

# Prevalence of Motorcycle Accidents and Its Associated Factors Among Road Traffic Accident Patients in Hawassa University Comprehensive Specialized Hospital, 2019

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**Background:** Road traffic damages were amongst the central causes of passing away, hospitalization, disability, and low socioeconomic status. About 1.3 million lethal road traffic damages and 20–50 million nonfatal damages happened consequently of road traffic accidents every year globally. Motorcycles are a small subsection of all motor vehicles significantly over-represented in total motor vehicle accidents and lead to a great rate of deaths and disabilities.

**Objective:** The study aimed to assess the prevalence of motorcycle accident and associated factors among road traffic accident patients in Hawassa University Comprehensive Specialized Hospital, Hawassa city, Ethiopia in 2019.

**Methods and Materials:** The health institution/hospital-based retrospective cross-sectional study design was applied and a systematic random sampling technique was implemented to select the sample size of 274 patient's cards from January 2018 to January 2019. The data were entered and analyzed on SPSS 20.

**Results:** From 274 patients' medical records reviewed in the study period, 151 (55.1%) injuries were due to motorcycle accident. In a multiple logistic regression analysis, age, sex, high speed, and types of roads showed significant association with motorcycle accidents.

**Conclusion:** The prevalence of motorcycle accidents was the main cause of injuries among others, which was 55.1%. Motorcycle accidents occurred mainly in males and in people with the age category of 20–29 years. Age, sex, high speed, and type of road were significantly associated with a motorcycle accident.

**Keywords:** road traffic accident, motorcycle accident, the prevalence

## Introduction

Road traffic damages were amongst the central causes of passing away, hospitalization, incapacity, and low socioeconomic status. About 1.3 million lethal road traffic damages and 20–50 million nonfatal damages happened consequently of road traffic accidents every year and about 1.24 million people die on global roads yearly.<sup>1</sup>

The Global Burden of Disease study estimates that 10% of the global death are due to injuries that if the recent trends persist this burden will greatly increase in the next 20 years.<sup>2</sup> In many countries, road traffic accident-related economic loss is as high as 3% of their gross domestic products.<sup>3</sup>

Recently, the number of individuals encountering motorcycle-related injuries is significantly increasing in several countries,<sup>4</sup> science the use of motorcycles as

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a main means of transportation in some countries<sup>5</sup> or even as an instrument of leisure in others.<sup>6</sup>

Thus, motor vehicles constitute very risky. The reason is the absence of safety strategies for the full body or protection structure for drivers and passengers.<sup>7</sup>

Motorcycle cycle injuries constitute a major but neglected emerging public health problems and contribute dramatically to the overall road traffic injuries, which is the leading causes of disability and deaths where main victims are the motorcyclists, passengers, and pedestrians, in their young reproductive age groups in developing countries.<sup>8</sup> Because of rapid motorization, poor enforcement of traffic safety regulations, the inadequacy of public health infrastructure, poor access to health services, etc.<sup>9,19</sup>

Motorcycles make lesser pictorial targets, this makes them be hidden by other vehicles, road, and weather situations. This is the concern specifically at crossings, in which nearly 70% of a motorcycle and other vehicle accident arises. Motorcycle accidents are the principal reasons for victims' disabilities and deaths. Primarily, the victims were motorcyclists, passengers, and pedestrians in their younger age category.<sup>14</sup>

The motorcyclists are young, prefer to drive at the highest speed, overload their motorcycles for quick returns, show irresponsibility, disorderliness, and absence of admiration for other road users, and which can be the main source of road-associated injuries. Commonly, motorcyclists did not attire any defensive equipment, hereafter the risk of acquiring severe head injuries highest. Thus, motorcycle consumers are susceptible on the road and denote a significant collection population mark for dropping road traffic harms.<sup>9</sup>

Globally, 17 road fatalities per 100,000 population per annum are reported. Road traffic-related accidents are higher in low –and middle-income countries with over 85% fatalities which is at least two –times common than in high-income countries.<sup>3</sup>

Deaths related to road traffic hurts in Africa are the highest in the world. It accounts for 28.3 passing per 100,000 people.<sup>10</sup> In Nigeria, the population load of road traffic injuries is projected to be 41 per 1000 people, and about 50% of traffic accidents had happened due to motorcycles. Different studies reported that the occurrence of motorcycle-related injuries differs from 12.8% to 60%.<sup>11</sup>

