

Investigation of Abdominal Injury Pattern in Accidents Led to Death in Motorcyclists Referred to Forensic Medicine Autopsy Hall of Lorestan Province

Mehdi Forouzes^{1*}, Abdolrazagh Barzegar¹, Forutan Salehinezhad², Hamidreza Nazifi², Leila Dousti²

¹ Forensic Medicine Research Center, Legal Medicine Organization, Tehran, Iran. ² Forensic Medicine Research Center, Legal Medicine Administration, Lorestan, Iran

Correspondence: Mehdi Forouzes. Forensic Medicine Research Center, Legal Medicine Organization, Tehran, Iran. Email: forouzeshiran@gmail.com

ABSTRACT

In our country road accidents are one of the major causes of death, which is a major part of the victims of motorcycle riders. For this reason, we decided to investigate abdominal injuries in crashes leading to the death of motorcyclists sent to the forensic clinic in Lorestan province. This is a descriptive-analytic study. Sampling was done by census. The data of each of the 196 accidental death cases in the motorcycle riders of the legal medicine center of Lorestan province in 2015-2017, including the results of examinations in the archives filed in the legal practitioner, hospital records, profiles and demographic information were recorded. Data were analyzed by SPSS software version 24. Of the 196 bodies referred to the center, 95.9% were male and 4.1% were women. The mean age of the subjects was 36.31. The place of death was 37.3% of the dead at the incident, 10.2% during the transfer and 52.6% in the hospital. 75% of drivers were traumatized and 24.5% were Turkish. Damage to various parts of the body, head and faces were in 35.2%, and breast and neck were 24%. The most common cause of death in abdominal injuries was visceral tear with 38.3%. Rupture of the spleen, liver, intestine, and bleeding of the peritoneal cavity is another cause of this type of death. Damage to the head was the main cause of death. Therefore, the use of helmets can play a significant role in reducing mortality and complications in accidents. In addition, the time of death of motorcyclists seems to follow a specific time pattern that can be cropped by preventive measures against such deadly road accidents.

Keywords: motorcycle, accident, death, injury, forensic, Lorestan.

Introduction

Most of the injuries and deaths around the world are due to road accidents. A significant increase in the rate of motor vehicle accidents has been reported in many parts of the world in recent years, so that transportation-related injuries have become the dominant mechanism of trauma in most parts of the world [1-3]. Nowadays, trauma is the main cause of the loss of

potential years of life in most developed countries and it is one of the main causes of death in the young population of these countries. It is the second leading cause of death after cardiovascular disease at all ages in Iran [4-8].

Various studies conducted in different parts of the world suggest that low-age pedestrians (children and adolescents) and the elderly people are two high-risk groups in traffic accidents. Other high-risk groups are motorcycle riders [9]. Road accidents are also the leading cause of the death in Iran. Based on the Iran's Forensic Medicine Organization in 2003, 25722 people died as a result of road accidents (as the leading cause of death). Theoretically, vehicle type makes no difference in the mechanism of injuries [10]. Some studies have reported that motorcycle accidents account for only 2% of all motor vehicle accidents and 0.3% of all accidents based on the distance travelled, but 9% of all deaths caused by accidents is related to this class.

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Its importance is revealed more when we know that motorcycle in Iran is used more as a means for everyday movements and transportations at all hours of a day rather than a recreational means at limited hours of a day. This issue can affect the number of motorcycle-related accidents. In Iran, men are often income-generating members of the family and their high risk behaviors such as using motorcycles makes them to be more prone to risk than women. Abdominal injuries are an important part of motorcycle accidents, especially in Iran where motorcycle is widely used ^[11]. Abdominal trauma is one of the major causes of death. It is the third major cause of death, so that about 13 to 15 percent of the traumas lead into death. Abdominal trauma will lead to a risk of blood loss and internal infection. Traffic accidents are the most common cause of non-penetrating trauma ^[12]. Skull injuries in 75% of cases are the cause of death, which its rate can be reduced by 50% if helmet is used ^[13]. In their study entitled "epidemiological pattern of fatal traffic accidents in northern provinces in 2010, Entezami et al (2015) concluded that the rate of fatal accidents in the Northern provinces is higher than that of other regions ^[12]. The fatal accidents make more young age groups involved. In addition, the most important cause of death is head injury and accidents on suburban roads ^[14].

