ISSN: 0976-3031

International Journal of Recent Scientific Research

Impact factor: 5.114

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Volume: 6 Issue: 9

THE PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
http://www.recentscientific.com
E-mail: recentscientific@gmail.com

ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 6, Issue, 9, pp.6087-6091, September, 2015

International Journal of Recent Scientific Research

RESEARCH ARTICLE

EPIDEMIOLOGIC INVESTIGATION OF INTRACRANIAL HEMORRHAGE IN TRAFFIC ACCIDENT VICTIMS OF SHOHADAYE HAFTOME-TIR HOSPITAL IN 2013

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ARTICLE INFO

Article History:

Received 05th June, 2015
Received in revised form 08th July, 2015
Accepted 10th August, 2015
Published online 21st September,2015

Key words:

intracranial hemorrhage, epidural hemorrhage, Intraventricular hemorrhage, traffic accidents, epidemiology

ABSTRACT

Backgrounds: Today, traffic accidents are one of the main causes of deaths in the world, especially in developing countries. Traffic accidents are a major problem for the health systems in the world. Our country, Iran, is among the areas with high rates of morbidity and mortality from road accidents.
Objectives: To determine the epidemiologic variations of intracranial hemorrhage in traffic accidents victims of Shohadaye Haftome-Tir Hospital in 2013
Methods: In this cross-sectional descriptive analytic study, the sampling was done randomly; 300 cases were selected randomly (cluster sampling) each season and 100 cases each month. Data collection was accomplished using a checklist and based on their medical records and paraclinic results (CT scan). Information registered included age, sex, season, time and location of the incident, transport duration, hemorrhage type, and etc. Data was analyzed by SPSS 18.
Results: A total of 1200 cases were investigated; 323 cases had intracranial hemorrhage, among whom epidural hemorrhage was the most common (117 cases) and intraventricular hemorrhage was the least common (18 cases).
Conclusion: Due to advances in technology and modernism, as well as the increasing need for equipment and vehicles for fast and immediate transfer, traffic accidents are steadily increasing. Hence the need for careful planning for the prevention of traffic accidents and educating culture of traffic laws and safety devices can have a major role in reducing traffic accidents.

INTRODUCTION

Motor vehicle accidents are the most common causes of mortality and morbidity in modern societies that lead to injuries and damage to various organs of the body.

Traumatic brain injury (TBI) is one of the most important and fundamental causes of morbidity and mortality in developing countries and head trauma is considered as a major preventable problem in health systems and the leading cause of morbidity and mortality of youngsters.

In more than 50% of cases, the main cause of death from accidents is brain injuries, including hemorrhage and vehicle accidents (cars and motors) are the leading cause of death following injury among all causes of death (1).

Head and neck injuries are the main cause of death, severe injury, and disability among motorists, pedestrians, and drivers. In European countries, head trauma includes 75% of vehicles deaths. It is estimated that in some low- and middle-income countries, over 55% of deaths is due to head trauma injuries and includes more than 88% of all deaths in the country (2).

Studies show that TBI is 2 to 4 times more common in men, is most common in age range of 15 to 25 years, and is the greatest cause of death under 24 years (4). Problems in data collection of epidemiology of TBI have caused lack of detailed information in this regard, which are mainly because of the fact that many victims suffering from a mild TBI do not refer to the hospital or may be discharged within a few hours without accurate data registration. Also, a large number of severe brain injuries may pass away at the accident scene or during transport to hospital, thus registration is not possible (3).

Studies in Mashhad have also shown that 38.5% of severe TBIs pass away before reaching the hospital (4) and this statistics is reported to be 68.4% in Germany (5). The results of TBIs in United States show that 17 people died out of hospital and 6 in hospital per 100000, which indicates that the number of TBI deaths whose information is not registered is almost 3 times more than those who died in the hospital (6).

Death from TBIs can occur at different stages from the accident time until many years after that. Studies have shown that 30% of deaths due to trauma happens in the first 24 hours of admission to the hospital, which mainly include TBI,

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uncontrolled hemorrhage, and shock that can increase cerebral ischemia and secondary injury to the brain as a result (7). Unfortunately, no detailed information is available regarding the outcome of TBI patients discharged from hospital in Iran, but some countries have studied this accurately; in a study published by McTisdal and Milan showed that 27% of patients discharged from the hospital with severe brain injuries have died within 7 years after discharge (8).

