

Motorcycle Road Traffic Injuries in Southern Nigeria: The Small Motorcycle as a Prevention Strategy.

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Background: The commonest mode of public transportation in Uyo is by motorcycle. There are two sizes of motorcycle in common use – the big one (Qlink or Skygo model, made in China) and the small one (C90, made in China). The study was carried out to determine if there is a lower risk of RTI severe enough to be brought to the hospital, attributable to using a small motorcycle.

Methods: Motorcycle RTI victims admitted at the Accident and Emergency department of the University of Uyo Teaching Hospital (UUTH), were reviewed prospectively over a 15 month period. Three community visual surveys of the proportion of small to large motorcycles were also conducted.

Results: A total of 131 RTI victims were reviewed over 15 months. The visual surveys of motorcycles in Uyo revealed that the mean proportion of small to large is 38 to 62, a ratio of 1:1.6. Eighty-three (63.3%) of the 131 RTI's involved motorcycles. 74 of these occurred in large motorcycles. There was a statistically significant relationship between motorcycle size and occurrence of an RTI severe enough to be brought to hospital.

Conclusion: There is a lower risk of RTI severe enough to be brought to hospital, from using a small motorcycle.

Introduction

Motorcycle riders have the highest risk of fatal and nonfatal injuries among all types of road users¹, yet they are the predominant means of public transportation in Uyo, the capital city of Akwa-Ibom, a southern Nigerian state. They have the advantage of easy manoeuvrability in traffic; take the rider to his/her specified destination (unlike buses which ply defined routes); are cheaper than taxi's and with increasing unemployment, provide a ready means of quick self-employment. Thus these 'Akaoke', as they are locally called, are here to stay.

The traffic situation is chaotic and poorly regulated, as in other low and medium income countries (LMIC). Several attempts by other states in Nigeria to reduce the high rates of RTI's by enforcing traffic regulations, have failed. Two years ago, Abuja, the capital city of Nigeria, banned motorcycle public transportation completely. The two sizes of motorcycle in use for public transportation are the 'large' and 'small'. The large one has an engine capacity of 125cc or 150cc, while the small one has a capacity of 90cc. Maximum speed for the small is 100km/hr, weight is 87kg; for the large type, the maximum speed is 140 – 150km/hr and weight 107 – 125kg.

There is also the problem of overloading. It is common to find 4 passengers on the large motorcycle or a huge bag of rice with the pillion passenger. These far exceed the maximum safe load and predispose to RTI. The small motorcycle does not have space for such an overload. In addition, the small size cycle has shin guards that may reduce the incidence of leg injury. This is important because the tibia is the commonest long bone fractured in motorcycle RTI². It was observed that the vast majority of RTI victims presenting to the UUTH, had been on a large motorcycle. Thus this study was carried out to determine if there was indeed a lower risk of RTI severe enough to be brought to hospital, from using a small motorcycle.

Studies in the developed world have been undertaken to identify and define the relationship between motorcycle engine capacity and occurrence of motorcycle RTI³. Other authors have identified a link between motorcycle engine capacity and increased fatality risk of a motorcycle crash^{4,5}. There have been varying results, probably because of general adherence to traffic regulations, which may somewhat neutralise the difference between the various motorcycles studied. In an unregulated environment, with added factors of regular overloading, many other variables apart from engine capacity and speed alone, come into effect that affect the relationship between the type of motorcycle and occurrence of an RTI severe enough to be brought to hospital. It was convenient to use size of motorcycle rather than engine capacity, because most RTI victims did not know the engine capacity of the cycles they had used.

The objective of this study was to determine if there is a lower risk of an RTI severe enough to be brought to hospital, with the use of the smaller motorcycle. Thus the null hypothesis (Ho) was that there is no relationship between motorcycle size and the occurrence of an RTI severe enough to be brought to hospital.

Patients and Methods

Information on RTI victims, who presented to the Accident and Emergency Department of the UUTH, from June 2005 to August 2006, was obtained from the patients, eye-witnesses to the event and case records. Data for two months was missed. Three community visual surveys of the proportion of large to small motorcycles in Uyo were carried out at different locations and time of the day. None was done at night because of visibility problems, since there were no street lights. This was done by standing by the roadside and noting the number of small motorcycles in the first 100 motorcycles that pass the observer, going in one direction. The first author carried out two of these surveys and another person carried out the third. Ethical approval was obtained from the hospital Ethical Review Board. No separate approval was obtained from the patients included in this study. In four of the motorcycle injury cases, data on motorcycle size was not obtained and these were excluded from the study. Data analysis was done with STATCALC, an internet software, in the domain of Chi-Squared test for goodness of fit. P value of ≥ 0.05 was accepted as statistically significant.

