

## Motorcycle-Related Head and Limbs Injuries from Road Traffic Accident at a Second Level Hospital in Cameroon

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### Abstract

Motorcycles have been increasing used widely in various urban, suburban and villages in Cameroon with an increased in accidents resulting to injuries among the population. Head and limbs injuries are responsible for most of the cases encountered from related crashes. A prospective study on head and limbs injuries resulting from motorcycle crash were assessed among the different cases brought to the casualty and emergency department of the Kumba district hospital. Most of the injured cases were of motorcycle and other vehicle collisions 203 (47.65) and the least among motorcycle lone crash 51 (11.97). Motorcycle to motorcycle collisions accounted for 107 (25.12 %) of the cases. 65 (15.26%) were motorcycle with pedestrians related collision. Stepping up and facilitating the regulations on licenses and the use of personal protective equipment for riders, improvement of roads infrastructures with pedestrian path, expanding health facilities and equipment, and human resources for health as well as empowering the population on road safety measures will be very important for RTAs control measures of the nation.

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## Introduction

Injuries related to road traffic accidents (RTAs) is a significant and increasing public health concern. This is due to the increase in mortality of more than 1.5 million people and above 25 million injured and disabled cases a year from RTAs worldwide [1]. Based on World Health Organization (WHO) estimates, RTAs is projected to be the third leading cause of disease burden in the world by 2030 [2]. The impact on individuals, families and the society is of great concern. This is further complicated in developing countries where commercial motorcycle accidents constitute a greater share of RTAs [3], followed by exponential population growth without the appropriate development of transport infrastructures. In the absence of a well-defined policy and implementation measures that will address these issues, the situation might become worse for the future generation.

The burden of injury from RTAs in low-income countries is on an increase [4-7]. In Cameroon, very few studies have addressed this issue [3, 6, 8-10], most of which have focused mainly on urban areas or cities and its health facilities. Policies and management regarding RTAs can only be effective if there is sufficient documented evidence that addresses its impact on the communities at all levels.

The low cost of purchase and management of motorcycle in Cameroon have encouraged its use for transportation. In addition to the flexible nature of the two wheels to get to many un-accessed areas by car due to bad roads or the unplanned nature of most towns and cities that encourages road traffic congestions. For the past decade in Cameroon, many people prefer to use motorcycles as their means of transportation within the cities, towns and villages and sometimes even long distances to gain time to their destinations leading to the rapid increase in motorcycles and its related RTAs. Motorcycle related accidents have been greatly related to the lack of define policies that regulate the effective use of this means of transportation in the country, coupled with the lack of formal training on road traffic instructions by the riders.

Kumba is one of the largest cities and the headquarters of Meme division in the South West region

of Cameroon. Motorcycles is the major means of transportation both commercially and individually, based on its size and low cost for low income earners within the division. However, some motorcyclists are characterized with over speeding, overloading of passengers, reckless riding and lack of qualified knowledge and legal documents for their operation. Also, most of the riders and passengers, rode their motorcycles without the use of protective equipment (helmet, cover toe shoes, knee and elbow cap protectors, etc), in addition to poor legal regulation, and excessive drinking of alcohol that have further lead to serve injuries during crashes. RTAs due to motorcycle circulation are very common in Kumba as it is the major transportation means to most users, coupled with the large population, bad roads and poor execution of road traffic regulations. In case of a crash, motorcyclists and passengers are more than three times more likely to be injured and above ten times more likely to die if crashed with a car than the car occupants [3]. The prevalence of those who are injured due to motorcycle accidents are mostly associated with the limbs and head injuries [11-14].

