

ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES

DEPARTMENT OF EMERGENCY MEDICINE



PATTERN AND OUTCOME OF FALL INJURIES AND ITS ASSOCIATED FACTORS IN EMERGENCY DEPARTMENT AT ADISS ABABA BURN, EMERGENCY AND TRAUMA HOSPITAL, ADDIS ABABA, ETHIOPIA, 2020.

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This is to certify that the thesis entitled on “Pattern and Outcomes of Fall injuries and its associated factors in Emergency Department At Addis Ababa burn, emergency and trauma Hospital, Addis Ababa, Ethiopia, ” is submitted in partial fulfilment of the MSc with specialization in “Emergency medicine and Critical care nursing” to the Graduate Program of the College of Health Sciences of Addis Ababa University and has done by AyeleFikadu, ID No: GSR/1506/11 under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence hereby can submit the thesis to the Department.

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Declaration

I hereby declare that this MSc thesis is my original work and has not been presented for a degree in any other university and all sources of material used for this thesis have been duly acknowledged.

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List of Acronyms and abbreviations

AaBET- Addis Ababa Burn, Emergency and Trauma Hospital

AHF-Accidental High Falls

ED -Emergency Department

FI- Fall Injury

IHF-Intentional High Falls

MOI - Methods of Injury

STI - Soft Tissue Injury

SLF- Same Level Falls

SPHMMC- Saint Paul's Hospital Millennium Medical College

USA- United States of America

WHO-World Health Organization

YLD-Years Lived with Disability

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Abstract

Introduction: Globally, falls are the second leading cause of unintentional injury deaths, with 80% occurring in low-and middle-income countries. Falls are a major health concern in the elderly population. Fall injuries are an important public health concern and remain a growing health problem globally. Two of the three leading causes of injury deaths road traffic injuries and falls – are predicted to rise in rank compared to other causes of death, with falls rising to become the 17th leading cause of death by 2030 unless necessary intervention is given.

Objective: This study was conducted to assess the pattern and outcomes of fall injuries among patients who had visited AaBET hospital ED from April 6 to May 2020

Methods: Institutional based cross-sectional study design was employed. A systematic random sampling technique was used to review patient's registration chart from January 2018 to December 2019. Then after data collection, data was checked and entered into Epi data 4.6 versions, finally, the cleaned data was exported to SPSS version 25 for analysis. binary logistic regression was used for dependent variables with p value < 0.05 considered to be the significant association. Finally based on the findings data was presented using statements, tables, and figures.

Result: The Most common outcome of falling injury was discharge 80.98% afterward to that was Leave against medical advice 6.34% and death which accounts 4.53% of the outcome. Among injured body parts lower extremity accounts around one fourth, 88(26.6%), followed by head injury 68(20.5%), whereas neck injury 1(0.3%) was the least injured body part. Based on multivariable logistic regression those patients with comorbidities were 65% more likely to be die than alcohol intoxicated patients, AOR 0.34 (95%CI 0.02-.87). with p value < 0.05 , whereas patient's age, marital status, and sex had no significant association.

Conclusion: The outcomes of fall injury were highly fatal having significant death rate Comorbidity and alcohol intoxication were the factors resulting in fall injury among the study participants.

Keywords: - pattern; injuries; outcome; fall; Emergency Department

CHAPTER ONE

Introduction

1.1 Background

Globally, “trauma is one of the vital problems and it may cause a substantial economic and social crisis”. More than 10% of all kinds of diseases as such communicable and non-communicable diseases have been reported to be integrated with trauma and its risk factors. The evidence showed that death due to injuries had been reached five million people since 2000. According to the World Health Organization's recent report, 2014 found that those five million deaths and which caused harm to millions more was due to various factors related to injuries. The report was indicated that falls and others were recorded as major causes of injuries among the communities. Therefore, injuries are the best example caused by day to day activities at home and workplace (1).

Falls defined as “inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects”. Falls are protuberant among the external causes of unintentional injury. It is which contains a wide range of falls including those on the same level, upper level and other unspecified falls (2,3).

Fall injuries (FI) are the second most common cause of injury associated mortality after traffic accidents. It comprises a significant percentage of blunt trauma cases and emergency department (ED) admissions. Falls mostly affects males and disproportionately affect the very young or very old. They cause more deaths in old people than in young. Many factors affect the mortality and morbidity of falls, such as patient age, fall height, cause of fall, type of ground on which the patient fell, and body parts injured (4).

The mechanism of fall injury category contains many different types of events, including falls on stairs or steps; from ladders; out of buildings; into holes; from one level to another such as from playground equipment, from furniture and falls on level ground.

Also included are sports injuries relating to falls due to slipping, tripping, or pushing and collisions due to pushing by another person. These different methods of injury (MOI) can, however, be grouped into three major groups: the same level falls (SLF), accidental high falls (AHF) and intentional high falls (IHF). People sustaining an AHF are named fallers and those sustaining an IHF are called jumpers (5).

Falls ensue as a result of a complex interaction of risk factors. Those are classified into four dimensions: biological, behavioral, environmental and socioeconomic factors. As exposure to risk factors increases, the greater becomes the risk of falling and being injured (6).

Biological factors that are pertaining to age, gender and race to the human body are associated with changes due to aging such as the decline of physical, cognitive and affective capacities, and the co-morbidity associated with chronic illnesses (7).

Behavioral risk factors include those concerning human actions, emotions or daily selections. They are potentially modifiable. For example, risky behavior such as the intake of multiple medications, excess alcohol use, and sedentary behavior can be increases risk fall and its consequences (8).

Exposure to environmental risk factors such as narrow steps, slippery surfaces of stairs, looser rugs, Poor building design, cracked or uneven sidewalks, and poor lightening in public places are such hazards to injurious falls (9).

