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Evaluation of the Use and Reasons for Not Wearing a Helmet by Motorcyclists Admitted to the Emergency Ward of Shahid Bahonar Hospital in Kerman

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Background: Motorcycle crashes are the cause of severe morbidity and mortality especially because of head injuries. It seems that wearing a helmet has an effective role in protection against head injuries. Nevertheless, motorcyclists usually have no tendency to wear a helmet when driving in cities and have several reasons for this behavior.

Objectives: This study aimed to evaluate the use and reasons for not using a helmet by motorcyclists admitted to an emergency ward of a trauma hospital due to accident in Kerman, Iran.

Patients and Methods: This study was carried out by recoding the opinions of motorcyclists who had been transferred to the emergency ward of Shahid Bahonar Hospital (Kerman/Iran). Since no data was available on the frequency of the use of helmets, a pilot study was carried out and a sample size of 377 was determined for the main study. Then a researcher-made questionnaire was used to investigate the motorcyclists' reasons for not using a helmet.

Results: Only 21.5% of motorcyclists had been wearing helmets at the time of the accident. The most frequent reasons for not using a helmet were the heavy weight of the helmet (77%), feeling of heat (71.4%), pain in the neck (69.4%), feeling of suffocation (67.7%), limitation of movement of the head and neck (59.6%) and all together, physical discomfort was the main cause of not wearing a helmet during motorcycle rides.

Conclusions: In general, it appears that it is possible to increase the use of helmets by eliminating its physical problems, and increasing the knowledge of community members in relation to the advantages of helmet use, which will result in a significant decrease in traumas resulting from motorcycle accidents.

Keywords: Motorcyclists; Helmet; Use; Reasons

1. Background

Road traffic injuries are a major public health and development crisis and in developing countries the process of modernization, has aggravated this crisis. Thus, about 85% of mortalities, 90% of disability adjusted life years (DALY), and 96% of all children deaths that are caused by road traffic accidents (RTAs) worldwide, occur in these countries. Road traffic trauma is the sixth most common cause of death and will be the third leading cause of mortality and morbidity by 2030 in developing countries according to the world health organization (WHO) (1). Iran has the highest rate of road traffic accidents worldwide and RTAs are considered as the third leading cause of mortality (2). Road traffic injuries cause different issues at different levels. At the national level, they cause considerable financial costs, especially for developing economies. These injuries are estimated to cost 1–2% of the gross national product of low-middle income countries, which is estimated at over 100 billion USD per year (3). Also, in many developing countries, conditions of referral centers, availability of modern equipments and skilled personnel in medical care centers are great issues. In addition, at the individual level, costs of prolonged and intensive medical care, individual and social problems of victims' disability and loss of income due to death or disability of the head of the household can worsen the families' life conditions (1, 4). Motorcycle has been accepted as a suitable vehicle to transfer the individuals in various communities and the public have welcomed its use. Nevertheless, it is a part of many accidents and it is a source of a large number of traumas and deaths (5). Thus, in many developing countries, the majority of people injured or died in road traffic crashes are motorcyclists. However, the number of road fatalities related to motorcyclists in developed countries, where private cars are more popular, is also disproportionately high (6).

In traffic accidents, motorcyclists are at high risk of head, neck, face and traumatic brain injuries (TBI); TBI being one of the most important causes of neuromotor disabilities and mortality in the world and reports from Europe, Asia, South Pacific, Africa and North Amer-

