

Pattern of neurologic, orthopaedic and soft tissue injuries sustained in commercial motorcycle accidents in Kano metropolis

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Abstract

Injuries resulting from commercial motorcycle accidents (CMAs) may produce disabilities that could lead to the loss of productivity among Nigerians. This one-year retrospective descriptive study assessed the pattern of neurologic, orthopaedic and soft tissue injuries sustained in CMAs in Kano metropolis. The study was conducted in 5 secondary level hospitals. A data capture form was used to record the socio-demographic characteristics of victims, types of injuries, accident dates and roles of accident victims from case files. The data collected were analyzed with descriptive statistics and illustrated with tables and figures using the Statistical Package for Social Sciences (SPSS) version 16.

There were 37260 cases of road traffic accidents out of which 17388 were CMAs giving a prevalence of 46.7% and the accident rate of 2 cases per hour in Kano metropolis. The majority of CMA victims were motorcycle drivers (49.8%, n=8653) aged between 20 – 39 years (55.4%, n=9635) and most of them were males (71.8%, n=12493). Orthopaedic injuries were more common (42.7%, n=7427) than neurologic injuries (34.8%, n=6050). Head injuries were more common among commercial motorcycle drivers (47.3%, n=2154) while spinal cord injuries were more frequently observed among pillion passengers (62%, n=930).

There was a high prevalence of CMA-related injuries in Kano and young people were mostly involved. With the current ban on commercial motorcycle activity in Kano metropolis since January 24, 2013 (for safety and security reasons), most of the affected young individuals now drive commercial tricycles within the city and many of them moved to villages. The authorities should take proactive measures to prevent fatal motorcycle crashes in villages.

Key words: motorcycle, accidents, injury, Kano metropolis

Introduction

Commercial motorcycle is a popular mode of transportation in most Nigerian cities and suburban areas. The dwindling Nigerian economy has led to increased use of motorcycles for commercial purposes as it provides cheap employment for many unemployed young individuals [1] and improves inadequate public transportation to serve rural and suburban communities [2]. The transport industry plays a crucial role in the economy of any nation [3]. The contribution of commercial motorcyclists to this industry in Nigeria is tremendous in the cities as they enter the nooks and crannies which

are not accessible to taxis and buses. The popularity of this means of transportation was however been marred by a rapid increase in the incidence of fatal crashes resulting in severe health and economic consequences. The majority of victims suffered casualty and accident-related costs as well as costs associated with loss of productivity [4]. Therefore, injuries due to road traffic accidents are a major public health concern worldwide.

Injuries from commercial motorcycle accidents (CMAs) increase the rates of morbidity and mortality among Nigerians [5] with most survivors sustaining varying degrees of physical deformities [6].

Injuries from CMAs range from abrasions, cuts, dislocations, skeletal fractures, spinal cord injuries to severe head injuries, sometimes with the loss of consciousness [1, 5, 6, 7, 8]. According to research findings, the prevalence of commercial motorcycle-related injuries in Nigeria ranges from 11.6% to 45.3% [1, 2, 7, 9]. Drivers and passengers of commercial motorcycles are less protected from injuries resulting from accidents when compared with drivers and passengers of cars and motor vehicles [10] because cars have special physical structures around drivers and passengers that offer some protection, while the only protection for those on motorcycles is to avert an accident [6]. Motorcyclists are therefore vulnerable road users [9].

The common causes of CMAs include speeding and reckless driving in an effort to avert traffic delay [11, 12], young age of motorcyclists and alcohol use [1, 5] followed by overload of pillion passengers and inadequate training of commercial motorcycle drivers [11,5]. According to most studies, the majority of CMA victims were not wearing their crash helmets at the time of the accident [2, 7, 8].

Kano is the most populous city in Nigeria with over 2 million commercial motorcycle drivers. Our study carried out in this city is the first attempt to evaluate the pattern of neurological, orthopaedic and soft tissue injuries associated with CMAs and to provide data for clinical and academic purposes. Furthermore, most studies conducted in this area have reported only on spatial characteristics of CMAs such as the nature of injuries, age groups at risk and various factors responsible for accidents. The present study, assessed spatial characteristics as well as temporal characteristics of crashes, such as the frequency of motorcycle accidents per hour, in order to highlight how fast the injuries are sustained in commercial motorcycle crashes and how often the precious man power is lost due to mortality and morbidity associated with such crashes.

