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Epidemiological, Clinical and Radiological Characteristics of Patients with Head Trauma

Amir Moghadam-Ahmadi[1], Alireza Vakilian[2], Habib Farahmand[3], Athena Sharifi-Razavi[4], Farzad Tajik[5], Mohsen Nadjmadini[6]*

[1] *Department of Neurology, School of Medicine, Noncommunicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran*

[2] *Department of Neurology, School of Medicine, Geriatric Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran*

[3] *Department of Radiology, School of Medicine, Rafsanjan University of Medical Sciences, Rafsanjan, Iran*

[4] *Department of Neurology, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran*

[5] *Clinical Research Development Center, Ali-Ibn Abitaleb Hospital, Rafsanjan University of Medical Sciences, Rafsanjan, Iran*

[6] *Kerman University of Medical Sciences, Kerman, Iran*

Corresponding Author: Amir Moghadamahmadi, E-mail: m.najmadini@yahoo.com

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ABSTRACT

Background: Head injury has been recognized as a major public health problem and is a frequent cause of death and disability in young people and makes considerable demands on health services. Motor vehicle accidents are the major causes of traumatic brain injury (TBI) that its occurrence has been increasing in our country in recent years. We decided to study head injury in our region to evaluate the Epidemiological, clinical and radiological features of this health problem. **Methods:** We reviewed 200 TBI-patients records in Ali Ibn Abi Taleb hospital of Rafsanjan during 2012- 2013. A Questionnaire including age, sex, job, the cause of trauma, Glasgow coma scale (GCS), brain computed tomography (CT) scan findings and clinical symptoms for every head trauma patient; was completed. Data were analyzed by SPSS software using Chi-square test and P-value less than 0.05 was considered significant. **Results:** From the total of 200 patients, 73.5% were males, and 26.5% were females. The most common age group was 20-24 years. The majority of patients were students. Traffic accidents were the major cause of injuries (64.5%), and 35.5% of them were a motorcyclist. The most frequent finding of brain CT scan was skull fracture, and subdural hematoma and 25% of patient had a severe head injury. In clinical symptoms in conscious patients, headache, nausea, vomiting and vertigo was common. **Conclusion:** This study showed that we should pay more attention to traumatic brain injury young patients who are the most active potential forces of our society. Traffic accidents are the major reason for head injuries. Pay attention to prevention of this accident can perform an important role in decreasing of head injuries.

INTRODUCTION

Traumatic brain injury (TBI) is a major cause of death and disability, with considerable direct and indirect costs to society (1). The TBI is a public health problem associated with injuries sustained by military personnel, concussion-related sports injuries, falls in the elderly and also among young individuals in high-income countries, and the incidence has steadily increased over the past decade (2,3). Recent reports estimates of the annual incidence of head injury range from 100 in 100,000 to 444 in 100,000. Although only 16% of those with head injuries are admitted to the hospital, 80% receive medical attention, and their injuries are documented.

The TBI is usually classified as mild, moderate, or severe, on the basis of the initial Glasgow coma scale (GCS) score recorded in the emergency room, the duration of loss of consciousness (LOC), and duration of post-traumatic amnesia (i.e., loss of memory of events after the injury) (4). Approximately 80% of these injuries are classified as mild with the LOC lasting less than 30 minutes, an initial GCS of 13 to 15, and post-traumatic amnesia lasting less than 24 hours (5). The period of greatest risk is from the mid-teens through the mid-20s, before the age at risk for onset of most major psychiatric disorders, and men have a several-fold higher risk of traumatic brain injury than women (6).

The TBI is a reasonable exposure to examine on later mental illness (6). Patients who survive a severe TBI, often suffer from long-lasting neuropsychological impairments that impede their functional and social recovery (7).

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The TBI initiates a cascade of complex pathophysiological events that can themselves add to physiological injury and the longer-term morbidity related to neurodegenerative complications. For example, TBI increases susceptibility for development of Alzheimer's disease (AD) and other dementias, post-traumatic epilepsy, neuropsychiatric disorders, post-traumatic stress disorder, and chronic traumatic encephalopathy. The diverse neurologic sequelae of TBI can occur months, years, even decades after the last head injury (8-10). Also, among chronic sequelae, sleep–wake disorders are especially common, particularly disturbances of arousals such as excessive daytime sleepiness and pleiosomnia (increased sleep need per 24 hours). Post-traumatic insomnia also can occur; sleep-wake disturbances occur in 30 to 40% of TBI patient (11-13).

Although it is clear that most patients suffer some acute cognitive difficulties, the nature and course of post-acute cognitive recovery remain an area of intense controversy. Most patients recover fully from mild TBI, but 7% to 33% have persistent problems. Frequently, complaints involve a constellation of physical, emotional, and cognitive symptoms collectively known as post-concussion syndrome, often without demonstrable structural changes to the brain or neuropsychological dysfunction (5).