ica have confirmed this claim (7, 8). In addition, some sources have reported more severe traumas due to motorcycle accidents in comparison with car accidents (5). Literature review reveals a mortality rate of 6.8% to 80.6% due to motorcycle accidents (9-11). For example, mortality rate due to motorcycle accidents in India, Indonesia and Malaysia have been 27%, 42% and 57% of all the road accidents. Furthermore, in two provinces of Iran (Fars & Mazandaran) mortality rates were 23.1% and 25.6%, respectively, achieved from recorded data of forensic medicine of these cities (12-14). In this context, the majority of deaths due to motorcycle accidents occur because of brain traumas (5, 15), and some studies showed a significant relationship between head injury and death in traffic crashes (16, 17). Thus, wearing a helmet significantly decreases the odds of deaths due to brain traumas (5, 15). Also, various studies have proved that the use of a helmet resulted in a significant decrease in injuries, brain traumas and mortality, and in turn lead to lives and financial savings. For example in the United States approximately 14,283 motorcyclists died from 2008 to 2010 due to accidents; 42% were not wearing helmets. In addition, financial savings due to the use of helmets in states implementing the universal law of compulsory use of helmets has been estimated as $725 for each motorcycle, which was four times higher than that in the states that had not implement such a law (18). Studies showed that wearing a helmet prevented traumas by 69% and decreased the odds of deaths by up to 42% and estimate of effectiveness ranges from OR 0.23 to 0.35 (7, 19). Therefore, recognizing the importance of helmet use in reduction of fatalities increased the implementation of helmet laws in different countries (5, 20-22). Although there is a definite relationship between mortality rate of motorcyclists and brain traumas on one hand and not wearing a helmet on the other, factors affecting wearing or not wearing a helmet by motorcyclists have not been evaluated precisely (23). In spite of the obvious benefits of helmet use by motorcyclists, unfortunately they have no interest in wearing a helmet. The rate of helmet use in different cities of Iran varied from 8.6% to 75% (24-26). In other countries this rate was different. For example this was 56% in Karachi Pakistan, 19.7% in Pamplona Spain, and 90-99% in Vietnam, among adults (19, 27).

2. Objectives

This study, for the first time, aimed to evaluate the frequency of wearing a helmet by motorcyclists in Kerman, Iran. As the reasons for not wearing a helmet by motorcyclists are important, we obtained the motorcyclists' opinions about not wearing helmets. Thus, the results may be used to warn all individuals in the community, especially motorcyclists, through mass media.

3. Patients and Methods

Since no precise data was available on the use of helmets by motorcyclists in Kerman, we conducted two studies: a pilot study and the main study.

A) Pilot study: this study was carried out for a period of one month in order to determine the sample size. During this one-month, 93 motorcyclists were referred to the emergency ward of Shahid Bahonar Hospital, a Trauma Hospital of Kerman, due to motorcycle crashes. Forty of these motorcyclists had been wearing helmets and 53 had not. Therefore, the sample size was estimated as 377 motorcyclists. Thus, 377 motorcyclists who had referred to the emergency ward of this hospital because of crashes during the time of the study were included and the motorcyclists who had not worn helmets were asked to answer the questionnaire.

B) Main study: Subsequently, a researcher-made questionnaire was used to investigate the motorcyclists' reasons for not using helmets. The first part of this questionnaire consisted of demographic characteristics and history of motorcycle accidents and the second part consisted of 15 questions (Table 1). Injured motorcyclists, under supervision of authors, responded to the questionnaire during all working shifts of the hospital. For assessing the content validity of the questionnaire, we distributed the questionnaire between ten members of Injuries and Disasters Prevention Committee of Kerman University of Medical Sciences to gain their opinion about the questions and with respect to their opinion, some questions were changed and the final questionnaire was prepared for our study. The revised questionnaire was checked by the members of that committee again and regarding their opinions the validity of the final questionnaire, as a whole, was estimated as 0.86. The reliability of the questionnaire based on Cronbach's alpha, was 0.75. Statistical significance was defined at $P < 0.05$.

4. Results

The mean age of motorcyclists who had worn and those who had not worn helmets were 28.36 and 26.33 years, respectively. Most motorcyclists had lower than diploma level of education. Furthermore, 52.7% of the motorcyclists had no previous history of motorcycle accidents and 69.5% of them had not used a helmet; 33.9% of the motorcyclists had a history of one accident and 83.8% of them had not used a helmet. Also, 13.4% of the motorcyclists had a history of more than one accident, 87.2% of them had not used a helmet (Table 2). There was no significant relationship between the motorcyclists' age and educational status, and wearing helmet ($P = 0.12$, $P = 0.42$). However, there was a significant relationship between history of motorcycle accident and wearing a helmet ($P = 0.008$) (Table 2).

