Original Article

Motorcycle Extremity Injuries in South-East Nigeria: A Multicenter Study

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Abstract

Background: Motorcycle extremity injuries are an important public health concern in developing countries though under-reported. This study aimed to determine the pattern of motorcycle extremity injuries and identify the potential areas to facilitate preventive strategies and improved outcomes. **Patients and Methods:** This was a prospective study of all the patients with motorcycle injuries that visited emergency rooms of three Nigerian tertiary hospitals from February 1, 2015, to July 31, 2016. **Results:** Of the 587 patients with motorcycle injuries, 393 (67%) of them sustained extremity injuries. The male: female ratio was 2.3:1; the age range was 1.25–80 years with a mean of 30 ± 14 years. Motorcycle collisions with motor vehicles were the topmost mechanism of injury. The lower extremity was the most common site involved. Fractures, abrasions and lacerations were the three top injuries sustained. One hundred and seventeen (29.8%) of them were multiply injured patients. Traumatic brain injury (TBI) (23.7%) was the most common associated injury. None of the victims wore a crash helmet or extremity protective gear at the time of injury. The mean injury-hospital arrival interval was 84 h and delayed presentation to the hospital correlated with the presence of extremity fractures. The mortality rate was 2%, and TBI was involved in 87.5% of the mortalities. **Conclusion:** In this study, extremity injury is an important component of injury associated with motorcycle road traffic accidents. This calls for preventive strategies based on the observed pattern, and the use of extremity protective gear by motorcyclist

Keywords: Extremities, injuries, motorcycle, multicenter, Nigeria

Introduction

Motorcycle injuries are an important component of morbidity associated with road traffic injuries, a neglected epidemic in developing countries.[1] Motorcycle, a two-wheeled motorized vehicle, known as Okada in Nigeria local parlance is a popular mode of transport in developing countries despite the high prevalence of road traffic injuries and the myriad of challenges associated with its use.[2] Previously published reports indicate a high vulnerability of motorcycle riders and passengers as well as pedestrians to motorcycle-related road traffic injuries of varying degrees of severity.[2,3] These reports also indicate that the extremities are the most vulnerable anatomical region of the body involved in motorcycle injuries.[2-6] In addition, extremity injury is the most important cause of morbidity and prolonged length of hospital stay among patients with motorcycle injury.[7] This entails a significant economic and financial cost that also compounds the injury burden in low- and middle-income countries.[8]

Motorcycles are open vehicles without any restraining safety device. Thus, in the event of a collision, the occupants are usually thrown off the vehicle and more often than not sustain injury from the impact with the ground. Fall from a motorcycle in transit or prior to a crash, direct impact with another vehicle during a collision, entrapment of the extremities in motorcycle wheel spokes, and burns from exhaust pipes are other mechanisms of injury to the occupants.[4,5,9] A pedestrian hit by a motorcycle is also at risk of extremity injuries as a result of the collision. Motorcycle extremity injury ranging from minor to limb or life-threatening ones may occur as an isolated

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injury limited to the extremities or as a component of injury in a polytraumatized victim.[4] The motorcycle crash morphology and mechanisms of injury and pericrash behavior vary in distribution from and within countries and have implications on the pattern and outcome of the injury.[2-5,10] Therefore, detailed information on the mechanisms and pattern of motorcycle extremity injuries in a given setting can facilitate preventive strategies and measures aimed at optimum care of the victims.

However, despite numerous published reports on motorcycle injuries,[2,3,5,6,11,12] the ones that focused on extremity injuries are very scanty.[4,13] This underscores the importance of this multicentre study aimed to determine the pattern of extremity injuries among the victims of motorcycle crashes seen in three tertiary hospitals in Nigeria and identify the potential areas for preventive measures and intervention for improved outcomes.

Patients and Methods

This was a multicenter prospective study of all the patients with motorcycle extremity injuries seen at the accident and emergency department of three Nigerian tertiary hospitals, Federal Teaching Hospital Abakaliki Ebonyi State, National Orthopedic Hospital Enugu and University of Nigeria Teaching Hospital Ituku-Ozala from February 1, 2015, to July 31, 2016. These three centers serve the South-East, South-South, and part of the North-Central geopolitical zones of Nigeria.