Motorcycle riding is consider as one of the most dangerous means of transportation due to the risk involve from direct energy transmission from the motorcycle to riders and or passengers and sometimes absorb kinetic energy during crash. One of the worrisome issue regarding commercial motorcycle usage as a means of transportation in Kumba has been the great involvement of youths and teenagers, some of whom are between the ages of  $\leq 18$  to 40 years, an active economic age in a population associated with most of these accidents. Similar studies have expressed this worry in other countries [15, 16]. Pedestrians both old and young gets involve in the motorcycle accidents when crossing the roads due to absence of traffic lights or road signs or a path for pedestrians. Most of the injured cases are brought to the Kumba district hospital, which is the most equipped at this level of the administrative setting of the nation. Studies have shown that drivers and pedestrian's knowledge on road safety measures are limited in both low and middle income settings [17]. However, emphasis on road safety

education to both drivers and pedestrians maybe an ideal way of preventing road injuries within the region and the nation as a whole.

There is dearth of data on motorcycle related injuries in Cameroon. This study was performed to determine the pattern of motorcycle-related head and limbs injuries and outcomes in patients presented at a second level referral hospital, and provide a baseline line data to policy formulators and others interested in improving road safety measures in the nation.

## Method

This was a hospital based prospective study that began from 1<sup>st</sup> January to 31<sup>st</sup> December 2014 and all patients were followed-up for additional 6 months post-injury. Prior to the study, an administrative and ethical approval was obtained from the hospital management and ethic committees. The study was conducted at the Kumba district hospital, a second level hospital in the South West region of Cameroon. Recent estimated population of Kumba is about 265, 071 inhabitants with motorcycle being the main transportation medium of the area. In this study, we defined motorcycle-related head and limbs injury from RTA as the events in which a motorcycle collided with another means of transportation, pedestrians, architectural obstacle, and the lone fall of the motorcycle. The district hospital is the main health facility of the city and has a capacity of 152 beds. All RTAs and other emergencies cases are brought to the casualty and emergency department (CED) with a 6 bed capacity and could admit cases within 24 hours. Patients of both sexes who had head and limbs injuries from a motorcycle-related crash were included in the study irrespective of their ages.

All patients with inclusion criteria were censored using a pre-designed study proforma that obtained consent from all patients or their guardians. Patients' demographics (age, sex, level of education and occupation), and alcohol consumption within 6 hours prior to the accident, Injury Severity Score (ISS), post-resuscitation Glasgow Coma Scale (GCS), use of protective gears, mode of injury, treatment and outcome of management were collected. Patients were initially managed at the CED and cases requiring further findings and admission were sent to the X-rays and or surgical

departments, run by a radiological technician and a general surgeon respectively. Injuries acquired during interpersonal actions; domestic injuries, self-inflicted injuries, non-motorcycle-related injuries, referral cases, and those who died before reaching the hospital was excluded from the study.

Head and limbs injury severity were graded from mild, moderate and severe using GCS and ISS while outcome was measured as favorable (with good recovery or moderate disability) and unfavorable (with severe disability, persisted vegetative state or death) using Glasgow outcome score (GOS). Outcomes were measured throughout the period of hospitalization and patients were followed up till discharge or death. We use Chi-square test and fisher exact test to determine significant differences between variables and use Statistical Software Package (SPSS) 21.0 to analyze our data. Results were interpreted as significant at p-value < 0.05.

## Results

Of the 474 RTAs received at the CED of the Kumba district hospital in 2014, 426 (89.87%) were motorcycle related and met the inclusion criteria. Out of the 426 cases, 268 (62.91%) were male and 158 (37.09%) female aged 4 to 72 years, with mean age of  $33 \pm 13$  years. All riders were male and a majority of the injured patients 312 (73.24) were within the active productive age of 15 to 44 years (Table 1).

Most of the injured cases were of motorcycle and other vehicle collisions 203 (47.65) and the least among motorcycle lone crash 51 (11.97). Motorcycle to motorcycle collision accounted for 107 (25.12 %) of the cases, while 65 (15.26%) were motorcycle with pedestrians related collision [table 2].