Computed tomography (CT) scan and magnetic resonance imaging (MRI) are the traditional diagnostic methods for detecting TBI (4,5,14). When clinical neuroimaging findings are present following a mild TBI, the classification changes to complicated mild TBI, which has a 6-month outcome more similar to moderate TBI (15). Therefore, it is in the symptomatic mild TBI patients with negative clinical neuroimaging that a search for more sensitive imaging techniques or biological markers continues. Newer and experimental neuroimaging techniques provide promise in this regard and may also be useful in demonstrating the physiological mechanisms of rehabilitation treatment effects (16). These include structural or chemical techniques, such as diffusion tensor imaging (DTI), magnetization transfer imaging (MTI), and magnetic resonance spectroscopy, and functional techniques such as functional MRI (fMRI), positron emission tomography (PET), and single-photon emission CT (SPECT) (5).

Due to this reality that head trauma has been recognized as a major public health problem and is a frequent cause of death and disability in young people, motor vehicle accidents are the major causes of TBI that its occurrence has been increasing in our country in recent years. Hence, the aim of this study was to evaluate the epidemiological, clinical and radiological features of this health problem in our area.

METHODS

This was a cross-sectional study of patients with head trauma that need to imaging and referred to the emergency ward of Ali ibn Abi Talib hospital in Rafsanjan-Iran. Period of this study was 2 year and the number of patients admitted during that time was 200 persons.

Information such as age, sex, occupation, education, mechanism of injury, consciousness status based on GCS criteria at the time of entry, CT scan, symptoms and injuries were recorded in the questionnaire that was developed for this purpose. The questionnaire was composed of three parts; the first part was epidemiological profile, the second part was a radiological profile of patients with head trauma, and the third part was containing the clinical signs of patients. The functional definition of injury severity has been stated based on the GCS criteria. Based on this criterion, the severity of the disease can be divided into three categories: mild brain injury (GCS score14 and 15), moderate brain injury (GCS score 9-13) and severe brain injury (GCS score 3-8) (17).

Interns and emergency physicians collected information of patients and also with the help of radiologists through patient's history and physical examination. Then data collection and encoded into SPSS software and were analyzed by using descriptive statistics (drawing tables, graphs, central indexes, and dispersion) and analytical statistics (independent t-test for quantitative variables and chi-square for qualitative variables).

RESULTS

During the study period, 200 patients were evaluated by head trauma that of these, 147 (73.5%) males and 53 (26.5 %) were female. Most of these patients were in the age range of 20-24 years (n = 61 and equivalent 30.5%) and 25-44 years (n =52 and equivalent 26%) and the lowest patients related to aged less than 5 years (n=12 and equivalent 6%) and older than 65 years (n=11 and equivalent 5.5%). In the term of education, most people (39.5%) with trauma had a diploma and associate degree and minimum of those (7.5%) who had a bachelor's degree or higher. Accidents are the most cause of trauma (64.5%) and then fall by 14 percent in the second place. In accidents, motorcycle accidents were the most important factor (35.5%) and then there was a car accident by 21%. Sporting events were included the lowest frequency regarding trauma, and least severe injury cases were also included (Table 1).

One hundred and seven (53%) of patients that admitted to the emergency had mild TBI (GCS 14-15), 29.5% of them (n=54) had moderate TBI (GCS 9-13) and 17% of them (n=34) had severe TBI (GCS less than 9).

Brain injury can be divided into two types as focal and diffuse. Focal lesions consist of contusion lesion, epidural hematoma (EDH), subdural hematoma (SDH), intracerebral hemorrhage (ICH), intraventricular hemorrhage (IVH),

Table 1. Frequency distribution of trauma patients based on the cause of trauma

Cause of trauma	Number	Percent
Accident	129	64.5
Falling	28	14
Conflict	16	8
Sports events	10	5
Occupational injuries	17	8.5
Total	200	100

subarachnoid hemorrhage (SAH) and skull fracture. Diffuse axonal injury (DAI) and concussion are divided as diffuse lesions. Regarding frequency distribution of lesions, skull fracture and SDH had the highest frequency in the amount of 52 (26%) and 50 (25%). The frequency of contusion lesion was less than the focal lesions. In this study, only 3 cases of DAI (1.5%) and 10 cases of concussion (5%) were reported (Table 2).

Th e most frequent of the lesion location on CT scan were related to parietal lobe (37 cases equivalent to 18.5%) and temporal lobe (31 cases equivalent to 15.5%).

DISCUSSION

Concussion and mild TBI are interchangeable terms to describe a common disorder with substantial effects on public health. Advances in brain imaging, non-imaging biomarkers, and neuropathology during the past 15 years have required researchers. These advances have led to guidelines for management of mild TBI in civilians, military personnel, and athletes, but their widespread dissemination to clinical management in emergency departments and community-based health care is still needed (4). According to a Centers for Disease Control and Prevention survey of emergency room visits for TBI, falls account for 38% of cases, primarily in children and older adults. Road traffic accidents (which include motor vehicle collisions, motor vehicle– pedestrian collisions, motorcycle, or bicycle accidents) contribute 16% of TBI cases, blunt trauma to the head accounts for 20%, assaults for 11% and other causes contribute 15% (18). Mild TBI is estimated to account for 80–90% of all cases of TBI in both civilian and military populations (19).

