

# Motorcycle Injury: An Emerging Menace To Child Health In Nigeria

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## Abstract

**Background:** In Nigeria, road traffic injuries (RTI) are among leading causes of morbidity and mortality and motorcycles have become a major means of transportation. Hence the need, to document the impact of motorcycle injuries on child health.

**Objectives:** To study the pattern and features of childhood motorcycle injuries (MCI) seen in Ilesa; a semi-urban community and compare the results with those of non-motorcycle vehicular injuries (NMCVI).

**Methodology:** A 12-month prospective study of consecutive childhood RTI attendances and admissions into the Children Emergency Room (CHER) of the Wesley Guild Hospital. Data was obtained and analysed on the children and the vehicles as well as the circumstances, mechanism, nature, severity and outcome of the injuries.

**Results:** RTI accounted for 8.0% of overall CHER attendances and 17.6% of deaths. Over half (50.2%) of the 263 RTI were due to MCI (83.5% of which were for commercial commuter use). Compared with NMCVI, statistically significant numbers of the children with MCI tended more to be pedestrians, younger, unaccompanied and more severely injured. MCI accounted for 88.5% of the 26 RTI deaths.

**Conclusions:** MCI contribute significantly to the high childhood RTI incidence, morbidity and mortality in this community.

**Recommendation:** Appropriate education of school pupils and teachers, parents, motorcyclists and other road users should be undertaken and backed with road safety measures. Perhaps use of motorcycles for municipal transportation should be de-emphasised.

## INTRODUCTION

Road traffic injuries (RTI) are a major cause of misery, disability and death globally, with a disproportionate number occurring in developing countries.<sup>1, 2</sup> Based on estimates that are at best conservative, Nigeria is a country with a serious and growing road crash problem which is among the worst in the world.<sup>3</sup> Deaths from RTI outnumber those recorded from many diseases of importance such as pneumonia, meningitis, tuberculosis and tetanus.<sup>4</sup> The WHO has estimated many more childhood deaths from road crashes than from HIV infection,<sup>5</sup> although the prominence of communicable diseases in West Africa masks this relative epidemiologic significance of RTI.<sup>6</sup>

Nigeria has witnessed at least a fivefold rise in recorded traffic-related fatalities within the last 3 decades.<sup>4</sup> This in part is due to the proliferation of roads, which are often in poor states and also, a phenomenal increase in the number of motor vehicles, many of which are old, and not road-worthy.<sup>4</sup> The increasing use of motorcycles particularly for commercial commuter service is a source of concern in this regard,<sup>3, 4, 5, 7, 8</sup> because motorcycles cause many more fatal road crashes than other vehicles worldwide.<sup>9</sup> In Ilesa, a semi-urban community of Southwest Nigeria, there are now about 2, 000 registered commercial commuter motorcyclists as against none 15 years earlier (personal communication with a leading member of the Association of commercial commuter motorcyclists). Thus, the present study was

undertaken to assess the burden of childhood MCI and compare it with that of NMCVI. Hopefully, information obtained will assist in formulating essential road traffic injury preventive and treatment strategy, particularly in this and similar communities. The study was conducted at the Wesley Guild Hospital, Ilesa, a unit of the Obafemi Awolowo University Teaching Hospital and the main referral facility providing paediatric and child health care for the semi-urban Ijesa community of Southwest Nigeria.<sup>8</sup>

### METHODOLOGY

All children aged below 16 years seen at the CHER with RTI between August 1, 2002 and July 31, 2003 were studied. A total of 263 patients were recruited. Information was obtained from parents or accompanying guardians, referral notes and the Police as necessary. The age, sex, mode of involvement of each child, the types and purpose of use of the vehicles involved were documented. The injury – presentation (IP) interval was recorded as either early (within one hour of the RTI) or late (after one hour). The pattern of injuries was described based on anatomical regions: head, maxillo-facial, neck and spine, abdomen, chest, pelvis and limbs. The mechanism of the injuries was termed as either blunt or penetrating.<sup>10,11, 12</sup> Loss of consciousness either brief (< 5 minutes) or prolonged (? 5 minutes), convulsions (generalised or focal), or ongoing revealed bleeding at presentation were documented. The injury severity was based on the Pediatric Trauma Score (PTS).<sup>6, 13</sup> A score ? 8 (termed low PTS) indicates major trauma and a score ? 9 (high PTS) suggests minor trauma. The eventual outcome of the patients was documented as discharged alive or died.

Data were analysed with the Student's 't' test or the z test as applicable using the Computer program for epidemiologists (PEPI) Version 3.01.<sup>14</sup> 'p' values < 0.05 in two-tailed tests were accepted as statistically significant.

### RESULTS

#### THE PATIENTS AND VEHICLES

Of the 3,301 children seen at the CHER during the 12-month study period, 263 (8.0%) had RTI from 206 road crashes. A total of 132 (50.2%) of the children sustained motorcycle injuries (MCI) as against 131 (49.8%) who had non-motorcycle vehicular injuries (NMCVI). Specifically, cars, buses and trucks injured 74 (28.1%), 52 (19.8%) and 5 (1.9%) children respectively, while none involved pedal bicycles.

