

Motorcycle Fatal Accidents in Khorasan Razavi Province, Iran

A Vafae-Najar¹, H Esmaeili², H Ibrahimipour¹, R Dehnavieh³, *M Seyyed Nozadi⁴

¹Dept. of Health and Management, School of Health, Mashhad University of Medical Sciences, Iran

²Dept. of Biostatistics, School of Health, Mashhad University of Medical Sciences, Iran

³Dept. of Health Management, Faculty of Management and Medical Information Sciences, Kerman University of Medical Sciences, Iran

⁴Dept. of Community Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Iran

(Received 16 Nov 2009; accepted 22 Apr 2010)

Abstract

Background: All over the world motorcycle accident are one of the major causes of road death and injury. This study aimed to determine the pattern of Motorcycle Fatal Accidents in Mashhad-Iran.

Methods: This descriptive cross-sectional study was carried out in 2006 to analyze the epidemiological pattern of the motorcycle accident in Mashhad, North-Eastern Iran. Three hundred fifty cases of motorcycle accidents were included. Data gathering tool was a standard questionnaire. The compiled data were analyzed using SPSS11 and χ^2 test. The significance level was considered 0.05 in all statistical tests

Results: In the time span of the study, 350 cases of motorcycle accident occurred, most of which happened at 8pm to 12pm. In 119 cases, the motorcyclist was the blameful rider. Generally, 84.2% of the motorcycle riders did not have safety helmets. About two third of blameful motorcycle riders (63.1%) were less than 25 years old. The major cause of the accidents (55.1%) was due to neglecting the Yield Right of Way. Motorcycle riders endanger pedestrian, other drivers, passengers and their own life.

Conclusion: Paying attention to cultural and instructional issues of correct motorcycle riding and performing appropriate monitoring in traffic and transportation system such as honoring our and others safety and setting limitations on using this vehicle by the youth is of great importance.

Keywords: Motorcycle, Road accident, Iran

Introduction

Accidents, whether natural or un-natural, are the leading cause of death in the world (1). In the United States, it is estimated that everyman would need emergency services twice in his lifetime due to accidents (2). In this regard, the major share of accidents has been dedicated to road collisions, which kill 1.2 million people and injure 50 million people annually (3). Road collisions are the second cause of death among the youth (5-29 yr old people) and the third cause of death among 30-44 yr old people (3). According to the investigations carried out in Iran, a large share of referrals of injured people (48%-75%) to hospitals had been due to collisions (4-5). Based on WHO statistics, Iran ranks first worldwide in terms of having highest number of

road accidents (6). All over the world, motorcycle accidents are one of the major causes of road death and injuries (4, 7-8).

Thus, this vehicle is called the most dangerous motor vehicle, as the risk of injury and death per mile with motorcycles are 3 and 16 times more than with cars (9-10). In Taiwan and Nigeria, 46 and 65% of accidents were due to motorcycle crashes (11). The results of a study shows that motorcycle riders are 10 times more exposed to injury in comparison with those who use four-wheel vehicles (12). Among those who are injured in a motorcycle crash, injury to head and leg is much more prevalent (7, 13-15) and the reasons are the small size of the vehicle and the pressure of the whole kinetic energy and the crash-resulted pressure solely on the riders (16-17). According to the re-

port of WHO, motorcycle riders are amongst the most vulnerable people in road accidents (18). Another issue, which intensifies the attention to motorcycle crashes, is the involvement of children, teenagers and active economic population in these kinds of accidents (14, 17) which significantly increases the life lost ratio and the costs of these kinds of accidents in comparison with other type of accidents. In Iran, It is estimated that motorcycle accidents impose 2 billion dollars to the country (19). According to a study carried out in Khorramabad; west of Iran, about 82% of injured motorcycle riders needed inpatient services and their total health cost was 981,572,746 dollars. According to a similar study performed in Australia, motorcycle crashes had imposed 1.25 billion dollars to the country (20). In Iran, as in many other Asian countries, motorcycles are used much frequently in the transportation system (21). The number of motorcycles has increased significantly in Iran due to different reasons (22). Statistically, the rate motorcycle production in 1986-1996 has increased from 50,599 to 8,334,552, respectively (23). This number indicates the significant increase of using this vehicle as it is mainly produced inside the country. According to the statistics derived from the first six months of 2004 and comparing it with the same statistics of 2008, motorcycle riders' death toll quadrupled. Based on the ownership of one hundred thousand motorcycles, the statistics for this 5 yr period had an increase of 60% and the rate of death toll indicated an increase of 381% for the aforementioned one hundred thousand populations (22). Also in Mazandaran, North of Iran, traffic collisions quadrupled from 2001 to 2002 (10). Having a just recognition of the traffic collision status quo is needed to control the increasing rate of accident-resulted mortalities.