Ethiopia is one of the developing countries, fronting a huge road security emergency. Over thousands of economically active road users are killed. The 2013 World Health Organization (WHO) estimation, the prevalence of

road traffic fatality in Ethiopia was 25.3 per 100,000 population and the rate is among the highest in the world.<sup>12</sup> Irresponsible behavior of the drivers, poor vehicle conditions, failure to apply traffic regulations, reduced road system, and poor road circumstances can be contributing reasons for the high prevalence of RTAs in Ethiopia.<sup>13</sup>

Ethiopia has observed several dangerous roads globally and has supervised to overtake a strong-minded road scattering out administrative ideologies in the last 15 years. As to the quotes of the Ethiopian National Road Safety Coordination Office, the fatality rate of road crashes was 114 deaths per 10,000 vehicles each year. But the real number may be higher than this because of an inappropriate reporting system. In comparison, in the United Kingdom, the fatality rate was 1 death per 10,000 vehicles and an average of 60 per 10,000 vehicles across 39 sub-Saharan African countries yearly.<sup>14</sup>

In the southern part of Ethiopia of all road traffic accidents, the motorcycle-associated crash was the major reason for injury.<sup>15</sup>

Data on a motorcycle accident in Ethiopia are inadequate, particularly in hospital facilities. Therefore, this study determined the prevalence of motorcycle accidents and their associated factors among Road traffic accident patients in Hawassa University Comprehensive Specialized Hospital emergency unit in 2019, which gives shocking information for policymakers to act on these issues.

## Methods and Materials

### Study Design, Study Area, and Study Period

The institution-based retrospective cross-sectional study design was applied at Hawassa university's comprehensive specialized hospital (HUCSH) from January 2018–2019.

HUCSH is located in Hawassa city. Hawassa is the capital city of Sidama National regional state. It is 273 km away from Addis Ababa, the capital city of Ethiopia. It is located near Lake Hawassa, at 1500–2000ms above sea level, which has a temperature of 20.1–25 degree and gates the annual rainfall of 800–1000mm

The hospital provides different medical services for more than 20 million people visiting from different parts of the country. The hospital has over 500 inpatient beds. It gives services in three coordinated levels as inpatient, outpatient, and emergency department levels. The emergency department can serve around 10,000 patients annually.

## Population

The source population was all patients who got medical service in the adult emergency department of Hawassa University's comprehensive specialized hospital starting January 2018- January 2019. All Road Traffic Accident victims presented to the emergency department of this hospital from January 2018-January 2019, and who fulfilled the inclusion criteria were selected as the study population.

## Inclusion and Exclusion Criteria

Those RTA patient cards recorded to HUCSH were included, and those RTA patient cards with incomplete information were excluded.

## Sample Size Determination and Sampling Techniques

To determine the sample size single population proportion formula was applied with the assumption of 5% marginal error, of Single population proportion formula was used to calculate sample size with the supposition of, 5% of margin error, 95% of the confidence interval, and 40% proportion of motorcycle accident were used from a similar study done in Arba Minch referral hospital,<sup>16</sup> then the calculated sample size was 368. However, the source population of 1080 was less than 10,000. Therefore, the total sample size was adjusted to 274 by using the Fisher correction formula. A systematic sampling method was applied to choose the participants' medical records. First, the value of the constant interval  $k = 3$  was calculated by dividing the total study population  $N = 1080$  by the total sample size of  $n=274$ . The first sample was selected by a simple random sampling technique using the lottery method for the first three patients' medical records, which was the 3rd from the list. Then, by following  $K$  intervals all victims' medical record in the time frame was included until all the calculated sample size was gained.

## Data Collection Instruments and Techniques

The data were collected by using a structured questionnaire developed by reviewing similar literature to the study title. Then, to maintain the quality of data pre-test was done in Adare general hospital on 5% (14 questionnaires) of the sample size. Then, the questionnaire was polished and the real data were collected. The collected data were coded, entered, and analyzed by using SPSS

software version 20. The binary and multiple logistic regression analyses were performed to check the association between dependent and independent variables. Then the strength of association was measured by adjusted odds ratio with 95% CI, and P- value less than 0.05% was considered as statistically significant in multiple logistic regression.

