# PREVALENCE OF MOTORCYCLE INJURIES AMONG SCHOOL STUDENTS IN SELANGOR, MALAYSIA.

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#### Abstract

**Aims:** This study is to determine the prevalence and factors associated with motorcycle injuries among late adolescent. **Methods:** This cross sectional study conducted in January 2003 among upper six students from government schools in Selangor, Malaysia. There were 601 self-administered questionnaires distributed to students who were selected through multistage stratified random sampling. **Results:** Response rate in this study was 97.2% (601/618). The respondents were mainly Chinese 282 (46.9%) and female 408 (67.9%). The prevalence of injuries was 8.0%. However the prevalence of injuries among the riders and pillion riders were 18. 8% and 11.6% respectively. Majority of the respondents sustained bruises (4.5%) and ligament sprain (2.0%). Prevalence of injuries were significantly higher among males respondents (OR 3.6, 95% CI 1.9.- 6.6) and Malays (OR 3.3, 95% CI 1.8-5.9). Seventy one percent of the respondents agreed with the mandatory laws on the usage of helmets for motorcyclists. **Conclusion:** Injuries among adolescents were associated with males and Malays.

Key words : Motorcycle injuries, Adolescents, School students, Malaysia

## **1. INTRODUCTION**

Injuries are a leading cause of mortality and morbidity in the world. An estimated 5.8 million people died from injuries in the world in 1998 (Krug,E.G., *et al*, 2000). It is a major public health problem and costly to society in terms of both human suffering and economic loss. In Malaysia (1996), injuries are the third principal cause of death and hospitalization (Epidemiology of Injury in Malaysia, 1997).

Injuries can be divided into unintentional and intentional injuries. Unintentional injuries are injuries that occur without anyone intending that harm be done such as those that result from car crashes, falls, drowning and fires. Where as intentional injuries, injuries judged to have been purposely inflicted, either by another or oneself such as assaults, intentional shootings and stabbings, and suicides (McKenzie, J.F., *et al*, 2002).

Adolescents are among the high-risk group to injury. Approximately 73% of all deaths among adolescents 10 to 19 years of age were caused by an injury (National Centre for Health Statistics, 2000). Motor vehicle crashes are the leading cause of an unintentional injury deaths for all age groups except for persons 80 years of age and older (National Highway Traffic Safety Administration, 2000). In Malaysia, the number of road traffic accidents injuries increases with age and reached its maximum among the adolescents (10 to 19 years of age). Motorcycle riders recorded the highest number of injury cases (55.7%) and pillion riders were 8.9%. Adolescents were among the highest group involved with motorcycle injuries. Superficial injuries (45.2%) were the main nature of injury sustained followed by open wounds (20.4%), contusion (12.1%) and fractures (9.0%) (Epidemiology of Injury in Malaysia, 1997).

Road safety has been one of the national issues in Malaysia. It is important to develop more responsible road users' practice, which should start from young. The purpose of this study was to determine the prevalence of motorcycle injuries among adolescence and the type of injuries. This study also looks into the association between injuries and safety measures used among the motorcycle riders and pillion riders.

#### 2. METHODS

This study was conducted in January 2003. This is a cross sectional study using self-administered questionnaires. The study population consisted of randomly selected 19 years old secondary school students who studied in twelve schools in the state of Selangor, Malaysia. Four districts (Hulu Langat, Klang, Petaling and Gombak) were randomly selected from the nine districts in Selangor to represent the state of Selangor in this study.

The list of schools with upper six students of Selangor served as sampling frame. Six hundred and eighteen secondary school students aged 19 years old were selected based on multistage stratified sampling. Schools were chosen according to the highest number of upper six students and all students from the selected schools were included in the study. Students who were absent on the day of the survey, were excluded from the study. Consent was obtained from the National

and State Education Department prior to the study. The students were gathered in classroom to fill in the questionnaire. They were instructed by one of the researchers. Student's anonymity was protected through confidential conditions.

In this study, validated self administered questionnaire was used, adapted from Motor vehicle Occupant Safety Survey 1998 (Motor Vehicle Occupant Safety Survey, 1998). The questionnaires included questions on respondent's background such as gender, ethnic, number of respondents sustained from motorcycle injuries, type of injuries and safety measures that the respondents used.

Respondents who sustained any form of injuries from riding motorcycle within a year 2003 were considered as having injury whereas usage of helmet during riding motorcycle was the safety measures. The selected factors assessed with outcomes (motorcycle users injuries, riders injuries and pillion riders injuries) were socio demographic profiles and usage of motorcycle helmet.

