Determinants and barriers of helmet use in Iranian motorcyclists: a systematic review

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Abstract:
Background: Helmet use by motorcyclists decreases the incidence and severity of an injury and its related death. Unfortunately, the helmet use rate is not in an acceptable level in Iran. This study aimed to systematically identify the determinants and barriers of helmet use among Iranian motorcyclists.

Methods: A systematic search of literature was done using PubMed, Scopus, Science Direct and Web of knowledge databases for English literature and SID for Persian articles by specified keywords. Manual searching and reference of references were used to improve the articles identification. Articles published before 1995 and those which did not report the barriers and determinants of helmet use were excluded. Data were extracted using an extraction table.

Results: Out of 49 retrieved articles, 13 articles were included in the study. Most of them (70%) had a cross-sectional design. Personal factors (such as older age, marital status and education) and motorcyclist’s attitude and beliefs about the helmet effectiveness were reported as important determinants of helmet use. Helmet weight and its visual and audial limitation for motorcyclists were known as the main reported barriers to use a helmet.

Conclusions: Interventions affecting the motorcyclists’ attitude must be employed along with the legal interventions. Moreover, cost-effective engineering improvements in helmet production remain an important policy to improve the compliance of helmet use.

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Introduction

Injuries caused by traffic accidents are the major challenges within domains of public health. Actually, the case fatality rate of traffic accidents in middle-income countries compared with high-income countries was 20.1 deaths for every 100000 people while these countries had only 52% of registered vehicles.1 Nearly 1.24 million deaths happen every year due to traffic accidents predicted to reach up to 1.9 million cases in 2030 without performing any actions on behalf of involved organs.2,3 Traffic accidents were introduced the eighth leading cause of death in the world and were considered the first cause of death in age group of 15-29 years.4,5 A study of current trends showed that road accidents will become the fifth leading cause of death in the world by 2030.1 According to the World Health Organization in 2014, years of life lost (YLL) due to driving injuries between 2000 and 2012 have increased up to 14%.6 In Iran, traffic injuries were considered the 3rd cause of deaths including more than 32000 deaths in 2012. Moreover, 7% of deaths of children under 5 in Iran were caused by traffic accidents in 2013.1,4,7 Vehicles with high vulnerability which
had the highest proportion of casualties due to accidents in the world are motorcycles. Motorcyclists were the most frequent victims of accidents on urban and rural streets and put themselves and others at risk with their risky behaviors. The probability of motor riders’ deaths during each mile (1.6 km) was 34 times more than those who use other vehicles. Motor riders compared to car drivers had 8 times higher risk of death, 4 times higher risk of injury, 2 times higher risk of an accident with pedestrians, and the probability of motorcycle accident is 9.3 times more than cars. In Iran, more than 51% of transport accidents resulting in death or hospitalization happen for motor riders or passengers. According to the World Health Organization, about 25% of victims of traffic accidents suffer from injuries related to brain trauma and the main risk factor for motorcyclists was due to not wearing helmets. Helmet use decreases the risk of death about 40 percent and severe injuries up to 70 percent in people using motorcycles. Studies in Iran showed that the leading cause of death in traffic accidents was trauma to the head and neck while the use of helmets in Iran is not desirable (10-43%).

It was reported in Vietnam that only 23.1% of motorcyclists were using helmet among 94.6 percent of those carrying a helmet. Literature demonstrated that having a helmet does not necessarily lead to helmet use by motorcyclists, but people should have the intention to use helmet. In this regard, studies to identify factors affecting the use of the helmet have been carried out. Zamani et al.’s (2011) results revealed that heat inside the helmet and lack of ventilation, helmet weight, limiting the visual and audial power of drivers, disrupting the appearance of drivers, lack of maintenance place for helmet on motorcycle, and high price of standard helmet compared with non-standard helmet were the factors preventing helmet use by drivers. Moreover, helmet heaviness, warming up inside the helmet, the length of trip, negative attitude towards the impact of helmet, existence of the mandatory law to helmet use, a person’s driving experience, age of the person, type of road and type of motorcycle had been mentioned as effective factors in helmet use in other studies. Given that preventing traffic accidents and reducing related injuries were among the priorities of the World Health Organization and most countries, identifying determinants of the safety behavior of drivers especially motorcyclists in Iran could provide useful information for adopting appropriate policies. This study aimed to identify the determinants and barriers of helmet use by motorcyclists in Iran.

