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Full Length Research Paper

The Prevalence and Impact of Motorcycle-Related Neurotrauma in South-East Nigeria: A Retrospective Study

Emejulu C. Jude-Kennedy[1*], Ekweogwu C. Ofodile[1] and Nottidge Timothy[2]

[1]Neurosurgery Unit, Department of Surgery, Nnamdi Azikiwe University Teaching Hospital Nnewi, Anambra State, Nigeria.

[2]Orthopaedic Surgery Unit, University of Uyo Teaching Hospital Uyo, Akwa Ibom State, Nigeria.

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Neurotrauma or cranio-spinal trauma is the most common pathology in multiple injuries, causing significant morbidity and mortality. Majority of cases result from road traffic accidents. In one of Nigeria's centres for neurosurgery, we evaluated our local etiological patterns to ascertain the impact of motorcycles, the most commonly used mode of intra-city transportation, on neurotrauma. This is a retrospective study of all consecutive neurotrauma patients presenting in our unit in the first 30 months after the commencement of neurosurgical services. The data were collected for each patient with a structured proforma, and were analyzed. A total of 1055 neurosurgical cases were attended to in our service in the period under study, out of which 138 had congenital anomalies and 917 had acquired diseases. Among the acquired cases, 785 had trauma but only 748 (95.3%) of them had complete re-cords, with 658 (88%) cases of head injury, 61 (8.1%) cases of spinal injury, and 29 (3.9%) concomitant head and spinal injuries. These are distributed thus: road traffic accidents 537 (71.8%), falls 120 (16.0%), assaults 47 (6.3%), missiles 20 (2.7%), falling objects 11 (1.5%), de-celeration/acceleration injuries 7 (0.9%), sports/recreational activities 3 (0.4%) and birth trauma 3 (0.4%). Majority were males 569 (76.1%), and in the 15-40year age group 376 (50.3%). Of the 537 cases of road accidents, those related to motorcycles were 367 (68.3%), motor vehicles 169 (31.5%) and bicycle 1 (0.2%); and none of the motorcycle cases wore a protective helmet at the time of the accident. Most of the cases were treated conservatively 559 (74.7%), and the mortality rate from all neurotrauma cases was 17.7%. Neurotrauma is the major reason for neurosurgical consultations in our service, affecting mostly the young male age group, and most cases result from motorcycle accidents caused by the poor compliance with traffic regulations. There is an urgent need to stringently control the use of motorcycles to reduce the morbidity and mortality amongst Nigerian youths.

Key words: Head, injury, spinal, road, traffic, accidents.

INTRODUCTION

Trauma is a major cause of morbidity and mortality worldwide, with neurotrauma (cranio-spinal trauma) accounting for a significant proportion of injuries in patients with multiple trauma, especially among the young males; it is also the most common cause of death in adults less than 45 years of age (Adesukanmi et al., 1998; IHITFR, 1989; Kemp and Sibert, 1997; Le et al., 2006; Reed, 1996; Solagberu et al., 2003). Over half of head and spinal injuries occur in the <30 year olds, most of them resulting from Road Traffic Accidents (RTA), with a male:female ratio of 1.7:1 for head, and 4:1 for spinal injuries, respectively (Adeolu et al., 2005; Al-Fallouji, 1999; CDCP, 2001; Ingebrigsten et al., 1998; Kolenda and Reparon, 1997; Muhammad, 1990; NCHS, 1987).

The incidence rate of head injuries is far more than spinal injuries and in most series, RTA is the leading cause of neurotrauma with motor vehicular accidents accounting for most of the case (Adeolu et al., 2005; Adesukanmi et al., 1998; Nwadinigwe, 2004; Odebode and Abubakar, 2004; Solagberu, 2002). Some studies have, however, shown that falls are the predominant cause in extremes of age, that is, in the very young and in the very old patients (Ingebrigsten et al., 1998; Pandey

*Corresponding author. Email: judekenny2003@yahoo.com. Tel: +234-803-328-3976.

