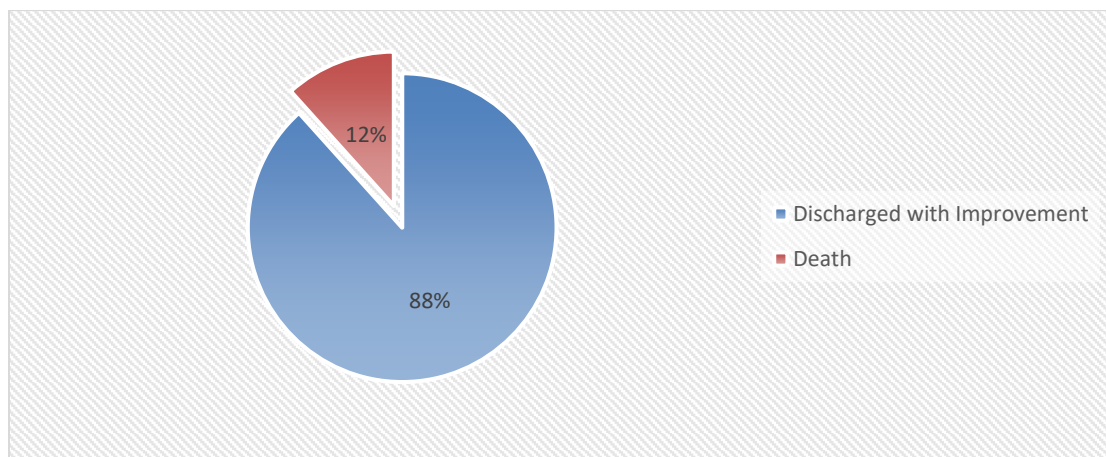


Figure 6: Outcome of abdominal injury patients visited from January 1/2019 to October 31/ 2020 at TGSH, Bahir Dar, Ethiopia.

Factors associated with abdominal injury of Outcome

Using bi-variable analysis /On crude odds ratio /, age, sex, residency, types of abdominal injury, Pulse Rate, presence of hollow organ injury, presence of complications and treatment given, were significantly associated with patients' management outcome (dead or improved) at 95% confidence interval and $P < 0.2$ (Table 3).

Numerous associations were found to be significant in the bi-variable analysis. Therefore, a multivariable approach was applied to determine which factors best explained and predict management outcome of patient. All explanatory variables showing significant association with dependent variable were analyzed using multivariable logistic regression model to avoid the possible confounding variables. As a result, age, sex, residency and presence of complications were significantly associated with patients' management outcome as (dead or improved) at 95% confidence interval and $P < 0.05$.

Therefore, those patients whose age group less than 40 years were 3.46 times more likely improved from abdominal injury (AOR: 3.46; 95% CI: 1.04, 11.96) than those patients whose age group 40 years and above.

Males had 4.75 times more likely to be improved compared to females (AOR: 4.75; 95% CI: 1.34, 16.82).

Those patients who developed postoperative complications were 72% times less likely to be improved from abdominal injury compared to who had complications (AOR: 0.28; 95% CI: 0.09, 0.92, $p = 0.035$).

Those patients who were living in rural site were 5.86 times more likely improved from abdominal injury compared with those at the living urban site (AOR: 5.86, 95% CI (1.65, 20.88))

Table 5:-Bi-variable and multivariable factors associated with abdominal injury outcomes for patients treated at TGSH, 2020

Variables	Outcomes of abdominal injury		COR(95% CI)	AOR (95% CI)	P-value
	Improved	Death			
Age in years					
<40	119	13	2.20(.76, 6.34)	3.46(1.01, 11.97)*	.049
≥40	25	6	1		
Sex					
Male	111	12	1.96(0.72, 5.39)	4.75(1.34,16.82)*	.016
female	33	7	1	1	
Residency					
Urban	59	11	1	1	
Rural	85	8	1.98(0.75,5.22)	5.86(1.65,20.88)*	.006
Pulse Rate					
<=100 beats per minute	100	8	1	1	
>100 beats	44	11	0.32(0.12, 0.85)	0.49(0.14, 1.7)	.26