## Operational Definitions

- A motorcycle - is any form of a two-wheeled vehicle with an engine.
- Accident – any form of injuries that happened on a person's body parts.
- A motorcycle accident - is any form of injuries occurred on a person due to any form of a two-wheeled vehicle with an engine.
- Prevalence of motorcycle accident – is the frequencies of any form of injuries occurred by motorcycle.

## Results

### Socio-Demographic Characteristics

The emergency department of Hawassa university's comprehensive specialized hospital served 1080 Road Traffic accident adult patients in one-year period (January 2018–January 2019). Among them, 274 medical records patients were reviewed. Of these studied records, 151 were admitted to the emergency department due to motorcycle accidents. This made the prevalence of Motorcycle related accidents 151 (55.1%). Among them 118 (78.1%) were males and 33 (21.9%) were females. This makes the ratio of male to female 3.6:1. The majority of the respondents, 67% were found in the age group of 20–49. People living in rural accounted for 81 (53.6%) and urban was 70 (46.4%) (Table 1).

### Role of Victims at the Time of Motorcycle Accidents

Among motorcycle victims 64 (42.4%) were drivers, and 38 (25.2%) were passengers (Figure 1).

### Reason for Motorcycle Accidents

Among the motorcycle accidents, the highest 62 (41.1%) was due to High-speed driving, 50 (33.1%) was a collision with other vehicles, 23 (15.2%) due to failure to give way for the pedestrian, and 11 (7.3%) due to drunk driving (Figure 2).

**Table 1** Socio-Demographic Characteristics of Motorcycle Accidents Visited in the Emergency Department of Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia from January 2018 – January 2019, (N=151)

Characteristics		Number	%
Age	< 20	19	12.58
	20–29	76	50.33
	30–39	32	21.2
	40–49	12	7.95
	50–59	5	3.3
	>60	7	4.64
Sex	Male	131	86.75
	Female	20	13.25
Ethnicity	Sidama	76	50.3
	Wolayta	18	11.9
	Oromo	49	32.5
	Others	8	5.3
Place of residence	Urban	70	46.4
	Rural	81	53.6

## Circumstances of the Motorcycle Accident

Of those 151 motorcycle accidents, 82 (54.3%) happened on asphalted roads and 69 (45.7%) were on non-asphalted roads. 81 (53.6%) of the accident occurred in the rural area and 70 (46.4%) in urban when looking at the time of the accident 28 (18.5%) occurred in the morning, 19 (12.6) in the afternoon, 6(4%), in the evening and for 98 (64.9%) the time of the accident was unknown, which is not specified in the patient chart.

## Parts of Body Injured During Motorcycle Accident

Among motorcycle accidents body part involved 74 (49%) was head the most prevalent injury type, 45 (29.8%) Lower extremity, 20 (13.24%) upper extremity, 6(3.97%) chest, 4 (2.65%) abdomen, and 2 (1.32%) other parts of the body (Figure 3).

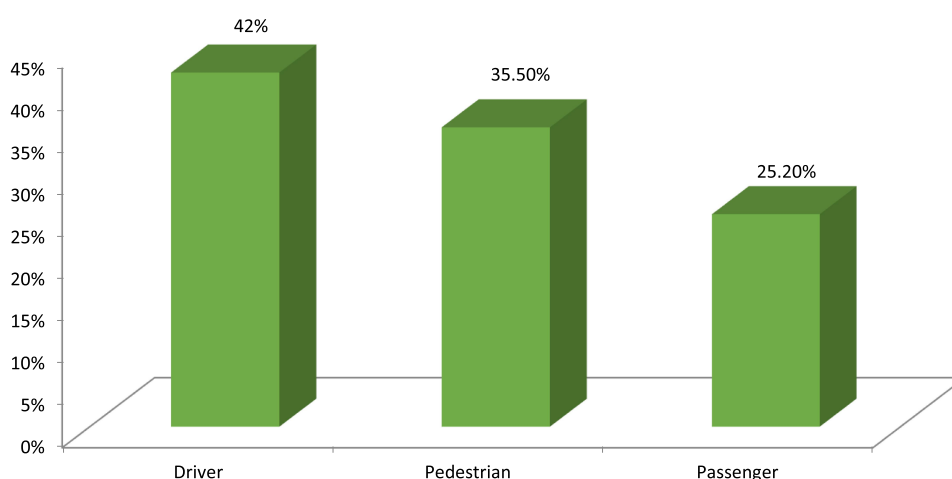
The most common characteristic of injury in the body was fracture accounts for 56 (37.1%), followed by soft tissue injury 37 (25.8%) (Table 2).

