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Original Article

The attitudes of injured motorcyclists about the use of safety helmets based on the health belief model

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Abstract

Introduction: Trauma to the head and the resulting deaths are one of the major health problems in the world. Traffic accidents are the main reason for these traumas in motorcyclists though wearing a helmet can reduce the damage to a great degree. This study aimed to determine the "injured" motorcyclists' attitudes about helmets based on the health belief model.

Methods: This is a cross-sectional and descriptive-analytical study injured motorcyclists who were hospitalized in Shahid Rajaee hospital, Shiraz, were included in the study. Data was collected using a researcher-made questionnaire called "Awareness & Attitude Associated with Motorcycle Traffic Safety". Independent t-test and One-way ANOVA were used to compare the factors affecting attitude and awareness based on the factors in the demographic information form. The significance level was considered ($P< 0.05$).

Results: In this study, 253 participants had a mean age of 30.47± 0.4years. The results of this study showed that in this study 37.5% of the participants were self-employed and 30%, were employees. Moreover, 53.4% had high school education, while 1.2% were illiterate. 50.6% reported it as their first motorcycle accident. Most of the injured patients were vehicle riders70% and 20% of them reported drug abuse. However, none of the factors, including vehicle riders, certification, accident frequency, drug abuse, education, and employment status had a significant effect on the participants' attitudes.

Conclusion: The results of this study showed that the overall mean scores of the health belief model in the participants were not in a favorable level; it was revealed that none of the factors of being a rider, having or not having a certificate, frequency of accidents, drug use, level of education, and employment status significantly influenced the participants' knowledge and attitude. In other words, the patients' attitudes toward helmets were deemed unfavorable.

Keywords: Behavior, Motorcyclists, Traffic Accident, Helmet, Health Belief Models

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Introduction

Road Traffic Accidents (RTAs), especially those of motorcyclists, due to the high level of vulnerability and specific characteristics, are considered a priority for research and intervention (1). Evidence shows that the financial burden of traffic injuries in different parts of the world varies according to the economic, social, and health conditions of countries (2). The overview of global statistics by Ameratunga et Al. suggests that traffic injuries, especially those related to motorcyclists, should be a priority for the World Health Organization (3). This group of riders account for the majority of road and traffic accident victims in developing countries and worldwide (4). Various studies have shown that wearing a helmet can prevent 40% of fatal road injuries and reduce the occurrence of serious non-fatal injuries up to 13% (5, 6). To prove the importance of attention to raising the level of helmet culture among motorcyclists, we can point to the lack of using helmets among at least one-third of motorcyclists worldwide, despite the strict rules in these countries, and it can be concluded that enacting laws alone, even if strictly enforced, cannot lead to maximum use of helmets by motorcyclists (6).

There are various health theories that have been proposed to increase the effectiveness of health education programs (7, 8).

One of these theories is the Health Belief Model, which has been proposed to determine the reasons why people do not take the recommendations and health laws into account to prevent health problems based on personal beliefs (9).

According to this model, if people find themselves at serious risks, they participate in screening and disease prevention measures (10). The Health Belief Model considers behavior as a function of one's knowledge and attitude, and according to its components, it is based on the fact that it causes people to perceive a health threatening factor and adopt a healthy life (10, 11).

Thus, if the individuals' perceptions are changed, they are more likely to follow the recommended health behaviors (11). Given that not wearing a helmet is a health-behavioral problem, it should also be examined through health-behavioral models (12). The aim of this study was to examine the attitudes of hospitalized injured motorcyclists, in relation to the use of helmets, based on the health belief model to assess the injured helmet-free motorcyclists' attitudes and the reasons why they do not use helmets, based on the scope of this model.

Material and Methods

There are various health theories that have been proposed to increase the effectiveness of health education programs (7, 8). One of these theories is the Health Belief Model, which has been proposed to determine the reasons why people do not take the recommendations and health laws into account to prevent health problems based on personal beliefs (9). According to this model, if people find themselves at serious risks, they participate in screening and disease prevention measures (10). The Health Belief Model considers behavior as a function of one's knowledge and attitude, and according to its components, it is based on the fact that it causes people to perceive a health threatening factor and adopt a healthy life (10, 11). Thus, if the individuals' perceptions are changed, they are more likely to follow the recommended health behaviors (11). Given that not wearing a helmet is a health-behavioral problem, it should also be examined through health-behavioral models (12). The aim of this study was to examine the attitudes of hospitalized injured motorcyclists, in relation to the use of helmets, based on the health belief model to assess the injured helmet-free motorcyclists' attitudes and the reasons why they do not use helmets, based on the scope of this model.

