

Pattern of plain x-ray findings in bone injuries among motorcycle accident victims in Lagos, Nigeria

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ABSTRACT

The use of motorcycles for transportation is perceived as posing a threat to public health in Lagos metropolis due to accidents associated with it. The aim of the study is to evaluate plain x-ray findings in bone injuries/fractures sustained by victims of motorcycle accidents in Lagos metropolis. In the retrospective cross-sectional survey, convenience sampling method was used to select three tertiary hospitals used for the study. Ethical approvals were obtained from the institutions' review boards before the study began. Available x-ray films with a radiologist's reports of plain x-ray investigations carried out between June 2011 and September 2012 were reviewed. Only subjects who carried out x-ray investigations as a result of motorcycle accidents were selected for the study. Subjects whose x-ray investigations do not have radiologist's reports were not included in the study. Of 812 subjects reviewed, 12.4 and 5.9% were in the 20 to 24 years and 50 to 54 years age range respectively; 29.3% had normal radiographs whereas a significant proportion (70.3%; $p < 0.05$) had fractures. Furthermore, a significant proportion (17.4%; $p < 0.05$) of all fracture cases confirmed by a radiologist's report were skull fractures. Skull fractures sustained following motorcycle accidents posed serious threats to people in Lagos metropolis within the period studied. The Federal Road Safety Commission (FRSC) and Lagos state government should, therefore, enforce use of helmets by motorcycle riders and their passengers; restrict the use of motorcycles for transportation in the state to prevent or ameliorate the carnage caused by motorcycle accidents in the metropolis.

Keywords: Okada, accidents, fractures, Nigeria.

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INTRODUCTION

Commercial motorcycle riding (popularly called *okada* in local parlance) is common in most Nigerian cities. Mostly in cities like Lagos where traffic gridlocks are common occurrences, commercial motorcycle riders provide easy means of livelihood for the teeming population of jobless people. Patrons of commercial motorcycle riders are mainly desperate commuters seeking to beat traffic jams and get to their destinations in time. With the aforementioned reasons and the fact that motorcycles are cheaper (especially brands from Asian countries) to acquire and maintain than motor vehicles; and also the

belief that commercial motorcycle riding brings quicker financial returns to their owners/riders, the popularity of this mode of transportation has been on the increase in the last two decades (Oluwadiya et al., 2004).

Commercial motorcycle riding, however, has begun to gain notoriety in recent times due to high rate of accidents associated with the trade (Solagrebu et al., 2006). Risk of injury or even death posed to commuters, riders and other road users by frequent road traffic accidents involving *okada* in Nigerian cities have led to calls from different quarters for a review of the use of

Table 1. Gender/hospital distribution of motorcycle accident victims.

Sex	LUTH	LASUTH	NOHI	Total
Male	248 (30.5%)	175 (21.6%)	195 (24.0%)	618 (76.1%)
Female	84 (10.3%)	47 (5.8%)	63 (7.8%)	194 (23.9%)
Total	323 (40.9%)	222 (27.3%)	258 (31.8%)	812 (100%)

motorcycles as a means of transportation in the country (Naddumbia, 2004). While some people and even some state governments in the country are rooting for an outright ban of commercial motor cycle riding, some believe that there is no fact to justify the call for such ban. Proponents of the continued use of motorcycles for transportation always point to the fact that it is an easy source of employment in most developing countries of the world (Solagrebu et al., 2006; Galukande et al., 2009). To opponents of the trade, however, it is not just risky but a major public health problem in developing and even in developed countries of the world (http://www.Wikipedia.org/wiki/motorcycle_safety...Accidents_rates Okada in Nigeria; Aetukumana et al., 2010; Museru and Leshabwi, 2002; Rafindadi, 2000; Peden et al., 2004; Ofonime, 2012). In a study to analyze road traffic accidents (RTA) in Nigeria (Ohakwe et al., 2011), it was reported that in one part of southeastern Nigeria for instance, RTAs involving two motorcycles and those involving motorcycles and motor vehicles accounted for 38.9 and 37.9% respectively, while those involving motor vehicles only accounted for 14.9%. Furthermore, it has been suggested that RTA is one war on one hand while regional wars is another being faced by developing nations (El-Gindi et al., 2001). It was further stated in the same study that while just 11% of automobiles in the world are owned by people in developing nations compared to 89% owned by people in industrialized (developed) nations, annual death rates from automobile accidents is 60 and 40% in developing and developed nations of the world, respectively (El-Gindi et al., 2001).