The ethics and research committee of the hospitals approved the study protocol. Resident doctors in each of these three centers with an informed consent of the patients collected data from them as soon as they were admitted to the hospital's accident and emergency department.

Inclusion criteria

Occupants of a motorcycle (involved in road traffic crash) with extremity injuries and pedestrians with extremity injury from a collision with motorcycle were included in the study.

Exclusion criteria

Occupants of bicycles and other types of motor vehicles that collided with a motorcycle.

Data collected on a pro forma included demographic characteristics of road user category, injury host status, number of occupants, type of road where the collision occurred, time and type of collision, type and anatomical sites of injuries, helmet and extremity protective gear use, prehospital care, the duration between injury and presentation to the hospital and trauma score parameters. The patients were categorized according to their placement (after resuscitation and treatment in the emergency room) into one of the following, admitted (directly or via intensive care unit) into the ward as an inpatient, discharged from the emergency room to an outpatient clinic, transferred/referred to another tertiary center, self-discharge against medical advice (DAMA), and dead. The patients were followed up for mortality within 30 days of the injury. Data collected also included the reason for DAMA, the duration of time between injury and death, and the duration of hospitalization at the time of death.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20 (SPSS Chicago IL, USA) statistical software. Data were entered into SPSS, and descriptive statistics were presented in tables and graphs. The Chi-square test was used for the analysis of categorical data, and statistical significance was set at $P < 0.05$.

Results

Within the study period, there were 587 patients with motorcycle injuries seen in the accident and emergency departments and 393 (67%) of them had 616 extremity injuries. Among these patients with injuries involving the extremities, 180 (45.8%) and 165 (42%) were motorcycle riders and passengers, respectively, whereas 48 (12.2%) were pedestrians that were hit by a motorcycle giving a rider, passenger, and pedestrian ratio of 3.8:3.3:1. The male-to-female ratio is 2.3:1, and the age range was 1.25–80 years with a mean of 30.6 ± 14.1 years. The prevalence of extremity injuries among the riders, passengers, and pedestrians were highest ($P < 0.001$) in young adults, children, and elderly populations, as shown in Table 1. The prevalence of extremity injury among the passengers and pedestrians was higher in females, whereas among the riders, the prevalence was higher in males ($P < 0.001$), as shown in Table l. The three top occupations involved were students, traders, and commercial motorcyclists, as also shown in Table 1.

The three most common mechanisms of injury were motorcycle collision with ≥4-wheel motor vehicle, motorcycle, and lone collision, as shown in Table 2. Majority of lone collisions (47, 71.2%) resulted from a motorcycle that veered off the road and crashed into a ditch when the rider lost control of it. Other causes of a lone collision were over speeding (6, 9.1%), road blocks and barriers (5, 7.6%), burst tyre (2, 3.0%), slippery sandy terrain (2, 3.0%), sudden application of break at top speed (2, 3.0%), break failure (1, 1.5%), and crash in an attempt to avoid collision with animals (1, 1.5%). With respect to the site of the accident, 317 (80.7%) patients sustained an injury on intra-city roads, whereas 76 (19.3%) patients sustained theirs on intercity roads. With respect to the time of the accident, 287 (73.0%) of the patients sustained their injury in the day time, whereas 106 (23.0%) of them sustained theirs in the night time. The incidence of injuries from motorcycle collisions rose from 6 to 11:59 p.m. to a peak of 12–5:59 p.m. The peak period of incidence for all collision-related injury was the same 12:00 p.m.–5:59 p.m., whereas the peak period for fall from a motorcycle in transit was 6:00 a.m. to 11:59 a.m., as shown in Figure 1.