## Factors Associated with Motorcycle Accident

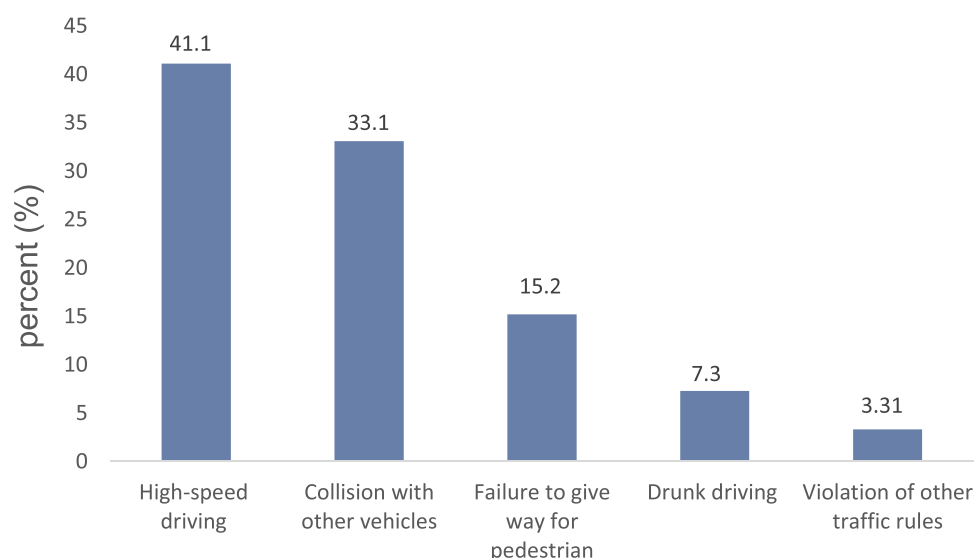
In Multiple logistic regression analyses, age, sex, speed, and types of road showed significant factors for the incidence of motorcycle-related accidents. These, age category 20–29 and 30–39 years, being male, high speed, and non-asphalted road have a significant association for the occurrence of a motorcycle accident (Table 3).

## Discussions

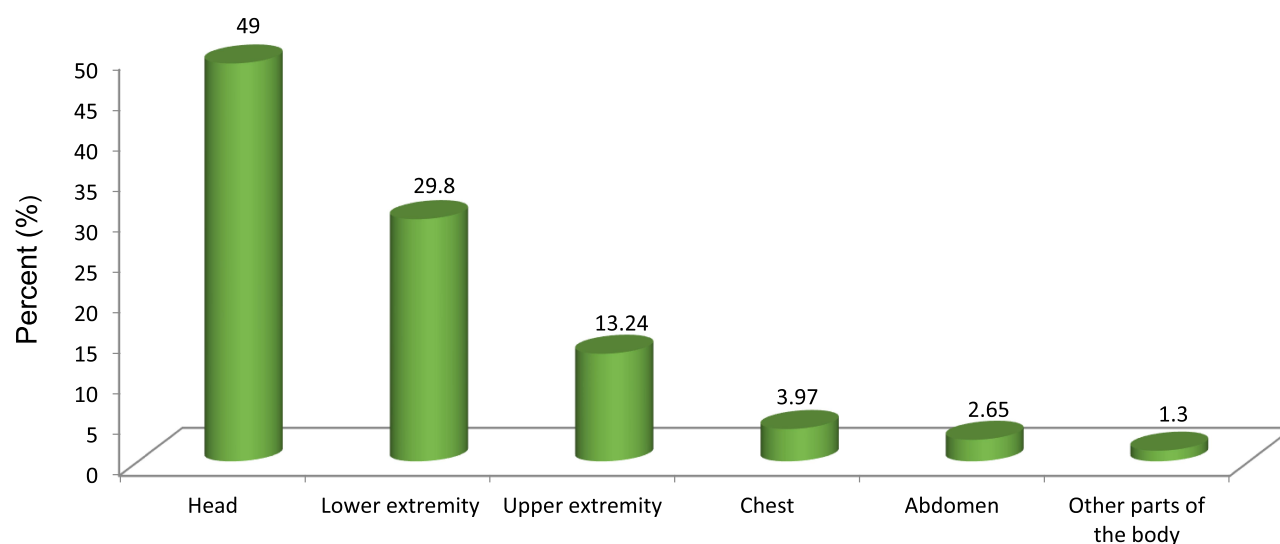
The prevalence of motorcycle accidents in the current study was 55.1%, which was adjacent to a similar study done in Nigeria (54%).<sup>15</sup> But higher than other studies conducted in Campina Grande, Brazil (20.8%),<sup>17</sup> Mwanza city Tanzania (37.2%),<sup>8</sup> Kitale level IV district hospital in Kenya (39.4%),<sup>17</sup> Arba Minch Hospital, Ethiopia (40%),<sup>15</sup> and Wolayta (31.2%),<sup>19</sup> the variation might be due to the socio-economic status of the country and area resulted in unable to build quality roads and