The ages of the children ranged from 3 months to 14 years with the mean (SD) of 7.9 (3.5) years. The mean ages (SD) of children with MCI and NMCVI were 7.3 (2.7) and 8.5 (4.0) years respectively ( $t = 2.85$  and  $p = 0.00467$ ). There were 147 (55.9%) boys and 116 (44.1%) girls of the total 263, giving a male: female ratio (MFR) of 1.3: 1. Boys accounted for 64 (48.5%) of the 132 MCI and 83 (63.4%) of the 131 NMCVI. The MFR of children with MCI and NMCVI was 0.9: 1 and 1.7: 1 respectively. Thus, significantly lower percentage of boys sustained MCI as against NMCVI ( $t = 2.31$ ,  $p = 0.021$ ).

#### PATTERN OF RTI

The 263 children with RTI consisted of 160 (60.8%) pedestrians and 103 (39.2%) passengers, including two infants who rode on their mothers' back on motorcycles. Pedestrians accounted for 109 (82.6%) of the 132 with MCI but 51 (38.9%) of the 131 children with NMCVI. This difference was statistically highly significant ( $z = 7.13$ ,  $p = 9.82 \times 10^{-13}$ ). So, that the victims of MCI were more likely to be pedestrians.

The reasons for the ill-fated journeys among the children with MCI were going to/ fro school (97), hawking sales items [or street trading] (16), travelling (13), going to the church (2), work (2), play (1) and farm (1). For children with NMCVI, the purposes were travelling (79), church (18), work (14), school (12), errand (6) and play in 2 instances.

Forty-two (31.8%) of the children with MCI as against 24 (18.3%) of those who sustained NMCVI were unaccompanied by adults on the ill-fated journey. This higher rate of journeying unaccompanied by those who suffered MCI was statistically significant ( $z = 2.38$ ,  $p = 0.017$ ).

The vehicles involved in the road crashes were government-owned, personal and used for commercial commuter activities in 6 (4.5%), 16 (12.1%) and 110 (83.4%) instances respectively among children with MCI but 3 (2.3%), 4 (3.0%) and 124 (94.7%) for children with NMCVI.

#### THE INJURIES

The details of the injuries are shown in Table I in which the MCI are compared with the NMCVI. It can be seen that greater and statistically significant number of children with MCI than NMCVI sustained penetrating injuries, head injuries, with convulsion and prolonged unconsciousness or presented with ongoing bleeding. Many more children with MCI than NMCVI had multiple injuries though without

statistical significance.

The IP interval ranged from 5 to 1, 020 minutes with the overall mean (SD) of 55.5 (68.9) minutes but 46.1 (89.7) and 65.0 (35.9) minutes for children with MCI and NMCVI respectively ( $t = 2.24$ ,  $p = 0.026$ ). Overall, 50 (19.0%) of the 263 children presented late, that is after the first hour of the injury; 13 (9.8%) of the 132 with MCI versus 37 (28.2%) of the 131 with NMCVI. Though averagely, children injured by motorcycles presented earlier, a higher and statistically significant percentage presented late ( $z = 3.64$ ,  $p = 0.000268$ ). No child was transported to the hospital by ambulances but all depended on either private or police vehicles. No passenger victim had used any safety device (crash helmet, car safety belt or child seat).

The overall mean PTS (SD) was 8.6 (2.9) but was 7.9 (3.2) and 9.3 (2.2) for children with MCI and NMCVI respectively. So, compared with NMCVI, the children with MCI tended to be more severely injured ( $t = 4.13$ ,  $p = 0.000486$ ). All but one of the 17 children who either suffered penetrating injuries alone or additional blunt injuries died as against 10 (4.1%) of the 246 children who sustained only blunt injuries. Thus, significantly many more deaths followed penetrating RTI than blunt injuries ( $z = 11.61$ ,  $p = 3.62 \times 10^{-31}$ ).

Limbs, the head and the maxillo-facial regions were the most commonly injured parts of the body in 87.1%, 43.3% and 10.6% instances respectively. However, all nine children with chest injuries were pedestrians knocked down by cars and none by motorcycles. The differences in the percentages of children with MCI and NMCVI who sustained limb, maxillofacial, spinal, abdominal and pelvic injuries were not statistically significant.

Twenty-four (9.1%) of the 263 children convulsed either prior to or at presentation and 83 (31.6%) had ongoing revealed haemorrhage at presentation in the CHER but only 13 (15.7%) of these 83 or 13 (4.9%) of the 263 children required blood transfusion.

## OUTCOME

The mean duration of hospitalisation (SD) was 92.3 (230.6) hours overall but 51.6 (112) and 147.4 (322.3) for children with MCI and NMCVI respectively. This difference was statistically significant ( $t = 3.22$ ,  $p = 0.00143$ ).