Two hundred and eighty-nine (67.84 %) of the crash victims arrived within the first 8 hours of injury at the CED and 93 (21.83 %) presented within 1 hour, while 44 (10.33 %) reported within 48 hours. Within this period, 179 (42.02 %) of cases showed unconsciousness or present a history of unconsciousness, 32 (7.51 %) of cases had seizures, 22 (5.16 %) presented with rhinorrhea, and 247 (57.98 %) showed a degree of headache.

A total of 268 (62.91 %) has associated injuries

Table 1. Age and gender of motorcycle related injury

Age group (WHO)	Gender		Total N %	p-Value
	Male	Female		
1-14	38	30	68 (15.96)	0.272
15-44	210	102	312 (73.24)	0.131
45-64	12	22	34 (7.98)	0.124
>64	8	4	12 (2.82)	<0.04
	268 (62.91)	158 (37.09)	426	

WHO: World Health Organisation

with 219 (51.42) having injuries on the head and maxillofacial, and 280 (65.73%) and 147 (34.51 %) on both upper and lower limbs respectively. Prior to the accident and injuries of the riders and passengers 366 (85.92) indicated not using personal protective gears with only 60 (14.08) who were found with at least a protective gear (helmet, or steel toe shoe or knee shield, or elbow shield). Also, 92 (37.86%) of the riders agreed alcohol consumption within 6 hours of the crash with 142 (33.33 %) as passengers [Table 3].

A majority 247 (57.98 %) of the patients had mild injuries, 168 (39.44 %) with moderate severity, 11 (2.58 %) severe cases and 4 (0.94 %) dead .The outcomes of patients with associated injuries was, 381 (89.44) having a good recovery and 38 (8.92 %) with complication during hospitalization with moderate recovery, 4 dead and 7 (1.64 %) severe disability [Table 4].

## Discussion

Prominently among the causes of injuries around the world are RTAs [4, 18]. Most developing countries where the roads are unpaved use motorcycles as one of their major means of transportation. However, this means of transportation have accounted for yearly RTA fatalities rate of more than 80 % [19, 10].Cameroon is reported to have as high as more than 30 times road related traffic accidents on similar roads in North America [10, 20]. Most studies performed in Cameroon regarding road traffic accidents have focused on third level health facilities, which are mostly in some major cities of the nation [3, 6, 8-10]. This study is the first attempt to report motorcycle related RTAs at a

peripheral second level hospital of the nation. The numbers of cases reported are low compared to other similar studies [3, 10, 11]. However, this is so because the district and its environs' major transport medium is the use of motorcycle vehicles as opposed to major cities that use multiple means of road transportation.

Among the patients received at the CED, most 312 (73.24 %) were within the active and economically productive ages of between 15-44 years and said to be consistent with other related findings on motorcycle rated injuries [20,21, 22]. This should greatly affect their livelihood and that of their dependents as well as the economy.

Motorcycle with other vehicle collision was the commonest means of accidents in this study 203 (47.65 %), congruent with studies performed in other developing countries [21, 23]. This could have been due to poor road network and lack of proper road signs and training among riders and road users Table 2.

Most of the patients presented at the CED department came within 6 hours of their crash; with others blame their reasons for delay on distances and poor roads accessibility from the side of injury as well as seeking and initial care from the nearest health facility. However, most of the health facilities within the division do not have the competent human resources and equipment to manage head and limb injuries resulting from a crash. It will be important to upgrade some of the health facilities within the division in order to handle such cases as well as other related diseases for a better improvement of the health of the population.

In this study, 366 (85.92%) of the patients did

Table 2. Mechanism of injury among the patients presented at the hospital

Types of collision	Severity			
	Mild	Moderate	Severe	Total N (%)
Motorcycle-other vehicle collision	108	87	8	203 (47.65)
Lone motorcycle crash	20	31	0	51 (11.97)
Motorcycle-motorcycle collision	73	32	2	107 (25.12)
Motorcycle-Pedestrian collision	46	18	1	65 (15.26)

Table 3. Relationship between some selected variables and severity of head and limb injuries