Types of Abdominal Injury					
Blunt	95	8	1	1	
Penetrating	49	11	0.38(.14, 0.99)*	0.44(.12,1.61)	0.21
Complications Occurred					
Yes	27	9	0.26(.095,0.69)*	0.28(.09,0.92)*	.035
No	117	10	1	1	
Liver injury					
Yes	18	5	0.40(0.13,1.24)	0.63(0.16, 2.50)	.516
No	126	14	1	1	
Hallow organ injury					
Yes	40	11	0.28(0.11,0.75)*	0.28(0.07,1.09)	.069
No	104	8	1	1	
Treatment Given					
Conservative	85	5	1	1	
Surgical management	59	14	0.25(.09, 0.72)*	0.29(.07, 1.21)	.089

**Significantly associated at p-value <0.05*

5. DISCUSSION

The study found that 88.3 % of abdominal injury outcome were discharged with improved and 11.7% were died. The result of this study is consistent with study in Pakistan(death rate 10%) (29), and Afghanistan(death rate 12.8%)(27).

The improvement from abdominal injury in this study was higher than from study in Tanzania 82.1%(26), and from study in Egypt 74.2%(3). The difference might be due to differences in the hospital setting, population difference.

However, the improvement from abdominal injury in this study was lower than the study in Addis Ababa, (91.5 %)(25),in Nigeria (92.1%)(30), India 96% (8)and study in Qatar (91.7%)(5).This difference might be due to differences in the hospital setting difference, socio-economic difference and population difference.

The death rate of this paper was twice as reports of an evaluation blunt abdominal trauma in Bangalore, India 4% (8).A possible explanation of the difference may be the current study include both blunt as well as penetrating abdominal injury while the Indian study was viewed only blunt abdominal trauma.

Our study revealed higher chance of death in patients presented with penetrating injury 18.3%. This is consistent with study in Addis Ababa (25) and study in Egypt(3).

In agreement with other studies, abdominal injuries were more common in males(8, 25, 26, 29) and affect the younger age group less than 40 years(25). This might be due to male's engagement in high-risk activities and the young age groups being the mobile population more involved in recreational activities as well as working in risky working area such as construction.

Blunt abdominal trauma was the leading mechanism of abdominal injury in our study which is in agreement with studies from Saudi Arabia(14), Qatar(5),Tanzania(26). In contrast to this, Addis Ababa(25) and Nigeria(30) authors found that Penetrating injury is more common than blunt. This might reflect a difference in the political situation, effectiveness of traffic law, prevalence of social conflict, country's' level of growth; in some studies included only patients who needed laparotomy.

In this study, the most frequently injured abdominal organ includes Spleen, followed by liver, and kidneys. This is consistent with other studies that have reported spleen to be the

most common injured abdominal organ (5). This might be, patients in some areas in Africa have splenomegaly due to chronic tropical infections that render them more susceptible to splenic rupture with even minor trauma.

This study found that, the sex was significantly associated with abdominal injury outcome, i.e. Males were 4.75 times more likely improved from abdominal injury as compared to females. This is similar to findings Amhara Regional State Referral Hospitals, (13)

Those patients who were living in rural site were 5.86 times more likely improved from abdominal injury compared with those at the living urban site. This might be due to the fact, rural dwellers always participated in farming activities that result better physical fitness and trauma resistance.

Age was also seen to be associated with outcomes of abdominal injury that; those patients whose age group less than 40 years were 3.46 times more likely improved from abdominal injury than those patients whose age group less than 40 years. That means higher age risky factor abdominal trauma deaths. This is similar to findings of Egypt (3), Tanzania (33), Afghanistan (27) Addis Ababa (25). Possible explanation may be that this age group is the active working years of life. In turn, this age group were high immunity to overcome complication and early improved.

Developing postoperative complications decreased improvement from abdominal injury by 72%. This may be due to complication may worsen the outcome.