The involvement of upper and lower extremities was significantly higher among passengers than riders and pedestrians (50% vs. 16.7 and 17.3% $P < 0.038$) whereas the incidence of upper extremity injury is higher among riders than passengers, as shown in Table 3.The prevalence of extremity injury as the component of multiple injuries was 29.8%, and the riders compared to passengers and pedestrian were more

Table 1: Riders, passengers and pedestrians by sociodemographic characteristics

Population characteristics	Riders (%)	Passengers (%)	Pedestrian (%)	Total (%)	*P*
Age					
0-17	4 (8.7)	20 (43.5)	22 (47.8)	46 (11.7)	0.001
18-39	142 (53.4)	109 (41.0)	15 (5.6)	266 (67.7)	
40-65	31 (43.1)	31 (43.1)	10 (13.9)	72 (18.3)	
>65	3 (33.3)	5 (55.6)	1 (11.1)	6 (2.3)	
Sex					
Male	164 (60.1)	86 (31.5)	23 (8.4)	273 (69.5)	0.001
Female	16 (13.3)	79 (65.8)	25 (20.8)	120 (30.5)	
Occupation					
Students/pupils	30 (26.4)	62 (52.5)	26 (22.0)	118 (30.6)	0.001
Traders	34 (42.5)	40 (50)	6 (7.5)	80 (20.4)	
Commercial motor cyclist/drivers	52 (92.9)	4 (7.1)	0 (0.0)	56 (14.2)	
Farmers	18 (39.1)	23 (50.0)	5 (10.9)	49 (11.7)	
Artisans	18 (60.0)	12 (40.0)	0 (0.0)	30 (7.61)	
Civil servants	7 (38.9)	7 (38.9)	4 (22.2)	18 (4.6)	
Police/army/security agents	9 (64.3)	4 (28.6)	1 (7.1)	14 (3.6)	
Unemployed school leavers/graduates	3 (37.5)	4 (50.0)	1 (12.5)	8 (2.0)	
Teachers	3 (42.9)	1 (14.3)	3 (42.9)	7 (1.8)	
House wives	0 (0.0)	4 (66.7)	2 (33.3)	6 (1.5)	
Health workers	2 (66.7)	1 (33.3)	0 (0.0)	3 (0.8)	
Clergy	2 (100)	0 (0.0)	0 (0.0)	2 (0.5)	
Lawyers	0 (0.0)	2 (100)	0 (0.0)	2 (0.5)	
Accountant/banker	1 (50.0)	1 (50.0)	0 (0.0)	1 (0.5)	
Engineer	1 (0.0)	0 (0.0)	0 (0.0)	1 (0.3)	

Table 2: Distribution of the extremity injuries by road type and crash morphology and mechanism of injury

Crash morphology/mechanism of injury	Inter city road (%)	Intra city road (%)	Total (%)
Collision related mechanism of injury			
Motorcycle – ≥4 wheel motor vehicle collision	36 (21.3)	133 (78.7)	169 (43.0)
Motorcycle – motorcycle collision	13 (15.7)	70 (84.3)	83 (21.1)
Motorcycle – auto tricycle collision	1 (6.3)	15 (4.7)	16 (4.1)
Motorcycle –bicycle collision	0 (0.0)	2 (100)	2 (0.5)
Motorcycle – pedestrian collision	7 (15.7)	37 (84.1)	44 (11.2)
Motorcycle lone collision	17 (25.8)	48 (74.2)	66 (16.8)
Noncollision related mechanism of injury			
Fall from motorcycle in transit	1 (16.7)	5 (83.3)	6 (1.5)
Entrapment of extremity in wheel spoke	1 (14.3)	6 (85.7)	7 (1.8)

χ^2=5.590, df=7, *P*=0.588

likely to be polytraumatized (59.0% vs. 30.8 and 10.3%, $P < 0.003$), as shown in Table 3. Of the 616 injuries sustained, fractures, bruises/contusion and lacerations were the three most common types of injuries as also shown in Table 3. The three top associated injuries were traumatic brain injury (TBI) maxillofacial and chest injuries; the incidence of head injury was significantly higher among the riders than passengers and pedestrians as also shown in Table 3. The incidence of associated TBI correlated ($P = 0.033$) with the type of extremity involved, it was 32.7%, 22%, and 16.2% among the victims that sustained upper, lower, and both extremities injuries, respectively. Fractures, dislocations, and bruises/contusions were the most common bone, joint, and soft-tissue injury, respectively, as shown in Table 4. The three most commonly fractured bones were tibia, fibula, and femur, whereas the three top joints dislocated were ankle, hip, and shoulder, as shown in Figure 2. The leg was the most common site for bruise abrasion and laceration, whereas the foot was the most common site of avulsion injury as shown in Figure 3.