Variables	Severity			Percentage
	Mild	Moderate	Severe	N (%)
Age group				
1-14	32	21	2	55 (12.91)
15-44	142	103	3	248 (58.22)
45-64	59	40	2	101 (23.71)
>64	14	4	4	22 (5.12)
Use of protective gears				
Yes	52	5	3	60 (14.08)
No	266	92	8	366 (85.92)
Licence status of riders				
Licensed	32	9	4	45 (18.52)
unlicensed	116	79	3	198 (81.48)
Alcohol consumption by riders				
Yes	53	36	3	92 (37.86)
No	103	43	5	151 (62.14)
Host status				
Riders	142	93	8	243 (57.04)
Passengers	78	61	2	141 (33.10)
Pedestrians	27	14	1	42 (9.86)

Table 4. Injury severity score and outcomes with patients associated with injuries frequencies

Glasgow	severity			Total
	Mild	Moderate	Severe	N (%)
Outcomes score				
Good recovery	231	150	0	381 (89.44)
Moderate	16	18	0	38 (8.92)
Severe disability	0	1	7	3 (0.70)
Dead	0	0	4	4 (0.94)



not use personal protective gears (helmets, boots, knee and elbow shield, wind glasses or goggles etc) were more vulnerable to sustaining injuries and or associated injuries once victimized. Studies have shown the reduction of risk associated with motorcycle related crash incidences when personal protective gears are used [24, 25]. Also, 193 (79.42 %) of the motorcyclists had no riding licenses, most 178 (92.23 %) of who were operating on commercial bases. In the absence of a license means most of the riders had no training and may not have the necessary acquaintance with the driving code of the nation, which broaden their chances for RTA.

Motorcycle and pedestrians collision accounted for 42 (9.86%) cases. Although, this value is lower than a similar study performed in a neighboring country [ 26], most towns and cities in Cameroon lack separate pathways for pedestrians and other means of transportation living the pedestrians at higher risk of injuries resulting from RTAs.

There was a lack of equipment to measure blood alcohol levels among injured patients that visited the CED, however, 92 (37.86 %) of participants reported alcohol consumption within the time of their crash. This value is higher than similar studies performed within the region [20]. Alcohol, which is one of the most consumed products in Cameroon communities, may have a greater role in motorcycle crash and injuries.

Head and limbs injuries were associated with other body parts in this study. A statistically significant relationship between injury severity score among the injured with associated injuries and outcome was observed at  $p < 0.05$ . Some of these associated injuries were mostly the facio-maxillary, the thoracic, abdominal cavities and the waist areas. Motorcyclists and their occupants are more vulnerable to multiple injuries as they are unprotected unlike their motor vehicle counterpart. About 172 (40.37 %) and 11 (2.58 %) of patients experienced associated injuries ranging from moderate to severe severity respectively.

Age was a significant factor ( $p < 0.05$ ) in head and limbs injuries outcome with the elderly patients expressing severed outcomes. Similar studies have expressed age as an independent factor of outcomes in motorcycle RTAs [25, 27]. It is arguably emphasize that

younger individuals do better in recovery from injuries than the elderly. This was noticed, as most of the quickly recovered cases were mostly the younger patients.

### Limitation

This study did not include patient's information that died before arriving the hospital or were referred upon arrival at the CED; also, an autopsy was not performed on the exact cause of the death cases after admission. Therefore, this study did not give the exact figures of the mortality rate from motorcycle related RTAs within this period referred to the hospital.

### Conclusion

Our study confirmed that motorcycle and other vehicle collision constituted the most common cause of head and limbs injuries received at the CED of the Kumba district hospital. In addition, variables such as the age, head and limbs severity and associated injuries were significant in affecting the outcome. Intensifying regulations on licences and the use of personal protective equipment for riders, improvement of roads infrastructures with pedestrian path, expanding health facilities and equipment, and human resources for health as well as empowering the population on road safety measures will be very important for RTAs control measures of the nation.

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### Competing Interest

All others read and declared that they have no competing interest

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