Materials and Methods

The study was conducted in 2010 before the abolishment of commercial motorcycle business within Kano metropolis by the Government of Kano State on January 24, 2013. A 12-month retrospective descriptive survey was carried out in some selected secondary hospitals in Kano metropolis between October 1, 2009 and September 31, 2010 and focused on neurologic, orthopaedic and soft tissue injuries sustained in CMAs. Data were collected in the Mohammed Abdullahi Wase Specialist Hospital, Kano, National Orthopaedic Hospital, Dala-Kano, Murtala Mohammed Specialist Hospital, Kano, Sheik Muhammad Jidda specialist hospital and Sir Muhammad Sanusi Specialist Hospital. The cases of commercial motorcycle drivers, pillion passengers and pedestrians who sustained injuries in CMAs were carefully reviewed.

Data collection

The introductory letters from the head of the department of physiology Bayero University, Kano were taken to the management of each of the selected hospitals where consent to conduct the study was sought and obtained. In each of the selected hospitals, the case files of victims of road traffic accidents that occurred between October, 2009 and September, 2010 were collected from the health record units and carefully sorted out. The socio-demographic characteristics of CMA victims, total number of motorcycle accidents per month, roles of victims in accidents (driver, passenger or pedestrian) and types of injuries sustained were carefully recorded in a data capture form.

The frequency of CMAs was calculated using the following formulae:

$$\text{Accidents per month} = \frac{\text{Total number of accidents per annum}}{(12 \text{ months})}$$

$$\text{Accidents per day} = \frac{\text{Total number of accidents per month}}{(\text{Average number of days in a month} - 30)^*}$$

$$\text{Accidents per hour} = \frac{\text{Total number of accidents per day}}{(24 \text{ hours})}$$

* The average number of days in a month was obtained from $365/12=30.4$ days. Approximately 30 days. The calendar year was not a leap year

Data analysis

The collected data were analyzed with descriptive statistics of frequency and percentage and illustrated with tables and figures using Statistical Package for Social Sciences (SPSS) version 16.

Results

There total number of road traffic accidents recorded during the 1-year study period was 37260, out of which 17388 were CMAs, representing a prevalence of 46.67%. The monthly CMA number was 1449, giving the average of 48.3 accidents per day and 2 accidents per hour. The CMAs included car-to-motorcycle hits (30.5% , n=5305), head-on collisions with a car (17.4% , n=3026), head-on collisions with another motorcycle (17%, n=2956), collisions with a pedestrian (13.2%, (n=2293), collisions with objects kept by the roadside (6.9%, n=1200) and single motorcycle crashes (15%, n= 2608).

The majority of CMA victims were males (12493,71.8%) and the male-to-female ratio was 2.5:1. The individuals aged 20-39 years (9635, 55.4%) (Fig. 1) and commercial motorcycle drivers (8653, 49.76%) constituted the majority of CMA victims (Fig. 2).

In our study, skeletal fractures involved orthopaedic injuries; neurologic injuries consisted of head and spinal cord injuries while abrasions, lacerations, deep cuts and sprains were considered soft tissue injuries. The orthopaedic and neurologic injuries were found to be most commonly associated with CMAs in Kano metropolis; their frequency was 42.7% (7427) and 34.8% (6050), respectively as presented in Figure 3.