The mean and median injury – hospital arrival interval was 82.2 h and 1.5 h, respectively. Injury to hospital interval correlated ($P < 0.001$) with the type of injury sustained by the patient as shown in Table 5. The rate of presentation to the hospital in the first 6 h of injury was significantly higher among patients with soft-tissue injuries only and dislocations only compared to those that had only fractures (86% and 80% vs. 60.4%. $P < 0.001$), as also shown in Table 5. The rate of delayed

Table 3: Riders, passengers and pedestrian by type of extremity, mode of presentation and associated injury

Extremity/mode of presentation/associated injuries	Riders (%)	Passengers (%)	Pedestrian (%)	Total (%)	*P*
Extremity					
Upper	52 (53.1)	39 (39.8)	7 (7.1)	98 (24.9)	0.038
Lower	98 (43.2)	92 (40.5)	37 (16.3)	227 (57.8)	
Upper and lower	30 (16.7)	34 (50.0)	4 (5.9)	68 (17.3)	
Mode of presentation					
Isolated extremity injury	111 (40.2)	129 (46.7)	36 (13.6)	276 (70.2)	0.003
Component of multiple injuries	69 (59.0)	36 (30.8)	12 (10.3)	117 (29.8)	
Associated injuries					
Traumatic brain injury					
Yes	53 (57.0)	28 (30.0)	12 (12.9)	93 (23.7)	0.024
No	127 (42.3)	36 (12.0)	137 (45.7)	300 (76.3)	
Maxillofacial injury					
Yes	19 (65.5)	8 (27.6)	2 (6.9)	29 (7.4)	0.085
No	161 (44.2)	157 (43.1)	46 (12.6)	364 (92.6)	
Chest injury					
Yes	16 (69.6)	6 (26.1)	1 (4.3)	23 (5.9)	0.057
No	164 (44.3)	159 (43.0)	47 (12.7)	370 (94.1)	
Abdominal injury					
Yes	5 (100)	0 (0.0)	0 (0.0)	5 (1.3)	0.050
No	175 (45.1)	165 (42.5)	48 (12.4)	388 (98.7)	
Spinal injury					
Yes	2 (100)	0 (0.0)	0 (0.0)	2 (0.5)	0.304
No	178 (45.5)	165 (42.3)	48 (12.3)	391 (99.5)	

Table 4: Distribution of 616 extremity injuries by riders, passengers and pedestrian

Type of extremity injury	Riders	Passengers	Pedestrian	Total (%)
Bones				
Close fracture	63	56	17	136 (22.1)
Open fracture	30	25	5	60 (9.7)
Joints				
Dislocation	7	6	3	15 (2.4)
Sprain	2	1	2	5 (0.8)
Soft tissues				
Bruises/ contusion	76	68	24	168 (27.3)
Abrasions/ friction burns	20	21	1	42 (6.8)
Lacerations	66	57	10	133 (21.6)
Avulsion injury	11	20	1	32 (5.2)
Crush injury	6	5	0	11 (1.8)
Neurovascular				
Nerve injury	2	0	0	2 (0.3)
Vascular injury	3	1	1	5 (0.8)
Traumatic amputation	5	2	0	7 (1.1)