$$CVR = \frac{\text{Number of experts selecting the "essential" choice} - \frac{\text{Number of all experts}}{2}}{\frac{\text{Number of all experts}}{2}}$$

$$CVR = \frac{n_E - \frac{N}{2}}{\frac{N}{2}}$$

For the purpose of validating and standardizing the questionnaire, 10 individuals per question were determined as the sample size. Consequently, 200 motorcyclists without helmets completed the questionnaire and Cronbach's alpha was determined. If Cronbach's alpha is above 0.70 the questionnaire considers standard and applies in the

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study (questionnaire attached). In order to fulfill the main purpose of the present study, we analyzed the data using factor analysis to measure the correlation between variables, reduce the data dimension, and determine the number of factors among the components. In this research, factor analysis was performed with exploratory factor analysis approach by principal component analysis.

Twenty-nine questions related to attitudes toward helmet use by motorcyclists were designed in 5 dimensions (perceived sensitivity, perceived severity, perceived benefits, perceived barriers, and guidance to action). The content validity of the questionnaire was confirmed on the basis of the score above 0.57 for 24 questions. The coefficient of Cronbach's Alpha for the 24-item questionnaire "Attitude towards the use of helmets by motorcyclists" was 0.836, which is an acceptable value. Therefore, it seems that the above-mentioned questionnaire had a significant reliability to be considered standard. For determining the main factors influencing attitude and awareness through Principal Component Analysis (PCA) method, first, correlation matrix was performed using Pearson's correlation coefficient.

At this stage, it was indicated that the questions in each domain were significantly related to each other and that the questions in each domain measured the same domain. The following was done for PCA: Pearson's correlation mtrix, KMO (Kaiser-Meyer-Olkin), Bartlett's Test, Total Variance Explained (Eigenvalue), Scree Plot, Communalities, Component Matrix, Rotated Component Matrix, and Component Transformation Matrix.

Independent t-test and One-way ANOVA were used to compare the factors influencing attitude and awareness based on the factors of demographic information form.

Therefore, the questionnaire designed for PCA was appropriate; in the next step, KMO and Bartlett's tests were performed. The KMO test is used to check the number of samples for each variable (question) for PCA. The amount of KMO obtained was 0.8, and the sample size was sufficient. Bartlett's score, which was below 0.05 ($P < 0.0001$), indicated that the correlation matrix with the Identity matrix (a measure that indicates zero correlation between parameters) was significantly different and suitable for PCA. In the next step, PCA was performed on 24 variables (questionnaire items).

Figure 2-4 shows the scree plot of the total variance study based on Eigenvalue, which was above 1 for 8 factors. Out of 24 questions in the questionnaire, 8 assessed the main contextual factors. Therefore, these 8 factors were selected. In the next step, PCA was performed on 24 variables (questionnaire items). Accordingly, Eigenvalue was above 1 for 8 factors. Apparently, the 24 questions of the questionnaire measured 8 main contextual factors. Therefore, these 8 factors were selected. Each value indicates that if multiple regression is performed on the model obtained on the PCA, the selected 8 factors will explain the variance of each question. According to this principle, the value of commonalities must be above 0.4. In the present model, the values of all 24 questions were above 0.4.

Therefore, the 8 selected factors well explain the variance of all 24 questions for determining which question was explained by which of the factors. Accordingly, all questions were related to all factors. Rotation was performed using Varimax rotation to explain each variable (question) by a factor and to have no cross loadings Tables 1 and 2.

Data analysis was performed through SPSS software (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp). Nominal variables at the descriptive level were presented as frequency (percentage) and quantitative variables as mean ± deviation from the criterion. CVR and Cronbach's Alpha were determined, and normality of data distribution was assessed via the Kolmogorov-Smirnov test. Independent t-test and One-way ANOVA were used to compare the factors affecting attitude and awareness based on the factors in the demographic information form. Significance level was considered $P< 0.05$.

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Table 1: Rotated component matrixa to explain factor loading using Varimax.

