ORIGINAL ARTICLE

Compliance of Proper Safety Helmet Usage in Motorcyclists

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Summary

Motorcyclists make up the largest group of fatalities on Malaysian roads, majority succumbing to head injuries despite the compulsory safety helmet laws in the country. One possible reason for this high fatality is improper usage of safety helmets. This study examines the compliance of proper safety helmet use in motorcyclists in a typical Malaysian town. Five hundred motorcyclists were studied. Only 54.4% of motorcyclists used helmets properly, 21.4% used them improperly; and 24.2% did not wear helmets. Six variables were found to be significant in improper safety helmet use. They were age, gender, race, formal education level, prior accident experience and type of license held. Marital status and riding experience were not significant. Efforts promoting proper use of safety helmets should focus on the young, male, less formally educated, unlicensed rider, who has had a prior accident.

Key Words: Motorcyclists, Crash helmets compliance

Introduction

Motorcycles represent half (51%) of the total vehicles registered in Malaysia and is the main mode of transport used by commuters[1]. Motorcyclists formed 49.2% of all reported accident cases and 67.7% of all road casualties in 1997 (Table I). Motorcycle accident fatalities represent 59.7% of all road fatalities. This is disproportionately high. The leading cause of death is *head injuries*, which accounted for 49.2% of all motorcycle fatalities in 1997 (Table II). The wearing of safety helmets could reduce severity of head injuries[2]. Although the authorities in Malaysia have enforced safety helmet regulations since 1971, there still is an alarmingly high rate of fatalities due to head injuries. One possible factor is improper wearing of safety helmets. This study profiles characteristics of motorcyclists towards proper safety helmet wearing in an attempt to identify individuals who represent a high risk; and subsequently be targeted for campaigns in an attempt to reduce the fatality rate of motorcyclists.

Materials and Methods

Kajang, Selangor was selected as the area for study, as this town was typical of most Malaysian towns; and had the highest number of accidents in Selangor for 1996. Five hundred consecutive motorcyclists were interviewed prospectively by an investigator who recorded the responses on a proforma sheet. Eight locations (*parking lots*) were chosen, both urban and rural; and on weekdays and weekends. A properly used safety helmet was defined as a helmet which was worn with the strap correctly fastened; and compliance was deemed to be present when the rider was wearing his helmet correctly. The responses were analysed with chi-squared test using SPSS v7.5 and statistical significance was determined at $p<0.05$.

Table I
Number of Deaths and Casualties by Type of Road User - 1997

Road Users	Fatalities	%	Casualties	%
Pedestrian	763	12.1	5054	8.9
Cyclist	251	4.0	2521	4.5
Car Driver	447	7.1	4086	7.2
Lorry Driver	196	3.1	1060	1.9
Taxi / Bus Driver	21	0.3	180	0.3
Motorcyclist	760	59.7	38317	67.7
Passenger	591	9.4	3416	6.1
Others	273	4.3	1940	3.4
Total	6302	100	56574	100

(Source: PDRM, 1997)

Table II
Motorcyclist Fatalities by Part of Body Injured

Part of Body	Fatalities	Percentage (%)
Head	1766	49.2
Neck	95	2.6
Chest	256	7.1
Arms	17	0.5
Back	14	0.4
Hips	23	0.6
Legs	50	1.4
Multiple	1371	38.2
Total	3592	100

(Source: PDRM, 1997)

Table III
Proper Usage of Crash Helmet and Age

Age (years)	Improperly Used	Properly Used	Total
Below 20	76 (62.8%)	45 (37.2%)	121 (100%)
21 - 25	62 (40.8%)	90 (59.2%)	152 (100%)
26 - 30	32 (32.7%)	66 (67.3%)	98 (100%)
31 - 35	33 (52.4%)	30 (47.6%)	63 (100%)
36 - 40	18 (45%)	22 (55.0%)	40 (100%)
>40	8 (30.8%)	18 (69.2%)	26 (100%)

(x^2=25.94, df=5, p<0.001)

Table IV
Proper Usage of Crash Helmet and Gender

Gender	Improperly Used	Properly Used	Total
Male	179 (49.9%)	180 (50.1%)	359 (100%)
Female	50 (35.5%)	91 (64.5%)	141 (100%)

(x^2=8.456,df =1, p<0.01)

Results

Eight variables (age, gender, race, marital status, education level, type of license, riding experience and prior accident experience) were studied.

Age

Only 37.2% of riders below 20 years of age used helmets properly. This contrasts with 69.2% of riders above age 40 who used helmets properly (Table III). Age and proper use was statistically significant at p<0.001.

Gender

Sixty five percent of female motorcyclists properly used their helmets compared to 50.1% of males. This is statistically significant at p<0.01 (Table IV).

Race

The proper usage of safety helmets were mostly seen in Chinese riders (70.7%), followed by Malay riders (52.8%), and least compliance was seen in Indian riders (39.7%) (Table V). This is significant at $p<0.001$.

Marital status

There was no difference in proper safety helmet usage practice in single or married riders ($p>0.05$) (Table VI).

Education level

Riders with tertiary level education were most compliant (63.9%), followed by riders with secondary level education (46.6%). Least compliant were riders with primary level education (28.6%) (Table VII). This is significant at $p<0.001$.