Plain x-ray is known to play a prominent role in the assessment of polytraumatized, hemodynamically unstable patients even in this era of advanced computed tomography (Chmelova et al., 2006). Whereas many have studied the incidence of motorcycle accidents in different cities in the country (Oluwadiya et al., 2004), it is imperative to study the nature of bone injuries/fractures among victims of motorcycle accidents in a major Nigerian city such as Lagos where *okada* riders are ubiquitous. The aim of this study, therefore, is to evaluate both clinical and plain x-ray findings among victims of motorcycle accidents in the Lagos metropolis. Specifically, this study would determine the number of motorcycle accident victims who presented for x-ray investigation within the period studied; identify the number that had bone injuries/fracture(s), identify bones mostly affected and also identify the type(s) of fractures

sustained within the study period.

SUBJECTS AND METHODS

A retrospective review of 863 *okada* accident victims who had plain x-ray investigations within a 12 months (June 2011 to May 2012) period was performed. Convenient sampling method was used to select 3 tertiary hospitals used for the study. Ethical approvals were obtained from the institutions' review boards before the study commenced. The 3 hospitals were Lagos University Teaching Hospital (LUTH), Lagos State University Teaching Hospital (LASUTH) and National Orthopedic Hospital (NOHI). Only victims of motorcycle accidents who had plain x-ray investigations as a result of such accidents were selected for the study. Furthermore, only x-ray examinations that had a radiologist's report were reviewed.

Data collection

From patient registers in each centre, subjects who came for x-ray examination following motorcycle accidents were identified. With x-ray registration numbers, x-ray request cards with patient's details were retrieved. Using the request cards, x-ray films and duplicates of radiologist's reports were retrieved. Clinical findings were taken as the information written on the x-ray request form by referring clinicians.

Data analysis

Retrieved x-ray films and radiologist's reports were matched after which all reports were sorted into those with normal findings and those with fractures. Injuries/fractured bones were identified, while types of fractures as described in the radiologist's reports were recorded. Descriptive statistic was used to analyze results. Student's t-test was used to test for statistical significance of result. SPSS computer software, version 17.0 (SPSS Inc; Chicago, Illinois, USA) was used to perform all computations. Results were presented in frequency tables.

RESULTS

Of 863 subjects identified for review, 51 radiological reports could not be traced and were therefore not included in the study. Of the 812 subjects reviewed, 618 (76.1%) were males while 194 (23.9%) were females. Table 1 shows that 332 (40.9%), 222 (27.3%) and 258 (31.8%) subjects were from LUTH, LASUTH and NOHI, respectively. Table 2 shows that people within their most productive age groups were mostly involved in motorcycle accidents during the period reviewed. Of 812 subjects reviewed, 101 (12.4%) were in the 20 to 24 years age bracket. Furthermore, 82 (10.1%), 178 (21.9%),

Table 2. Age distribution of accident victims.

Age range (years)	Frequency (%)
20-24	101 (12.4)
25-29	82 (10.1)
30-34	178 (21.9)
35-39	170 (20.9)
40-44	145 (17.9)
45-49	88 (10.8)
50-54	48 (5.9)
Total	812 (100)

Table 3. Plain x-ray findings.

Findings	LUTH	LASUTH	NOHI	Total	P. value
Normal	91 (27.4)	70 (31.5)	77 (29.8)	238 (29.3)	
Fractures	241 (72.6)	152 (68.5)	181 (70.2)	574 (70.7)	0.004
Total	323 (40.9)	222 (27.3)	258 (31.8)	812 (100)	

Table 4. Fractured bones and fracture types.

Bone	Simple fracture	Compound fracture	Fracture/dislocation	Impacted fracture	Depressed fracture	Avulsion fracture	Pott's fracture	Colle's fracture	Total (%)
Skull		48			52				100 (17.4)
Clavicle	28		4						32 (5.5)
Rib	43	8							51 (8.9)
Cervical spine			55						55 (9.6)
Shoulder/Humerus	26					32			58 (10.1)
Radius	29	12						2	43 (7.4)
Ulna	40	3	2						45 (7.9)
Hand	26	6							32 (5.6)
Femur	26	16	6						48 (8.4)
Tibia	35	9							44 (7.2)
Fibula	39	2							41 (7.1)
Ankle			21	1			3		25 (4.4)

170 (20.9%), 145 (17.9%), 88 (10.8%) and 48 (5.9%) were in the 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49 and 50 to 54 years age range, respectively. From Table 3, it can be seen that 238 (29.3%) subjects had normal plain x-ray findings while 574 (70.3%) had fractures.