Methods

Eligibility

Eligibility of studies to be reviewed included the articles published in peer reviewed journals, reporting determinants and barriers of helmet use, indexed in valid databases and published after 1995. Conference abstracts and articles which had reported the effects of helmet on accidents and published before 1995 were excluded.

Identification

Using keywords (Helmet use, predictor, determinant, affecting factor, facilitator AND Iran), literature was systematically searched in PubMed, Scopus, Science Direct and Web of knowledge databases for English literature and SID for Persian ones in 2016. Manual search of journals were done. Also, references of the selected articles were reviewed to identify more articles.

Selection

Articles were first screened reviewing their titles in order to exclude non-relevant articles. Then, the abstract and full texts of the retained articles were reviewed. Endnote X5 software package was used to organize and screen articles and identify duplications. Articles quality assessment was done by two of researchers using the STROB checklist (M Saadati and L Abedi).

Synthesis

Extraction table was used to extract the data from the included articles. Reviewing articles and extracting information were done by two researchers (M Saadati and R Rezapour) and disagreements were solved by the third one (L Abedi).

Results

Searching articles in the databases has led to 41 articles. Moreover, 8 articles were found through hand searching. Retrieved articles were screened as reported in figure 1, and finally 13 articles were included in the study.

Most of the studies had a cross-sectional design (70%) and were done in Yazd, Shiraz, Kerman and Mashhad, respectively. Personal factors (such as older age, marital status and education) and motorcyclist’s attitude and beliefs about the helmet effectiveness were reported as important helmet use determinants. Helmet weight and its visual and audial limitation for motorcyclists were known as the main reported barriers.
to use helmet. Detailed results of an individual article are presented in Table 1.

**Discussion**

The results demonstrated the impact of various factors including demographic ones (age, education, driving experience and marital status), attitude towards the use of helmets and some factors related to helmet (such as heaviness, feeling the heat in helmet use and helmet expensiveness) in using helmet by Iranian motorcyclists.

Proper use of the helmet reduces the severity of injury in accidents and risk of death. The results of this study indicated that the use of helmets among Iranian motorcyclists was very low (it was reported in some studies to be from 5% to 53%). The use of helmet in America was reported 60% and in China 67.7%. Moreover, similar statistics to Iranian studies had been reported in countries such as Vietnam and Argentina. Given that more than 51 percent of traffic accidents resulted in death or hospitalization happen for motor riders or passengers in Iran, proper policies to promote a culture of using safety equipment should be taken.
Table 1: Detailed information of individual included articles.