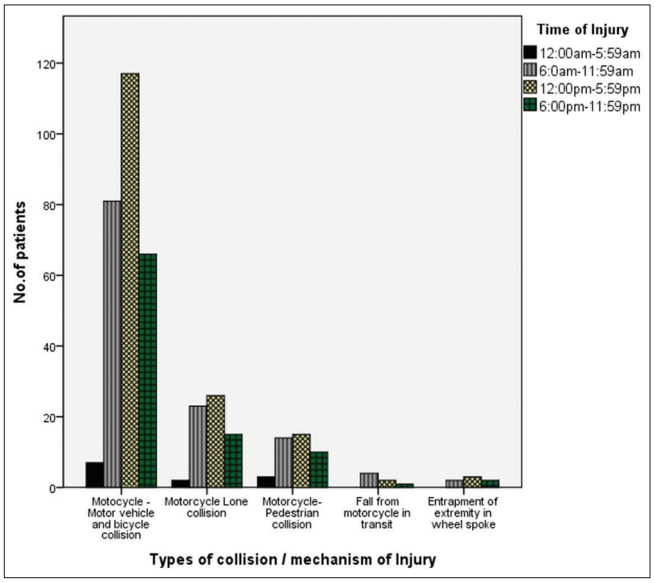
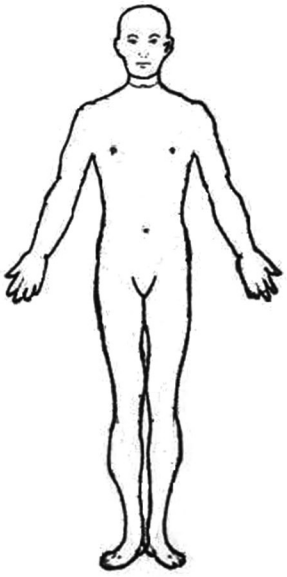


Figure 1: Motorcycle extremity injury by type of collision/mechanism and time of injury

presentation to the hospital later than 24 h was significantly higher among patients that sustained only fracture, as also shown in Table 5. Nineteen out of the 173 (11%) patients with fractures sought care from a traditional bonesetter (TBS) prior to presentation to the hospital. Seventeen of the 21 (81%) of patients that sought TBS care presented later than 24 h. Patients with fracture only, fracture/soft tissue, and soft tissue accounted for 16 (76.2%), 3 (14.3%) and 2 (9.5%) of the entire visit to TBS prior to the presentation to the hospital.

There was no pre-hospital care for 286 (72.8%) of the patients. The means of transportation of victims to the hospital were car (265, 67.4%) auto tricycle (65, 16.5%), motorcycle (25, 6.4%), van (14, 3.6%), bus (13, 3.3%), jeep (2, 0.5%), hospital ambulance (1, 0.3%), and others (19, 2.1). None

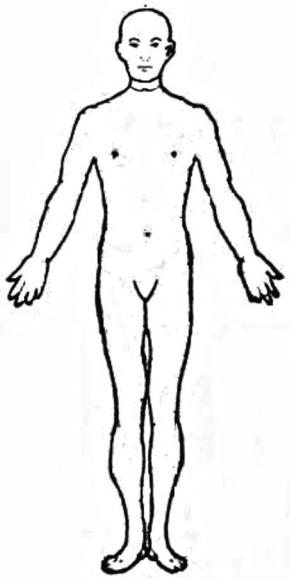
Bone	Fracture		Total (%)
	Close	Open	
Clavicle	14	0	14 (7.1)
Scapula	1	0	1 (0.5)
Humerus	8	1	9 (4.6)
Radius & ulna	9	3	12 (6.1)
Radius	4	0	4 (2.0)
Ulna	2	0	2 (1.0)
Scaphoid	1	0	1(0.5)
Metacarpal	3	0	3(1.5)
Pelvis	18	0	18 (9.2)
Femur	35	9	44 (22.5)
Patella	2	2	4 (2.0)
Tibia &fibula	20	30	50 (25.5)
Tibia	13	8	21 (10.7)
Fibula	6	1	7 (3.6)
Calcaenus	1	0	1 (0.05)
Metatarsal	0	4	4 (2.0)
Toe phallanx	0	1	1 (0.5)



Joint	Dislocation (%)	Sprain(%)
Shoulder	3 (20)	0 (0.0)
Elbow	1 (6.7)	0 (0.0)
Wrist	1 (6.7)	0 (0.0)
Hip	3 (20.0)	0 (0.0)
Knee	0 (0.0)	1 (16.7)
Ankle	6 (40.0)	5 (83.3)
Foot	1 (6.7)	0 (0.0)