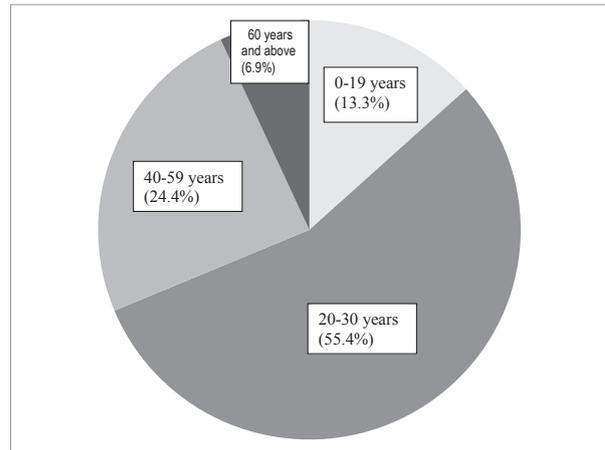


Figure 1. Distribution of CMA victims according to their age category

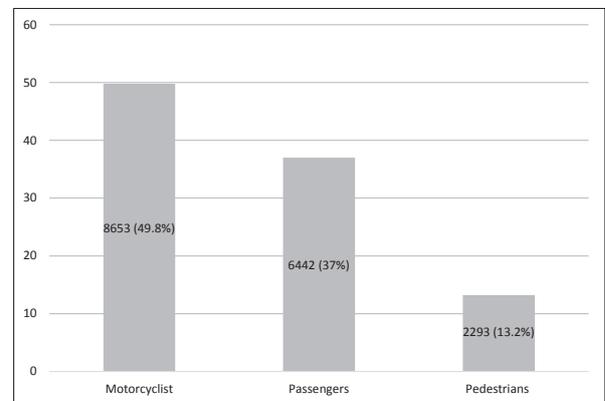


Figure 2: Distribution of CMAs according to the role of victims

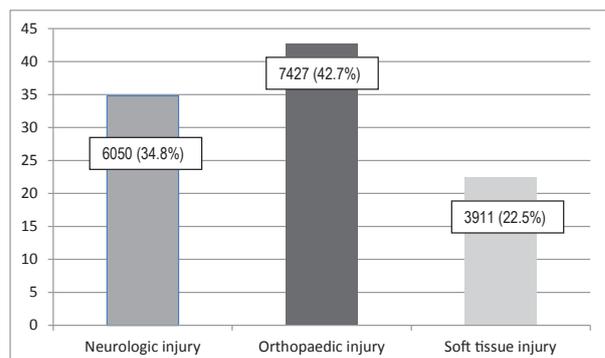


Figure 3: Distribution of CMA victims according to the type of injury sustained

Analysis of neurologic injuries showed that the drivers of commercial motorcycles sustained the highest number of head injuries (2154, 47.35%) versus 1340, 29.5% and 1056, 23.2%) while the pillion passengers suffered from the highest number of spinal cord injuries (930, 62%) (Table 1).

Table 1. Distribution of CMA-related injuries according to the role of victims, age category and gender

	Head injuries n (%)	UL fractures n (%)	LL fractures n (%)	Other fractures n (%)	STI n (%)	Spinal cord injuries n (%)
Roles of victims						
Motorcycle drivers	2154 (47.3)	1650 (64.4)	2456 (64.0)	223 (22)	2025 (51.8)	145 (9.7)
Passengers	1340 (29.5)	789 (30.8)	1192 (31.0)	473 (46)	1718 (43.9)	930 (62)
Pedestrians	1056 (23.2)	123 (4.8)	192 (5)	329 (32)	168 (4.3)	425 (28.3)
Total	4550	2562	3840	1025	3911	1500
Age categories						
0-19 YR	25 (2.6)	497 (18.3)	658 (10.9)	32 (2.5)	1089 (19.2)	3 (0.4)
20-39 YRS	771 (79.6)	1219 (44.8)	3616 (60.3)	770 (59.9)	2595 (45.9)	664 (87.6)
40-59 YRS	154 (15.9)	826 (30.3)	1285 (21.4)	461 (35.8)	1437 (25.4)	72 (9.5)
60 and above	19 (1.9)	181 (6.6)	434 (7.2)	23 (1.8)	538 (9.5)	19 (2.5)
Total	969	2723	5993	1286	5659	758
Gender						
Males	3269(71.8)	1841(71.9)	2759(71.8)	736(71.8)	2810(71.8)	1078(71.9)
Females	1281(28.2)	721(28.1)	1081(28.2)	289(28.2)	1101(28.2)	422 (28.1)
Total	4550	2562	3840	1025	3911	1500

UL = upper limb, LL = lower limb, n = frequency, % = percent, other fractures = i.e. of the clavicles, scapulas, mandibles and pelvis. STI = soft tissues injuries i.e. abrasions, lacerations, deep cuts, sprains.

The number of upper and lower limb fractures was higher in commercial motorcycle drivers compared to passengers and pedestrians (1650, 64.4% and 2456, 64.0% versus 789, 30.8% and 123, 4.8%, 123, 4.8% and 192, 5%, respectively); the highest number of fractures of the clavicles, scapulas, mandibles, pelvis and of soft tissue injuries (i.e. abrasions, lacerations, deep cuts and sprains) was observed in pillion passengers (n=473,46% and n=1718, 43.9%, respectively)

Our results demonstrated that the victims of CMAs aged 20-39 years more frequently sustained head injuries (79.6%, n=771), upper limb fractures (44.8% , n=1219), lower limb fractures (60.3% , n=3616), fractures to the clavicles, scapulae, mandibles and pelvis (59.9%, n=770) as well as soft tissue injuries (45.9%, n=2595) and spinal cord injuries (87.6%, n=664) as compared to the other age categories. Moreover, comparison of the participants aged 20-39 years and those aged

40-59 years revealed fewer accidents, joint injuries and extremity fractures in the latter.