Variables	Components				
	Perceived sensitivity	**Perceived severity**	**Perceived benefits**	**Perceived barriers**	**Practice guide**
There is no need to use a helmet in quiet streets and driving at low speed	0.142	-0.215	0.264	0.717	0.028
Experienced motorcyclists do not spin, do not turn, and do not go through red lights. So they do not need to use a helmet	0.01	-0.122	0.009	0.819	-0.259
There is a risk of death in motorcycle riders due to not wearing a helmet	-0.042	-0.007	-0.093	-0.220	0.717
Failure to use a helmet leads to disability	-0.524	0.392	0.058	0.134	0.234
Failure to use a helmet leads to head and neck injuries	-0.162	-0.04	-0.107	0.104	0.239
Failure to use a helmet causes injury and high treatment costs	-0.758	0.042	0.175	-0.018	-0.014
Using a helmet is one of the cheapest and best ways to ensure the health of motorcyclists	-0.198	0.504	-0.380	-0.55	0.173
A helmet causes peace of mind to the driver and reduces accidents	-0.590	-0.194	-0.32	-0.460	-0.279
The helmet spreads the contact pressure over a larger area so that the force is not concentrated on a specific area of the skull	-0.378	0.446	-0.97	-0.039	0.231
Wearing a helmet reduces the risk of head injuries about 72%	-0.659	0.329	0.185	-0.138	-0.056
A helmet causes peace of mind to motorcyclists and reduces accidents	-0.132	0.535	-0.212	-0.265	0.038
I respect the traffic rules by wearing a helmet	-0.157	0.791	-0.022	-0.162	-0.082
A helmet reduces visibility while motorcycle driving	0.77	-0.186	0.062	0.156	-0.195
The weight of the helmet is high and cannot be tolerated	0.777	-0.059	0.151	0.194	-0.231
When wearing a helmet, a feeling of heat is created in the head	0.500	-0.233	0.419	-0.023	-0.176
The price of the helmet is high and it is not possible for motorcycle drivers to buy it	0.379	-0.139	0.359	0.135	-0.103
Helmets mess up the hairstyle	0.660	-0.128	0.262	-0.049	-0.004
I get ridiculed with a helmet	0.201	-0.006	0.092	0.141	-0.195
A helmet reduces the motorcyclist's hearing	0.748	-0.100	0.315	-0.084	-0.111
Wearing a helmet is time consuming	0.111	-0.218	0.598	0.212	0.264
People feel suffocated by wearing a helmet	0.039	0.016	0.793	0.122	-0.141
The traffic police fine is effective in using a helmet	0.058	-0.072	0.005	-0.135	0.309
Mass communication media (radio, television) play an effective role in the use of helmets by motorcycle riders	-0.255	0.08	0.012	0.046	0.558
Guidance from friends and family members can be an incentive to use a helmet	-0.091	-0.027	-0.027	0.014	-0.046

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Table 2: Component transformation matrix for showing the lack of cross loadings using Varimax.

Components	Perceived sensitivity	Perceived severity	Perceived benefits	Perceived barriers	Practice guide
Perceived sensitivity	0.806	-0.369	0.295	0.249	-0.207
Perceived severity	-0.498	-0.207	0.522	0.599	-0.123
Perceived benefits	0.079	-0.150	0.189	-0.024	0.710
Perceived barriers	-0.248	-0.462	0.280	-0.298	0.014
Practice guide	-0.029	0.195	-0.181	0.363	0.313

Results

In this study, the analysis was performed on 253 participants with a mean age of 30.47± 0.4, the minimum age being 15 and maximum of 66. With regard to the motorcyclists' job, 37.5% had self-employed, 30% were employees, and 20.9% were students. In addition, the education level of most of the participants was high school diploma (53.4%) and university degree (43.1%). more over 54.5% of the motorcyclists did not have a motorcycle license, and 70% were cyclists. About half of the motorcyclists (50.6%) had their first accident, and 20.6% of them were drug users. Demographic information is presented in detail in Table 3.

Table 3: Demographic information of the participants

Number	253
Age (mean ± standard deviation)	30.47±0.4
Employment status (frequency percentage))	
Unemployed	10 (4%)
manual worker	16(6.3%)
Employee	76 (30%)
Free	95 (37.5%)
student	53 (20.9%)
Incomplete data	3 (1.2%)
Level of Education	
Illiterate	3 (1.2%)
Elementary School	4 (1.6%)
High school	135 (53.4%)
University	109 (43.1%)
Incomplete data	2 (0.8%)
Have a certificate	115 (45.5%)
Accident frequency	
1 Times	128 (50.6%)
2 Times	79 (31.2%)
3 Times	46 (18.2%)
Motorcycle rider	177 (70%)
drug use	52 (20.6%)

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Table 4 presents the average score of each domain and the total score. Based on this result, the mean scores of perceived sensitivity, perceived severity, perceived benefits, perceived barriers, practice guide, and total score were (5.58± 0.91, 5.16 ± 1.54, 7.55 ± 2.02, 21.76 ± 5.10, 3.81± 3.27, and 36.33±7.19) respectively.