Results

There were 127 RTI victims reviewed from June 2005 to August 2006 including 92 males and 39 females, a male to female ratio of 2.4:1. The age range was from 4 to 65 years, with a median of 28 years. There were 79 patients on motorcycles i.e. 62.2%. 74 involved large motorcycles and 5 involved small motorcycles i.e. 93.6% and 6.4% respectively. The visual survey of motorcycle sizes in Uyo revealed 39 small motorcycles twice and 37 once, in the 3 sets of 100 motorcycles surveyed. The mean proportion of small to large is 38.3 small to 61.7 large in each 100, approximately 38 to 62, a ratio of 1:1.6. Thus in 79 motorcycle crash cases it is expected that 30 of them should have involved small and 79 involve large motorcycles, assuming that the same factors impact on both types of motorcycle.

Df = 1

$X^2 = 22.94, p < 0.001$

Thus Ho is rejected. and there is a significant relationship between motorcycle size and the occurrence of an RTI severe enough to be brought to hospital, with increased risk of such an RTI attributable to the large motorcycle.

Discussion

The occurrence of an RTI severe enough to be brought to hospital can be somewhat assumed by the fact of the patient presenting at the hospital. This study did not take injury severity scores into

account, so the severity of the injury on its own cannot be considered. The study did not obtain information on the absolute numbers of small to large motorcycles involved in accidents during the study period and so cannot determine the risk for occurrence of an RTI.

The two sites of observation for this study were chosen because the required data are not reliably kept by public institutions, as obtains in the developed world. Thus using the information from patients presenting to the hospital, on what size of motorcycle they were riding, is a surrogate for absolute data on the number of large and small motorcycles involved in road traffic accidents (RTA), over the period of the study. It should be noted that in 1975 Kraus et al⁶ found only 39% of the data used for their study in California, from official police records. The majority of his data was from hospital records, as in this study. A visual survey in the community, to determine the proportion of small to large motorcycles, is in lieu of finding out how many small and large motorcycles plied the roads. The results of the visual survey were taken as representative, because the figures obtained were similar, despite varying sites and time of the day, in the same town.

The use of Chi-squared test for goodness of fit requires that all things be equal. For this study, it was assumed that the same factors affected both the occurrence of RTI on either small or large motorcycles and the presentation of more severe injuries at the only hospital in the state capable of handling severe injuries.

The reason why only these two sizes are available for public transportation in the state may be related to the current trend to use the larger, faster, roomier bike and the lower cost of purchase from eastern countries - South Korea and China. The increased speed and more space for excess load may explain why the less durable but more expensive large cycle, is much more common. Kraus et al⁶ found that the risk of motorcycle injury was not related to motorcycle make, but to engine size. However, the size of the motorcycle was not taken into account. Larsen⁷ noted that there was a statistically significant relationship between the occurrence of a fatal motorcycle crash and use of a larger engine capacity motorcycle. 50% of the motorcycles involved in Larsen's study had a capacity above 560cc.

The threshold engine capacity for risk of a fatal crash was not specified, but both Yannis⁴ and Bradbury⁸ place this threshold at about 750cc. Langley et al⁹ specified that the threshold engine capacity above which the risk of motorcycle RTI increased by 50%, was 250cc. However, they note that there was no linear relationship between RTI and engine capacity, above 250cc. Thus the threshold engine capacity varies with the prevailing circumstances and other factors like the weight of the motorcycle. Langley⁹ noted that engine power and weight considerations together, may have greater import than engine capacity alone. This study amplifies this concept by using the motorcycle size in this environment, as the main discriminator and thus considering specifics about the motorcycle (engine capacity, speed, weight etc) together with the way it is used (overloading) in an unregulated environment. In this environment, it is likely that all these factors combine to make the smaller cycle the safer one.

It has already been noted that in developing countries, pedestrians, car passengers and motorcyclists combined account for about 90% of deaths due to RTI¹⁰. Innovative measures are needed to help tackle this 'neglected epidemic'¹¹, as reliance on regulations has been found to fail in a yet to be regulated environment¹⁰. Adopting a policy of using the small motorcycle for public transportation is likely to help critically reduce the occurrence of more severe types of motorcycle RTI.

Conclusion

Use of the small motorcycle in Uyo, has a lower risk of RTI severe enough to be brought to hospital. Further studies are required to determine the factors responsible for this finding.

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