**Figure 1** Patient role at the time of Motorcycle accidents visited in the Emergency Department of Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia from January 2018 to January 2019.



**Figure 2** Reasons for motorcycle accident cases visited in the Emergency Department of Hawassa University Comprehensive Specialized Hospital, Hawassa, Ethiopia. January 2018 to January 2019.



**Figure 3** Prevalence of victim's body parts injured by motorcycle accident in the Emergency department Hawassa University comprehensive specialized Hospital from January 2018 to January 2019.

a lack of awareness of the motorcyclist as well as pedestrians to traffic rules.

This study showed that (50.33%) of motorcycle-related accidents have occurred in economically active age groups between 20–29 years, which was consistent with another study conducted in Campina Grande, Brazil (33.9%)<sup>17</sup> and Nakuru county Kenya (42.3%).<sup>20</sup>

In the current study, (86.75%) of motorcycle accident occurred in male, which is similar to other studies conducted in Campina Grande, Brazil (85.8%),<sup>2</sup> and Kenya (80.8%),<sup>21</sup> but higher than the study done in Kenya

(69.8%),<sup>18</sup> this dissimilarity might be due to variation of the study setting and implementation of driving rules and regulations.

In this study, motorcycle accidents occurred in 64 (42.4%) of drivers, 49 (32.5%) pedestrian, and 38 (25.2%) of passengers. This finding was slightly interrelated to the previous study conducted in Kenya, motorcycle accidents occurred in (34.6%) of the drivers (38.8%) of pedestrian, and 26.9% of passengers.<sup>20</sup> But, was lower than the study conducted in Tanzania 62.8% of motorcycle crash victims were drivers, 48.7% pedestrians, and 53.4%

**Table 2** Characteristics of Motorcycle Injury Victims in the Emergency Department of Hawassa University Compressive Specialized Hospital, Hawassa, Ethiopia from January 2018 to January 2019, (N=151)

Characteristics of Motorcycle Injury	Frequency	Percent
Fracture	56	37.1
Soft tissue injury	45	29.8
Dislocation	15	9.9
Sprain	3	2
Other	32	21.2

were passengers. This variation might be due to study area circumstances like road nature, training status of the population on safety measures in two countries.<sup>2</sup>

In our study commonest reason for motorcycle accidents was high or over speed which was (41.1%), which was less than the study done in Nigeria (47.1%) and greater than the study done in Ghana (31.5%).<sup>22</sup> This variation might be due to the difference in different traffic and safety rules and the nature of the road in the countries.

Concerning to time of the accident in the current study 28 (18.5%) occurred in the morning, 19 (12.6%) in the afternoon, 6(4%) in the evening, and 98 (64.9%) the time of accidents were not stated in patients' medical records which were lower than the study conducted in Mwanza, Tanzania (73.9%) occurred during daytime, 23.9%) at

night. But time of accident not specified in patients chart in our study was very higher than Tanzanian study which was (2.2%),<sup>3</sup> this variation might be due to variation of geographic, climatic conditions, and medical registration system of the study area.

In the present study, motorcycle accidents resulted in 49% of head injury, 29.8% of the lower extremity, and 13% upper extremity. This was different from the study conducted in northeast Brazil Campina Grande in which lower extremities were the major injured part of the body (55.2%),<sup>20</sup> this difference might be due to variation in driving safety usages such as helmet.

In this study age, sex, high speed, and type of road were significantly associated with motorcycle accidents.

