Original Article:

Epidemiological Study of Injuries among Traffic Accident Patients Admitted to Governmental Hospitals in Isfahan

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Abstract

Introduction: Traffic-related injuries are one of the most significant challenges to the healthcare and socioeconomic systems. This study aimed to determine the epidemiology of injuries in patients admitted to Ayatollah Kashani and Al-Zahra hospitals after traffic accidents.

Materials and Methods: The study was a descriptive-analytical cross-sectional one. Using stratified random sampling and random numbers, 480 cases of traffic accident patients admitted to Ayatollah Kashani, and Al-Zahra (PBUH) hospitals in the year 1398 (based on the Persian calendar) were selected. A Chi-square test was used to evaluate the hypotheses.

Results: Most of the patients' injuries were related to motorcycles (46.3%). The most common injuries were fractures and injuries of the head and face, followed by leg and ankle fractures, especially on the right side. The survey found that the most common season for traffic accidents was autumn, followed by spring. The prevalence was significantly higher in men (77.5%) than women (22.5%). The age groups of 30 to 39 were the most prevalent with 22.7%, followed by 20 to 29 years with 22.3%.

Conclusion: The results of this study can help prioritize and implement preventive safety techniques and injury control treatment plans consistent with the Iranian national scientific and research priorities.

Keywords: Epidemiology, Injury, Hospital, Traffic accident

1. Introduction

Traffic accidents are a leading cause of disability and death worldwide [1]. Driving accidents cause high costs and damages every year, killing 1.2 million people and injuring 50 million others [2]. According to WHO, Iran is responsible for one out of forty traffic accidents worldwide, even though it is home to only 1% of its population [2,3]. Traffic accidents are a principal reason for injury and the second cause of death in Iran [4,5]. Traffic accidents are responsible for 29% of all deaths in Iran and represent a significant economic burden [6].

In comparison to the massive attention paid to the statistics of fatalities in traffic accidents, little attention is paid to the damage and injuries left behind. In contrast, attention to the statistics of injuries caused by traffic accidents has the potential to significantly reduce the mortality rate of accidents, as timely and appropriate medical measures can save the lives of

many injured. Second, the estimated number and type of injuries can calculate the burden (dolly index) of traffic accidents. According to studies, unfortunately, 15% of those injured in accidents and traffic accidents die in Iran, while this figure is much lower in developed countries and is about 2%. This problem shows that the Iranian healthcare system and hospital emergencies require more attention and planning. Therefore, immediate measures must be taken to reduce this rate. These measures aim to collect accurate data in this field, especially epidemiological and statistical data [7].

Given the foregoing information and the fact that injuries caused by traffic accidents are one of the most serious problems confronting the healthcare and socioeconomic systems of all countries, including Iran, this study was conducted in 1398 to investigate the epidemiology of injuries among patients admitted to the Ayatollah Kashani and Al-Zahra (AS) hospitals in Isfahan.

2. Materials and Methods

The present study is a descriptive-analytic cross-sectional research. The study population includes all cases of patients injured in traffic accidents admitted to the emergency department of Kashani or Al-Zahra Hospitals within one year of the accident, i.e., from 1/1/98 to 29/12/98.

After receiving the code of ethics, the inspection of the archived files of Ayatollah Kashani and Al-Zahra (As) hospitals in Isfahan was allowed (IR.MUI. MED.REC.1398.148). In 1398, the hospital archives obtained a list of all patients involved in traffic accidents. We identified 480 patients involved in traffic accidents using stratified random sampling and randomly assigned numbers. Since Kashani had twice as many referrals as Al-Zahra, 160 cases from Al-Zahra and 320 cases from Kashani were randomly selected from the patient list. The sample size was determined using the following formula:

$$p = ./5$$

$$d = 0/1 p = 0/05$$

$$n = (Z_1 - \alpha/2)^2 p(1-p)/d^2 = 385$$

After accessing the patients' record information, a checklist including variables such as age, sex, season, the hospital to which they were admitted, and the injured person's condition at the time of the accident (pedestrian, motorcyclist, car occupant, and cyclist) was prepared. Moreover, the types of injury (1- Fractures and injuries of the head and face, 2- Intracranial hemorrhage, and cyclist. 3- Fractures and injuries of the cervical spine, thoracic spine, lumbar spine, sacrum, and coccyx 4- Fractures and injuries of the pelvis 5- Fractures and injuries of the pelvis, ribs, sternum, rib cage, abdomen, genitals, and internal organs, 6- Femur, knee and patella fractures and injuries, 7- Leg, ankle and foot fractures, and injuries, 8- Shoulder, arm, clavicle and scapula fractures, and injuries, 9- Elbow, forearm, wrist, and hand fractures and injuries) were also considered.

Subsequently, the collected data were analyzed using descriptive statistics and the generation of frequency distribution tables and graphs using SPSS3 20 statistical software. In this study, we hypothesized a significant relationship between the frequency distribution of injury type and gender, age, and type of accident. The chi-square test was used to test these hypotheses at a significance level of 0.05.

