

Injury Severity among Non-Fatal Children and Adults related to Motorcycle Crashes

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I. INTRODUCTION

Motorcyclists account for a high proportion of deaths and serious injuries, with motorcyclist fatalities being three times higher compared to passenger car fatalities, six times higher than pedestrian fatalities and nearly 50 times higher than bus passenger fatalities [1]. In Malaysia, the statutory minimum age for possessing a motorcycle licence is 16 years, but underage children often ride motorcycles and become involved in collisions. When child motorcyclists are involved in a road traffic crash, there is a high risk of injury to rider and pillion [2]. Alongside this, children start to travel pillion on motorcycles at an early age as motorcycles are commonly family vehicles in ASEAN countries, especially in Malaysia. Children will either be seated behind the rider or, alternatively, in front of the rider, a position that is hazardous to them. This paper presents a comparison of the severity of adult and child injuries in motorcycle crashes.

II. METHODS

Data were collected retrospectively from closed files of the third-party bodily injury (TPBI) insurance claims database for the period 2013–2015. A systematic random sampling technique was used to select the cases due to the large sampling frame. Out of the available and archived 7,542 TPBI claims from 2013 to 2015, a total of 910 non-fatal adult motorcyclists and 198 non-fatal child motorcyclists were identified and analysed. For the purpose of this analysis, child motorcyclists were defined as those aged 17 or under and adult motorcyclists were defined as those aged 18 or over. Injury information was retrieved from the medical reports provided in the TPBI database. Abbreviated Injury Scale (AIS) was used for the injury scoring system. The AIS scores between the adults and children were compared in order to determine which group suffered more severe injuries. New Injury Severity Score (NISS) was calculated in assessing the severity score of multiple injuries sustained by the motorcyclist. Statistical analysis was performed with chi-square test, logistic regression analysis and Kruskal-Wallis test using SPSS, version 20.

III. INITIAL FINDINGS

Of the 1,108 non-fatal motorcyclists who were involved in crashes and known to have made bodily injury claims, 17.9% were in the children group (with a median age was 14 (range: 1–17 years)), compared with 82.1% in the adult group (median age of 27 (range: 18–83 years)). Prevalence of injury distribution among children and adults by body region is shown in Fig. 1. The injury pattern among children and adult according to body region is quite similar where lower limb is the highest followed by upper limb, head/neck and face. However, injury pattern of thorax and abdomen region is differ from children and adult where percentage of thorax region is higher (4.3%) than abdomen region (1.3%) among adult motorcyclists. Meanwhile child motorcyclists show an increase percentage on abdomen region (1.8%) compared to thorax region (1.5%). The distribution was statistically significant ($p=0.016$). Fig. 2 shows no major or significant difference on the injuries severity comparative percentages of AIS1-2 between children and adults in each body region.

Lower limb injury was dominant for AIS \geq 3 for both groups, as shown in Fig. 3, and the difference was statistically significant ($p<0.001$). It shows that children riding motorcycles are highly likely to have serious injuries at lower limb region compared to adult riders (OR=2.62; (95% CI) = 1.80-3.82). On the other hand, adult motorcyclists are more likely to sustain serious injuries at thorax region compared to children (OR=1.14; (95% CI) = 0.19-6.65), but this difference is not statistically significant ($p=0.89$). The NISS differences for stratified age groups of motorcyclists is shown in Table I. The median NISS for adult is 5 (IQR, 3–9) and for children is 6 (IQR, 3–11). Additionally, the median NISS for age group 10–14 years was the highest compared to others with 11 (IQR, 2.25–13), and the differences is statistically significant ($p=0.007$).

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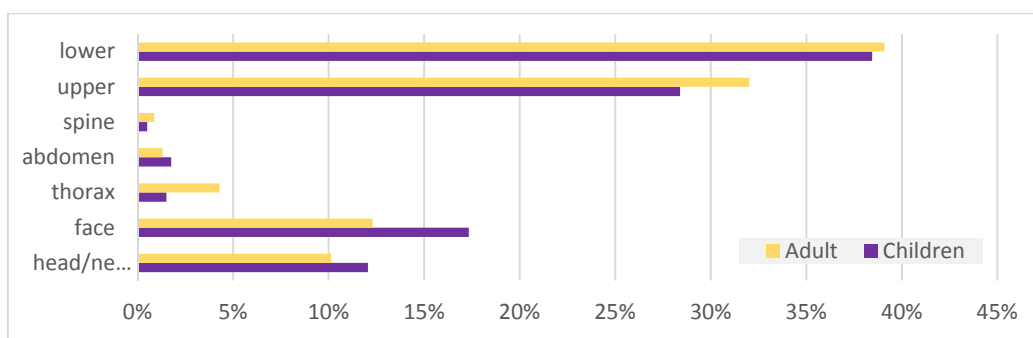


Fig. 1. Body region of principal diagnosis.