Strengths and limitations of the study

Strengths of the study

Use all charts of abdominal injury

Limitation of the study

Since the study was conducted in hospitals, merely in surgical department of the referral hospitals it cannot be generalized to the population living in the catchment area.

Furthermore, illegible handwriting on patient charts were the major challenges. In addition, since the study retrospectively cannot determine disability status of clients.

6. CONCLUSION

The study found that 88.3 % of abdominal injury outcome were discharged with Improvement and 11.7% died. Blunt abdominal trauma was the leading mechanism of abdominal injury and spleen was the most frequently injured abdominal organ. The study found that age less than 40 years, being male, being rural resident and absence complications were significantly associated with patients' abdominal injury outcome (improvement from abdominal injury).

Recommendation/future direction and implications

Further research shall be multicenter facility and prospective follow up study.

For hospital, staffs' and surgeons shall give greater attention for blunt abdominal trauma, postoperative complications, and surgically managed patients.

Majority of abdominal injury caused by road traffic accident, so government shall enforce strong traffic regulation and safety road design.

Community health education on personal assault and strong law enforcement.

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7. Annexes

ANNEX I: INFORMATION SHEET

Title of the Research Project: Outcomes of abdominal injuries and associated factors

Name of Principal Investigator: Dr. shitahunAgaje

Introduction: Greetings! My name is Dr. shitahunAgaje I am a student at Bahirdar University, school of Medicine, department of surgery. As part of certificate of specialty in surgery training, I am undertaking a research Project on outcome of abdominal trauma and associated factors.

Purpose of the Research Project: The aim of this study is to assess outcome of abdominal trauma and associated factors. The information gained from this research will be used to make recommendations to improve patient care.

Procedure:The data collection will be conducted from Tibebe Gion comprehensive specialized hospital medical records.

Risk and /or Discomfort: the data will be extracted from medical records, so it will not impose any harm on patients.

Benefits: The study has no direct benefit for those.

Confidentiality:During data extraction the patients name will not be taken, instead they will be identified by their card number in the registration book. All extraction forms collected will be kept confidential and destroyed two years after the end of the project. The information abstracted will be used only for research purpose.

Person to contact:If you have any further questions or would like to receive further information about the project, please contact:

ShitahunAgaje Principal investigator):+251-910801315

Thank you for reading the Information Sheet, and asking any questions that you might have had.

ANNEX II: QUESTIONNAIRE

Bahir Dar University, College of Health Sciences and medicine, Department of Surgery designed data collection check list to assess outcomes of abdominal injuries and associated factors at TGSH, Bahir Dar, Ethiopia, 2020

Part I: Socio Demographic Characteristics

Date: _____ Card No _____ sr. no: _____ address _____ residency _____

Age	Sex	Marital status			
		Married	Single	Divorced	Widowed

Occupation

Farmer	Student	Trader	Office worker	Housewife	Driver /assistant	Daily labor	Others (specify)

Part II: Types and causes of abdominal injury

Types	Causes				
Blunt	RTA	Falls	Assaults	Others (specify)	
Penetrating	Stab	Gunshot	Horn	Arrow	Others (specify)

Part III: Duration from injury to presentation in hours and Vital signs at admission

Duration in hrs	PR	BP	RR

Part IV: Extra abdominal injuries

Extremities	Head	Chest	Others (specify)

Part V: Identified abdominal organ injuries

Solid organ injuries	Spleen	Liver	Kidneys	Pancreas	Others (specify)		
Hollow organ injuries	Stomach	Small bowel	Large bowel	Bladder	Gallbladder	Ureter	Others (specify)

Part VI: Treatment given

Conservative	Blood transfusion	Surgical intervention

Part VII: Procedures applied if surgical intervention is given

Repair	Resection /anastomosis	Splenectomy	Colostomy	Lavag	Cholecystectomy	Ileostomy	Others (specify)

Part VIII: complications and outcomes

complications	SSI	fistula	Abdominal collection	Wound dehiscence	HAI	DVT	Anastomotic leak	Shock	Others (specify)
Outcomes	Discharge with improvement					Death			

Part IX: Hospital stays in days _____