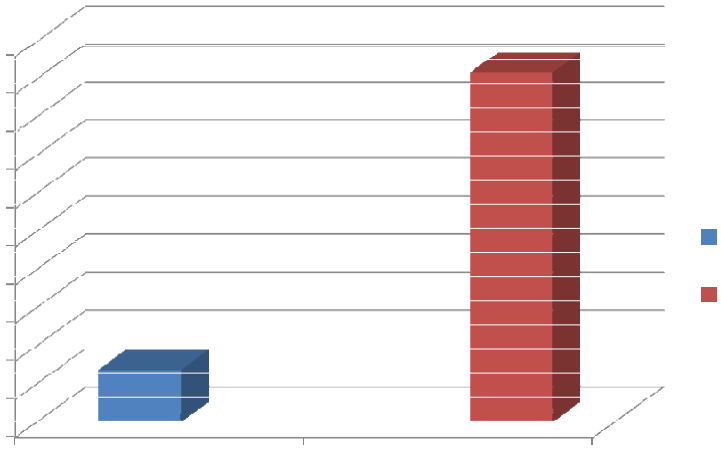

Figure 1. Aetiologic distribution of all neurological diseases.

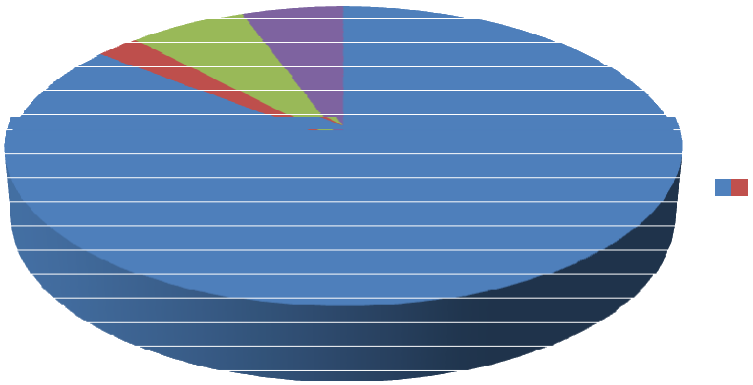

Figure 2. Aetiologic distribution of patients with acquired (non-congenital) diseases.

et al., 2007).

The incidence and effects of trauma have decreased in some developed countries where appropriate traffic programmes and laws have been implemented, unlike in most developing countries (Adeolu et al., 2005; Falope, 1991).

In our centre, which is one of Nigeria's new neurosurgical centres (services were commenced in April 2006), we undertook a 30-month retrospective study of neurotrauma patients to evaluate the etiological patterns and thus, ascertain the impact of motorcycles, the most common mode of intra-city commuting in South-East Nigeria.

PATIENTS AND METHODS

This is a retrospective study of all consecutive neurotrauma patients from 21st April, 2006 to 20th October, 2008 (the first 30 months of service). The demographic data, etiologies and diagnoses were collected from the case notes with a structured proforma completed for each patient. Simple analysis of the data collated was subsequently done. Our locality, Nnewi, is a commercial town populated mostly by traders of machineries and accessories, with many bad road networks, necessitating the preferential use of motorcycles for commuting on account of high maintenance cost and difficult mobility with motor vehicles, due to the difficult terrain.

RESULTS

There were 1055 neurosurgery cases in our centre within the study period, with 138 congenital anomalies and 917 acquired diseases (Figure 1) . Amongst those with acquired diseases, 785 (85.6%) were traumatic, 22 (2.4%) infective, 59 (6.4%) neoplastic, and 51 (5.6%) were degenerative (Figure 2). Majority of the neurotrauma cases, 748 (95.3%), had complete records with the remaining 37 (4.7%) patients excluded from the study because of incomplete records. The age distribution was 0-15years 144 (19.2%), >15-40 years 376 (50.30%), >40-60 years 148 (19.8%), and >60 years 80 (10.7%) as shown in

Table 1. Age distribution of neurotrauma cases.

Age (yrs)	Number	Percentage (%)
0-15	144	19.2
>15-40	376	50.3
>40-60	148	19.8
> 60	80	10.7
Total	748	100

Table 1. Majority were males 569 (76.1%) with a male : female ratio of 3.2:1(Figure 3), and there were 658 (88%) cases of isolated head injury, and 61 (8.1%) cases of isolated spinal injury, giving a head:spinal injury ratio of 10.8:1. The rest, 29 (3.9%), were cases of concomitant head and spinal injuries.