Figure 2: Distribution of extremity bone and joint injuries by type and anatomical site

SITE	Abrasions	Bruises
Shoulder	2	13
Arm	5	11
Elbow	1	11
Forearm	6	16
Wrist	2	4
Hand	5	18
Hip	0	5
Thigh	6	13
Knee	3	16
Leg	8	38
Ankle	2	9
Foot	2	14
Total	42	168



Laceration	Avulsion	Crush	Total(%)
4	0	0	19 (4.9)
6	0	0	22 (5.7)
6	0	0	18 (4.7)
13	3	0	38 (9.9)
2	0	0	8 (2.1)
9	2	1	35 (9.1)
2	1	0	8 (2.1)
5	1	1	26 (6.7)
8	2	0	29 (7.5)
40	2	5	93 (24.1)
6	2	0	19 (4.9)
32	19	4	71 (18.4)
133	32	11	386 (100)

Figure 3: Distribution of extremity soft tissue injuries by type and anatomical site

of the victims was wearing a crash helmet, high boots, and extremity protective gear at the time of the crash with the motorcycle.

Eight patients died, giving a 30-day mortality rate of 2%. All the patients that died presented to the hospital within the first 6 h of injury with a mean injury to hospital arrival interval of 1 h 15 min. The duration of hospital admission at the time of death was < 1 h in 25% (2/8), 1–6 h in 50% (4/8), 7–24 h in 12.5% (1/8) and > 24 h–6 days in 12.5% (1/8) among the patient that died. Of the 8 patients that died, 5 (62.5%), 2 (25%) and 1 (12.5%) of them were motorcycle riders, pedestrians and passengers respectively. Seven (87.5%) of the patients that died were multiply injured and all had severe TBI whereas one of the mortalities was due to septic shock that complicated an isolated extremity crush injury. Hypovolemic shock was involved in the death of two patients, one with pelvic fracture, TBI and maxillofacial injuries; the other with a femur fracture, head and abdominal injury. Of the 385 survivors (98%), 183 (47.5%) were treated in the emergency room and discharged, 176 (45.7%) were admitted and treated in the surgical ward and discharged, 2 (0.5%) were transferred/referred, and 24 (6.2%) discharged self against medical advice.

Table 5: Distribution of the patients by injury sustained and injury to hospital arrival interval

Injury sustained	Time interval, *n* (%)			
	0-6 h	7-24 h	>24 h	Total
Fracture/dislocation	4 (80.0)	1 (20.0)	0	5 (1.3)
Soft tissues/fractures	41 (71.9)	7 (12.5)	9 (15.8)	57 (14.5)
Fracture only	67 (60.4)	12 (10.8)	32 (28.8)	111 (28.2)
Dislocation only	5 (83.3)	0	1 (16.7)	6 (1.5)
Soft tissues only	184 (86.0)	14 (6.5)	16 (7.5)	214 (54.5)
Total	301 (76.6)	34 (8.7)	58 (14.8)	393 (100)

χ^2=33.69, df=8, P<0.001

Discussion

In this study, the involvement of the extremities in over two-third of patients with motorcycle injuries, is similar to the findings in previously published studies[2-6,13] and indicates that the extremity is the most vulnerable anatomical region affected in motorcycle crashes. The male-to-female ratio and the mean age in this study is close to 2.8:1 and 30 years, respectively, reported by Oluwadiya *et al*. in Ife South-west Nigeria.[4] The negative socio-economic impact resulting from the involvement of a predominantly young and active male population is an additional burden to the morbidity of motorcycle extremity injuries. The rider passenger pedestrian ratio of 3.8:3–3:1 and 13% of the riders that are females in this study is quite different from 1.85:1.6:1 and 0% of females among the riders with motorcycle limb injuries reported by Oluwadiya *et al*. almost two decades ago when the commercial motorcycle was an emerging means of transportation in South-west Nigeria.[4] In this setting, the use of commercial motorcycle as a means of transport was at its peak in the period of the study, and female riders are common, especially in the rural areas. This is a plausible explanation for these differences observed. The occupational distribution of the patients in this study is a reflection of the predominance of the low socioeconomic class in the use of motorcycle as a means of transport in developing countries that have been well documented in previously published reports.[2,4]