Falls are a major health concern in the elderly population. Currently, individuals over the age of 65 make up an estimated 13% (4.2 million) of the 32 million people living in Canada, and this number is expected to grow to approximately 6.7 million 20% by 2021 and to approximately 9.2 million 25% by 2041 (10).

Fall-related injury accounts for 20% of the nearly 20 billion dollar annual cost of accidental injury in the USA. Although incidence grows with advancing age, fall-related injury affects all age groups and occurs in both inside and outside settings among community-dwelling individuals (11).

A one-year prospective cross-sectional study done in South West Nigeria shows from all mechanisms of injury fall from height accounts 28 (4.3%) (12).

1.2 Statement of the problem

Globally, falls are the second leading cause of unintentional injury deaths, with 80% occurring in low-and middle-income countries(13,14).

Mortality due to falls in the Eastern Mediterranean Region is reported as 2.9 per 100,000 populations which is the highest among all World Health Organization regions (WHO). Globally, the number of injury deaths increased by 24% in the last decade with falls claiming about 540,000 global deaths in 2010 (15).

Falls are the 13th leading cause of global years lived with disability (YLD). From 2005 to 2015, global deaths due to falling increased by about 21%, and a major contributor to this were population growth and aging. If left unaddressed, the burden of fall injuries is projected to increase by 100% by the year 2030 (13).

More than 5 million people die each year as a result of injuries, of which fall injuries account for 14% of it. This accounts for 9 percent of the world's deaths, almost 1.7 times the number of fatalities that result from HIV/AIDS, tuberculosis and malaria combined. Fall injuries are an important public health concern and remain a growing health problem globally. Two of the three leading causes of injury deaths road traffic injuries and falls – are predicted to rise in rank compared to other causes of death, with falls rising to become the 17th leading cause of death by 2030 unless necessary intervention is given (16).

A five years survey study conducted at Ethiopia shows that a total of 136(21.8%) of accidental fall-related death was reported (17).

Despite increasing awareness of the magnitude of the problem, attention to fall injuries prevention and control among policymakers and those funding global public health programming remains disproportionately low. This is particularly alarming given that many fall injuries can be prevented: there is a wide range of strategies based on sound scientific evidence that is effective and cost-effective at decreasing these injuries consequences, and these prevention strategies should focuses education, training, creating

safer environments, prioritizing fall-related research and establishing effective policies to reduce risk(16).

Generally, a different study was conducted worldwide regarding pattern, outcomes and associated factors of fall injuries with many recommendations to reduce its burden even though some recent reports show the consequence and health burden of the fall injuries are increasing. So the aim of this study is to show the gap related to fall injuries and recommend the responsible bodies on its prevention.

1.3. Significance of the study

Firstly, the finding obtained from this study would have significant importance for communities living around AaBET hospital and other setups regarding to identify common risk factors of fall injuries and strategies on how to prevent fall injuries and related economic and health burden

Secondly, since there is lack of data recent in Ethiopia in line with pattern and outcomes of fall injuries and its associated factors these might be important for health workers and managers to show the gap related with falls injuries and its health burden and provide a direction on how to prevent fall injuries in the country.

Lastly, the study finding may be used as secondary data sources for researchers who want to research on the same inquiry

CHAPTER TWO

LITERATURE REVIEW

Falling injuries represent an important and growing disease burden in the developing world, and now represent one of the leading causes of death in economically active adults in many low- and middle-income countries (18).

Globally each year, 3 million people are treated in emergency departments for fall injuries. Over 800,000 patients a year are hospitalized because of a fall injury, most often because of a head injury or hip fracture (19).

As a study done in the South-East Asia Region, in China, in Japan, Americas (Latin/Caribbean region), and the incidence of all injuries was 31%, 20%, and 21.6% fall each year respectively (9). According to the 2015 WHO global study on fall injuries the prevalence of fall-related injuries ranged from 6.6 % in India to 1.0 % in South Africa and were 4.0 % across the pooled countries (20).

2.1 Pattern of fall injuries

The meta-analysis of randomized controlled trials done at France in 2013 shows that protective effect seems most pronounced for the most severe fall-related injuries: the estimated reduction is 37% for all injurious falls, 43% for severe injurious (21).

A retrospective review at Sweden in 2017 shows that Extremity skeletal injuries (ranging from 20% in SLF to 77% in high falls, where hip and upper extremity injuries prevail in SLFs and other lower extremity injuries are more common in high falls. Spine injuries are very common (ranging from 13% in mixed falls to 36% in high falls. Spine injuries are not limited to high falls but can happen from even below 2 m. In SLFs, brain injury is also common. Brain and spine injury were seen in 25% of the same level fallers in one study; hence it was more common than fractures. Thoracic injuries are more common in high falls, the commonest specific injuries being rib fractures, lung contusion, pneumothorax and hemothorax (5).

A retrospective review conducted at Taiwan in 2014 shows that study of 484 patients who had fallen or jumped from a height, the most frequently affected body part was the head 91%, followed by the thorax 54%, abdomen 37%, extremities 36%, and neck 17%. Falls are the most common cause of traumatic brain injury in the elderly and account for 46% of all fall-related deaths(22)

A retrospective study done in India shows that Work-related fall injuries accounted for 22%. Most falls 70% occurred at home, and fall from, out of or through building or structure account 36% from this head injury the second most common site of injury was the face, followed by the spine and lower limbs. Most facial injuries were lacerations, 134(47%) and Vertebral fractures were observed in 66%, and 40% of these fractures were at the level of C4–C5. Patients presenting with multiple injuries were also 35% (23).

According to a 2015 retrospective study conducted in Pakistan cases of unintentional fall injury: 56.6% of fall injuries were due to slipping while about 28.5% are from height, and 15% were from tripping and other reasons. The injured body parts at the initial presentation were recorded for 85.4% of cases with fall injuries. Among injured body parts about 29.6% of fall injuries involved upper extremities, lower extremities 37.0%, followed by head/neck 25.4%, and face 9.8%. The nature of injury at the initial presentation was documented for 69.6% of the patients: cuts and wounds occurred in 58.8% of the fall injury patients; sprains, strains, and bruises in 29.2% and fractures and dislocations happened in 12.1% of patients (15).