3. Results

Table 1 summarizes the classification of injury types numbered consecutively, and all the tables use the number given rather than repeating the injury type.

Table 1. Type of injury

1	head and facial fractures and injuries
2	intracranial hemorrhages
3	fractures and injuries of the cervical spine, thoracic spine, lumbar spine, sacrum, and coccyx
4	pelvic fractures and injuries
5	fractures and injuries of the pelvis, ribs, sternum, rib cage, abdomen, genitals, and internal organs
6	fractures and injuries of the thighs, knees, and kneecaps
7	fractures and injuries of the leg, ankle, and foot
8	fractures and injuries of the shoulder, arm, clavicle, and scapula
9	fractures and injuries of the elbow, forearm, wrist, and hand

The results show that most subjects (77.5%) are male.

Patients ranged in age from two to ninety-three years, with a mean of 34.51 years. Male patients had a mean age of 33.11 years, while female patients had a mean of 39.34 years, a statistically significant difference (p-value = 0.004). (See also Tables 2 and 3).

Table 2. Demographic information on the frequency of sex and the average age of patients in traffic accidents.

Sex	Frequency	Percent	Age average	Standard deviation
Male	372	77/5	33/11	17/18
Female	108	22/5	39/34	20/37

Table 3. Age classification of traffic accident patients

Age group		Less than 7 years	7_12	13_19	20_29	30_39	40_49	50_59	60_69	70 years and older
Frequency	number	14	22	69	107	109	59	45	30	25
	percent	2.9	4.6	14.4	22.3	22.7	12.3	9.4	6.3	5.2

Fractures and head and neck injuries (25.8 %) and fractures and injuries to the legs, ankles, and feet (22.5 %) were the most common types of injuries, while fractures and pelvic injuries were the least common type of injury (2.1 %) (Table 4).

In all of these instances, the majority of those injured (46.3 %) were motorcycle riders. Cyclists (3.5%) had the lowest injury rate (Table 5).

The frequency distribution of injury types by the season of the event is depicted in Table 6. The results indicate that most injuries occurred in the fall leading to fractures and head and face injuries, while the fewest occurred in the spring and summer resulting in fractures and leg, ankle, and foot injuries. Additionally, the chi-square test indicated a statistically significant relationship between season and injury type (P-value = 0.001).

Table 4. Frequency of injury classification in patients involved in traffic accidents

Injury classification		1	2	3	4	5	6	7	8	9
Frequency	Number	124	32	30	10	62	31	108	30	53
	Percent	25.8	6.7	6.3	2.1	12.9	6.5	22.5	6.3	11
Age average		31.62	39.25	42	30.7	39.17	34.9	33.4	35.06	31.18

Table 5. The frequency of the situation of injured patients in traffic accidents

the status of injured patients with traffic accidents	Frequency	
	number	percent
pedestrian	88	18.3
motorcyclist	222	46.3
car's passenger	153	31.9
cyclist	17	3.5

Table 6. Frequency distribution of injury type by accident season

Season	Frequency	Type of injury									Total
		1	2	3	4	5	6	7	8	9	
Spring	count	23	9	9	3	20	7	35	5	9	120
	% within	19.2	7.5	7.5	2.5	16.7	5.8	29.2	4.2	7.5	100
Summer	count	34	16	12	4	14	8	19	4	9	120
	% within	38.3	13.3	10	3.3	11.7	6.7	15.8	3.3	7.5	100
Fall	count	36	3	2	0	19	3	28	11	18	120
	% within	30	2.5	1.7	0	15.8	2.5	23.3	9.2	15	100
Winter	count	31	4	7	3	9	13	26	10	17	120
	% within	25.8	3.3	5.8	2.5	7.5	10.8	21.7	8.3	14.2	100
Total	count	124	32	30	10	62	31	108	30	53	480
	% within	25.8	6.7	6.2	2.1	12.9	6.5	22.5	6.2	11	100

P-value = 0.001

Table 7. Frequency distribution of injury type according to patients' sex

Sex	Frequency	The type of injury									Total
		1	2	3	4	5	6	7	8	9	
Male	count	91	24	19	10	41	28	92	19	48	372
	%	24.5	6.5	5.1	2.7	11	7.5	24.7	5.1	12.9	100
Female	count	33	8	11	0	21	3	16	11	5	108
	%	30.6	7.4	10.2	0	19.4	2.8	14.8	10.2	4.6	100
Total	count	124	32	30	10	62	31	108	30	53	480
	%	25.8	6.7	6.2	2.1	12.9	6.5	2.5	6.2	11	100

P-value = 0.001

Table 7 shows the frequency distribution of injury types by patient sex. The chi-square test results indicate a statistically significant relationship between gender and injury type (P-value = 0.001). The highest number of injuries occurred in males.

According to Table 8, among the 480 traumatic patients, the most common injury was head and facial injuries, with a frequency of 124 (25.8%) and an average age of 32 years.

Of the two hospitals studied, Ayatollah Kashani Educational and Medical Center admitted 82 patients with head and facial injuries compared with Al-Zahra Educational and Medical Center (Table 9).