Table 4 shows that the skull was the most frequently injured bone during motorcycle accidents within the period studied. While 100 (17.4%) subjects had skull fracture, 25 (4.4%) subjects had fracture/dislocated ankle joint. Table 4 further shows that different types of fracture were sustained following motorcycle accidents within the period studied.

DISCUSSION

The entrance of commercial motor cycle riding as a mode of transportation in Nigeria dates back into the late 1980s and early 1990s following the introduction of structural adjustment programme (SAP). SAP eroded the country's economy and forced many industries to go under. The immediate SAP period ushered in an army of the unemployed that has continued to expand ever since and has worsened with the current global economic downturn. While commercial motorcycle riding appeared to have brought succor both to the jobless and helpless commuters

desirous of beating ubiquitous gridlocks in Nigerian urban roads, the relief bought by the trade seems to have floundered as the incidence of road traffic accidents involving motorcycles both in Nigerian cities and other developing nations is high (Rafindadi, 2000; Galukande et al., 2009).

In Nigeria, plain radiography is easily available in most urban areas such as Lagos. It is also less expensive than other imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI). Furthermore, the three tertiary hospitals selected for the study have the best equipped x-ray departments in the entire Lagos metropolis in terms of diagnostic x-ray machines and trained personnel such as radiologists and radiographers. For this reason and also the fact these centres are also where most other highly skilled personnel such as orthopedic surgeons may be easily found place them in good stead to receive and manage many trauma cases.

This study shows that majority of victims of motorcycle accidents in Lagos metropolis within the period studied were males. This trend is not unexpected as virtually all commercial motorcycle riders are males. Furthermore, persons involved in motorcycle accidents during the period studied were between 20 and 54 years old. These are people in the most productive years of their lives. The implication of this finding appears to be that the desire to engage themselves in any productive venture (in spite risks involved) in the face of spiraling joblessness may have pushed some the victims to commercial *okada* riding. This result appears to corroborate reports of earlier studies that have established high incidences of road traffic accidents among the young and actively working groups (Chmelova et al., 2006). Furthermore, it is reported that mortality is 20 times higher in motorcycle accidents than in motor vehicle accidents. The road safety guideline of 2005 warned specifically that motorcycle riders (described as exposed users) have higher chances of mortality than motor vehicle users in the event of accidents (Chmelova et al., 2006; Dunning et al., 2004). It is logical therefore, to assume that those assessed in the study may have been at greater risk than people who do not use *okada* as a mode of transportation since those assessed may also have been using other forms of transportation such as motor vehicles which have their own risks too. This assertion, however, needs further verification.

The study found that cases of injuries sustained during motorcycle accidents were quite high while the incidence of fractures was statistically highly significant ($p < 0.05$; Table 3). Slightly more than 70% of victims had fractures. This alone is comparable with the combined incidence rates of RTAs involving two motorcycles (38.9%) and those involving motorcycles and motor vehicles in a particular year (37.9%) cited in one study in southeast Nigeria (Ohakwe et al., 2011). This may not be unconnected with high fatality associated with motorcycle

accidents globally (Dunning et al., 2004) and high incidence rate of RTAs rampant in developing nations, especially in urban areas such as Lagos metropolis (El-Gindi et al., 2001). This further obviates the fact that a significant proportion of commercial motorcycle riders and their passengers were at serious risks of injury or possibly even worse outcomes within the period studied. If the trend is unchecked, it could result in more dependant than productive population in the state. Apart from likely distortion of the state's population in favour of dependants, morbidities and mortalities arising from *okada* accidents could cause immediate financial strains on the economy. According to Pasco et al. (2005), management of fractures is costly and continues to demand considerable resources from a country's healthcare system as management (of fractures) continues to generate significant cost throughout the first year after discharge (The RoSPA guide to road safety projects, 2005).