A one-year cross-sectional study conducted in Kenya among elderly patient's shows that fall injuries account for 41.7% of traumatic injuries. The study reveals due to traffic and falls, the major anatomical region affected was the extremity 63.9%. Injuries to the head/neck instituted 26.4% of all injuries. Specific injuries most recurrently recorded were fractures of the femur 34.7%, fractures of the lower limb other than femur 19.4% and head injuries 11.1%(24).

A prospective study conducted at Addis Ababa Ethiopia shows that falls are exceptionally common among females aged over 65 years of in whom, they are recorded in 52.2% of their injury-related complaints (25).

A cross-sectional hospital-based study was done in Tikur Anbessa specialized referral hospital from February 1 to April 30, 2013, show that fall accident accounts 21.2% with Unintentional injuries were the primary cause for the majority of patients seen in ED (18).

2.2 outcomes of fall injuries

A 2011 Iowa university injury prevention research center data shows a total, of 853 (2.7%) were died among patients visit emergency departments due to fall injuries from all trauma cases, the rate for falls increased nearly 30% from 35.5 to 46.1. Falls are also increasing in the Iowa death certificate data 41.9% from 2002 to 2009 (26).

According to study done at the European country in 2013 by the institute of global health shows that falls are 5.7% were dead among from unintentional injuries(27).

Another study conducted at Taiwan in 2014 shows that elderly patients in fall accidents tend to experience a higher injury severity, a worse outcome, and a higher mortality rate compared to adult patients (22). A national safety council reported that in 2016, 697 (1.55%) workers died in falls to a lower level, and 48,060 were injured badly enough to require days off work. A worker doesn't have fall from a high level to suffer fatal injuries; 134 workers died in falls on the same level(28).

A retrospective study was done in Iran from November 2011 to November 2014 with a history of falls from height 63.5% men and 36.5% women patients. 5.6% of patients died and the majority of them were in equal or greater than 62 years old group. People fell mainly from 1.1–4 meters level 46.1% (3).

A retrospective study done in 2011 at Jimma shows that the majority of 92.5% of the cases were discharged with improvement and follow up and 87.5% died and 72.3% of the

deceased were males. Death was more common in those between 15-49 years of age, 79.5% followed by those 5-14 years old 12%(29).

2.3 Factors associated with outcome of fall injuries

A seven-year retrospective study conducted in the United States shows that age greater than 65 years were significantly associated with death due to fall injury as well as regarding with sex, women were more significantly to be die than male genders due to the cause of fall injuries in adult patients.(30).

In the same way a 2014 USA Bureau of Labor Statistics reveals that construction workers were more likely to be die than other workers because of fall injuries and those patients who fall from height had higher chance of death than patients who fall from lower level (fall from ground)(31).

According to three-year retrospective study trauma registry data from a major trauma center in the United Kingdom comparing older and younger adult patients admitted to the ED following a fall down a flight of stairs between July 2012 and March 2015 shows that Older patients were more likely to suffer injuries to all body regions and sustained more severe injuries to the spine 23.6% and also more likely to suffer poly trauma 10.6%. Alcohol intoxicated patients were more likely to suffer injuries to the head 42.9% as while as neck 30.5% and age of the study participant being younger 53 years than sober up patients 69 years is significantly associated with fall injuries (17).

According to retrospective study done in Taiwan in 2014 comorbidities like hypertension diabetes mellitus, coronary artery disease, end-stage renal disease, and congestive heart failure are associated with fall injuries (22).

Another retrospective cross-sectional study conducted in Bangladesh in 2017 regarding fall injuries shows that elderly patients had higher odds of experiencing fatal falls and there is statistically significant association is found between injured body parts and age

lower limb injuries are frequent in young adults 15–24 years old; and waist injuries were frequent in adults over 24 years of age(13).

A three years retrospective study was done in Iran in 2014 shows that unintentional fall injury at the workplace in daily laborer more significantly associated with fall injuries (3).

A cross-sectional study was conducted at Gondar among community-dwelling older adults show that 170 (28.4%) having experienced fall in the past 12 months. Sex (OR = 1.91, 95% CI: 1.24–2.95), low educational status (OR = 2.37, 95% CI: 1.19–4.74), uncomfortable home environment (OR = 2.02, 95% CI: 1.34, 3.04), having diagnosed medical condition 18.02% and use of medication 26.21%. Most outdoor falls are associated with females and participants aged below 66 years was significantly associated with fall injuries. (32).

Another cross-sectional study in Gondar city Ethiopia shows that the main leading causes of injuries fell from ground level 21.3% followed by overexertion during lifting (20.6%), and fall from elevation 16.1% in building construction workers(33).

Another study conducted at Jimma University specialized hospital shows that sex of study participants being male is significantly associated with falling injuries with 1.6% and also age greater than 64 is associated with 5.2% (29).

Generally, different studies were conducted world wide regarding to pattern of fall injuries and associated factors even though outcome of fall injuries were as usual, so the aim of this study was to identify main problems associated with it.