Age, educational status and a history of accident were considered in the multiple logistic regression models and the adjusted odds ratio (OR) (95% CI) were estimated. These results also showed no significant relationship between age, educational status and wearing a helmet but there was a significant relationship between a history of

motorcycle accident and wearing a helmet (Table 3). From 377 motorcyclists only 81 motorcyclists (21.5%) had worn a helmet at the time of the accident. The motorcyclists' reasons for not wearing a helmet during the motorcycle ride were the heavy weight of the helmet in 77%; neck pain after wearing a helmet in 69.4%; limitation of movements of the head and neck in 59.6%; visual limitation during wearing a helmet in 57%; feeling of heat in 71.4%; feeling of suffocation in 67.7%; unfavorable appearance of the helmet in 55.4%; difficulty of preserving or holding the helmet before and after the ride in 59.2% and being ridiculed by others due to the use of a helmet in 53.9%. In addition, 64.8% of motorcyclists believed that summer was not a suitable season for wearing a helmet due to excessive heat and 66.3% believed that winter was a suitable season for wearing a helmet. Furthermore, 53.4% of the cases believed that if they obeyed the rules and rode at low speed, there would be no need to use a helmet. In addition, 41.6% of the subjects believed that they did not need a helmet because they were sure that they could keep their balance if an accident occurred and 49.8% believed that quiet streets were the best places to ride motorcycles without the need of wearing a helmet. Also 59.5% confessed that when they were in a hurry, they did not use their helmet.

Table 1. Questionnaire Investigating Motorcyclist's Reasons of not Using a Helmet

Number	Question details	Completely Agree	Agree	No Opinion	Disagree	Completely Disagree
1	The helmet is heavy and I don't use it for this reason					
2	The helmet causes neck pain					
3	I feel heat on my head when wearing the helmet					
4	I have a feeling of suffocation when wearing the helmet					
5	When I ride slowly there is no need to wear a helmet					
6	I think if an accident occurs I can maintain my balance so there is no need to wear a helmet					
7	It causes limitations in neck and head movement					
8	In summary, I can not use a helmet due to excessive warmth					
9	The winter season is suitable for wearing a helmet					
10	When I am in a hurry, I do not use a helmet					
11	In quiet streets and valleys there is no need to wear a helmet					
12	Helmet leads to restriction of vision					
13	Helmets do not have a suitable appearance					
14	Carrying the helmet before and after use is difficult					
15	Some people ridicule motorcyclists who wear helmet					

Table 2. Demographic Characteristics of Motorcyclist [a]

	Helmeted Motorcyclists	Non-Helmeted Motorcyclists	P Value
Age, y	28.36 ± 10.33	26.33 ± 10.19	0.12
Education Level			0.42
Illiterate	3.7	7.9	
Under diploma	44.4	47.9	
Diploma	34.6	31.2	
Academic Education	17.3	13	
History of Accident			0.008
Did not have any	30.5	69.5	
One time	16.2	83.8	
More than one time	12.8	87.2	

[a] Data are presented as % or Mean ± SD.

Table 3. The Relationship Between Using a Helmet and Demographic Characteristics of Motorcyclist [a]

Chance for Using Helmet		
Variable	**Adjusted OR**	**P Value**
Age	1.43 ± 0.074	> 0.05
Education Level		
Under Diploma	2.88 ± 0.13	> 0.05
Diploma	2.81 ± 0.14	
Academic Education	2.47 ± 0.24	
History of Accident		
One time	0.45 ± 0.016	< 0.05
More than one time	0.38 ± 0.062	

[a] Abbreviation: OR, odd ratio.