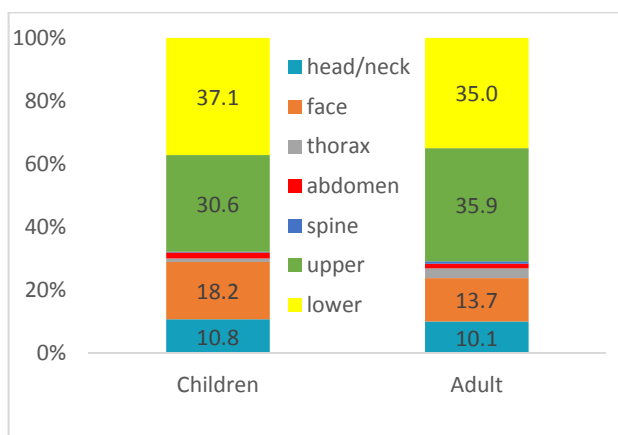


Fig. 2. Distribution of injury severity (AIS1-2) by body region.

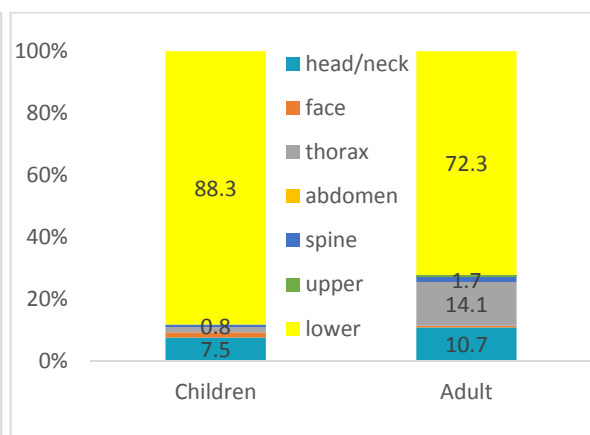


Fig. 3. Distribution of injury severity (AIS≥3) by body region.

TABLE I

MEDIAN AND INTERQUARTILE RANGE OF NISS IN DIFFERENT AGE GROUPS

Age group	Total (n=1108)	≤9 (n=15)	10-14 (n=36)	15-17 (n=147)	≥18 (n=910)
NISS: Median (IQR)	5 (3–9)	3 (2–5)	11 (2.25–13)	6 (3–11)	5 (3–9)

IV. DISCUSSION

In order to plan good intervention and prevent road traffic injuries, it is essential to obtain accurate information on crashes and the characteristics of injured victims. It is not within the scope of this study to address either the risk of sustaining injuries or the factors contributing to the crashes that result in the injuries for both age groups. The focus of this study is to provide information on injury patterns among non-fatal motorcycle victims sustained in different age groups, especially for children, as children are at greatest risk of a road traffic injury. Lower limb injuries are common injuries observed for motorcyclists in non-fatal crashes [4]. This study arrived at the same result, yet the study shows that lower limb injuries are more severe among children. In addition, the study showed that, in road traffic safety work, more attention should be paid to children aged 10–14 years as a pattern of serious injury (high NISS) was observed among that age group. By using appropriate safety measures, injury can be minimised. However, children and adults exhibit huge differences in anthropometric qualities. A proper and standard safety feature needs to be designed appropriate to the body size of children, or else they will be exposed to additional risk. Without such a comparison of age groups, it will be difficult to design adequate interventions and, equally important, to monitor and evaluate their effectiveness.

V. REFERENCES

[1] Abdul Manan, M.M. and Varhelyi, A. *IATSS*, 2012.
 [2] Peden, M. *et al.* *World Report on Child Injury Prevention*. Geneva: World Health Organization, 2008.
 [3] Noor Faradila, P. *et al.* *AJBAS*, 2014.
 [4] Mohan, D., *Safety of Children as Motorcycle Passengers*. Indian Institute of Technology, Delhi, 2009.