1.4 Conceptual Framework

This conceptual frame work adapted from (6–9) .As the revelation to complex interaction of risk factors rises, the greater becomes the risk of falling and being injured. The risk factors and the interaction of them on falls injuries are summarized in Figure 1.1

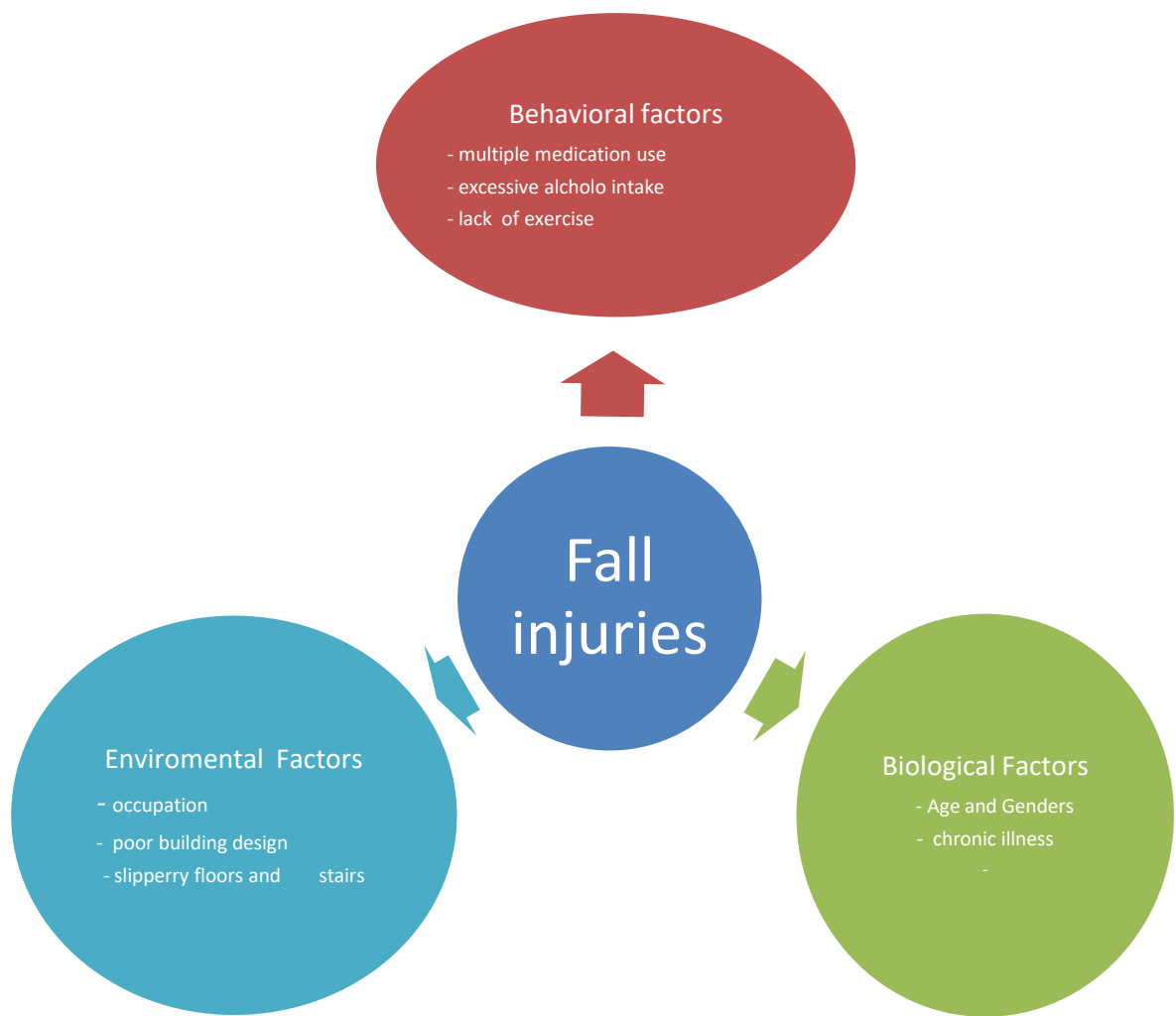


Figure1.1 A conceptual framework of risk factors and the interaction of them on falls injuries.

CHAPTER - THREE

OBJECTIVES

General objective

- To assess pattern and outcomes of fall injuries and associated factors among adult patients visit Addis Ababa burn emergency and trauma hospital, Addis Ababa, Ethiopia from April 6 to May 2020.

Specific objective

1. To assess pattern of fall injuries among adult patients visit Addis Ababa burn emergency and trauma hospital, Addis Ababa, Ethiopia, 2020.
2. To determine outcome of fall injuries among adult patients admitted to Addis Ababa burn emergency and trauma hospital, Addis Ababa, Ethiopia, 2020.
3. To identify factors associated with outcomes of fall injuries among adult patients who visit ED at Addis Ababa burn emergency and trauma hospital, Addis Ababa, Ethiopia.

CHAPTER - FOUR

Methods and materials

4.1 studyarea

The study was carried out at Addis Ababa burn emergency and trauma (AaBET) hospital. AaBET Hospital is a major trauma center in Addis Ababa, Ethiopia. It was established in 2015, affiliated with St. Paul's hospital millennium medical college (SPHMMC). AaBET hospital currently provides health care service in specialties namely; orthopedics, neurosurgery, plastic and reconstructive surgery, and emergency and critical care. The emergency department had 3 sites based on triage scale Red area 5 beds, the orange area with 8 beds and yellow and green area with 30 recliners. It has approximately 20 - 30,000 emergency visits to the hospital and provides 24/7 emergency services (34).

4.2 Study period

The study period was from April 6 to May 8, 2020.

4.2 Study design

Institutional-based cross-sectional study was employed.

4.3 populations

4.3.1 Source population

All traumapatients' chart who had visited ED of AaBET hospital from January 2018 to December 2019

4.3.2 Study population

Fall injury patient's chart who had visited ED of AaBET hospital from January 2018 to December 2019.

4.4. Sample size determination

Sample size was determined using single population formula with confidence level 95%, 5% margin of error, n_i = initial sample size

$$n_i = \frac{(Z_{\alpha/2})^2 p(1-p)}{d^2} = 377$$

Where $P=56.6\%$, proportion of pattern of falls injuries in Pakistan

Margin of error 0.05, confidence level required at 95%=1.96

Since the sample size was taken from less than 10,000 populations adjusted correctional formula was used

$$n_f = \frac{n_i(N)}{n_i + N} = \frac{377(1758)}{377 + 1758} = 310$$

Where N , is the total number of fall injuries patients admitted at AaBET hospital from January 2018 to December 2019.