All types of CMA-related injuries were more common in males than in females, as presented in Table 1.

Discussion

The present study observed a high prevalence of CMAs in Kano metropolis, which was associated with reckless driving, drug abuse, as well as young and untrained motorcycle drivers. In addition, a high rate of 2 accidents per hour was alarming. The above findings show that the working population is being depleted very fast due to severe CMA injuries, which is one of the reasons for the ban placed on commercial motorcycles activities within Kano metropolis in 2013. A high prevalence of CMAs demonstrated in our study is consistent with the findings of another study where the rate of CMAs was 45.3% [1].

According to our results, the most common victims of CMAs in Kano metropolis were males, as commercial motorcycle drivers and their passengers in Kano are mostly males. The female passengers have alternative ways of transport (the tricycles). In addition, males are usually bread-winners and most occupations are dominated by males.. Likewise, males and individuals within the age range of 20-39 years were found to sustain more injuries to the extremities, head, soft tissues and spinal cord when compared with their female counterparts. Similar studies have also observed a preponderance of males over females in CMAs [2, 7, 9].

In addition, the study indicated that among all the victims of CMAs, the motorcycle drivers had the highest accident rates, followed by pillion passengers and pedestrians. The roles of motorcycle drivers are central in any accident:, they are always involved through ultimate control of the machine and they can crash even in the absence of any passenger or pedestrian. A similar trend of CMA involvement has been observed in the other studies with drivers being more affected followed by passengers and pedestrians [2, 5, 7].

Moreover, our findings demonstrated that more than half of CMA victims in Kano metropolis were 20-39 years of age, which is likely to be associated with the fact that the business of commercial motorcycling requires young adults who have high physical strength and the zeal to roam the streets of Kano on a daily basis and under adverse weather conditions. Our study results are in-line with the findings of another study in which people aged 20-39 years were mainly the ones at risk of involvement in CMAs [1]. Furthermore, some other studies have unanimously reported the age range of 21-30 years as the most common age of those involved in CMAs [2, 5, 9].

The findings of our study showed high numbers of orthopaedic injuries, predominantly lower and upper limbs fractures. It is natural for any individual

to try to protect his head and trunk from serious injuries using the upper or lower limbs. Our results are consistent with those reported in another study in which limb fractures were the most common injuries sustained, followed by head and soft tissue injuries [6]. However, the findings reported in still another study regarding village accidents differ from the ones presented above and demonstrate that soft tissue injuries are the most common types of injuries observed [1], which is likely to be associated with fact that fewer accidents on un-tarred village roads are fatal when compared to those that occur on busy highways in metropolitan cities.

Furthermore, in our study motorcycle drivers were demonstrated to sustain more head injuries than passengers and pedestrians, likely because the driver is the first person to be hit in any head-on collisions. Likewise, pillion passengers were found to sustain more spinal cord injuries. The possible reason is that unlike motorcycle drivers who have the steering wheel to hold to during an accident, passengers are usually thrown off from the motorcycle and can be hit by any moving vehicle.. The finding of another study was that head injuries were more common than any other forms of injuries [7]. A high percentage of head injuries found in the present study is worth noticing, which is connected with the fact that most victims did not have their helmets on during the accident.

Our study had some limitations; the major one was that mortality rates due to CMAs could not be reported; the sparse data regarding mortality might not be a true reflection of the magnitude of the problem as most files of deceased victims were inaccessible. Being a retrospective study, the research is constrained by the availability of data obtained from patients' records. The educational qualifications of victims, the number of hours it took them to reach the hospital and prognosis were not fully documented.

Conclusion

Commercial motorcycle accidents occurred on an hourly basis in Kano metropolis and males aged 20-39 years were the most commonly affected. Orthopaedic injuries were more common than neurologic and soft tissue injuries. With the current ban on commercial motorcycle activity in Kano metropolis since January 24, 2013 (for safety of commercial motorcycle drivers and their passengers and to curb incidents of crime due to persistent use of motorcycles in drive-by gun attacks in the city [13]), most of the affected young individuals now drive commercial tricycles within the city and many of them moved to villages as the ban did not include riders in villages. Authorities should take proactive measures to prevent fatal motorcycle crashes in villages or deadly commercial tricycle accidents similar to the ones observed during the commercial motorcycle era. Such measures could include control of drug abuse among drivers, proper licensing and training on driving skills, mass education, helmet wearing regulations, and enforcement of speed limit adherence.

Conflicts of interest

The authors have declared no conflicts of interest.

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