In a research entitled "Evaluation of trauma pattern and its related factors in patients treated in Besat Hospital in Sanandaj in 2011, Mobaleghi et al (2014) concluded that the rate of accidents was high among the young people. In addition, there was a relationship between traumatic pattern and age, gender and type of accident ^[15]. In a retrospective and cross-sectional study conducted by Ramos et al entitled "Epidemiology of head and neck fractures caused by motorcycle accidents", all patients referred to the emergency department during 2013 due to head and neck injuries caused by accident, were motorcyclists. The results of this epidemiologic study showed that the prevalence of head and neck fractures in motorcycle accidents is higher in younger people, male gender and those who do not use safety equipment. The most common site of fractures in the head and neck related to neck vertebrae, skull, and face bone fractures, respectively ^[16]. In a study entitled "Determination of the type and frequency of lower limb injuries caused by trauma due to motorcycle accidents in Imam Hossein Hospital during one year", Arhami Dolatabadi et al showed that most accidents occurred on urban streets between the hours of 2 pm and 10 pm. The most common site of fracture was leg bones (tibia), sole (lisfranc bone), knee (patella), ankles (outer side of ankle), thighs (trunk) and pelvis (sacrum and upper ramus) ^[17]. This study was conducted with the aim of determining the trauma pattern led to death of motorcyclists referred to Forensic Medicine Autopsy Hall of Lorestan province in 2017.

Methodology

The present study is a descriptive, cross-sectional and prospective study. The research population included all medical files archived in the General Office of Forensic Medicine of Lorestan Province during the years of 2015 to 2017. The

research samples were selected among the motorcyclists died in accidents due to intra-abdominal injuries in the liver, spleen, intestine, kidney, stomach, pancreas, and so on and their bodies were referred to General Office of Forensic Medicine Autopsy Hall of Lorestan province. The sample size was based on archived records over the past five years (unknown number) separated based on the death agent. Data of each of the records, including the outcome of forensic medicine, hospital records, and demographic characteristics were collected. Then, they were analyzed by SPSS 24 software. All data and names derived from the records in the General Office of Forensic Medicine of Lorestan Province remained confidential.

Results

In this study, victims of accidents referring to the Forensic medicine organization of Lorestan province were investigated. The information of victims such as age, gender, level of education, site of injury, cause of death, dead people status, accident site, and accident vehicle type was collected from reports of corpses and victim caregivers. To compare the variables, frequency (percentage) was used and descriptive statistics including mean, standard deviation, minimum and maximum values were used for descriptive results. It should be noted that all calculations were performed using SPSS 24 software. By examining the data collected, it was revealed that the mean age of the dead people was 31.36 with a standard deviation of 14.50. Moreover, the lowest age among the samples is 3 years and the maximum age is 82 years. Table 1 shows the descriptive information of age of samples.

Table 1. descriptive information on age of samples

variable	mean	SD	min	max
Dead person age	31.36	14.50	3	82

Table 2 shows the frequency distribution of gender, marital status, living place, level of education, and job status of victims of accidents.

Table 2. Frequency distribution of gender, marital status, living place, level of education, and job status of victims of accidents

variable	f	%	
gender	male	188	95.9
	female	8	4.1
	total	196	100
Marital status	married	92	46.9
	single	103	52.6
	unknown	1	0.5
	total		
Living place	urban	95	48.5
	rural	100	51.0
	Total	196	100
Level of education	Illiterate	21	10.7

Job status	Elementary	38	19.4	Types of abdominal injuries	Chest and abdomen	47	24
	Secondary	62	31.6		Head and leg	9	4.6
	High school diploma	19	9.7		Posterior trunk	2	1
	student	45	23.0		pelvis	3	1.5
	associate	5	2.6		legs	10	5.1
	Bachelor	4	2.0		unknown	49	25
	total	2	1.0		total	196	100
	School student	196	100		Viscera rupture	18	38.3
	University student	20	10.2		Spleen rupture	12	25.5
	Housewife	13	6.6		Liver rupture	7	14.9
	employee	4	2		Intestine rupture	5	10.6
	worker	3	1.5		Peritoneal cavity bleeding	5	10.6
	Self-employed	20	10.2		total	47	100
	Soldier	89	45.4		Head injury	96	49
	Working in marketplace	4	2		bleeding	13	6.6
	unemployed	6	3.1		Multiple fractures	84	42.9
	farmer	12	6.1		others	3	1.5
	others	23	11.7		total	196	100
total	2	1	At accident site	72	36.7		
	196	100	During transferring to hospital	20	10.2		
			hospital	103	52.6		
			home	1	0.5		
			total	196	100		

Table 3 shows the frequency distribution of accidents in cities and the lighting status in accident site.

Table 3. Frequency distribution of accidents in cities and lighting status in accident site

variable	f	%
Khorramabad	39	19.9
Boroujerd	34	17.3
Pol-e Dokhtar	12	6.1
Aligudarz	25	12.8
Delfan	2	1
Noorabad	18	9.2
Kuhdasht	20	10.2
Durud	24	12.2
Azna	12	6.1
Rumeshkhan	4	2
Sepiddasht	3	1.5
Dowreh	1	0.5
Mamulan	2	1
total	196	100
daylight	120	61.2
night	61	31.1
Lighting status of accident site		
During sunset or sunrise	15	7.7
total	196	100

Table 4 shows the frequency distribution of injury site, types of abdominal injuries, the cause of death and the site of death.