After adding 10% contingency for incomplete data, the total final sample size was: - $n_f +$ contingency.

$$\begin{aligned} &= 310 + (310 \times 0.1) \\ &= \underline{341} \end{aligned}$$

4.5. Eligibility Criteria

4.5.1 Inclusion criteria

- All patients' registration chart with fall injuries with complete data

4.5.2 Exclusion criteria

- Adult patients who visited AaBET hospital with fall injury
- Registration charts with incomplete data

4.6 Sampling technique

Systematic random sampling technique was used using order of chart review by sampling fraction(k)= $N/n_f = 1758/377=5$ the first chart review was selected using lottery method, then the subsequent patient's chart review was obtained by adding the sample fraction (5)

4.7 Study Variables

4.7.1 Dependent variables

- outcome of fall injury

4.7.2 Independent variable:

- Socio-demographic characteristics: - age, sex, marital status, occupation
- Comorbidity
- Alcohol intoxication

4.8 Data collection methods and procedures

A checklist developed from previous literature with related title by principal investigator which contains socio-demographic characteristics, pattern of falling injury, outcomes and associated factors of fall injury to address the objectives appropriately was employed.

Data was collected through chart review based on inclusion criteria by trained 5-degree holder Nurses

4.9. Data quality control

A pretest was done on 5% of sample size study conducted at Tikur Anbessa Specialized Hospital (TASH) to check the consistency of the Checklist, and based on the obtained necessary modification was carried out. Training was given for one day before they are assigned to collect the data for data collectors on the parts of the checklist. After that trainee was evaluated for their understanding of all of the data collection checklist words and variables.

During the period of data collection, the principal investigators was provided on-site close supervision, technical support, and all filled checklist was checked daily for completeness, accuracy, clarity, and consistency by the principal investigator. The data were checked daily for its completeness and those with incomplete information was discarded.

4.10 Data processing and Analysis

After data collection, it was checked for completeness and consistency. Data were cleaned and entered into Epi data 4.6 versions. Then, the data were exported and analyzed using SPSS version 25.0 for windows. Descriptive statistics such as percent, frequency and mean, was used to summarize categorical variables of patients' characteristics and pattern, outcomes and associated factors of fall injuries. The data analysis and binary logistic regression were done based on the selected variables to address objectives adequately. Predictors with a probability value of less than 0.05 were considered statistically significant. Finally, the result was interpreted and presented using statements, tables, and figures.

4.11 Ethical consideration

Before starting of data collection, a letter of permission was obtained from the college of health science department of emergency medicine ethical review committee and was given to AaBET hospital administrator. permission was taken to review patients' registration charts. The patient's names were omitted from the Checklist. There wouldn't be potential risks that may cause any harm in any form on the study subjects. Confidentiality of all the documents reviewed was highly secured throughout the data collection of the research process.

4. Dissemination of the finding

After completion of the study, a finding report would be presented at college of health sciences department of emergency medicine, and the copy would be sent to advisors of the article, AaBET hospital, and ministry of health and subsequently, attempts would be made to present it on different conference, then the manuscript was prepared and submitted journal for publication find.

4.13 Operational definitions/definition of terms

Pattern:-troubled with frequency distribution of fall-related injuries presenting to the emergency departments according to the injured body part and their cause.

Injury- Any instance of physical damage to the body or body part.

Unintentional injury- injuries that were accidental events in which occurs in a short period of time seconds or minutes, that the harmful outcome was not sought, or the outcome was the result of one of the forms of physical energy in the environment or normal body functions being blocked by external means.

Outcome of injury: - indicate the intent of the injury that results on the victim to be alive or death.

Death: -The irreversible cessation of all vital functions especially as indicated by permanent stoppage of the heart, respiration, and brain activity because of fall injuries.

Incomplete data: - is the existence of disappeared of all the necessary information of patient based on our data Collection formats.

CHAPTER - FIVE:Result

Socio-demographic characteristics

A total of 331 participants were included in the study giving a completion rate of 97.1%. The mean age of respondents was 40.87 ± 19.5 years. Regarding sex of participants 207(62.5%) were males, and 197 (59.5%) of them were married. The most common occupational status of participants was governmental employee which accounts 65(19.6%) and 46(13.9%) of them were daily laborer. The majority of participants' residence area was urban which accounts for 253(76.4%) (Table1).

Table1: socio-demographic characteristics of patients with fall injury at AaBET Hospital in June 2020(n=331)

Variables		Frequency	Percent
Age	15-25	84	25.4
	26-40	115	34.7
	41-64	76	23.0
	>=65	56	16.9
	Total	331	100.0
Sex	Male	207	62.5
	Female	124	37.5
	Total	331	100.0
Marital Status	Married	197	59.5
	Single	102	30.8
	Widowed	20	6.0
	Divorced	12	3.6
	Total	331	100.0
Occupation	Government Employee	65	19.6
	Merchant	53	16.0
	Farmer	44	13.3
	Daily Laborer	46	13.9
	House Wife	32	9.7
	Student	54	16.3
	Other	37	11.2
	Total	331	100.0
Residence	Urban	253	76.4

	Rural	78	23.6
	Total	331	100.0

5.1 outcome of falling injuries

The Most common outcomes of falling injury was discharge 80.98% afterward to that was Against medical advise 6.34% and death which accounts 4.53% of the outcome (see figure 1).