This study aimed to determine the pattern of Motorcycle Fatal Accidents in Mashhad-Iran.

Materials and Methods

This descriptive study was carried out in Mashhad, North-Eastern of Iran, in 2006. The study

population was motorcycle accidents in which the traffic officer had prepared reports on it. In this study, motorcycle refers to a single-track, two-wheeled motor vehicle usually with a third wheel for a small module attached to it (24). In this study, the involved motorcycle riders have been divided into two categories of blameful and blameless riders and the criteria for this categorization was based on the report of the traffic officer. This study included 350 cases. The data compilation tool was a standard questionnaire, which has been regulated by the Iranian Traffic Police Office, so its validity and reliability has been confirmed. In addition, someone was trained by a traffic officer in order to compile required data from the files. The compiled data were entered SPSS 11.5 software and then were analyzed using X^2 test. The significance level was considered 0.05 in all statistical tests.

Results

Research results indicate that in the time span of the study, 350 cases of motorcycle crashes occurred in Mashhad. The motorcycle rider was recognized as a blameful rider in 119 cases and blameless in 231 cases. Most of these accident happened at 8 p.m. to 12 p.m. (Table 1).

Table 1: Frequency distribution and percent of motorcycle accidents

Hour	Blameful		Blameless		Total	
	n	%	n	%	n	%
0-8	14	11.8	21	9.1	35	10
8-12	9	7.6	34	14.7	43	12.4
12-16	28	23.5	45	19.5	73	21
16-20	15	12.6	44	19	59	17
20-24	51	42.9	86	37.2	137	39.1
Total	119	100	231	100	350	100
Sig= 0.134						

In 229 accidents in which the motorcycle has been the cause of crash, 99.1% led to injuries and 0.9% was fatal. The respective statistics for accidents in which the motor rider was not guilty was 117 cases (98.3%) for injury-leading accidents and 2 cases (1.7%) for fatal accidents. In addition, two people were killed in 84% of accidents and three people were injured in 11% of the accidents.

Seventy cases of blameful riders (92.1%) and twenty-one cases of (84%) blameless riders did not have safety helmets. Generally, 84.2% of the motorcycle riders did not have safety helmets. In addition, 14 cases in which the rider was blameful (87.5%) led to injuries and in other cases, no one was hurt or it led to death. However, in cases with a blameless motorcycle rider, 126 cases (94%) led to injuries and two people (1.5%) died.

About two third of blameful motorcycle riders were less than 25 yr old. The variance between blameful and blameless motorcycle riders was significant by a special age (Table 2).

The major cause of the accidents was due to neglecting the Yield Right of Way (Table 3).

The educational background of 50% (157 people) of the study population was not known. Amongst those with certain educational background, 58% (90 people) had secondary school degree, 23%

(36 people) had diploma degree, 13% (20 people) had elementary degree, 5% (14 people) had associate's degree and others were either illiterate or had other degrees. There was not any significant divergence between blameful and blameless groups regarding educational background (sig= 0.492). More than 70% of the accidents, whether the rider was blameful or not, happened due to negligence of traffic regulations. (Table 4)

Table 2: Distribution of the age of motorcycle riders involved in an accident

Age (yr)	Blameful		Blameless		Total	
	n	%	n	%	n	%
< 25	53	63.1	43	25	96	37.5
25-35	17	20.2	60	34.9	77	30.1
35<	14	16.7	69	40.1	83	32.4
Total	84	100	172	100	256	100
Sig= 0						

Table 3: Distribution of the number of final cause of the accidents

Cause of the accident	Blameful		Blameless		Total	
	n	%	n	%	n	%
Ignoring the longitudinal distance	3	2.5	1	0.4	4	1.2
Ignoring the lateral distance	1	0.8	5	2.2	6	1.7
Ignoring the yield right of way	46	39	144	63.4	190	55.1
Lack of attention to the front	23	19.5	8	3.5	31	9.0
Inability to control the vehicle	7	5.9	1	0.4	8	2.3
Violating the speed limit	0	0	1	0.4	1	0.3
Violating the authorized speed	0	0	1	0.4	1	0.3
Deviation to left as a result of overtaking	2	1.7	3	1.3	5	1.4
Deviation to left	11	9.3	13	5.7	24	7.0
Turn incorrectly	1	0.8	3	1.3	4	1.2
Passing through forbidden places	6	5.1	1	0.4	7	2.0
Moving in the opposite direction	8	6.8	4	1.8	12	3.5
Reverse movement	0	0	8	3.5	8	2.3
Sudden change in moving	1	0.8	22	9.7	23	6.7
Passing the red light	7	5.9	1	0.4	8	2.3
Bypass in forbidden places	0	0	3	1.3	3	0.9
Other reasons	2	1.7	8	3.5	10	2.9
Total	118	100	227	100	345	100
sig= 0.00						

