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Evaluation of the Frequency of Upper and Lower Extremity Injuries in Victims of Road Traffic Accidents Referred to Shahid Rajaee Trauma Hospital during March-August 2015

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ABSTRACT

Trauma is the first mortality cause in developing countries. In addition, one of the leading causes of disability in these countries has been considered as health-related economic losses. This study aimed to evaluate the incidence rate and demographic characteristics of four extremity trauma in victims of road traffic accidents, who referred to the Shahid Rajaee Trauma Hospital during March-August 2015. This study was conducted on all patients with trauma caused by road traffic accidents, who referred to Shahid Rajaee Hospital in Shiraz, Iran during March-August 2015. Demographics of the patients and information related to their stage of trauma were recorded and analyzed. Chi-square, analysis of variance (ANOVA) and independent t-test were used to evaluate the results, which were indicative of high frequency of four extremity trauma in the head, chest and abdomen. Frequency of physical trauma was more observed in male patients, compared to female subjects. According to the results, the frequency of trauma is more observed in young adults, compared to the elderly and mortality caused by head, chest and abdomen trauma were less observed. Duration of hospital state was more seen in patients with the upper and lower extremity injuries, compared to those with head, chest and abdomen trauma. Moreover, no significant difference was observed between male and female patients with four extremity trauma. However, the frequency of four extremity trauma, such as scratch and being crushed, was significantly lower, compared to fracture and dislocation. According to the results of this study, the frequency of four upper and lower extremity injuries was higher in male and young adults, compared to other patients.

Keywords: Trauma, Four extremity trauma, Traffic accidents

INTRODUCTION

The pattern of damage to man and its causes are different, including road traffic accidents, fall from height, burn, sports injury, industrial accidents, damage caused by cold weapon and firearm and snakebite. Among all of the mentioned patterns, road traffic accidents are the most important and common cause of injury (1).

While it has been attempted to standardize the treatment of trauma patients over the past few years, 50% of mortality in these individuals is caused by spinal cord injury, aortic rupture and massive hemorrhage into the abdominal cavity at the accident site. Most of the times there is no proper treatment for the mentioned conditions; therefore, policy-makers have more focus on the prevention of trauma (2).

In developing countries, the most vulnerable group of people toward road accidents are pedestrians, which could be due to low level of knowledge, lack of compliance with safety measures while crossing the road and presence of motorcyclists with careless driving and high speed (2, 3).

In a previous study, it was indicated that the four extremity trauma was more observed (78.5%), compared to other body parts, such as head and face (76.5%), chest (44%), abdomen (31.8%) and neck (12.9%) (3).

A reduction in morbidity and mortality rates of traffic accidents in developed countries could be resulted from the establishment of equipped trauma centers and provision of special and organized services. Meanwhile, these rates have increased in developing countries, which could be due to the lack of organized medical services and insufficient budgets (5, 6).

It is recommended that health-related policies be made in a way that this significant issue, which affects the health of the society, be efficiently managed and controlled. Preventive measures should be considered, identified as regulations and be accurately monitored.
Some of the precautions in this regard could be the use of helmet by motorcyclists, organizing emergency services based on the two speed and accuracy criteria and establishment of trauma centers and ambulance stations near accident-prone areas (7).

This study was conducted to evaluate the benefits and effects of the data derived from epidemiological studies on the improvement of prevention and treatment strategies, analyze risk factors, reduce morbidity and mortality and create an organized and accurate intervention system. In this study, demographic and epidemiological characteristics of patients with four extremity trauma, who referred to Sahid Rajaee Trauma Hospital, were assessed in order to take a step toward the improvement of healthcare systems regarding traumatic injuries (5, 8).

MATERIALS AND METHODS

This retrospective study was conducted on all patients with trauma caused by traffic accidents, who referred to Shahid Rajaee Trauma Hospital in Shiraz, Iran during March-August 2015. Demographics of the subjects and data related to their stage of trauma were extracted from medical records, recorded and analyzed.

Demographic characteristics of the participants included age, gender, duration of hospital stay, mortality rate and information related to the trauma of the patients (e.g., trauma of the head, chest and abdomen) and type of trauma (e.g., scratch, being crushed, fracture and dislocation).

Data analysis was performed in SPSS using descriptive and inferential statistics, analysis of variance (ANOVA) and independent t-test.

RESULTS

This research was conducted to evaluate the frequency of incidence and demographic factors of four extremity trauma in victims of road traffic accidents, who referred to the Shahid Rajaee Trauma Hospital during March-August 2015.

In total, 2824 (80.69%) of the subjects were male and 676 (19.31%) cases were female. Mean age of the participants was 36.75 years with standard deviation of 21.12. In this regard, mean age of the male patients was 38.65 years with standard deviation of 20.32, whereas mean age of the female participants was 33.14 years with standard deviation of 19.32. Other demographic characteristics of the participants are provided in Table 1.