The frequency distribution of injury types according to the patient's health status at the time of the accident is shown in Table 10. The chi-square test significantly correlates season and head and facial injuries (P = 0.001). Fall is the season with the highest rate of head and facial injuries, accounting for 30% of all injuries.

Table 8. The average age of patients in traffic accidents by type of injury

Injury classification	1	2	3	4	5	6	7	8	9
Age average	31.62	39.25	42	30.70	39.17	34.90	33.40	35.06	31.18

Table 9. Frequency distribution of injury type in patients by Ayatollah Kashani and Al-Zahra hospitals

Hospital	frequency	The type of injury									Total
		1	2	3	4	5	6	7	8	9	
Ayatollah Kashani	count	82	26	23	7	39	19	77	23	24	320
	%	25.6	8.1	7.2	2.2	12.2	5.9	24.1	7.2	7.5	100
Al-Zahra	count	42	6	7	3	23	12	31	7	29	160
	%	26.2	3.8	4.4	1.9	14.4	7.5	19.4	4.4	18.1	100
Total	count	124	32	30	10	62	31	108	30	53	480
	%	25.8	6.7	6.2	2.1	12.9	6.5	22.5	6.2	11	100

P-value = 0.017

Table 10. Frequency distribution of the type of injury according to the patient's condition during the accident

Season	Frequency	Type of injury									Total
		1	2	3	4	5	6	7	8	9	
Spring	count	23	9	9	3	20	7	35	5	9	120
	%	19.2	7.5	7.5	2.5	16.7	5.8	29.2	4.2	7.5	100
Summer	count	34	16	12	4	14	8	19	4	9	120
	%	28.3	13.3	10	3.3	11.7	6.7	15.8	3.3	7.5	100
Fall	count	36	3	2	0	19	3	28	11	18	120
	%	30	2.5	1.7	0	15.8	2.5	23.3	9.2	15	100
winter	count	31	4	7	3	9	13	26	10	17	120
	%	25.8	3.3	5.8	2.5	7.5	10.8	21.7	8.3	14.2	100
Total	count	124	32	30	10	62	31	108	30	53	480
	%	25.8	6.7	6.2	2.1	12.9	6.5	22.5	6.2	11	100

P-value = 0.001

4. Discussion

The injuries suffered by victims during traffic accidents are a critical aspect and consequence of the event. They impose high financial costs on the healthcare system and hospital staff, but they can avert many deaths and irreversible damage if treated promptly and intelligently. This study was conducted to determine the epidemiology of injuries among patients admitted to governmental hospitals in Isfahan.

The current study's findings indicate that most subjects were male, which is consistent with previous research [8,9].

The findings indicated that the majority of those injured were young adults and between the ages of 20 and 39. Numerous factors could account for this, including the inexperience of this age group when it comes to driving. In this regard, enforcing stricter standards and cultivating a culture surrounding the issuance of driver's licenses may assist in resolving this issue.

According to the current study's findings, the majority of injuries include head and neck trauma. These results contradict those of other studies conducted in other countries [10]. According to studies conducted in Delhi and Kenya, the leading cause of accidental injuries is injury of lower limbs [10,11].

Additionally, the results of the present study revealed that approximately half of the injuries involve motorcyclists, which could result from the city's high concentration of motorcycles and their disregard for traffic rules. The findings indicate a statistically significant relationship between motorcycle riders' risk of brain hemorrhage and the seasons. Moreover, the findings showed that the most common seasons for this type of injury are summer and spring, with a higher prevalence than fall and winter. This is understandable, as winter motorcycle riders are more likely to wear helmets. Additionally, the present findings indicated that head and skull injuries are more prevalent than other injuries; a study in Kermanshah province already confirmed this issue [8].

Male motorcyclists also had more fractures and injuries to the legs, ankles, and feet than women, consistent with a study in Khorasan province [9]. One possible explanation for this discrepancy is that motorcyclists in Iran are mainly males rather than females.

All the time and in all areas, the first step is to address the problems and challenges associated with proper recognition and appropriate information dominance. The traffic accident and injury management in Iran is still far from ideal in terms of global standards. One of the country's priorities should be addressing this problem quickly, making macro and micro decisions in the healthcare system, advancing legislation, revising inefficient processes, and improving traffic culture.

By providing the necessary information in this area, studies of this type will help the health care system and other sectors solve the existing problems to reduce the number of patients injured in accidents and the associated consequences. After an accident, injured ones should be appropriately monitored and treated to ensure that the nation's health care system suffers the least possible human and financial cost.

5. Conclusion

The current research results can help prioritize and plan preventive measures related to traffic accidents. Depending on the trauma mechanism and by identifying the most common injuries, preventative safety measures, and treatment programs to minimize these injuries, strategies should be adopted following the country's scienctific and research priorities.

Ethical Considerations

Compliance with ethical guidelines

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Author's contributions

All authors equally contributed to preparing this article.

Conflict of interest

The Authors declare that there is no conflict of interest.

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