Table 4: distribution of effective human causes in the accidents

Human cause of the accident	Blameful		Blameless		Total	
	n	%	n	%	n	%
Exhaustion and drowsiness	0	0	3	1.4	3	0.9288
Alcohol consumption	1	0.9	1	0.5	2	0.6192
Negligence of regulation	85	73.9	147	70.7	232	71.827
Expediency and undue haste	14	12.2	21	10.1	35	10.836
to neglecting the Yield Right of Way	0	0	2	1	2	0.6192
Deliberate violation	0	0	1	0.5	1	0.3096
Other factors	9	7.8	23	11.1	32	9.9071
Negligence of regulation and unreasonable haste	6	5.2	10	4.8	16	4.9536
Total	115	100	208	100	323	100

sig= 0.69

Discussion

Our findings indicate that in the aforementioned period, 350 motorcycle accidents had happened in Mashhad. In 119 cases, the motorcycle rider had been blameful and in 231 cases, they were blameless. Most of the accidents had happened from 8 to 12 p.m. which is similar to the result of other studies performed in Thailand, Mashhad, Sari and Mazandaran province (9-10, 14, 25). Considering the time of accidents, it seems that darkness has an important contribution to these accidents. Paying attention to road safety and specially roads without enough lighting and regulating rules to limit the traffic of motorcycles without having technical standard license would be effective in decreasing the rate of accidents (10). Besides, checking the motorcycles to ensure about having good lights to warn other drivers can be effective, too.

In addition, the fact that there was more than one wounded person in 84% of the accidents indicates that there is more than one person on each motorcycle. Other studies suggest imposing heavy fines for violating the rule of single track (22). The fact that less than 15% of the motorcycle riders had used safety helmet indicates that using this helmet has not still been accepted among the motorcycle riders of Mashhad. Not using safety helmet and safety cover are issues, which have been highlighted so many times in national and international studies (5, 14, 19, 22, 26, 27). The

results of other studies indicate that among the wounded people of motorcycle accidents, the most vulnerable organ that would be wounded (40% to 95%) are head, face and neck (4, 9-11, 16,17, 27, 28).

Using helmets would decrease injuries to head and face by 50% and would decrease severe brain injuries dramatically (16, 21, 29-33). It is believed that imposing heavy fines for those who do not wear safety helmets would increase the use of this tool (34). The decreased death rate of motorcycle riders in Tehran confirms the case as there had been regulated stringent rules if not using helmets (22). In a study carried out in Singapore, it revealed that there was not outstanding rate of death and severe injuries as 100% of the motorcycle riders had used helmets (7).

About two third of blameful motorcycle riders were less than 35yr, which is confirmed by the same, results from other national and international studies (7, 10, 14, 17, 22, 26, 35-38). This fact indicates that those who are involved in motorcycle accidents are notably youth and their death or disability would have negative impacts on the production growth of the society and increase the life lost ratio. The interesting point in this research was the relationship found between age of motorcycle riders and their being blameful, in other way, the lower the age of motorcycle riders, the more the possibility of their being blameful in occurrence of the accident. This trend is adverse in blameless motorcycle riders. This variance was considerable sta-

tistically which means that the youth cause more crashes and collisions rather than the other adults. The most notable cause of accidents has been violation of the yield right of way, not paying attention to the front, deviation to left and sudden change in moving. The same pattern exists for the blameful riders. According to the studies performed by 2 experts of Planning and Management Organization on 100 motorcycles, 52% of these vehicles had passed forbidden places, 32% passed through pavements, 32% carried unauthorized cargo, or person and 24% passed red lights per a day (22). These factors had led to a sharp increase in traffic violations and fatal accidents. Most of the study population of the research involved in an accident, whether blameful or blameless, had secondary school degrees. In other studies performed in Mashhad and Khorramabad, west of Iran, 65.2% of the study population had degree of elementary school degrees and just 1.5% of them had university degrees (14). In the study performed in Lorestan, west of Iran, 31.5% of the study population was illiterate, 23.4% had elementary school degrees, 15.2% had secondary school degrees and 23.8% had high school degrees (39). The significant increase in illiterate and those with elementary school degree in contrast to other with higher educational background indicates the effective impact of literacy and higher trainings in decreasing the number of accidents (14). Therefore, there is a significant relationship between the level of literacy and reducing accidents.