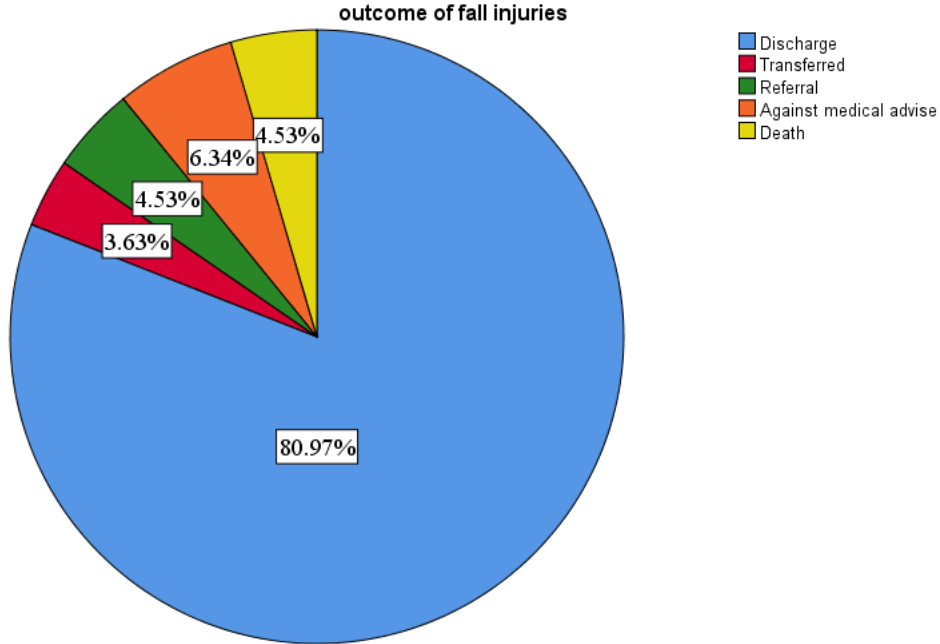


Figure 1: Outcome of fall injury at AaBET Hospital in June 2020(n=331)

5.2 pattern of fall injuries

Among injured body parts lower extremity accounts around one fourth, 88(26.6%), followed by head injury 68(20.5%), whereas neck injury 1(0.3%) was the least injured body part (see table 2).

Table 2: pattern of patient with fall injury at AaBET Hospital in June 2020(n=331)

Variables		Frequency	Percent
Injured area	Head	68	20.5
	Neck	1	0.3
	Face	4	1.2
	upper extremity	63	19.0
	lower extremity	88	26.6
	Chest/Abdomen	8	2.4
	Pelvic	26	7.9
	spinal cord	19	5.7
	Poly trauma	22	6.6
	STI	32	9.7
	Total	331	100.0

5.3 Risk factors with fall injuries

Of which factors related with fall injuries Comorbidity was common factor 92 (71.3%), then Alcohol intoxicated accounts 29 (22.5%) (See table 3).

Table 3: Risk factors related with fall injuries at AaBET Hospital in June 2020(n=129)

Variables		Frequency	Percent
Factors related with fall injuries	Alcohol intoxicated	29	22.5
	Comorbidity	92	71.3
	Other*	8	6.2
	Total	129	100.0
Occupation	Government Employee	65	19.6
	Merchant	53	16.0
	Farmer	44	13.3
	Daily Laborer	46	13.9
	House Wife	32	9.7
	Student	54	16.3
	Other	37	11.2
	Total	331	100.0

*Other: history of previous surgery, history of previous fall injuries

Among type of comorbidity related with fall injuries Diabetes mellitus accounts 27(29.3%), followed by hypertension 26(28.3%), then heart disease 15(16.3%) where as both postural hypotension and syncope was least comorbidities of fall injuries (see table 4).

Table 4: Types of comorbidity in patient with fall injuries at AaBET Hospital June 2020(n=92)

Variables		Frequency	Percent
Hypertension	Yes	26	28.3
	No	66	71.7
	Total	92	100.0
Diabetes mellitus	Yes	27	29.3
	No	65	70.7
	Total	92	100.0
Stroke	Yes	3	3.3
	No	89	96.7
	Total	92	100.0
Arthritis	Yes	4	4.3
	No	88	95.7
	Total	92	100.0
postural hypotension	Yes	2	2.2
	No	90	97.8
	Total	92	100.0
Heart disease	Yes	15	16.3
	No	77	83.7
	Total	92	100.0
seizure disorder	Yes	9	9.8
	No	83	90.2
	Total	92	100.0
Syncope	Yes	2	2.2
	No	90	97.8
	Total	92	100.0
psychiatric disorder	Yes	7	7.6
	No	85	92.4
	Total	92	100.0
Cancer	Yes	8	8.7
	No	84	91.3
	Total	92	100.0
Other*	Yes	10	10.8
	Total	10	100.0

*other: RVI, Asthma

5.4 Mechanism of fall injury

The common cause of falling injuries were fall from ground which accounts 53.47%, followed by fall from height 25.98%, while the least cause of fall injuries was fall from stair 8.46% (see Figure 2).