Statistics show that 80% of TBI cases were mild and 20% were moderate and severe. Concerning the prognosis, 100% of mild, 93% of moderate, and about 42% of severe TBIs survive. This survival rate depends on the applied equipment and technology and prevention of secondary brain damage occurring in the later stages of primary complication, as the secondary injuries strongly increase the mortality rates of TBI (9).

Meningeal layers include dura mater (dura) and leptomeninges (arachnoid and pia mater).

There is no real subdural space. In the elderly, the anchor-like cords and vascular connections of the subarachnoid space is longer, which makes them more susceptible to tensile stress.
Epidural hemorrhage has the lowest prevalence rate, is often associated with skull fractures, is not visible on the skull base, is placed between the inner surface of the skull and dura layer, and only 1-3% of head trauma leading to epidural hemorrhage need surgery. In 15% of extradural hemorrhage, the skull is healthy.

The blood volume collected before the onset of clinical symptoms is 35 ml and minimum level observed in fatal cases is 100 ml. Lucid interval can be seen in extradural hemorrhage, subdural, and fat emboli.

Subdural hemorrhage is more common than epidural hemorrhage. Subdural hemorrhage can never be considered a countercoup lesion.

The theory of shaking the baby has been questioned because its power is 50 times less than a direct trauma. Hemorrhage occurs due to changes in the speed and rotational movement (Acc-Dec). Delayed subdural hemorrhage may exceed average of four hours, which is seen in arterial epidural hemorrhage. This gap is usually absent in severe hemorrhage. Subdural hemorrhage, unlike epidural hemorrhage, is quite dynamic.

Subarachnoid hemorrhage is the most common meninges' hemorrhage, which might be observed in child abuse suspected to head trauma in the first months of life; Histological measures to determine the onset of hemorrhage is affected by hemosiderin left from childbirth, based on the pearl reaction.

Thus, the association of the cause of death with subarachnoid hemorrhage is difficult. In head injuries, death is most likely caused by concurrent brain tissue damage, rather than moderate amounts of blood in the subarachnoid space, which is less important (10-12).

METHODS

Study Type: Cross sectional
Time of study: 2013
Place of study: Shohadaye Haftome-Tir Hospital, Shahre Rey
Study population: traffic accidents victims
Study sample: traffic casualties referring to Shohadaye Haftome-Tir Hospital

Sample size: According to the Cochran formula, 1186 cases were selected, which was increased to 1200 due to the risk of omitting some samples.

Sampling methods: Random cluster sampling was performed, 300 medical documents were randomly selected each season and 100 each month. (According to the injury list and one in every 10 samples)

Study tools: researcher-made checklist

Study method: After receiving introductory letter and referring to the hospital, medical records of traffic accidents victims were examined and completed based on the checklist and the contents of clinical records.

Research limitations: Incomplete medical records were excluded from the study.

Ethical Considerations: All gathered information was kept confidential and even the patient's name was not mentioned in the checklist.

Analysis methods: Data analysis was carried out by SPSS 18 software, and Chi square test and demonstrated through tables and figures.

Table 1 The mean age of accidents victims of Shohadaye Haftome-Tir Hospital according to gender (p≤01001)

Gender	Mean	Standard deviation	Minimum	Maximum	Range
Men	33.61	13.99	2.00	83.00	81.00
Women	39.32	19.27	3.00	80.00	77.00
Total	35.01	15.64	2.00	83.00	81.00

Table 2 Age distribution of traffic accident victims of Shohadaye Haftome-Tir Hospital

Age groups	Number	Frequency	Cumulative percent
Less than 10 years	29	2.4	2.4
10 to 20 years	133	11.1	13.5
20 to 30 years	331	27.6	41.1
30 to 40 years	276	23.0	64.1
40 to 50 years	192	16.0	80.1
50 to 60 years	144	12.0	92.1
More than 60 years	95	7.9	100
Total	1200	100	

- The mean age of traffic accident victims of Shohadaye Haftome-Tir Hospital was 35.1±15.64; the mean age of male traffic accident victims was 33.6±13.9, and the mean age of female traffic accident victims was 39.3±19.2, with significant difference obtained by Chi-square test. (P<0.001)

- Of the total 1200 studied victims, the most frequent age group was 20-30 years with 331 cases (27.6%) and the least frequent age group was less than 10 years with 29 cases (2.4%).