License type

Riders with no licences had a compliance of proper helmet usage of 29.8%. Probation and Full license holders had a compliance rate of 58.5% and 58.4% respectively. Learner license holders had a compliance rate of 50.0%; this is significant at $p<0.001$ (TableVIII).

Table V
Proper Usage of Crash Helmet and Race

Race	Improperly Used	Properly Used	Total
Malay	158 (47.2%)	177 (52.8%)	335 (100%)
Chinese	27 (29.3%)	65 (70.7%)	92 (100%)
Indian	44 (60.3%)	29 (39.7%)	73 (100%)

($x^2=16.443$, df=2, $p<0.001$)

Table VI
Proper Usage of Crash Helmet and Marital Status

Status	Improperly Used	Properly Used	Total
Single	166 (45.9%)	196 (54.1%)	362 (100%)
Married	63 (45.7%)	75 (54.3%)	138 (100%)

($x^2=0.002$, df=1, $p>0.05$)

Riding experience

Helmet compliance level was low among young riders with riding experience below 1 year (40.6%). Otherwise there was no significant difference between less than 1 year up to 15 years riding experience ($p>0.05$) (Table IX).

Table VII
Proper Usage of Crash Helmet and Formal Education Level

Education Level	Improperly Used	Properly Used	Total
Primary	10 (71.4%)	4 (28.6%)	14 (100%)
Secondary	135 (53.4%)	118 (46.6%)	253 (100%)
Tertiary	84 (36.1%)	149 (63.9%)	233 (100%)

($x^2=18.449$, df=2, $p<0.001$)

Table VIII
Proper Usage of Crash Helmet and License Type

License Type	Improperly Used	Properly Used	Total
None	40 (70.2%)	17 (29.8%)	57 (100%)
Learner's	29 (50.0%)	29 (50.0%)	58 (100%)
Probation	27 (41.5%)	38 (58.5%)	65 (100%)
Full	133 (41.6%)	187 (58.4%)	320 (100%)

($x^2 = 16.846$, df = 3, $p<0.001$)

Table IX
Proper Usage of Crash Helmet and Prior Riding Experiences

Riding Experiences (year)	Not Properly Used	Properly Used	Total
Below 1	19 (59.4%)	13 (40.6%)	32 (100%)
1 - 5	93 (45.1%)	113 (54.9%)	206 (100%)
6 - 10	70 (43.2%)	92 (56.8%)	162 (100%)
11 - 15	30 (46.9%)	34 (53.1%)	64 (100%)
Above 15	17 (47.2%)	19 (52.8%)	36 (100%)

($x^2=2.908$, df=4, $p>0.05$)

Table X
Proper Usage of Crash Helmet and Prior Accident Involvement

Accident Involvement	Not Properly Used	Properly Used	Total
No	115 (41.5%)	162 (58.5%)	277 (100%)
Yes	114 (51.1%)	109 (48.9%)	223 (100%)

(χ^2=4.591, df=1, p<0.05)

Prior accident involvement

Riders without prior accident involvement had a higher percentage proper usage of crash helmet (58.5%) compared to those with prior accident experiences (48.9%). This is significant at $p < 0.05$ (Table X).

Discussion

Motorcycle crashes cannot be totally prevented but the resultant head injuries and their severity can be avoided or minimised by protective devices like safety helmets for motorcyclists. To be effective however, these safety helmets must be worn properly[2]. This study looked specifically at compliance of proper safety helmet wearing and the factors related to it. Age and proper wearing of safety helmets have a positive correlation[3,4]. This was seen in our study, and could be due to increased maturity and rationality among older riders.

Female riders used safety helmets more than male riders. This is also seen among bicyclists[4,5]. This trend is also seen in traffic offences, where males are five times more likely to commit offences than females[4,5]. This implies specific behaviour differences between the genders in road habits. Although we report safety helmet compliance differences between ethnic groups which is statistically significant, there is no prior published data on this.

We found no difference in proper usage of safety helmets between single and married riders. However in a related study on motorcyclist's knowledge of road safety, married riders had more knowledge than single riders[6]. Married riders also appeared more concerned on road safety matters[6]. Safety helmet usage increases with increasing level of formal education[3]. Educated motorists also tend to have a significantly lower violation rate compared to the less formally educated group[7]. This is also seen in our study. Generally educated motorcyclists and motorist tend to comply with traffic regulations.

Unlicensed riders have a higher odds ratio of crashing compared to full license holders[8]. Unlicensed motorcyclists are a high-risk group for improper safety helmet wear[3]. We also found low helmet usage among unlicensed riders. This is confirmed by other studies which have shown helmet usage increases as riding experience increases[3]. In our study 34% of beginning riders (below 6 months) used helmets compared to 50% for riders' of 3 years and above.

Motorcyclist with previous traffic offence tend to repeat[9]. Our study shows those with prior accident experiences to have a lower percentage of proper helmet usage. This suggests an attitude and practice issue among motorcyclists.

Conclusion

This study evaluated the compliance of motorcyclists on the proper usage of safety helmets. Six variables were found to be significant in improper safety helmet usage. They are age, gender, race, formal education level, prior accident experiences and type of license held. Marital status and riding experience was not significant. Efforts promoting proper usage of safety helmets should focus on the young, male sex, less formally educated the unlicensed rider, and those who had prior accident experiences.

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