Table 1. Distribution frequency of variables of age, educational level and occupational status of participants

Variable	Variable levels	Frequency	Percent
Age	Lower than 25 years	429	12.25
	25-44 years	2249	64.25
	Higher than 44 years	822	11.50
Educational level	Illiterate	173	4.94
	Reading and writing	418	11.95
	High school diploma	1134	32.40
	Academic education	1775	50.71
Occupational status	Unemployed	82	2.34
	Housewife	314	8.97
	Student	603	17.23
	Government employee	1069	30.54
	Self-employed	1432	40.92

As observed in Table 1, approximately two-thirds of trauma cases were observed among the participants within the age range of 25-44 years and other cases were related to the patients under 25 years and those aged more than 44 years.

In terms of educational level, almost half of the participants had academic education and the lowest percentage in this regard was allocated to illiterate individuals.

Moreover, the highest percent of occupational status was assigned to the subjects who were self-employed, whereas the lowest frequency was related to unemployed cases.

Table 2. Comparison of place of trauma in gender, age, educational level and occupational subgroups in evaluated individuals

Place of trauma Variable	Variable levels	Head and neck	Chest	Abdomen	Four extremities	Total	P-value (level of significance)
		Frequency (%)					
Gender	Male	615 (21.78%)	176 (6.24%)	84 (2.97%)	1949 (69.01%)	2824 (100%)	0.48
	Female	131 (19.37%)	51 (7.54%)	31 (4.58%)	463 (68.49%)	676 (100%)	
Age	lower than 25 years	152 (35.43%)	36 (8.39%)	17 (3.96%)	224 (52.21%)	429 (100%)	**0.01***
	25-44 years	507 (22.64%)	153 (6.80%)	73 (3.25%)	1516 (67.41%)	2249 (100%)	
	Higher than 44 years	87 (10.58%)	38 (4.62%)	25 (3.04%)	672 (81.75%)	822 (100%)	
Educational level	Illiterate	53 (30.81%)	9 (5.23%)	12 (6.73%)	99 (57.55%)	173 (100%)	**0.02***
	Reading and writing	117 (27.99%)	29 (6.93%)	26 (6.22%)	246 (58.85%)	418 (100%)	
	High school diploma	293 (25.83%)	81 (7.14%)	41 (3.61%)	719 (63.40%)	1134 (100%)	
	Academic education	283 (15.94%)	108 (6.08%)	36 (2.02%)	1348 (75.94%)	1775 (100%)	
Occupational status	Unemployed	19 (23.17%)	3 (3.65%)	4 (4.87%)	56 (68.29%)	82 (100%)	**0.07**
	Housewife	78 (24.84%)	25 (7.96%)	17 (5.41%)	194 (61.78%)	314 (100%)	
	Student	168 (27.86%)	28 (4.64%)	9 (1.49%)	398 (66.00%)	603 (100%)	
	Government employee	256 (23.94%)	74 (6.92%)	18 (1.68%)	721 (67.44%)	1069 (100%)	
	Self-employed	225 (15.71%)	97 (6.77%)	67 (6.35%)	1043 (72.83%)	1432 (100%)	

The chi-square test was used to compare the frequency of place of trauma in gender, age, occupational status and educational level subgroups of the participants.

According to the results, a significant association was observed between the place of trauma and variables of age and educational level ($P< 0.05$).

In addition, four extremity trauma percentage was significantly more observed in cases with academic education, and the highest percent of head and neck injuries were related to illiterate participants.

In terms of age, the highest incidence rate of head and neck trauma was observed in patients aged more than 44 and cases under 25 years. While the distribution frequency of place of trauma was difference in the subgroups of occupational status and gender, no significant relationship was observed between the place of trauma of the variables of gender and occupational status in the present study ($P> 0.05$).

Table 3. Difference in mean duration of hospital stay based on type of trauma

Indicator / Variable	Mean	Standard deviation	Lowest	Highest	P-value (level of significance)
Four extremities	5.43	3.21	2	8	0.001
Head and neck	27.62	6.34	4	70	
Chest and abdomen	24.13	5.02	4	43	

According to the information provided in the mentioned table and using the one-way ANOVA, a significant relationship was observed between mean duration of hospital stay of the participants, which was related to the type of trauma ($P< 0.05$).

In addition, application of a Post Hoc test revealed that this difference was between the four extremities and head and neck. The same significant difference was observed between the four extremities and trauma to the chest and abdomen. However, no significant difference was observed between the two variables regarding the length of hospital stay.

Table 4. Difference in mean duration of hospital stay based on gender of participants

Variable	Variable levels	Mean	Standard deviation	Lowest	Highest	P-value
Gender	Male	4.83	14.27	2	63	0.73
	Female	5.12	13.71	2	70	

According to the information presented in the mentioned table and results of independent t-test, no statistically significant association was observed between mean duration of hospital stay and gender of the subjects (P> 0.05).

Table 5. Difference in mean duration of hospital stay based on age of participants

Indicator / Variable	Mean	Standard deviation	Lowest	Highest	P-value (level of significance)
Less than 25 years	3.42	1.65	2	21	0.001
25-44 years	19.18	7.52	3	52	
More than 44 years	23.94	11.74	7	70	

According to this table and the results of the one-way ANOVA, a statistically significant difference was observed between mean duration of hospital stay based on age of the participants (P< 0.05).