Trauma is one of the leading causes of mortality and morbidity in young and middle age adults (20). In the present study, most cases of head trauma occurred among people aged 20-24 and 25-44 years. These groups of patients are active community groups, and this could be due to a higher prevalence of high-risk behavior in these age groups. These statistics are varying in different societies; results show that the most common brain injury is related to the third decade of life in developed countries (20-23). Chiu et al. revealed that the most common age group 20-29 years in Taiwan (24) and in a study that done in Norway, the most common head injury was reported in the 0-4 and above 75 years age groups.

Table 2. The frequency distribution of CT scans findings

Lesions	Subtype	n (%)
Focal	Contusion	32 (16)
	Epidural hematoma (EDH)	30 (15)
	Subdural hematoma (SDH)	50 (25)
	Intracerebral hemorrhage (ICH)	10 (5)
	Intraventricular hemorrhage (IVH)	4 (2)
	Subarachnoid hemorrhage (SAH)	16 (8)
	Skull fracture	52 (26)
Diffuse	Diffuse axonal injury (DAI)	3 (1.5)
	Concussion	10 (5)

While in this country, the most common head injury in people was between the ages of 29-19 in the past, and this difference is likely due to the aging of the population and reduces the role of traffic accidents in head injury (25).

Our results showed that 73.5% of the patients in this study were male and 26.5 percent were female. Also, in an international investigation, we can be seen this difference between the two gender of patients (26-28). It should be noted that this ratio is changed to increase the percentage of women compared to men, that is probably due to the more use of motor vehicles, especially motorcycles by women (24).

Regarding the situation of education, the most of the trauma was seen in individuals who had a high school diploma or associate degree and the least amount of it among people who had a bachelor's degree or greater. In the study of the Ghodsi et al. was shown in terms of education, the most amount of trauma occurred in the groups that are illiterate (29).

By viewpoint of occupation, in our study, most patients with head trauma were students (5.20%) and then unemployed (14%). In the Fakharian et al. study, the highest rate of head injury was seen in children and students (30).

The main cause of trauma in this study was an accident (64.5%), after it, fall by 14 percent was in the second place and. Among accidents, motorcycle accidents were identified as the main factor. Our results were consistent with the Yousefzadeh and colleagues study (31). In European countries and America in the past, traffic accidents were the most common cause of head injury. However, by improving the standard of roads, production of safer cars, speed limits, use of safety belts and helmets and education programs, traffic accidents (which led to head trauma) had been reduced (32-34). In traffic accidents, the most common factors are a motorcycle (56.3%), machinery (21.7%) and pedestrian (14.3%) respectively (35). In the present study, strife and conflict by 8%, became known as a weak agent of head trauma. Generally, in Iran, the share of invasion in head injury is less than European and American societies (25). Because in Iran, there is a ban on carrying weapons and alcohol consumption that leads to reducing the incidence of invasion of people.

In our study, 53.5% of patients had a mild brain injury (GCS score14 and 15), 29.5 % moderate brain injury (GCS score 9-13) and 17% severe brain injury (GCS score 3-8). Also, international reports the majority of cases were mild head trauma (26). However, in Sweden and Norway rate of hospitalized patients with mild head injury varied from 15% to 94% (36).

In this study, regarding the frequency of injury, skull fracture and subdural hematoma were most frequently in the amount of 26% and 25%, respectively. In another study was carried out in Poursina Hospital on 880 patients in six months, the most of the damages that caused by trauma were SAH (37). In the study of Ehsaei et al., cerebral edema was the most common CT scan findings in patients with mild traumatic brain injury, and ICH was the most common findings in patients with moderate brain injury and severe brain injury (38). Mild trauma to the head is not always associated with mild results, in the study of Fazel and colleagues in Kashan-Iran, 3.4% of patients with mild head trauma had crush or bleeding within the brain (35).

CONCLUSION

Results of this study show that traffic accidents as a cause of head trauma like most other studies. According to these results, we can say that accurate and timely diagnosis, and treatment methods, especially methods of preventing of these injuries are necessary and due to the high incidence of traffic accidents as the leading cause of such injuries, reform social, cultural and improvement in the field of road transport should be considered. Since most cases of head trauma in young, active and productive of society had occurred, therefore, social and cultural measures recommended in the field of young people's guidance and tips as well as proper planning to prevent such injuries and social damage in this age group.

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AUTHORS CONTRIBUTION

Alireza Vakilian, Habib Farahmand, and Farzad Tajik helped us for design of the study and doing the study; Athena Sharifi-Razavi wrote and revised the study; Mohsen Najmaddini helped for data collection and analysis, and Amir Moghadam-Ahmadi participated in all stages of the work.

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