| No | Authors (date)                  | Country/City | Study design | Mean age | % of having license | % of wearing helmet | Barriers to wear helmet                          | Determinants of using helmet                  |
|----|--------------------------------|--------------|--------------|----------|---------------------|---------------------|-------------------------------------------------|-----------------------------------------------|
| 1  | Fereshteh Zamani et al (2011)   | Tehran       | mixed-method | 33       |                     |                     | • Encouragement or the positive influence of others |
|    |                                |              |              |          |                     |                     | • Being the head of the household/family.         |
|    |                                |              |              |          |                     |                     | • Perceived vulnerability and severity of accident-related injury |
|    |                                |              |              |          |                     |                     | • Belief in helmet efficiency                     |
|    |                                |              |              |          |                     |                     | • Other perceived benefits of the helmet          |
|    |                                |              |              |          |                     |                     | • Having direct and indirect experiences of traffic injury.  |
| 2  | Mahdi Quchaniyan Haqverdi et al (2015) | Mashhad | cross-sectional | 31       | 47.6                |                     | • Feeling of heat                                  |
|    |                                |              |              |          |                     |                     | • Decreasing vision and hearing of the rider      |
|    |                                |              |              |          |                     |                     | • Perception of social norms                      |
|    |                                |              |              |          |                     |                     | • Tendency to get engaged in risky traffic behaviors|
|    |                                |              |              |          |                     |                     | • Understanding the necessity and importance of using helmets |
|    |                                |              |              |          |                     |                     | • Ease of use                                     |
| 3  | Mehri Ali et al (2011)          | Iran         | review       | 34.8     | 37.8                |                     | • Attitude, subjective norms, and perceived behavioral control had significant correlations with and are significant predictors of helmet use intention. |
|    |                                |              |              |          |                     |                     | Perceived behavioral control refers to the degree of which an individual feels that the performance of a behavior is under his or her volitional control.  |
|    |                                |              |              |          |                     |                     | • Perceived more behavioral control               |
|    |                                |              |              |          |                     |                     | • Perceived more cues to action                   |
|    |                                |              |              |          |                     |                     | • More self-efficacy                              |
|    |                                |              |              |          |                     |                     | • Older age                                       |
|    |                                |              |              |          |                     |                     | • Education                                       |
| 4  | Teamur Aghamolaei et al (2011)  | Yazd         | cross-sectional | 26.8     | 27.6%               | 52%                 | • The heavy weight of helmet                      |
|    |                                |              |              | (7.2)    |                     |                     | • Feeling of heat                                 |
|    |                                |              |              |          |                     |                     | • Pain in the neck                                |
|    |                                |              |              |          |                     |                     | • Feeling of suffocation                          |
|    |                                |              |              |          |                     |                     | • Limitation of movement of the head and neck     |
|    |                                |              |              |          |                     |                     | • Physical discomfort                             |
| 5  | Javad Faryabi et al (2014)      | Kerman       | cross-sectional | 21.5     |                     |                     | • Older age of rider                               |
|    |                                |              |              |          |                     |                     | • Married people compared with the singles        |
|    |                                |              |              |          |                     |                     | • Having more driving experience                  |
|    |                                |              |              |          |                     |                     | • Using motorcycle for business reasons           |
|    |                                |              |              |          |                     |                     | • Having license                                  |
| 6  | Seyed Taghi Heydari et al (2016) | Shiraz      | cross-sectional | 27       | 68.8%               | 33.1%               | • Low socio-economic status                       |
|    |                                |              |              |          |                     |                     | • Having license                                  |
| 7  | Ghobad Moradi (2014)            | Kurdistan    | Surveillance data | 5%       |                     |                     | •                |
Most of the helmet use barriers among Iranian motorcyclists were related to helmet problems ranging from heaviness, feeling the heat during helmet use, lack of sufficient sight of motor rider to surroundings, limiting the hearing of the rider and expensiveness of standard helmets. In a study by Faryabi et al. (2014), 77% of motorcyclists had raised heavy weight of helmet as the main reason for not using it followed by neck pain due to using the helmet (69.4%) and head motion restriction (59.6%), respectively, which were other important factors that have hindered the use of helmets among motor riders. Similar results were reported in some studies in other countries such as Greece, Italy and Pakistan. Designing a safety helmet in accordance with defined conditions of motor riders could be effective in facilitating helmet use by motorcyclists. On the other hand, studies showed that the individual factors were effective in the use of helmets. Literatures showed that, in Iran, older and married people use the helmet more than the younger and unmarried people which was consistent with the findings of Hong et al. (2008) in Vietnam and Kulanthayan et al. (2000) in Malaysia. Moreover, a significant relationship between higher education and helmet use was reported in other studies, which was in contradiction with the study by Heidari et al. (2015). Attitude and beliefs toward being safe and the effectiveness of helmet were issues introduced in some studies as facilitating factors for helmet use. Promoting knowledge and awareness of motor riders will lead to a positive attitude which will result in their positive performance. Therefore, promoting safety culture (especially helmet use) should also be taken in the priority of intervention programs in addition to the application of legal interventions.

### Conclusions

The results of this study showed that a number of different factors (individual factors, factors related to helmets and attitudes toward the use of helmets) influence the use of helmets by motor riders in Iran. In addition, individual factors such as age and marital status and other factors identified could be affected and changed by adopting right strategies. Therefore, to

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**Continue of Table 1: Detailed information of individual included articles.**