In our study being a young age group, 20–29 years is 5.3 times and age group 30–39 years is 3.3 times higher expected to get motorcycle accidents than individual with the age group above 60 years, which is related to the study done in Brazil.<sup>17</sup> Being male was 2 times higher likelihood to acquire motorcycle injuries than females, which is similar to the other study conducted in Brazil.<sup>15</sup> High speed or excessive speeding can lead to a motorcycle accident at (AOR=2.203, 95% CI, 1.-297–4.092), which was related to the studies conducted in south Nigeria<sup>21</sup> and China.<sup>22</sup> As well, being non-asphalted road had a significant association with motorcycle accidents, which was similar to the study done in Australia.<sup>23</sup>

**Table 3** Bivariate and Multivariate Logistic Regression Indicating Factors Associated with Motorcycle Accident Among RTA Patients in Hawassa University Comprehensive Specialized Hospital Hawassa, Ethiopia from January 2018 - January 2019, (N=151)

Variable		An Accident Caused by a Motorcycle		P<0.25	P-value	P<0.05	P-value
		Yes	No	COR (95% CI)		AOR (95% CI)	
Age	< 20	19	27	1.407(0.478–4.147)	0.535	1.946(0.610–6.207)	0.261
	20–29	76	32	4.750(1.753–12.872)	0.002*	5.337(1.843–15.451)	0.002**
	30–39	32	24	2.667(0.933–7.623)	0.067*	3.312(1.086–10.102)	0.035**
	40–49	12	21	1.143(0.361–3.615)	0.820	1.586(0.471–5.342)	0.457
	50–59	5	5	2.00(0.430–9.293)	0.376	2.829(0.563–14.202)	0.207
	>60	7	14	Reference(1)		Reference (1)	
Sex	Male	131	20	2.605(1.412–4.805)	0.002*	1.997(1.030–3.872)	0.041**
	Female	20	131	Reference (1)		Reference (1)	
High speed	Yes	62	31	2.067(1.229–3.479)	0.006*	2.303(1.297–4.092)	0.004**
	No	89	92	Reference(1)		Reference (1)	
Drunk driving	Yes	12	139	4.754(1.037–21.869)	0.045*	2.413(0.479–12.165)	0.286
	No	12	96	Reference(1)		Reference(1)	
Type of road	Non asphaltd	69	30	2.609 (1.549–4.394)	0.000**	2.224(1.269–3.898)	0.005**
	Asphalted	82	93	Reference(1)		Reference(1)	

**Note:** \*p – value < 0.05 on COR, \*\*P- value < 0.05 on AOR.



## Conclusions and Recommendations

Our study required to detect the prevalence and factors associated with the occurrence of motorcycle accidents. Thus, the prevalence of motorcycle accidents in this study was (55.1%), which was the primary cause of road traffic accidents in the study area at the time of the study period. Motorcycle accidents predominantly occurred in the male sex and young age group between 20–29 years. Motorcycle accidents commonly occurred in rural areas.

Age, sex, high speed, type of road (non-asphalted road), and drunk driving were associated with the occurrence of a motorcycle accident in binary logistic regression. And in multivariate analysis, age, sex, high speed, and type of road were significantly associated with a motorcycle accident. Therefore, we expect this research finding can guide the government and other stakeholders to formulate strategies and take action and conduct further research to reduce motorcycle-related accidents.

## Limitations of the Study

This study was a cross-sectional and thus cause and effect relationship between the dependent and independent variables was difficult to establish. The study was conducted by using information from the medical record of the patient (secondary data). The information in medical records of the patients was limited, which cannot measure all casual factors of road traffic accidents.

## Abbreviations

HUCSH, Hawassa University Comprehensive Specialized Hospital; RTA, road traffic accident; WHO, World Health Organization; AOR, adjusted odd ratio; CI, confidence interval; COR, crudes odd ratio.

## Data Sharing Statement

All relevant information was involved in the article.

## Ethical Consideration

Ethical clearance was obtained from Hawassa University College of Medicine and Health Sciences Institutional Review Board (IRB) with Reference number IRB/240/11 on 20/04/2019 and a Letter of cooperation was written by Hawassa University College of Medicine and Health Sciences to the Hawassa University comprehensive specialized hospital and permission were obtained from the hospital to conduct the study on patients' medical records. As well, confidentiality of the patients' information on

their medical records was kept by coding the medical records.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

All the authors declared that they had no competing interests.

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