There were some limitations in performing this research. Inability of the researcher to check the information was one this cases as the information had been registered by the officer and the validity of this information was influenced by the officer's attitude, time limitations etc. which the researcher could not check.

In conclusion, with regard to the number and variations of motorcycle accidents, irresponsible motorcycle riding can be considered as a social pathology.

Ethical Consideration

All Ethical issues (such as informed consent, conflict of interest, plagiarism, misconduct, co-authorship, double submission, etc) have been considered carefully.

Acknowledgments

The authors would like to thank Forensic Medicine of Iran for their financial support, Traffic Department of Khorasan Razavi Province for cooperation in data gathering phase, and Vice Chancellor for Research of Mashhad University of Medical Sciences for their support.

References

1. Rautji R, Girdhar S, Lalwani S, Dogra T (2004). A fatal impaling injury in a road traffic accident: a case report. *Med Sci Law*, 44: 176-78.
2. Adekoya N (2009). Motor Vehicle-related Death Rates-United States, 1999-2005. *Morb Morta Weekly Rep*, 58: 5.
3. Anonymous (2010). World Health Day: Road safety is no accident!. World Health Organization, Geneva. Available from: <http://www.who.int/mediacentre/news/releases/2004/pr24/en/index.html>
4. Hemmati H, Chabok S, Dehnadimoghdam A, Melksari H, Dafchahi M, Shabani S (2009). Trauma in Guilan (North of Iran): An Epidemiologic Study. *Acta Medica Iranica*, 47: 403-408.
5. Karbakhsh M, Zargar M (2005). Road Traffic Accidents in Iran: Results of National Trauma Project in Sina Trauma Research Center. In *First International Conference on Traffic Accidents*, Tehran University of Medical Sciences. Tehran.
6. Almasi A, Hashemian A (2002). Frequency Distribution Of Street Vehicle Accidents In Kermanshah (1998). *Behbood*, 6(1): 47-54.
7. Lateef F (2002). Riding Motorcycles: Is it a Lower Limb Hazard? *Singapore Medical Journal*, 43: 566-69.

8. Preusser D, Williams A, Ulmer R (1995). Analysis of fatal motorcycle crashes: crash typing. *Accident; Analysis And Prevention*, 27(6):845-51.
9. Janmohammadi N, Pourhossein M, Hashemi S (2009). Pattern of Motorcyclists Mortality in Mazandran Province, Northern Iran. *IRCMJ*, 11: 81-4.
10. Pourhossein M, Saeed Hosseini A, Babaei M (2004). The Study of Cyclist Situation Died Owing to Road Accidents Referred to Legal Medicine Center- Sari, 2003. *Scientific Journal of Forensic Medicine*, 10(35): 132-36.
11. Farzan A, Farzan A (2001). Evaluation Of 993 Head Injury Cases In Yazd. *Journal of Shahid Sadoughi University of Medical Sciences and Health Services*, 9(2):3-8.
12. Li Y, Qiu J, Liu G, Zhou J, Zhang L, Wang Z, Zhao X, Jiang Z (2008). Motorcycle accidents in China. *Chinese Journal of Traumatology English Edition*, 11: 243-46.
13. Ankarath S, Giannoudis P, Barlow I, Bellamy M, Matthews S, Smith R (2002). Injury patterns associated with mortality following motorcycle crashes. *Injury*, 33: 473-77.
14. Araghi E, Vahedian M (2007). Study On Susceptible And Damages From Motorcycle Accidents In Mashhad In 2005. *Ofogh-e-E-Danesh*, 13(1): 34-9.
15. Sarkar S, Peek C, Kraus J (1995). Fatal injuries in motorcycle riders according to helmet use. *The Journal of Trauma*, 38 (2): 242-45.
16. Peitzman Ab, Rhodes M, Schwab Cw, Yealy Dm, Fabian T (2002). *The trauma manual*. 2nd ed, Lippincott Williams & Wilkins. Philadelphia.
17. Shahla A, Chare-Saz S (2006). A survey on Injured Motorcyclist referred to Motahhari Hospital- Uroumyeh (Farsi). *Legal Medicine Journal*, 12(4): 79-83.
18. Peden M, Scurfield R, Sleet D, Mohan D, Hyder Aa, Jarawan E, Mathers C (2004). *World report on road traffic injury prevention*. World Health Organization, Geneva, Switzerland.
19. Moghisi A (2005). Headlines Newsletter. In A National Helmet Laws- Three Country Reports. World Health Organization. Geneva. Available from: <http://www.who/helmets.org/headlines/05-fall-threecountries.htm#iran>
20. Schramm Aj, Rakotonirainy A (2008). An analysis of cyclists crashes to identify ITS-based interventions. *15th World Congress On ITS*, Jacon K. Javits Convention Center, New York.
21. Zargar M, Khaji A, Karbakhsh M (2006). Pattern of motorcycle-related injuries in Tehran, 1999 to 2000: a study in 6 hospitals. *Eastern Mediterranean Health Journal*, 12 (1-2): 81-7.
22. Setayesh-Valipour J, Shariat-Mohaymeni A (2005). Analysing the statistics of Motorcycle accident Injuries in Iran. *2nd congress of civil engineering* (Setayesh, H., Ed.), Pajouheshi Torab, Tehran, Elm-O- Sanat University.
23. Anonymous (2010). Productions and Imports statistics of Motorcycle from 1994 to 2004 in Iran (in Farsi), Institution of International energy Study (Affiliated with Ministry of Oil of Iran), Tehran. Available from: <http://eia.iies.org/conservation/trans6.asp>.
24. World-Health-Organization (2004). *International statistical classification of diseases and related health problems*. Vol. 2, second ed., World Health Organization, Geneva, pp.: 224-226.
25. Sirathranont J, Kasantikul V (2003). Mortality and injury from motorcycle collisions in Phetchaburi Province. *J Med Assoc Thai*, 86: 97-102.
26. Besharati M, Shoja M (2006). Ocular Injuries Occurring In Motor Vehicular Accident Victims, Yazd Province. *Journal Of Shahid Sadoughi University Of Medical Sciences Aand Health Services*, 14: 5.
27. Torabi A, Tarahi M, Mahmoudi G (2009). Epidemiology of Motorcycle Accident in Khoramabad, Iran. *Payesh Journal*, 8(3): 9.