Table 4. frequency distribution of injury site, types of abdominal injuries, and the cause of death and the site of death.

variable	f	%
Head and face	69	32.2
Neck	7	3.6

Table 5 shows the frequency distribution of suburban accidents, urban accidents, accident type, and dead person status. As frequency distribution of suburban accidents shows, the accident site for 33 accidents leading to death has not been recorded by motorcycles, and in the urban accidents, 90 accidents leading to death have been reported by motorcycles.

Table 5. Distribution of suburban accidents, urban accidents, accident type, and dead person status

variable	f	%
freeway	2	1
highway	4	2
main road	91	4.46
Sidetrack	15	7.7
Suburban accidents		
Rural road	31	8.15
Ring road	6	1.3
others	14	1.7
Unknown	33	16.8
total	196	100
Main road	78	8.39
Auxiliary road	20	2.10
Alley	1	0.5
Square	3	1.5
Urban accidents		
Underpass	1	0.5
Boulevard	2	1
others	1	0.5
unknown	90	45.9
total	196	100
Accident type		
Collision with another vehicle	144	73.5
Vehicle collision with pedestrians	1	0.5

	Vehicle collision with fixed object	14	7.1
	Overturning of the carrier vehicle	31	15.8
	Falling the vehicle containing the		
	dead people	5	2.6
	unknown	1	0.5
	total	196	100
	driver	147	75
	pedestrian	48	24.5
Dead person status	Passenger or leaving the vehicle	1	0.5
	unknown	196	100
	total	147	75

Discussion and Conclusion

The results of the present study on examining the age of people died in the accident showed that the mean age of these people was 31.36 years with a standard deviation of 14.5 and their age range was 3 to 82 years. The highest rate of accidents belonged to males with 95.9%. In examining the marital status of the people who had accidents, it was found that 103 of them (52.6%) were single and 92 of them (46.9%) were married. In examining the job status and the level of education of these people, it was found that the highest rate of them was self-employment with 47.6% and 31.6%, 23% and 19.4% of them, respectively, had elementary, secondary, and high school level of education, and 1% of them had bachelor level of education. In the examination of the injury site, 69 of them had head and face injury and 47 of them had chest and abdomen injury. In 47 cases of abdominal injury, visceral rupture with 38.3% was the most common cause of death in abdominal injuries, followed by spleen, liver and intestinal rupture with 25.5, 14.9, and 10.6, respectively. In examining the urban accidents, the highest frequency related to main roads was 39.8%, and in suburban accidents, the highest frequency related to the main road with 46.4%.

In examining the status of dead people and the accident type, 147 (75%) of them were driver and 48 (24.5%) people were passenger or were sitting on the backstage of the vehicle, 73.5% of the accidents occurred due to collision with other vehicles and 13.8% occurred due to vehicle overturning. Examining the site of accident showed that 37.7% of them died at the accident site and 52.6% died after transferring to the hospital. Moreover, the results of this study showed that most people died in motorcycle accidents had mean age of 31.36 years and they were male and most of them were vehicle drivers. These results are in line with the rules governing Iran, where majority of the motorcycle riders are male. The most common cause of death in these accidents was head injury due to lack of using helmet. The second agent was also introduced chest and abdomen injuries, as it causes serious damage to the internal organs. As all deaths occurred in younger people and as there is less monitoring on motorcycle riders that car drivers and as less attention is paid to motorcycle driving regulations,

motorcyclists control to have a license and the use helmets is necessary.

The results of this study also showed that most of the injuries caused by motorcycle accident belonged to 20-30 years old males who were using motorcycle to meet their everyday needs. In most of the domestic and foreign studies, including the current research, the rate of death in men is higher than that of women in motorcycle accidents. It seems that cultural issues are involved in this difference. In Iran and some other countries, motorcycles are not commonly used by women, and this has led to such a disagreement in results of different studies. Like many studies, more victims were young group of people with mean age of 30. This issue reflects the importance of investment and training in young men to reduce the rate of accidents and to reduce the injuries caused by it. Although there was no significant difference between the number of suburban and urban accidents, the relative increase in number of accidents in suburban areas is justified by the multiplicity of suburban villages and the use of motorcycle by villagers. Most of the victims died at the accident site or in the hospital, which can indicate the severity of the injuries. Based on this study, most accidents occurred due to motorcycle collision with cars or fixed barrier. The most common cause of death was head injury, followed by chest and abdomen injuries. Motorcycle accidents are one of the main causes of organ injuries, especially the lower limb injury, which can cause death or physical disabilities. These studies indicate the necessity of training the driving rules and the proper use of safety equipment.

Research practical recommendations

As motorcycle accidents have a high mortality rate and most of the victims are young people, public education is necessary for proper use of motorcycle and observing the traffic and driving rules. Despite advices on the necessity of using helmet, many motorcycle riders do not use it. Thus, taking appropriate measures in confronting with offenders will help reduce the risk of injury in such accidents. As the rates of motorcycle deaths are significant at dark hours of the day and within the city, improving road conditions, especially in dark and lightless streets and restrictions on use of motorcycle at night, can be effective in reducing the rates of death caused by these accidents.

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