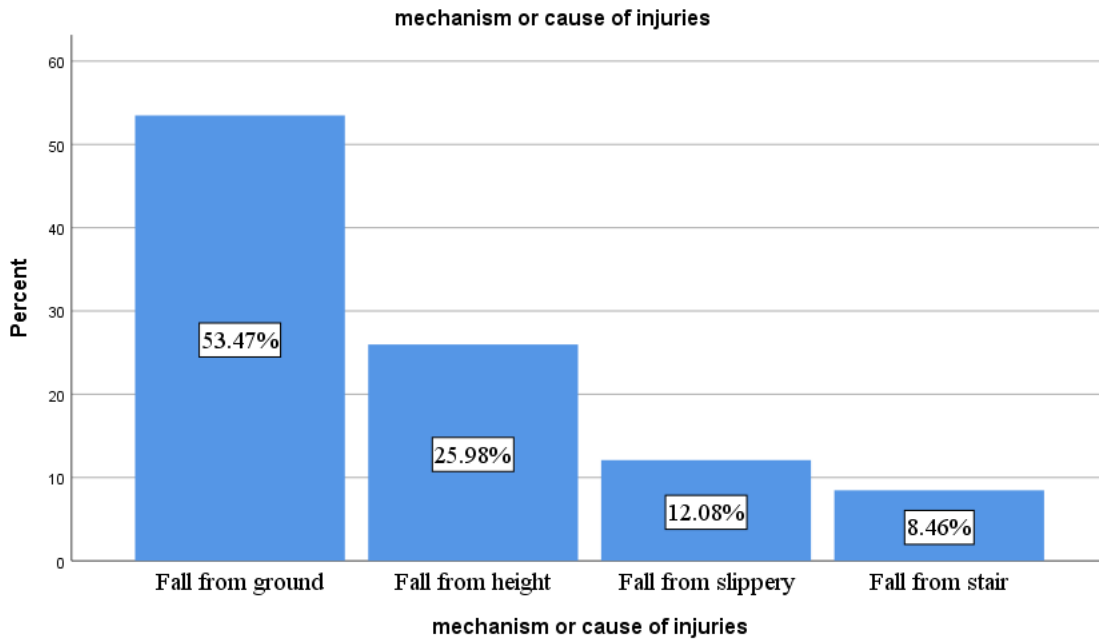


Figure 2: Mechanism or cause of fall injuries of patient at AaBET Hospital in June 2020(n=331)

5.5 Factors associated with outcomes of fall injuries

All independent variables were checked for association with the outcome of interest by using bi variable analysis. Those independent variables that showed association with p-value of less than 0.2 for outcome of fall injuries were included into initial multivariable analysis. variables for alive and death that showed association with a p-value of less than 0.2 respectively in bi variable analysis were included into multivariable logistic regression. In binary logistic regression comorbidity, and occupational status were found to be contributing factors for outcome of fall injuries with P-value of less than 0.05 (Table 6).

Based on multivariable logistic regression those patients with comorbidities were 65% more likely to be die than alcohol intoxicated patients, AOR 0.34 (95% CI 0.02-.87). Regarding occupation of the patients Daily Laborer was 0.76 times less likely to become alive than death outcome as compared with government employee, AOR 0.76 (95% CI 0.41-.95), whereas patients age, marital status, and sex had no significant association. (table 6)

Table 5: Factors associated with outcome of fall injury as alive compared with death of fall injury among patients at AaBET in June 2020 (n=331)

Variables		p-value	Crude OR (95% CI)	AOR (95% CI)
Alive	Male	.166	.403(.11-1.46)	
	Female		1:00	
Alive	Age of patients	.601		
	15-30			
	31-45	.438	1.90(.38-9.64)	
	46-64	.710	.18-3.17)	
	≥ 65	.436	.59(.16-2.19)	
Alive	Marital status	.330		
	Married	.756	1.40(.17-11.78)	
	Divorced	.126	9.18(.54-57.28)	
	Single	.709	1.73(.10-30.45)	
	Widowed			
Alive	occupation of the patient	.019*		
	government employee		1.00	1.00
	Merchant	.686	1.65(.15_18.72)	1.45(1.21-13.01)
	Farmer	.372	.43(.07-2.71)	2.01(1.6-18.43)
	daily laborer	.216	.33(.06-1.90)	0.76(.41-.95)
	house wife	.777	1.33(.18-9.72)	0.53(.23-.91)
	Urban	.366	1.66(55-5.02)	.
	Rural		1.00	
Alive	Factors related with fall injuries	.557		
	Comorbidity	.161*	2.01(.45-8.97)	.34(.02-.87)
	Alcohol intoxication		1.00	
Alive	Mechanism or cause of injuries	.639		
	fall from height	.328	.34 (.04 -2.94	
	fall from ground	.662	.62(.07-5.21	
	fall from stair	.798	.69(.04-11.56	
	fall from slippery		1.00	

*significant association after adjusted

Chapter six:

6.1 Discussion

Fall was the leading cause unintentional injury which occurs both in low- and middle-income countries and it might be occurs due to some risk factors like ageing, comorbidity and occupational status. So, the aim of this study was to identify common cause, outcome of fall injuries and its associated factors.

This study shows that most outcomes of falling injury was discharge 80.98% of them afterward to that was leave medical advice 6.34% and death which accounts 4.53% of the outcomewhich10(68%) of them were found ≥ 65 age groups. This study was consistent with other studies conducted in European country in 2013 by the institute of global health shows that falls are 5.7% were dead among from unintentional injuries (27), a retrospective study was done in Iran from November 2011 to November 2014,5.6% of patients died and the majority of them were in equal or greater than 62 years old group (3).Another retrospective study done in 2011 at Jimma shows majority of 92.5% of the cases were discharged with improvement and follow up (29).

The possible reason for this comparability might be due to identical study design and selecting study participants. In another way this study was contradict to other studies conducted in Iowa death certificate data 41.9% from 2002 to 2009 due to fall injury (26).

The probable justification for this inconsistent may be due to difference in socio-demographic characteristics and health care accessibility.

Among injured body parts lower extremity accounts around one fourth, 88(26.6%), followed by head injury 68(20.5%), whereas neck injury 1(0.3%) was the least injured body part. This study finding is consistent with a retrospective review at Sweden in 2017 shows that Extremity skeletal injuries (ranging from 20% in SLF to77% in high falls, where hip and upper. Brain and spine injury were seen in 25% of the same level fallers (5), Aretrospective study conducted in Pakistan shows among injured body parts about 29.6% of fall injuries involved upper extremities, lower extremities 37.0%, followed by head/neck 25.4%, and face 9.8%.(15).