Table 3 Sex distribution of traffic accident victims of Shohadaye Haftome-Tir Hospital in 2013

Gender	Number	Frequency percent	P value
Male	906	75.5	
Female	294	24.5	p≤0.001
Total	1200	100	

Table 4 Distribution of cerebral hemorrhage in CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital in 2013

Hemorrhage type	Number	Frequency percent	P value
No hemorrhage	877	73.1	
Intraventricular hemorrhage	18	1.4	
Intracranial hemorrhage	25	2.1	
Subarachnoid hemorrhage	63	5.3	p≤0.001
Subdural hemorrhage	100	8.3	
Epidural hemorrhage	117	9.8	
Total	1200	100	

- P value obtained from Anova test was less than 0.001. Thus, the difference observed between the distribution of intracerebral hemorrhage in CT scans was significant, as of 1200 studied CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital, 877 cases were without hemorrhage.

Table 5 Frequency of epidural hemorrhage on CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital

Epidural hemorrhage on CT	Number	Frequency percent	P value
Yes	117	9.8	
No	1083	90.3	p≤0.001
Total	1200	100	

- Of the total 1200 CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital, 1083 cases had no epidural hemorrhage and 117 patients had epidural hemorrhage.

Table 6 Frequency of subdural hemorrhage on CT scans of traffic accident victims in Shohadaye Haftome-Tir Hospital

Subdural hemorrhage on CT scan	Number	Frequency percent	P value
Yes	100	8.3	
No	1100	91.7	p≤0.001
Total	1200	100	

- Of the total 1200 CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital, 1100 cases had no subdural hemorrhage and 100 cases had subdural hemorrhage.

Table 7 Frequency of subarachnoid hemorrhage on CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital in 2013

Subarachnoid hemorrhage on CT scans	Number	Frequency percent	P value
Yes	63	5.2	
No	1137	94.8	p≤0.001
Total	1200	100	

- Of the total 1200 CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital, 1137 cases had no subarachnoid hemorrhage and 63 patients had subarachnoid hemorrhage.

Table 8 Frequency of intraparenchymal hemorrhage on CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital in 2013

Intraparenchymal hemorrhage on CT scans	Number	Frequency percent	P value
Yes	25	2.1	
No	1175	97.9	p≤0.001
Total	1200	100	

- Of the total 1200 CT scans of traffic accident victims of Shohadaye Haftome-Tir Hospital, 1175 cases had no intraparenchymal hemorrhage and 25 patients had intraparenchymal hemorrhage.

Table 9 Frequency of skull fracture of traffic accident victims of Shohadaye Haftome-Tir Hospital in 2013

Skull fracture	Number	Frequency percent	P value
Yes	920	76.7	
No	280	23.3	p≤0.001
Total	1200	100	

- Of the total 1200 studied cases, 920 victims had skull fracture and 280 patients (23.3%) had no skull fracture.

Table 10 Frequency distribution of the final outcome of traffic accident victims of Shohadaye Haftome-Tir Hospital according to epidural hemorrhage in 2013

Outcome	Epidural hemorrhage	Percent	No epidural hemorrhage	Percent	Total	Percent	P value
Died	93	47.2%	104	52.8%	197	100	
Relative recovery and discharged	24	2.4%	979	97.6%	1003	100	0.001
Total	117	9.7%	1083	90.3%	1200	100	

- Of the total 1200 studied cases, 93 patients died with epidural hemorrhage and 24 patients were discharged with epidural hemorrhage and partial recovery. Also 104 patients died without epidural hemorrhage and 979 patients were discharged with partial recovery. Statistical tests showed significant difference between the frequency distribution of outcomes based on epidural hemorrhage in CT scans (P≤0.001).

Table 11 Frequency distribution of the final outcome of traffic accident victims of Shohadaye Haftome-Tir Hospital according to subdural hemorrhage in 2013

Outcome	Subdural hemorrhage	Percent	No subdural hemorrhage	Percent	Total	Percent	P value
Died	79	40.1%	118	59.9%	197	100	
Relative recovery and discharged	21	2.1%	982	97.9%	1003	100	0.001
Total	100	8.3%	100	91.7%	1200	100	

- Of the total 1200 studied cases, 79 patients died with subdural hemorrhage and 21 patients were discharged with subdural hemorrhage and partial recovery. Also 155 patients died without subdural hemorrhage and 982 patients were discharged with partial recovery. Statistical tests showed significant difference between the frequency

distribution of outcomes based on subdural hemorrhage in CT scans (P≤0.001).