5. Discussion

Motorcycles crashes are considerable causes of injury-related fatality and disability (22). Head injuries as one of the most common injuries after motorcycle crashes are estimated to be the cause of most deaths and long-term disabilities. Also in some studies, head injuries and deaths had a significant relationship (16, 17). In our study, the mean age of motorcyclists was less than 30 years. This finding was consistent with the results of the Janmohammadi et al. study in Mazandaran (28.1%) but lower than the results of other studies in Yazd (34.8%), Fars (31.4%), Tehran (32.3%) and United State of America (38%) (13, 14, 26, 28, 29). This pattern showed that most motorcyclists' injuries and disabilities occur in the productive age group of the society, which causes enormous social and economic problems. The majority of riders had an education level under diploma, similar to Heydari et al. (13), Vafaee-Najar et al. (25) and Amirjamshidi et al. (26) studies in Fars, Mashhad and Tehran, respectively. However, in Mehri et al. (29) study in Yazd 54.7% and in McCartt et al. (30) study in the United States 38% of the participants had college education (13, 25, 26, 29, 30). In the present study, there was no significant relationship between wearing a helmet and age and educational status. Also, in a study carried out by Khan et al. (27) in Pakistan the subjects' awareness of the helmet law, their marital status and their average age had no effect on wearing or not wearing a helmet (27). Brown et al. and Dee studies, did not reveal any significant relationship between the use of a helmet and age or gender (28, 31). Nevertheless, in McCartt's study the frequency of helmet use was related to drivers age (30). In the current study, most participants (52.7%) had no history of accidents by motorcycles, similar to McCartt's study (57%). Furthermore, 33.9% of the participants had a history of one accident, 83.8% of which had not worn a helmet and 13.4% had a history of more than one motorcycle accident, 87.2% of which had not worn a helmet. These findings suggest a pattern of persistent high-risk behavior among people who have the experience of an accident for not using a helmet. In Mehri et al. study, only 10.7% of all motorcyclists with a history of motorcycle crash used a helmet and in Moghisi et al. study 55% of the motorcyclists had at least one accident and only two of them were wearing helmets at the time of the accident (29, 32). Also, there was a significant relationship between a previous history of motorcycle accident and wearing a helmet. Arguments against helmet use for motorcycle riders include the claims of increasing the risk of neck injuries and severity of other body injuries in crashes, decreasing of rider visibility and effectiveness of helmets in reducing mortality (7). However, against these claims the results of different studies in different countries have proved that wearing standard helmets significantly decreases mortality rate due to traumas during riding a motorcycle. Also studies showed a decrease in the rates of fatal injuries and deaths of motorcyclists after the helmet-use laws (33, 34). For example, Dee's (31) study showed that State laws requiring helmet use, reduced motorcyclist fatalities by 27%. Based on the result of the present study, 21.5% of motorcyclists in Kerman wore helmets. This rate was different in other cities of Iran like Tehran during 1999-2000 (8.6%) and 2007 (75%), Mashhad (15.8%) and Ahwaz (10%) (24-26, 35). In Karachi of Pakistan this rate was 56%, in Pamplona of Spain, 19.7%, which increased to 94.8% after the law of compulsory use of a helmet by motorcyclists took effect, in Indonesia 89%, in Texas (1994-2006) 56% and in Ghana 34.2% (27, 28, 36). The reasons for different percentages of using safety helmets by motorcyclists in various studies may be due to cultural behaviors, mandatory motorcycle helmet laws, economic power of people and urban or rural site for riding of motorcycles. Also the type of helmet worn, correct fastening of helmets and cost are secondary issues that are particularly relevant to motorcycle helmet usage in developing countries (7). In the present study the most common reason for not wearing a helmet was the weight of the helmet (77%), and other reasons were the feeling of heat during helmet use (71.4%), neck pain (69.4%), feeling of suffocation (67.7%) and limitations in the movements of the head and neck (59.6%). In Moghisi et al. (32) study looking funny 73.2%, disturbing issues 44.4%, decreased hearing 36.4% and feeling of heat during helmet use 30%, were the most common reasons of not using a helmet. Khan reported that 44% of motorcyclists did not wear a helmet due to physical discomfort and 25% due to visual limitations (27). In a study by Conrad in Indonesia there was differences in time and place where motorcyclists reported wearing helmets. They used helmets rarely at night and physical discomfort and absence of police surveillance was the most common reasons for not wearing helmets (37). Thus, in general it can be concluded that physical discomfort was the most important reason for not wearing a helmet in this study, consistent with the results of other studies. Since in many cases, motorcyclists were the breadwinners of the family and they

were at their productive age, motorcycles' safety devices become of greater importance. Thus manufactures of helmets must consider factors that determine the ease of use and motorcyclists comfort, in construction of standard helmets. Also, motorcyclists training and planning for changing their attitudes and behaviors, should be considered in the future to help increase the usage of helmets and decrease risky behaviors during riding.

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Authors' Contributions

Javad Faryabi: study design, abstraction of data and critical revision of the manuscript for important intellectual content. Mahbobeh Rajabi: data collection, study supervision and manuscript writing. Shahin Alirezaee: data collection.

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