| No | Authors (date) | Country/City | Study design | Mean age | % of having license | % of wearing helmet | Barriers to wear helmet | Determinants of using helmet |
|----|----------------|--------------|--------------|----------|---------------------|---------------------|------------------------|----------------------------|
| 8  | Rezazadeh et al (2015) | Bojnourd | cross-sectional | 30.06 | 44.6 | 52.8 | Feeling of heat, The heavy weight of helmet, Limitation in vision | Married people compared with the singles, Older age of riders, Higher education, Having license, Living in city compared with village |
| 9  | Ali Mehri et al (2011) | Yazd | Semi-experienced | 34.7 | | 22 | Feeling of heat, The heavy weight of helmet, Limitation in vision | Attitude of the motor drivers, Subjective norms, Behavioral control |
| 10 | Baghiann- moghadam (2010) | Yazd | cross-sectional | 37.6 | 48.6 | 43.3 | Feeling of heat, The heavy weight of helmet, Limitation in vision | Summer compared with winter, Holidays were less than other days |
| 11 | Mokhtari et al (2015) | Kerman | cross-sectional | 11.2 | | | | Having higher education, Using motorcycle for work |
| 12 | Kiyarash Zinat Motlaq (2013) | Shiraz | cross-sectional | 40 | | 11.2 | Uncomfortability of the helmet | |
| 13 | Abrishami et al (2014) | Mashhad | cross-sectional | 30.8 | | | | Positive attitude of helmet use, Having unsafe behaviors, Knowledge of traffic laws, More driving experience, Long time driving |
improve motor riders’ safety culture in Iran, a comprehensive policy that covers all factors should be taken. Moreover, cheap engineering, improvements in helmets’ design and production could be a good solution to improve the motorcyclists’ compliance.

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References

1. World Health Organization. Global status report on road safety 2013: Supporting a decade of action, 2013.
2. World Health Organization. Road safety: Basic facts. Geneva: WHO, 2014.
3. Sadeghi-Bazargani H, Saadati M. Speed Management Strategies; A Systematic Review. Bulletin of Emergency And Trauma. 2016 Jul;4(3):126-33.
4. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2013;380(9859):2095-128.
5. World Health Organization. The global burden of disease—2004 update. Geneva: WHO, 2008.
6. World Health Organization. World health statistics 2014. Geneva: WHO, 2014.
7. Sadeghi-Bazargani H, Ayubi E, Azami-Aghdash S, Abedi L, Zemestani A, Amanati L, et al. Epidemiological patterns of road traffic crashes during the last two decades in Iran: a review of the literature from 1996 to 2014. Archives of trauma research. 2016;5(3):e32985.
8. Naghavi M, Akbari M E. Epidemiology of injuries from external causes (accidents) in the Islamic Republic of Iran. Tehran: Fekrat, 2002.
9. Lin MR, Kraus JF. A review of risk factors and patterns of motorcycle injuries. Accident Analysis & Prevention. 2009;41(4):710-22.
10. Abedi L, Sadeghi-Bazargani H. Epidemiological patterns and risk factors of motorcycle injuries in Iran and Eastern Mediterranean Region countries: a systematic review. International journal of injury control and safety promotion. 2015;1-8.
11. Barros AJ, Amaral RL, Oliveira MS, Lima SC, Goncalves EV. Traffic accidents resulting in injuries: underreporting, characteristics, and case fatality rate. Cad Saude Publica. 2003;19(4):979-86.
12. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E. World report on road traffic injury prevention. 2004.
13. Koang S-H. Helmet use and motorcycle fatalities in Taiwan. Accident Analysis & Prevention. 2005;37(2):349-55.
14. Khademi A, Moradi Sad E. Statistical study of traffic casualties at Noruz of 2008 in Iran (from 15 march 2008 to 3 April 2008). SJFM. 2009;15(1):21-8.
15. Shahla A, Charehsaz S. Injuries resulting from motorcycle-induced trauma during two years in Shahid Motahari Clinical Center of URMIA. SJFM. 2006;12(2):79-83.
16. Fanian H, Ghasemi-Moghadam M, Goddousi A, Abedi MH, Farajzadegan Z, Kazemi Rizati A. Epidemiologic evaluation of traffic accidents in Isfahan(2002-2003). SJFM. 2007;13(2):87-91.
17. Mazloomi MahmoodAbad S, Mehr A, Morovati SharifAbad M, Fallahzadeh H. Application of extended model of planned behavior in predicting helmet wearing among motorcyclist clerks in Yazd (2006). Journal of Birjand University of Medical Sciences. 2007;14(4):9-15.
18. Baghianimoghadam M, Zolghadr R, Ghafarzadeh J, Dastgy M, Aaram M. A survey about attitude and practice of Yazd motorcycle drivers on using helmet. Tolo-E-Behesti. 2010;9(1):51-7.
19. Everett SA, Price JH, Bergin DA, Groves BW. Personal goals as motivators: predicting bicycle helmet use in university students. Journal of Safety Research. 1996;27(1):43-53.
20. Zamani-Alavi J, Bazargan M, Shafiei A, Bazargan-Hejazi S. The frequency and predictors of helmet use among Iranian motorists: A quantitative and qualitative study. Accident Analysis & Prevention. 2011;43(4):1562-9.
21. Li L-P, Li G-L, Cai Q-E, Zhang AL, Lo SK. Improper motorcycle helmet use in provincial areas of a developing country. Accident Analysis & Prevention. 2008;40(6):1937-42.
25. Ambak K, Hashim H, Yusoff I, David BD. An Evaluation on the compliance to safety helmet usage among motorcyclists in Batu Pahat, Johor. International Journal of Integrated Engineering. 2010;2(2):1-8.