Table 4: The average of each domain

	Maximum score possible	Average	Standard deviation	Minimum	Maximum
Perceived sensitivity	6	5.58	0.91	2	6
Perceived severity	12	5.16	1.54	4	10
Perceived benefits	18	7.55	2.02	6	17
Perceived barriers	27	21.76	5.1	9	27
Practice guide	9	3.81	3.27	3	9
Total score	72	36.33	7.19	30	49

There was no significant difference in the total score of the questionnaire in terms of riding (P = 0.74), having a certificate (P = 0.59), frequency of accidents (P = 0.88), drug use (P = 0.05), level of education (P = 0.54), employment status (P = 0.05), and age (P = 0.56; r = -0.03) (Table 5 and Figure 1).

Table 5. Comparison of the total score of the factors affecting attitude and awareness based on demographic information

	Yes	No	p-value
Rider 1	36.62±7.21	35.67 ± 7.12	0.74
Certificate1	36.97 ±7.12	34.94± 6.95	0.99
Drugs1	42.69±3.4	43.72 ± 3.42	0.05
Accident frequency1	**First time**	**Second or third time**	
	36.34 ±7.07	36.3 ±7.32	0.88
Independent t-test, One-way ANOVA			

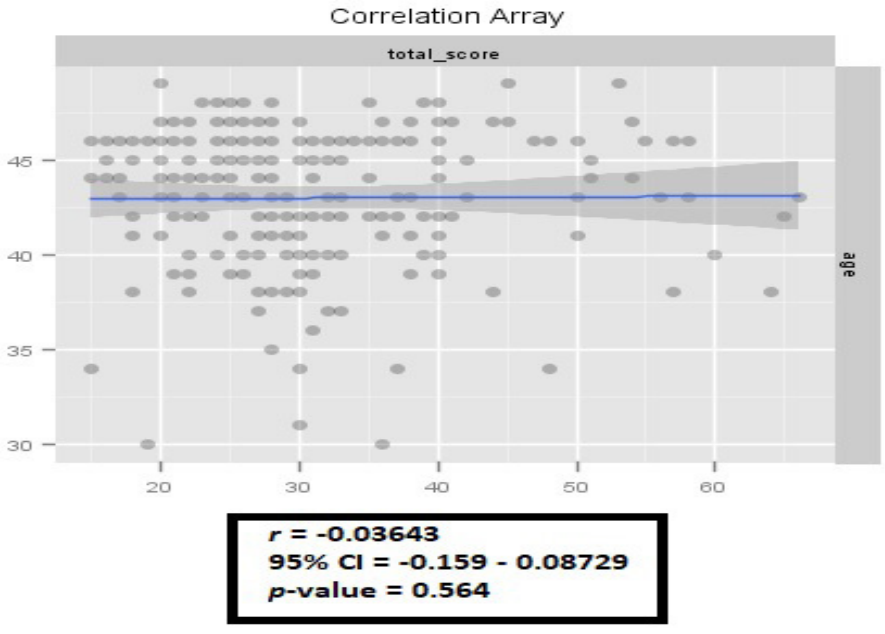

Figure 1. The relationship between age and the total score of the factors affecting attitude and awareness (each point represents a motorcyclist. Bold gray areas represent 95% confidence interval (CI) (95% confidence intervals).

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Discussion

Road accident injuries, especially those of motorcycle accidents, are one of the major overlooked public health challenges that require more focus and effort to prevent them effectively and sustainably (14).

In this study, based on the Pearson correlation test, perceived benefits and perceived barriers were the most important determinants of helmet use, which were consistent with the study conducted by Peden, Dandona, and Laraque (15-18).

The mean age of the patients was 30.47 ±10.4, showing that most of the motorcycle accident induced injuries were those of young people. Given that, in this study, only 4% of patients were unemployed; thus, the above-mentioned issue becomes more pronounced as 67.5% of total patients were employed or freelance patients, so with the temporary or permanent disability of these groups, many working hours will be lost in the departments and economic enterprises, which can lead to irreparable damage to the economy and disrupt the provision of services to the community.

Contrary to Aidoo et al.'s study, a significant number of the injured had a university degree, which can indicate the weakness of educational system of the country, even in academic and university settings in terms of awareness and improving the attitude of people towards safety equipment, especially helmets (19). In the present study, the average use of helmet was 28.2%; yet, most of those who had a history of accidents had not worn helmets at the time of the accident. These findings were consistent with those of some other studies (20-22).