This study finding is inconsistent with other studies conducted at Taiwan in 2014 shows that study of 484 patients who had fallen or jumped from a height, the most frequently affected body

part was the head 91%, followed by the thorax 54%, abdomen 37%, extremities 36%, and neck 17% (22), and it was inconsistent with other retrospective studies, conducted in India shows that 36% of them had head injury and the second most common site of injury was the face, followed by the spine and lower limbs. (23), A one-year cross-sectional study conducted in Kenya among elderly patients shows that the major anatomical region affected was the extremity 63.9%. Injuries to the head/neck constituted 26.4% of all injuries (24).

The possible explanation for this incomparability was due to different mechanism/ cause of fall injuries result in difference in site of injured body parts.

The common cause of falling injuries were fall from ground which accounts 53.47%, followed by fall from height 25.98%, while the least cause of fall injuries was fall from stair 8.46%. This study was comparable with other studies (23), whereas in contrast to studies conducted in Pakistan revealed 56.6% of fall injuries were due to slipping while about 28.5% are from height, and 15% were from tripping and other reasons (15). This might be due to nature of geographic landmarks living areas.

Based on multivariable logistic regression those patients with comorbidities were 65% more likely to be die than alcohol intoxicated patients, AOR 0.34 (95% CI 0.02-0.87). Regarding occupation of the patients Daily Laborer was 0.76 times less likely to become alive than death outcome as compared with government employee, AOR 0.76 (95% CI 0.41-0.95), whereas patients age, marital status, and sex had no significant association. This study was consistent with other studies conducted in United Kingdom which reveals marital status and age of patients were no significant association (17) and also with study in Taiwan ((22)) and USA which states sex of participants had no significant association (30), The possible reason for this inconsistency might be due to socioeconomic difference among different study regions. While it was inconsistent with a study in Bangladesh in 2017 regarding fall injuries shows that the risk of falls was higher at extremes of age (13). This inconsistency might be due to sociodemographic difference of study respondents.

Among type of comorbidity related with fall injuries Diabetes mellitus accounts 27 (29.3%), followed by hypertension 26 (28.3%), then heart disease 15 (16.3%) whereas both postural hypotension and syncope were least comorbidities of fall injuries studies was consistent with studies conducted in Taiwan in 2014 which shows comorbidities like hypertension diabetes mellitus, coronary artery disease, end-stage renal disease, and congestive heart failure are

associated with fall injuries (22). The possible justification might be due to identical study design.

6.2 Conclusion

The most common outcomes of fall injury were discharge with improvement even though there was high number of death rate

Lower extremities injuries were most common pattern of injury, followed by upper extremities while neck was the least pattern of fall injury.

Comorbidity and alcohol intoxication were the factors resulting in fall injury among the study participants. Diabetes mellitus and hypertension are most common comorbidities which were related to fall injuries among patients visited the AaBET hospital.

The most common cause or mechanism of fall injury was fall from ground, and then fall from height

The finding of study indicated that comorbidities and occupational status were factors significantly contributed to the fatal outcome of fall injuries among the victims. it was the second leading cause of fall injury.

6.3 Recommendations

For AaBET Hospital: based on the finding fall from height and patients with comorbidity had more likely an outcome to be die AaBET hospital administrator should consider raising awareness on precautions that prevent fall and its consequences and for once fallen patient treating at the hospital they should have to teach immobilization of injured parts and how to move from one place to another with help of devices

For Federal ministry of health: federal ministry of health should have to consider country wide Awareness creation on to prevent socioeconomic burden of fall injuries.

For Researchers: since this study was conducted only in one study area further multicenter study should be conducted

6.4. Strength of the study

This study gives information on pattern, outcome, and its associated factor of falling injury in AaBET Hospital emergency department.

It generate a valid information for the organization to establish or strength the health service

This finding is an original study in this particular study area that gives away and expected to formulate base line information for the one who need to conduct another assessment. So that, the finding of this study, will contribute for epidemiology of falling injury in emergency department in AaBET Hospital and to generate information for the respective institution, in specific.

6.5 Limitation

Single centered study might be affecting the finding conclusion.

Lost patients' cards were one of the limitations affect the data.

Time of data collection due to COVID 19 pandemics were hindered.

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Annex I: Data collection checklist

Pattern, outcomes and associated factors of fall injuries in AaBET hospital, Adult ED from January 2018 - December 2019

Date of data collection _____ MRN _____

Checklist SN _____ Name of data collector _____

Part I: Socio Demographic data of fall injuries in AaBET, ED

Serial numbers	Variables	If yes (√) for the write one	Remark
1.	Age (year)	
2.	Sex	Male	
		Female	
3.	Marital status	Married	
		single	
		Widowed	
		Divorced	
4.	Occupation of patient	Govt. employee	
		Merchant	
		Farmer	
		Daily laborer	
		House wife	
		Student	
		Other/ specify	
5.	Residence area	Urban	
		Rural	

Part II: outcomes of fall injuries

s.no	outcome of patients	If yes (√) for the write one	Remark
7.	Discharge		
	Transferred		
	Referral		
	Against Medical Advise		
	Death		

Part III: Factors related with fall injuries

S.no	Factors associated	If yes (√) for the write one	Remark
8.	Alcohol intoxicated		
9.	Comorbidity		
10	If comorbidity		
	Hypertension		
	Diabetes mellitus		
	Stroke		
	Arthritis		
	Postural hypotension		
	Heart disease		
	Seizure disorder		
	Psychiatric disorder		
	Syncope		
	Other		
11.	Other		

Part IV: pattern and cause of fall injuries

s.no	pattern of injuries	If yes (√) for the write one	Remark
10.	Head		
	Neck		
	Face		
	Upper extremity injury		
	Lower extremity injury		
	Chest		
	Abdomen		
	Pelvic		
	Spinal cord		
	Poly trauma		
	Soft tissue injury (STI)		
11.	Mechanism or cause of injuries		
	Fall From height		
	Fall from Ground		
	Fall from Stair		
	Fall from Slippery		