The study also found the head to be at the highest risk in the event of a motorcycle accident (Table 4). Equally disturbing is the fact that the cervical spine was also found to be at high (8.9%; Table 4) risk of injury in the event of a motorcycle accident. Earlier studies have established that intra cranial hemorrhage (ICH) is a major consequence of head trauma, especially from acceleration/deceleration forces encountered during automobile accidents. Moreover, cervical spine injuries could also result to paralysis if it is associated with spinal cord injury (Kumar and Lalwani, 2008; Armin et al., 2006). This finding supports earlier report by Nwadiaro et al. (2011), that head injuries were more preponderant among motorcycle accident victims in North-Central Nigeria. The result of this study may be another pointer to poor helmet use by *okada* riders and their passengers that was reported in a previous study in Nigeria (Saheeb and Etatafia, 2003).

Earlier studies had reported that head and limb fractures are common causes of morbidity and mortality among people who sustained motorcycle accident injuries (Ekere and Ibeanusi, 2003; Munoz-Sanchez et al., 2009; Nantulya and Reich, 2002). In particular, the present study (Table 4) shows that extremities were also extensively injured during motorcycle accidents. A host of authors, in previous studies, suggested extremities to be at most risk of injury following such accidents (Eluwa et al., 2010; Markogiannakis et al., 2006; Seleye-Fubara and Ekere, 2003). A plausible reason for this is that extremities often get entangled between the motorcycle and other impacting objects or surfaces when accidents occur.

In the study, other plain x-ray findings, apart from fractures, include bruises, lacerations, abrasions and burns. Specifically, radiologists reported different types of fractures such as depressed fractures in the skull, avulsion fractures in the shoulder and impacted fractures in the ankle joint (Table 4). These specific plain x-ray

findings (different fractures) seem to further underline the importance of plain x-ray investigations in the management of trauma. Since management of soft tissue injuries, fractures, hospitalization period and cost of management usually depend on their type and severity, early diagnosis with plain radiography (following proper clinical screening to select only patients who will maximally benefit from exposure to ionizing radiation) could drastically reduce cost of management of bone injuries emanating from motorcycle and other forms of RTAs.

Conclusion

Plain x-ray findings in bone injuries sustained during motorcycle accidents in Lagos metropolis were reviewed. Fractures, especially skull fractures arising from such accidents posed significant threats to riders, commuters and other road users within the period studied. Investigating the overall incidence of road traffic accidents in the whole of Lagos metropolis to compare RTA as a result of commercial motorcycle riding with other modes of transportation is an interesting prospect. Furthermore, a study to explore and compare incidences and causes of motorcycle accidents in both urban and rural areas in Nigeria is also a prospect.

RECOMMENDATION

1. Whenever it is clinically indicated, all victims of motorcycle accidents should have plain skull x-ray investigation as soon as possible since the facility for it (plain x-ray) is easily available in the country and is less expensive than computed tomography (CT) scan.
2. The use of motorcycles for commercial activities in Lagos metropolis be restricted to remote and less busy parts of the mega city as an outright ban of commercial motorcycle riding will entail further job losses in an already depressed economy.
3. The Federal Road Safety Commission (FRSC) and Lagos State Government should henceforth enforce mandatory use of helmets by motorcycle riders and their passengers in the state to cushion the head in the event of an accident.