Twenty-six children died following RTI giving a case fatality rate of 9.9%. This constituted 17.6% of the 148

overall CHER deaths. However, 23 (88.5%) of the 26 deaths involved MCI. The case fatality rates for MCI and NMCVI were 23 (17.4%) and 3 (2.3%) respectively. Thus, MCI were 7.6 times more fatal than NMCVI. All the children who died sustained multiple injuries including severe head injuries with intracranial haemorrhages.

## Figure 1

Table I: Comparative analysis of numbers of children with MCI and NMCVI.

Outcome Variables	MCI n = 132 (100%)	NMCVI n = 131 (100%)	z scores	p values
1. Had multiple injuries	93 (70.5%)	89 (67.9%)	0.32	0.747
2. Had only blunt injuries	117 (88.6%)	129 (98.5%)	2.99	0.00278
3. Had combined penetrating and blunt injuries	14 (10.6%)	1 (0.8%)	3.18	0.00149
4. Presented with ongoing bleeding	72 (54.5%)	11 (8.4%)	7.95	< 0.0001
5. Had head injuries	74 (56.1%)	40 (30.5%)	4.06	0.000482
6. Lost consciousness	54 (58.1%)	39 (49.1%)	1.76	0.079
7. Had prolonged unconsciousness	23 (17.4%)	4 (3.1%)	3.64	0.000276
8. Convulsed prior to or at presentation	23 (95.8%)	1 (4.2%)	4.48	< 0.0001

## DISCUSSION

A higher rate of road traffic injuries (RTI) was observed in this study than was previously documented from this same centre about a decade earlier.<sup>8</sup> This is consistent with the rising trend of RTI in African communities.<sup>2, 5</sup> Compared with the earlier study, this was prospective and additionally, more specific in details. Motorcycle injuries were the paramount contributor to this high incidence. Its victims were mostly pedestrians, journeying unaccompanied to school. They were younger and more severely injured than those involved in all other forms of vehicular crashes altogether. These school-age group children are usually very active and are often less supervised than pre-school age children. Coupled with the paucity of boarding school facilities for children of their age as well as of school buses, pupils have to walk varying distances to and from school. This was the case in the vast majority of children knocked down in this study.

At this age also, children increasingly attend to outdoor errands as typified by some cases in this study. Hawking sales items on the streets is common in Ijesaland most especially by female children, who run this act as errands for their parents in attempts to augment family earnings. As a substantial fraction of the victims in the present study were in deed street trading at the time of their motorcycle crashes, it is obvious that this form of trading by children is risky. This may be an additional ground for dissuading the public from child labour activity, if need be, by legislation and stringent law enforcement.

The high fatality rate observed emphasises the need to control childhood RTI in this community. Many studies have

shown that head injury is a leading cause of death following road crashes in children,<sup>1, 2, 8, 9</sup> for which motorcycles are particularly notorious.<sup>15</sup> There is no doubt that the health facilities, as they currently exist in many developing countries such as this, will not appreciably improve the outcome of childhood RTI.<sup>16</sup> The facilities and interventions necessary to improve survival are very expensive and often unavailable,<sup>8</sup> hence, prevention is highly desirous. However, it is noteworthy that none of the children used crash helmets or indeed any protective devices at the time of the RTI. As suggested in Vietnam,<sup>15</sup> helmets should be made mandatory to mitigate the effects of head injuries in Nigeria.

Additionally, the overall mortality in the present study is comparable with those seen in studies from other developing countries,<sup>5, 16</sup> but is higher than that from the industrialised ones.<sup>17</sup> The fact that none of the victims in this study was transported to the hospital by ambulances is a reflection of the poor state of readiness of the local health system to handle trauma care. Despite the blood transfusions to the 13 patients with haemorrhagic shock, all but 1 victim died due to delayed hospital presentation. In countries with good ambulatory care, such transfusions begin at the trauma site or while in transit.<sup>18</sup> There is thus a need to establish co-ordinated pre-hospital resuscitation and evacuation services, together with an integrated in-hospital trauma team approach to management in this community.

Motorcycles particularly commercial commuter motorcycles were responsible for the majority of cases and fatalities in the present study. This prominence is an important socio-economic development that requires well thought out actions. The easy manoeuvrability of the motorcycle can be tempting to most ill-experienced riders, thus reducing the level of caution exercised by them, hence their proneness to RTI. Compared with other vehicles and consequent to its manoeuvrability and speed, motorcycle crash victims undergo more movement and impact, thus they sustain more severe injuries. This risk is heightened by the poor state of most roads in this region<sup>3, 4</sup> and may be less likely with tricycles which are less manoeuvrable. Before endorsement as being road-worthy, vehicles should have safety fittings for all occupants, including children. Motorists, principally commercial commuter motorcyclists need to be re-oriented about road and public safety. The public should be dissuaded from riding motorcycles without adequate protective devices or carrying infants and young children. Also, there is a need to conduct investigations on when children develop the skills needed for safe motorcycle riding or mounting as

passengers. In the interim, motorcycling by the young (perhaps under nine years) should be discouraged because of plausible insufficient development of motor coordination. What is more, the use of motorcycles for municipal transportation should be reviewed altogether and perhaps outlawed.

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