

Injury Severities among Riders and Pillion Riders in Non-Fatal Crashes in Malaysia

Zarir Hafiz Zulkipli, Siti Atiqah Mohd Faudzi, Sharifah Nur Hanis Syed Noh*

I. INTRODUCTION

A study in Malaysia shows that in the past decade, over 25,000 people were injured and more than 6,000 people were killed annually in road crashes [1-2]. Motorcyclists are the majority group to sustain these injuries and fatalities compared with others road users. As the motorcycle became the most popular transport used by people, due to the high cost of living nowadays, the rate for motorcycle fatalities has climbed up into three times higher than that for car fatalities [2]. In addition, the number of persons on the motorcycles at the time of collision could affect the level of injuries sustained by riders and pillions. Accidents tend to be worse where the rider carries more than one pillion passenger [3]. For those riders who take on pillions, it is more difficult to handle and stabilise the motorcycle due to the resulting increased inertia [3]. This paper presents a comparison of severity between matched pairs of riders' and pillions' injuries in motorcycle crashes on Malaysia's roads.

II. METHODS

The data used in this study was based on closed files of third-party bodily injury insurance (TPBI) claims collected from the database of an insurance company in Malaysia. Data regarding demographics, crash narratives and injury data were retrieved from various sources, such as police reports, adjuster reports, medical reports and opinion reports available in the selected cases. The cases selected for this study comprise riders who brought pillions (matched study) on the same type of motorcycle between 2013 and 2015. Out of the available insurance cases listed, 171 matched pairs of motorcyclists and their pillions were identified for the study. For the purpose of this analysis, child motorcyclists were defined as those aged 17 or under; adult motorcyclists were defined as aged 18 or over. We considered six modes of crash configuration: motorcycle front crash into the rear of other vehicle (Mrear); motorcycle front crash into other vehicle front (Head-on); motorcycle front crash into the side of the other vehicle (Mside); motorcycle sideswipe other vehicle (Sideswipe); other vehicle crash into the side of the motorcycle (Vside); and other vehicle crashing into the rear of the motorcycle (Vrear). The scoring system used includes the Abbreviated Injury Scale (AIS) and the Injury Severity Score (ISS). The scores between the riders and pillions of the matched pairs were compared, and the ISS was used to determine the outcome, namely which position gives rise to the most severe injuries. Statistical analysis was performed with chi-square test and Kruskal-Wallis test using SPSS, version 20.

III. INITIAL FINDINGS

Among the matched pairs, 94% (n=161) consist of rider with one pillion; the remaining 6% comprise rider with two or three pillions. The percentage of male riders with male pillion was the highest, followed by male rider with female pillion. The most common crash type was motorcycle colliding with sides of car (Mside). However, head-on crashes were found to be more severe to both rider and pillion as its ISS median and the range are higher than other modes of crash configurations (Table I). Also, there was statistical difference in the ISS between riders and pillions for head-on crashes, indicating that in these crash types riders suffered more serious injuries than pillions. Based on the ISS results in Table I, the ISS for male rider with male pillion was higher compared to male rider with female pillion. In terms of the effect of age on injury severity, the ISS for rider and pillion was significantly higher than other categories if the riders were children. The majority of the accidents occurred at a junction, however the ISS were higher for riders and pillions when the crash occurred at the mid-block.

* Z. H. Zulkipli and S. A. Mohd Faudzi are Research Officers at Malaysian Institute of Road Safety Research (MIROS) (Tel: +603 8924 9200, e-mail: zarirhafiz@miros.gov.my). S. N.H. Syed Noh is a final year student at Faculty of Computer & Mathematical Science, Universiti Teknologi MARA, Malaysia.

TABLE I
DEMOGRAPHIC AND COMPARISON BETWEEN RIDER AND PILLION

		No. of pairs	%	ISS, Median (IQR)	
				Rider	Pillion
Pillion	1 rider and 1 pillion	161	94%	4.5 (1-9)	3 (1-5)
	1 rider and 2 pillions	9	5%	5 (1-8)	–
	1 rider and 3 pillions	1	1%	5 (5)	–
Gender	Male rider and female pillion	60	37%	3 (1-5)	2 (1.5-5.25)
	Male rider and male pillion	71	44%	5 (1-9)	4 (1-5)
	Female rider and male pillion	10	6%	5 (1-10)	5 (1-10)
	Female rider and female pillion	20	12%	4 (1-5)	1 (1-4.5)
Age	Adult rider and child pillion	19	12%	5 (2-10)	4.5 (1-10)
	Child rider and adult pillion	4	3%	3.5 (2)	1 (1)
	Adult rider and adult pillion	127	80%	4 (1-5)	2 (1-5)
	Child rider and child pillion	9	6%	12 (7.50-20)	19 (9-13)
Crash type	Head-on	26	16.6%	5 (3-11)	5 (1-9.25)
	Mrear	24	15%	4 (1-5)	3 (1-5)
	Mside	68	43%	4 (1-9)	2 (1-5)
	Vrear	11	7%	1 (1-5.5)	4 (1-10)
	Vside	19	12%	5 (1.5-9)	1 (1-9)
	Sideswipe	12	8%	2.5 (1-5.25)	1 (1-5)
Road alignment	Cross junction	15	11%	5 (1-5)	3 (1-9.25)
	Mid-block	52	37%	5 (2-9)	5 (1-10)
	T-junction	71	51%	3.5 (1-5.25)	1 (1-5)
	Merging lanes	1	1%	2 (2)	2 (2)

IV. DISCUSSION

The study found that there was not much difference in injury severity between the riders and pillions, except in the case of head-on crashes, in which riders suffered more severe injuries compared to pillions. The injury severity increases significantly for both riders and pillion riders when the rider is a child. This finding shows that allowing children to ride motorcycles is very dangerous, bringing with it a high risk of severe injury. In addition, there seems to be a gender effect in injury severity. In the matched pairs of male rider and female pillion, a lower ISS was observed compared to matched pairs of male rider and male pillion. One of the limitations of this study is that it only focuses on the population of motorcyclists whose injuries resulted in hospitalisation, leaving out the group where both riders and pillions died in the crash. Nonetheless, this insurance sample is adequate enough to represent the non-fatal cases of real-world crashes because the crash characteristics are similar to other, earlier studies that used different sources of data [1-2]. This study provides useful information in the clinical management of motorcyclists and may have an impact on vehicle insurance policies.

V. REFERENCES

- [1] An International Expert Network and Database on Road Safety Data-5, *Road Safety Annual Report 2014*.
- [2] Abdul Manan, M. M. & Várhelyi, A. *IATSS Research*, 2012.
- [3] Oluwadiya, K. S., Ojo, O. D., Oladiran, O., Mock, C., & Popoola, O. S. 7300, 2015. (<http://doi.org/10.1080/17457300.2014.969280>)