Most cases in this study were from RTA 537 (71.8%), whereas falls accounted for 120 (16.0%), assaults 47 (6.3%), missiles 20 (2.7%), falling objects 11 (1.5%), acceleration/deceleration injuries 7 (0.9%), sports/recreational activities 3 (0.4%) and birth trauma 3 (0.4%) (Table 2). Amongst the 537 cases of RTA, 367 (68.3%) were from motorcycles, 169 (31.5%) motor vehicles and 1 (0.2%) from bicycle road traffic accident, resulting in a motorcycle : motor vehicle ratio of 2.2:1 (Figure 4). None of the motorcycle victims, as usual, wore a protective helmet at the time of the accident (Figure 5).

Most of the isolated head injured cases 487 (65%), spinal injuries 53 (7%) and concomitant head and spinal injuries 19 (2.5%) were treated non-operatively; all cases of skull traction with Gardner -Wells' tongs were classified as non-operative treatment. Majority of the head injury cases 441 (59%) recovered to normal activities and function. While all cases of complete spinal cord injury 17 (2.3%) did not make any neurological gains from their initial injury, the rest with partial cord injury recovered to various levels of functional gains.

Mortality from head injury was 113 (15.1%), mostly from severe head injuries, that from spinal injury was 13 (1.7%), all from cervical spine injury; whereas the mortality from concomitant spinal and head injuries was 7 (0. 9%), resulting in a combined mortality rate of 17.7% from all neurotrauma cases.

DISCUSSION

The male preponderance and the peak age range in this study correlated with other published reports (Adeolu et al., 2005; Al-Fallouji 1999; CDCP, 2001; Ingebrigsten et al., 1998; Kolenda and Reparon, 1997; Muhammad, 1990; NCHS, 1987). The predominance of head injury in our neurotrauma cases also tallies with the universally reported patterns as head to spinal injury incident ratio in our series was 10.8:1 (Benzel and Larson, 1986; Ingebrigsten et al., 1998; Lindsay et al., 1992). Road traffic accident is the most common cause of neurotrauma as in other reports worldwide. However, in this study, motorcycles accounted for most of these accidents with the incident ratio of 2.2:1, unlike higher incidents from motor vehicles from most other reports. Our locality, Nnewi, is a commercial town with many bad road networks necessitating the preferential use of motorcycles over motor vehicles for commuting on account of high maintenance cost and difficult mobility with the latter, due to the difficult terrain.

Most of the head injury cases were mild injuries 69.3%, which explained the majority of cases with good outcome (67%), though all those that had good outcome were not solely, mildly injured. It is an established fact that the severity of head injury has an inverse relationship to outcome (Al-Fallouji, 1999; Greenberg, 2001). Also, among the cases of spinal injury, all the mortality was among those with cervical spinal injury and all complete injuries did not recover neurological function - both of these occurrences have also been widely reported in literature (IHITFR, 1989; Kemp and Sibert, 1997). The mortality rate of 17.7% was still high and could be related not only to the severity of injuries but also to the sub-optimal care and inadequate facilities obtained in our new centre. With an improvement in these, the expectation is that the mortality rate would progressively decline.

Reasons for increased frequency of motorcycle related neurotrauma in developing communities like ours reported by other workers included bad road networks, careless road use by motorcyclists, poor knowledge of and non- compliance with traffic codes and safety measures such as the use of well fitting crash helmets, inadequate formal training in the use of the motorcycle, and illiteracy. These earlier reports also suggested that overloading of motorcycles (in some instances as many as 4 persons commute on a small motorcycle at the same time, as in Figure 5), use of malfunctioning motorcycle parts, alcohol consumption, absence of road signs and lack of enforcement of traffic laws, have contributed to the increased frequency of this preventable epidemic [Adeolu et al., 2005; Adogu and Ilika, 2006; Kemp and Sibert, 1997; Kolenda and Reparon, 1997).