Moreover, application of the Post Hoc test revealed that this difference was observed in the age group of less than 25 years and 25-44 years and also between the age group of less than 25 years and the age group of more than 40 years. This difference was also observed between patients within the age range of 24-44 and cases aged more than 44; however, this difference was not statistically significant.

Table 6. Comparison of distribution frequency of studied variables of pain and alive and deceased groups

Variable	Variable level	Alive	Deceased	Total	P-value
Gender	Male	2465 (87.30%)	359 (12.70%)	2824 (100%)	**0.67**
	Female	598 (88.47%)	78 (11.53%)	676 (100%)	
Age	Less than 25 years	337 (78.56%)	92 (21.44%)	429 (100%)	**0.006**
	25-44 years	1995 (88.71%)	254 (11.29%)	2249 (100%)	
	More than 44 years	729 (88.69%)	93 (11.31%)	822 (100%)	
Type of trauma	Four extremities	2386 (98.93%)	26 (1.07%)	2412 (100%)	**0.001**
	Head and neck	570 (75.07%)	186 (24.93%)	746 (100%)	
	Chest and abdomen	117 (34.22%)	225 (65.78%)	342 (100)	

In this study, the Chi-square test was used to compare the mortality rate in subgroups of gender, age and place of trauma.

According to the results of the current research, a significant difference was observed between the mortality rate and variables of age and place of trauma (P< 0.05). In this evaluation, no significant difference was observed between the two genders regarding the mortality rate of the patients. However, the mortality rate was significantly higher in cases with head and neck trauma and chest and abdomen injuries, compared to those with four extremity trauma.

In terms of age, the highest mortality rate was related to the patients aged less than 25 years. This rate was similar for the age groups of 25-44 years and more than 44 years and difference between the age groups was significant (P< 0.05). While the mortality rate of two genders are different, no significant association was observed between gender and mortality rate caused by accidents in the present study (P> 0.05).

Table 7. Comparison of form of four extremity trauma in subgroups of gender and age of participants

Variable	Variable level	Fracture	Dislocation	Crushed	Scratch	Total	P-value
Gender	Male	931 (47.76%)	620 (31.81%)	174 (8.94%)	224 (11.49%)	1949 (100%)	**0.034**
	Female	107 (23.11%)	139 (30.04%)	127 (27.42%)	90 (19.43%)	463 (100%)	
Age	Less than 25 years	95 (42.41%)	68 (30.35%)	23 (10.26%)	38 (16.96%)	224 (100%)	**0.02**
	25-44 years	634 (41.82%)	586 (38.65%)	154 (10.15%)	145 (9.56%)	1516 (100%)	
	More than 44 years	312 (46.42%)	105 (15.62%)	124 (18.45%)	131 (19.49%)	672 (100%)	

The Chi-square test was used to compare the frequency of type of injury in subgroups of gender and age. According to the results, a statistically significant relationship was observed between the form of injury and variables of age and gender ($P< 0.05$).

Fracture was significantly more observed in patients aged more than 44 years, whereas the lowest percentage of scratch was related to the age range of 25-44 years. In terms of gender, the highest frequency of fracture was observed among the male participants and the lowest percentage of being crushed was also related to the male patients.

DISCUSSION AND CONCLUSION

The present study was conducted on 3500 individuals with road traffic accidents to evaluate the frequency and demographic characteristics of four extremity trauma in such patients. According to the results, the highest rate of trauma was related to the four extremities, followed by head, chest and abdomen.

A retrospective study was performed by Khatami et al. (2003) on 1393 patients and their results revealed that the highest risk group was young male individuals, which is in line with our findings (9).

In the current research, the frequency of four extremity trauma was significantly more observed in young adults, compared to the elderly. In another study by Zargar et al. (2002), it was demonstrated that trauma caused by accident was more seen in male patients, compared to female subjects, which is not in congruence with the results of the present research (10).

According to the results provided in Table 2, no significant difference was observed between male and female patients regarding four extremity trauma. In addition, the results of Chi-square test are presented in Table 4, which were indicative of less mortality rate of four extremity trauma, compared to chest, head and abdomen.

According to the results of one-way analysis of variance (ANOVA) and Post Hoc test, which are provided in Table 3, shorter duration of hospital stay was observed for patients with four extremity trauma, compared to head trauma. Moreover, the results of student's t-test are presented in Table 2, which demonstrated the insignificant difference between the male and female patients in terms of duration of hospital stay caused by four extremity trauma. The results of the ratio test are provided in Table 7 and indicated that the frequency of four extremity trauma in the form of scratch or being crushed was significantly less observed, compared to fracture and dislocation.

Given the results of the research and significant difference in the frequency of four extremity trauma compared to other types of injuries, and considering the higher risk of four extremity trauma in male and young individuals, it is suggested that proper planning and preparations be carried out in this area by relevant authorities.

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