Statistical analysis in this study showed that 54.5% of motorcycle riders were not certified, indicating that those in charge of this field, like other vehicles, should deal with the violations in this area much more seriously to improve the situation in the society. In relation to the number of accidents, similar to the result of the study performed by Aidoo et al., nearly 55% of crashers had no prior experience of a motorcycle accident (19). Although various studies have reported that the use of helmets is more common among motorcyclists than other riders (23).

In the present study, most of the injured were motorcyclists (70% of patients). Findings of this study showed that 20.6% of patients had consumed drugs, which is much higher than the prevalence of drug addiction in the whole community (24). In the present study, the maximum possible score for perceived sensitivity in the questionnaire was 6 and the mean score of participants was 5.58.

The mean obtained for the perceived sensitivity in our study showed that motorcyclists who had the accident, felt sensitive to this phenomenon. This observation may be due to the fact that the patients had the accident shortly before the completion of the questionnaire and were still involved in its consequences at the time of the study; in other words, if this observation was based on their pre-accident awareness, their chances of using helmets would have increased (25).

However, patients were in good condition in terms of the perceived sensitivity structure. The maximum possible score for perceived severity was 12, while the mean score obtained by patients in this ward was 5.16. Perceived severity score indicates the degree to which a person feels threatened (25). The results of this study showed that motorcyclists, who had the accident, did not consider motorcycle-related traffic accidents as a threat to themselves.

The maximum possible score for perceived benefits was 18 and the mean score obtained by patients was 7.55, showing that the participants in this item were not in a significant position. These findings were consistent with those of Oginni et al.' study (2007). In their study, only 20% of the cyclists believed that wearing a helmet during a traffic accident could protect them from head injuries (26). In the present study, the maximum possible score in the construct of perceived barriers was 27 and the average score of the participants was (21.67). This observation indicates that participants, despite their relative belief about reducing the sensitivity and severity of damage in traffic accidents, have a mental picture of possible financial costs, inconvenience, etc. when wearing a helmet, which can eventually cause them not to use helmets. In the study conducted by Bachani et al. (2017), one of the main reasons for

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not wearing a helmet was reported by motorcycle users. In this study, the researchers suggested that this obstacle could be reduced, ultimately leading to more use by motorcycle riders, by increasing the quality of helmets in terms of compliance with the existing standards and paying more attention to the rider's feeling of comfort when using the helmet. (27). In the present study, the maximum possible score for the guide structure was 9, and the average score of the participants was 3.81, which is not very good. In this regard, it is suggested that those in charge of traffic rule education, as well as health authorities, should make better use of the media to further improve the level of public health behaviors (24).

However, the results of this study showed that none of the factors of being a rider, having or not having a certificate, frequency of accidents, drug use, level of education, and employment status significantly influenced the motorcycle riders' knowledge and attitude. These results are significantly different from those reported in other similar studies. For example, in the Aidoo et al.'s study (2018), the education level was introduced as an effective factor in the level of knowledge and attitude about helmets (19). One of the effective factors in the present study can be due to the uni-centrality of this study. Therefore, if we assume that people travel in their residential areas more than they do in other areas, the probability of having accident in the residential areas will be higher than in other places. Therefore, sample collection from only one hospital can cause a large percentage of the samples to be related to the areas near the center and, therefore, close to socioeconomic as well as cultural level, which affects the observations obtained from the study and reduces the effect of the studied factors.

Conclusion

The findings of this study show that in the field of culture and awareness in connection with the use of helmets, more attention should be paid to the issue in schools, especially universities because a large percentage of the victims participating in this study had university education. Also, the capacity of the media and internet-based social networks should be used more and more purposefully in this regard. In general, the use of the health belief model shows that to improve the use of helmets as health behavior, we need to raise the level of awareness and attitude of people, motorcyclists in particular, in the community. In addition, it is suggested that in cooperation with the Ministry of Health and Medical Education, the Ministry of Education, and the Ministry of Science, Research and Technology, appropriate and codified programs with educational content should be held to raise the level of knowledge and attitude of students regarding the use of safety equipment and include other health behaviors in the curriculum. Also, the Traffic Authority, in cooperation with the Ministry of Health and Medical Education, should teach the public the existing rules and regulations to raise their awareness and attitude through mass media, social networks, and television programs and help them comply with those rules and regulations with the ultimate goal of decreasing accident induced injuries and improving the health in this regard.

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Conflicts of Interest

None declared.

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