Data were analysed using Statistical Package for Social Science version 12.0. Frequency and percentage of respondents who sustained injuries, type of injuries and safety measures that the respondents used were analysed. Further analysis involved the calculation of crude odds ratio and the 95% confidence interval for injuries by the selected factors. The estimated odds ratio is considered statistically significant at 0.05 level.

## **3. RESULTS**

Of the 618 students, 601 students were included in the study. This gave a response rate of 97.2%.

#### 3.1 Socio demographic profile

Table I shows the socio demographic profile of the respondents. Four hundred and eight of the respondents (67.9%) were female. Majority of the respondents were Chinese (n=282, 46.9%) followed by Indian (n=156, 26.0%) and Malays (n=154, 25.6%) (Table 1). Thirty one percent of the respondents were from Klang District, 30.3% from Hulu Langat District, 22.3% from Petaling District and 16.1% from Gombak District.

# **3.2 Injuries**

There were 8.0% (n=48) of respondents sustained motorcycle injuries in this study (Table 2). Majority of them sustained bruises (4.5%), Ligament sprain (2.0%), dislocation (1.7%) and muscle sprain (1.7%). Among respondents who sustained the injuries, 18.8% was motorcycle riders and 11.6% was pillion riders (Table 3). Generally motorcycle users injuries have significant association with male (OR 3.6, 95% CI 1.9-6.6) and Malays (OR 3.3, 95% CI 1.8-5.9) (Table 4). Majority of the respondents (70.6%) agreed with the mandatory laws on the usage of helmets for motorcycle users.

#### 3.3 Injuries among motorcycle riders

Males motorcycle riders (26.6%) were more commonly involved compared to female (12.3%). Motorcycle riders injuries have only significant association with male (OR 2.6, 95% CI 1.3-5.1) and safety measures used (OR 2.2, 95% CI 1.1-4.4) (Table 5). Bruises (10.5%) were the main nature of injury sustained followed by ligament sprain (4.6%) and muscle sprain (4.2%) (Table 3).

#### 3.4 Injuries among pillion riders

As for pillion riders, both sexes were involved in pillion injury cases but males were more prevalent (19.7%) as compared to female (7.1%). In this study, Malays (OR 2.3 95% CI 1.2-4.3) and male (OR 3.2 95% CI 1.7-6.2) have significant association with pillion riders injuries (Table 6). Like motorcycle riders, pillion riders also sustained bruises (6.7%), ligament sprain (3.0%) and muscle sprain (2.7%) as the main nature of injury sustained (Table 3).

## 4. DISCUSSION

Our findings indicate that the prevalence of motorcycle injuries among upper six students in the state of Selangor, Malaysia is 8.0%. It is much lower than the national data on the injuries in all age groups (16.7%) because the samples used for the current research study were late adolescents. National data also showed that 55.7% of the injuries occurred among the riders and 8.9% among the pillion riders (Second National Health and Morbidity Survey, 1997). This study showed that prevalence of injuries among riders was 18.8% and 11.6% among pillion riders but it is difficult to compare with the local study since not many studies particularly in this age group. However the number of motor vehicle injury cases was gradually increased with age and reached its maximum that was 31.0% among the adolescents (Epidemiology of Injury in Malaysia, 1997)

This study found that male adolescents have higher prevalence of injuries in riders as well as pillion riders compared to female. The study done by Injury Prevention and Control Unit, Ministry of Health Malaysia (1997) also showed that males motorcycle riders (87.0%) and males' pillion riders (60.6%) were more commonly involved as compared to female. Another study done among children and adolescents in Sweden also indicated that motorcycle injuries were more common among males (63%) than females (Brownell, M., *et al*, 2002)

The most common injuries sustained among motorcycle users in this study were bruises, ligament sprain, muscle sprain and dislocation. However in the national study done in Malaysia (1997) also revealed that superficial injuries (41.1%) was among the commonest (Epidemiology of Injury in Malaysia,1997). As study done in patients injured in road traffic accidents included in Israeli National Trauma Registry revealed that most of the motorcyclists' injuries involved extremities (47%) and only 10% had head injury Daniel, L.A., *et al*, 2003)

In our study motorcycle injuries were found higher among students using helmet. However we did not investigate on the proper usage of the helmet. Another study reported 66% reduction in total brain injury among those using helmet (Sood, S., 1988). We did not obtain any cases of head

injuries in this study as most of the respondents reported superficial injuries such as bruises, ligament sprains, muscle sprains and dislocation.