28. Bried J, Cordasco F, Volz R (1987). Medical and economic parameters of motorcycle-induced trauma. *Clinical Orthopaedics And Related Research*, 223(4): 252-56.
29. Bachulis B, Sangster W, Gorrell G, Long W (1988). Patterns of injury in helmeted and nonhelmeted motorcyclists. *American Journal of Surgery*, 155(5): 708-11.
30. Branas Cc, Knudson Mm (2001). Helmet laws and motorcycle rider death rates. *Accident Analysis and Prevention*, 33: 641-8.
31. Ichikawa M, Chadbunchachai W, Marui E (2003). Effect of the helmet act for motorcyclists in Thailand. *Accident Analysis And Prevention*, 35: 183-89.
32. Liu B, Ivers R, Norton R, Blows S, Lo Sk (2004). Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev*, 23(1): CD004333.
33. Mayrose J (2008). The effects of a mandatory motorcycle helmet law on helmet use and injury patterns among motorcyclist fatalities. *Journal of Safety Research*, 39(4): 429-32.
34. Fereshteh Za, Shamsaddin N, Eesa M, Ali M, Fazlollah G, Fazlollah A, Shahrzad B (2009). Motorcyclists' reactions to safety helmet law: a qualitative study. *BMC Public Health*, 9(1): 393.
35. Begg Dj, Langley Jd, Reeder Ai (1994). Motorcycle crashes in New Zealand resulting in death and hospitalisation. I: Introduction methods and overview. *Accident Analysis & Prevention*, 26: 157-64.
36. Ferrando J, Plasència A, Ricart I, Canaleta X, Seguí-Gómez M (2000). Motor-vehicle injury patterns in emergency-department patients in a south-European urban setting. *Annu Proc Assoc Adv Automot Med*, 44: 445-58.
37. Roudsari B, Sharzei K, Zargar M (2004). Sex and age distribution in transport-related injuries in Tehran. *Accident Analysis and Prevention*, 36: 391-98.
38. Zargar M, Sayyar-Roudsari B, Shadman M, Kaviani A, Tarighi P (2003). Pediatric transport related injuries in Tehran: the necessity of implementation of injury prevention protocols. *Injury*, 34: 820-24.
39. Saki M, Ehsan-Saleh A, Moshfeghi G (2003). Epidemiological study of road accidents resulting in death, Lorestan Province, 1999-2001. *Scientific Journal of Forensic Medicine*, 8(28): 24-8.