REFERENCES

- Aetukumana IL, Onumbu I, John M, 2010. Possible causes of motorcycle (okada) accidents in Karu, Nigeria. *Injury Prev*; 16 (suppl.1), A88.
- Armin SS, Colohan AR, Zhang JH, 2006. Traumatic subarachnoid hemorrhage: our current understanding and its evolution over the past century. *Neurolog Res*, 28(4):445-452.
- Chmelova D, Dzupa V, Baca V, Grill R, Pieva L, 2006. The role of plain radiography in pelvic trauma in era of advanced computed tomography. *Acta Chr Orthop traumatol Cech*, 73(6):394-399.
- Dunning J, Stratford-Smith P, Lecky F, Batchelor J, Hogg K, Browne J, Sharpin C, Mackway-Jones K, 2004. A meta-analysis of clinical correlates that predict significant intracranial injury in adults with minor head trauma. *J Neurotrauma*, 21(7):877-885.
- Ekere AU, Ibeanusi S, 2003. Pattern of motorcycle associated injuries in Port Harcourt Hospital based study. *Orient J Med*, 16:36-40.
- El-Gindi S, Mahdy M, Abdel Azeem A, 2001. Traumatic brain injuries in developing countries, road war in Africa. *Revista Espaniola de Neuropscologia*, 36:3-11.
- Eluwa MA, Wonwu VE, Ekong MB, Ekanem TB, Akpantah AO, 2010. Disposition of fractures and dislocations among road accident victims in Rivers and Bayelsa States of Nigeria from 1992-2005. *Internet J Epidemiol*, 8(1).
- Galukande M, Jombwe J, Faulal J, Gakwaya A, 2009. Bodaboda injuries a health problem and a burden of disease in Uganda a tertiary Hospital survey. *East Center Afr J Surg*, 14:33-37.
- Kumar A, Lalwani S, 2008. Fatal traffic accidents and their relationship with head injuries. *Indian J Neurotrauma*, 5(2):63-67.
- Markogiannakis H, Sanidas E, Messaris E, Koutentakis D, Alpantaki K, Kafetzakis A, Tsiiftsis D, 2006. Motor vehicle trauma: analysis of injury profiles by road user category. *Emerg Med J*, 23(1):27-31.
- Motorcycle safety. Available at http://www.wikipedia.org/wiki/motorcycle_safety...Accidents_rates Okada in Nigeria.
- Munoz-Sánchez MA, Murillo-Cabezas F, Cayuela-Domínguez A, Rincón-Ferrari MD, Amaya-Villar R, León-Carrión J, 2009. Skull fractures with or without clinical signs in MTBI is an independent risk marker for neurosurgical relevant intracranial lesion: a cohort study. *Brain Inj*, 23(1):39-44.
- Museru LM, Leshabwi MT, 2002. Road traffic accidents in Tansania; a 10-year epidemiological appraisal. *East Center Afr J Surg*, 7:23-26.
- Naddumbia EK, 2004. A cross sectional retrospective study of Bodaboda injuries at Mulago Hospital in Kampala, Uganda. *East Central Afr J Surg*; 9:44-47.
- Nantulya VM, Reich MR, 2002. The neglected epidemic: road traffic injuries in developing countries. *BMJ*, 324:1139-1141.
- Nwadiaro HC, Ekwe KK, Akpayak IC, Shitta H, 2011. Motorcycle injuries in north-central Nigeria. *Niger J Clin Pract*, 14:186-189.
- Ofonime EJ, 2012. Prevalence and pattern of traffic accidents among commercial motorcyclists in a city in Southern Nigeria. *Edu Res*, 3(6):537-542.
- Ohakwe J, Iwueze JS, Chikezie DC, 2011. Analysis of RTAs in Nigeria: A case study of Obinze/Nekede/Iheagwa road in Imo state, southeastern Nigeria. *Asian J Applied Sci*, 4:166-175.
- Oluwadiya KS, Oginni IM, Olasinde AA, Fadiora SO, 2004. Motorcycle limb injuries in developing countries. *West Afr J Med*; 23(1):42-47.
- Pasco JA, Sanders KM, Hoekstra FM, Henry MS, Nicholson GC, Kotowicz MA, 2005. The human cost of fracture. *Osteoporosis Int*, 16:2046-2052.
- Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, Mathers C, 2004. World report on road traffic injury prevention – summary. World health organization, Geneva. Available at http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/summary_en_rev.pdf.
- Rafindadi AH, 2000. A review of injuries sustained following road traffic accidents and their prevention. *Nig J Surg Res*, 2:100–104.
- Saheeb BDO, Etatafia MO, 2003. Influence of positions on the incidence and severity of maxillofacial injuries in vehicular crashes. *West Afr J Med*, 23:146-149.
- Seleye-Fubara BA, Ekere AU, 2003. Vehicular road deaths in the Niger Delta. *Orient J Med*, 15:41-44.
- Solagrebu BA, Ofoegbu CKP, Nasir AA, Ogundipe OK, Adekanye AO, Abdur-Rahman LO, 2006. Motorcycle injuries in a developing country and the vulnerability of riders, passengers and pedestrians. *Injury Prev*, 12:266-268.
- The RoSPA guide to road safety projects, 2005. Available at http://www.rospa.com/roadsafety/adviceandinformation/highway/rural_roads.aspx.