In conclusion, prevalence of motorcycle users injury in this study was 8.0%, and 18.8% and 11.6% for riders and pillion riders respectively. Motorcycle riders were significantly associated with male and usage of motorcycle helmet, whereas pillion riders injuries were significantly associated with males and Malays.

The study findings reflect the situation of this group of adolescent at the time the study was conducted. This sample did not include the out school adolescent population, thus a community based study is recommended to get a full picture of adolescents motor vehicle users injury. Since all data are based on self-report, potential bias from over and under reporting of the respondents is expected.

This study has important implications for health education and promotion program for the adolescents. School health team may play an important role in the prevention of injuries among adolescents by educating them individually and also the parents. Collaboration and support from the Ministry of Education and other organizations such as youth clubs are also essential.

#### ACKNOWLEDGEMENTS

This study was funded by the Fundamental Grant of University Putra Malaysia, project number: 04-08-02-0049F. The authors would like to thank the Ministry of Education for consenting to this study. Our gratitude also goes to Ms Fadhillah Jailani, for her assistance in this project. The authors also record their appreciation to the schools and students who had participated in this study.

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Socio demographic profile	n	%
Gender		
Male	193	32.1
Female	408	67.9
Ethnicity		
Chinese	282	46.9
Indian	156	26.0
Malay	154	25.6
Others	9	1.5

Table	1. Socio	Demographie	c Profile o	of Responder	nts (n=601).
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Table 2. Number and Percentage of Injuries Sustained by Respondents (n=601).

Injuries	n	%
Yes	48	8.0
No	553	92.0

# Table 3. Types of Injuries Sustained by All Respondents (n=601), Riders (n=239) and Pillion riders (n=371)

Types	All respondents	Riders	Pillion riders
	n (%)	n (%)	n (%)
Bruises	27 (4.5)	25 (10.5)	25 (6.7)
Ligament sprain	12 (2.0)	11 (4.6)	11 (3.0)
Muscle sprain	10 (1.7)	10 (4.2)	10 (2.7)
Dislocation	10(1.7)	9 (3.8)	9 (2.4)
Puncture wound	6 (1.0)	6 (2.5)	6 (1.6)

Socio demographic factors	Injuries n (%)	No Injuries n (%)	Crude OR 95% CI
Gender			
Male	29 (60.4)	164 (29.7%)	*3.6 (1.9-6.6)
(Female)	19 (39.6)	389 (70.3%)	
Race			
Malay	24 (50.0%)	130 (23.5%)	*3.3 (1.8-5.9)
(Non Malay)	24 (50.0%)	423 (76.5%)	

Table 4. Crude Odds Ratio and 95% Confidence Intervals for Motorcycle Users Injuries by Gender and Race (n=601)

\*Significant p<0.05

Table 5. Crude Odds Ratio and 95% Confidence Intervals for Motorcycle Riders Injuries by Gender, Race and Usage of Safety Measures (n=239)

Socio demographic factors	Injuries n (%)	No Injuries n (%)	Crude OR 95% CI
Gender			
Male	29 (64.4)	80 (41.2)	*2.6 (1.3 – 5.1)
(Female)	16 (35.6)	114 (58.8)	
Race			
Malay	22 (48.9)	72 (37.1)	1.6(0.8 - 3.1)
(Non Malay)	23 (51.1)	122 (62.9)	
Usage of safety measures			
Yes	16 (35.6)	39 (20.1)	*2.2 (1.1-4.4)
(No)	29 (64.4)	155 (79.9)	、 <i>,</i> ,

\*Significant p<0.05

Socio demographic	Injuries	No Injuries	Crude OR 95% CI
factors	n (%)	n (%)	
Gender			
Male	26 (60.5)	106 (32.3)	*3.2 (1.7 – 6.2)
(Female)	17 (39.5)	222 (67.7)	
Race			
Malay	23 (53.5)	110 (33.5)	*2.3 (1.2 – 4.3)
(Non Malay)	20 (46.5)	218 (66.5)	
Usage of safety			
measures			
Yes	17 (39.5)	109 (33.2)	1.3(0.7-2.5)
(No)	26 (60.5)	219 (66.8)	
*Significant p<0.05			

Table 6. Crude Odds Ratio and 95% Confidence Intervals for Pillion Riders Injuries by Gender,Race and Usage of Safety Measures (n=371)