However, our results were quite the contrary and showed the priority of cars.

Table 12 Frequency distribution of the final outcome of traffic accident victims of Shohadaye Haftome-Tir Hospital according to subarachnoid hemorrhage in 2013

Outcome	Subarachnoid hemorrhage	Percent	No subarachnoid hemorrhage	Percent	Total	Percent	P value
Died	42	21.3%	155	78.7%	197	100	
Relative recovery and discharged	21	2.1%	982	97.9%	1003	100	0.001
Total	63	5.2%	1137	84.8%	1200	100	

Table 13 Frequency distribution of the final outcome of traffic accident victims of Shohadaye Haftome-Tir Hospital according to intraparenchymal hemorrhage in 2013

Outcome	Intraparenchymal hemorrhage	Percent	No intraparenchymal hemorrhage	Percent	Total	Percent	P value
Died	19	9.6%	178	90.4%	197	100	
Relative recovery and discharged	6	0.6%	997	99.4%	1003	100	0.001
Total	25	2.1%	1175	97.9%	1200	100	

- Of the total 1200 studied cases, 42 patients died with subarachnoid hemorrhage and 21 patients were discharged with subarachnoid hemorrhage and partial recovery. Also 155 patients died without subarachnoid hemorrhage and 982 patients were discharged with partial recovery. Statistical tests showed significant difference between the frequency distribution of outcomes based on subarachnoid hemorrhage in CT scans (P≤0.001).
- Of the total 1200 studied cases, 19 patients died with intraparenchymal hemorrhage and 21 patients were discharged with intraparenchymal hemorrhage and partial recovery. Also 178 patients died without intraparenchymal hemorrhage and 977 patients were discharged with partial recovery. Statistical tests showed significant difference between the frequency distribution of outcomes based on intraparenchymal hemorrhage in CT scans (P≤0.001).

DISCUSSION AND CONCLUSION

Each year, approximately 1.2 million people lose their lives due to traffic accidents worldwide and more than 50 million are injured. In recent years, Iran faced a 10% annual increase in mortality and morbidity due to road accidents. Iran's statistics show that traffic accidents are the leading cause of death in all age groups and the first cause of morbidity and mortality in the age group under 40 years old, after cardiovascular diseases (13).

In this study, of the total 1200 victims of Haftome-Tir hospital, the most frequent age group was 20-30 years in 331 cases (27.6%) and the least frequent age group was less than 10 years with 29 cases (2.4%). These results are statistically similar to studies conducted by JacquesL in 2003 to 2008 in Michigan (14).

- Of the total 1200 victims of traffic accidents of Shohadaye Haftome-Tir Hospital, 757 cases were in car (63%) and 443 in motorcycle (36.9%). In study of Everett and colleagues, this priority was in motorcyclists, in which helmet had a decisive role (15).

The study of Odero W, Garner P, and Zwi A showed that the majority of victims were pedestrians, while the data obtained in this study, showed converse results, as follows: 512 cases out of 1200 investigated cases were drivers and 222 were pedestrians (16,17).

Data on the prevalence and type of brain hemorrhage showed that of 1200 CT scans of victims of traffic accidents of Shohadaye Haftome-Tir Hospital, 877 cases had no hemorrhage. 117 patients had epidural, 100 subdural, 63 subarachnoid, and 25 patients had intracranial hemorrhage. Baldo V *et al* also showed that the priority of trauma type was skull fracture and then subarachnoid, subdural, and epidural hemorrhage (18,19).

Based on daily statistics, 75 people die in traffic accidents; in addition, the economic loss caused by accidents is about 8 billion dollars or 4% of gross domestic product. It is more painful to know that Iran, with a record of 27 thousand annual deaths in a population of 75 million, has the first rank in this field in the world. Many factors are involved in producing the statistics of unfortunate traffic accidents (20).

Suggestions

A. Creating the right culture of driving for the next generation
B. Securing the existing roads, according to the international standards at all roads levels
C. Setting global standards for automakers and close monitoring

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How to cite this article:

Mohammadali Emamhadi *et al*., 2015. Epidemiologic Investigation of Intracranial Hemorrhage In Traffic Accident Victims of Shohadaye Haftome-Tir Hospital In 2013. *International Journal of Recent Scientific Research.* 6 (9), pp.6087-6091.

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International Journal of Recent Scientific Research

ISSN 0976-3031