The result of this study indicates that extremity injury is most prevalent in motorcycle versus motor vehicle collisions; a finding similar to the ones reported by Oluwadiya *et al*. in South-west Nigeria and Lateef Fatimah in Singapore.[4,14] The exact reason for the predominance of motorcycle – motor vehicular collisions in the mechanism of extremity injury is not evident in this study. The use of motorcycles mainly on intracity roads by students, traders and others commuting to and fro the school, market and places of work during the day perhaps explains the predominance of collisions and extremity injuries on intracity roads and during the day time.

In this study, the lower extremity, the site of more than half of the injuries, was the topmost anatomical region involved and this is also similar to the findings in previously published reports.[4,12-16] The very high vulnerability of lower extremity to motorcycle injuries has been attributed to the squeezing of the lower extremity of the occupants between the motorcycles and impacting vehicle, object or ground, and the direct impact on the lower extremity in motorcycle pedestrian collisions.[14,15] The use of high boot and impact protective gear has been shown by Otte *et al*. to reduce the incidence and severity of lower extremity injuries in motorcycle crash.[17] However, in this study none of the riders wore protective gear at the time of injury. This is an identified area of intervention to reduce the incidence and severity of motorcycle extremity injuries, and it calls for public enlightenment on the importance of protective devices in secondary injury prevention.

In this study, TBI is the topmost associated injury, and this is close to 27.8% reported by Oluwadiya *et al*., and quite different from 53% reported by Cawich *et al*. in Jamaica.[15] The rate of associated TBI that was significantly less in those with lower extremity injuries compared to those with upper extremity injuries is consistent with the rarity of TBI (0.5%) among the victims (all with crash helmets) with lower extremity injury reported by Lateef in Singapore.[14]

The three top fractured bones in this study are also similar to tibia, fibula and femur reported by Oluwadiya *et al*. but differs from tibia, fibula and radius reported by Cawich *et al*. in Jamaica, and leg, hand and wrist fractures by Batista *et al*. in Brazil.[15,18] The exact reasons for the differences in the distribution of fractures by bone in reports from Nigeria, Jamaica and Brazil are not evident. The anatomic location of leg and foot, forearm and hand is such that the regions are more exposed to absorption of energy in the event of collisions; this perhaps explains the predominance of soft tissue injuries observed in these sites.

In the settings of this study, patronage of traditional bone setters by patients with a musculoskeletal injury especially fractures is common, and delays in decisions to seek orthodox care for fractures as well as visits to TBS prior to presentation influence the injury hospital arrival interval.[19] This perhaps explains delayed presentation to the hospital that significantly correlated with the presence of fracture among the patients.

The mortality rate observed in this study is comparable to the rates in other published reports.[4,15] However, one case of mortality from isolated extremity crush injury complicated by septic shock in this study is quite different from multiple injuries that accounted for all the mortalities reported from Jamaica by Cawich *et al*.[15] The involvement of TBI in over 85% of those that died and the none use of crash helmet by all the victims (including the law enforcement agents among them) at the time of injury is a serious secondary injury prevention concern that calls for re-orientation and enforcement of already existing laws on the use of crash helmet by motorcycle riders and passengers.

The strength of this study is in being a multicenter and prospective one. The limitation is it being a hospital-based study and may not be a representation of the entire population

of motorcycle extremity injury: fatal and nonfatal injuries that did not present to the hospital were not captured in the study.

Conclusion

Motorcycle injuries, occur predominantly from motorcycle-motor vehicle collisions, and are more prevalent in young males and in the lower extremities. Extremity injuries of varying degrees of severity, from bruises to traumatic amputation were observed. This calls for preventive measures based on the observed pattern, and the use of extremity protective gears by motorcyclist.

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Conflicts of interest

There are no conflicts of interest.

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