26. Yannis G, Laiou A, Vardaki S, Papadimitriou E, Dragomanovits A, Kanellopoulis G. A statistical analysis of motorcycle helmet wearing in Greece. Advances in Transportation Studies. 2012(27):69-82.

27. Haqverdi MQ, Seyedabzahami S, Groeger JA. Identifying psychological and socio-economic factors affecting motorcycle helmet use. Accident Analysis & Prevention. 2015;85:102-10.

28. NHTSA's National Center for Statistics and Analysis U. Traffic Safety Facts. 2015.

29. Ledesma RD, Peitier RI. Helmet use among motorcyclists: observational study in the city of Mar del Plata, Argentina. Revista de Saúde Pública. 2008;42(1):43-5.

30. Faryabi J, Rajabi M, Alirezaei S. Evaluation of the use and reasons for not using a helmet by motorcyclists admitted to the emergency ward of Shahid Bahonar hospital in kerman. Archives of trauma research. 2014;3(3):e19122.

31. Germeni E, Lionis C, Davou B, Petridou ET. Understanding reasons for non-compliance in motorcycle helmet use among adolescents in Greece. Injury Prevention. 2009;15(1):19-23.

32. Bianca A, Trani F, Santoro G, Angellillo IF. Adolescents' attitudes and behaviour towards motorcycle helmet use in Italy. European journal of pediatrics. 2005;164(4):207-11.

33. Khan I, Khan A, Aziz F, Islam M, Shaqar S. Factors associated with helmet use among motorcycle users in Karachi, Pakistan. Asian Journal of Emergency Medicine. 2008;15(4):384-7.

34. Heydari ST, Lankarani KB, Vossoughi M, Javanmardi K, Sarikhani Y, Mahjoor K, et al. The prevalence and effective factors of crash helmet usage among motorcyclists in Iran. Journal of injury and violence research. 2015;8(1):1-5.

35. Kulanthayan S, Umar RR, Hariza HA, Nasir MM, Harwant S. Compliance of proper safety helmet usage in motorcyclists. Medical Journal of Malaysia. 2000;55(1):40-4.

36. Rezazadeh J, Rajabzadeh R, Jabbari S, Soliymani A, Emami O, Hosseini SH. Knowledge, attitude, and practice of the motorcyclists of Bojnourd regarding using helmets. Safety Promotion and Injury Prevention. 2015;2(4):303-12.

37. Mehr A, Mazloomi Mahmodabad SS, Morovicatsharifabad MA, Nadrian H. Determinants of helmet use behaviour among employed motorcycle riders in Yazd, Iran based on theory of planned behaviour. Injury. 2011;42(9):864-9.

38. Aghamolaei T, Tavafian SS, Madani A. Prediction of Helmet Use Among Iranian Motorcycle Drivers: An Application of the Health Belief Model and the Theory of Planned Behavior. Traffic Injury Prevention. 2011;12(3):239-43.

39. Moradi G, Arzakani HM, Majdzadeh R, Bidarpour F, Mohammad K, Holakouie-Naeni K. Socioeconomic inequalities in nonuse of seatbelts in cars and helmets on motorcycles among people living in Kurdistan Province, Iran. Iranian Journal of Public Health. 2014;43(9):1239-47.

40. Mokhtari AM, Samadi S, Hatami SE, Jalilian H, Khamjani N. Investigating the Rate of Helmet Use and The Related Factors among Motorcyclist in Kerman between 1391-92. Safety Promotion and Injury Prevention. 2014;2(3):209-15.

41. Zinat Motlagh K, Jahangiri M, Zinat Motlagh F, Jalilian F. Factors Affecting the Use of Helmets among Motorcyclists. J Health Syst Res. 2013;8(7):1174-9.

42. Abrishami E, Hagverdi MG, Boroujerdi AM, Zavareh MF. Analysis and modeling of factors influencing the use of helmets by motorcyclists, Case Study: Mashhad. Transportation Engineering. 2014;6(2):289-302.
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