The government of Nigeria would, therefore, need to ensure that the enforcement of traffic laws, creation of good road networks, appropriate use of protective measures like crash helmets, and traffic enlightenment of motorcyclists, are made an urgent priority. The role of improved manpower and facilities in the hospitals is also paramount. These will significantly reduce the impact of motorcycles on our neurotrauma burden and save a great proportion of our youths from the debilitating premature morbidity and mortality of cranio-spinal trauma.

Conclusion

Neurotrauma from road traffic accidents, affecting mostly

Table 2. Aetiology of neurotrauma.

Aetiology	Number of patients (Percentage)
Road traffic accidents	537(71.8%)
Falls	120(16.0%)
Assaults	47 (6.3%)
Sports/ Recreational activities	3 (0.4%)
Missiles	20 (2.7%)
Falling objects	11 (1.5%)
Birth trauma	3 (0.4%)
Acceleration/Deceleration injuries	7 (0.9%)
Total	748(100.0%)

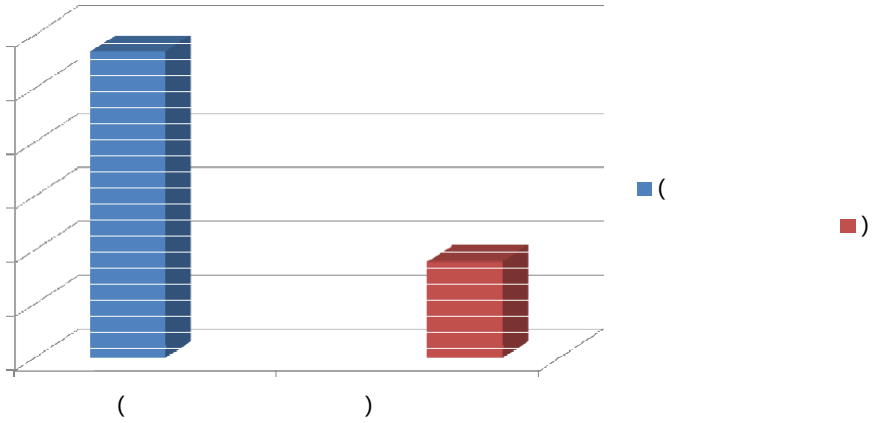

Figure 3. Sex distribution of neurotrauma cases.

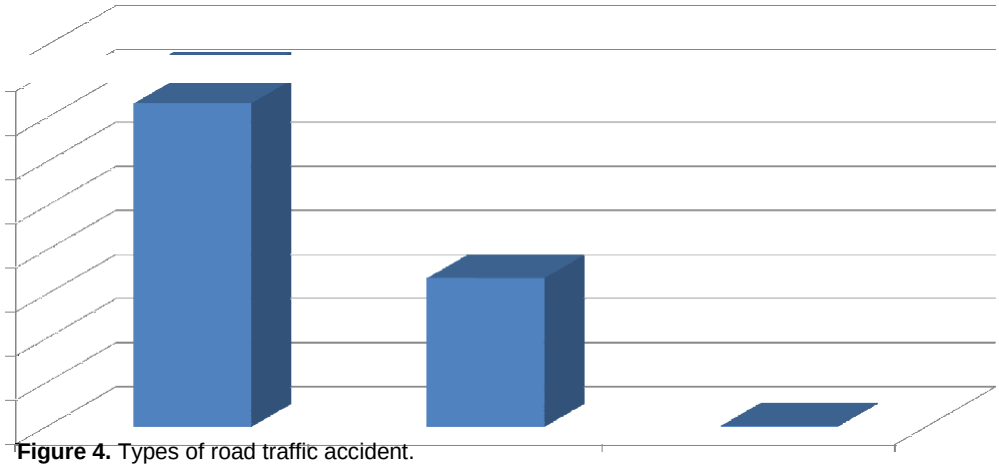

Figure 4. Types of road traffic accident.

young males, was the most common neurosurgical condition seen in our neurosurgical services; and majority of our patients resulted from motorcycle accidents.

Appropriate preventive measures like the use of well fitting crash helmets in addition to construction of good road networks, more stringent enforcement of traffic regulations, education and attitudinal changes of motor-cyclists will significantly reduce the incidence.

Figure 5. Four passengers on a motorcycle on a highway without protective helmets – a typical scenario in South-East Nigeria.

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