

# Determining the prevalence and type of traumatic brain injury in children

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**Background and Objectives:** Head injury is a major health problem worldwide, especially in children (1). Trauma is one of the most common causes of morbidity and mortality in developed societies. Traumatic injuries to the head can occur because of motor vehicle crashes, falling from heights, being beaten, and brain injuries caused by child abuse (4). The most common causes of head trauma in children are child abuse and motor vehicle accidents in developed countries (2). Head trauma in children has a better prognosis when compared with adults (2). Previous studies indicate serious damage in head injuries caused by falling from heights (3) and may lead to irreparable damages such as brain ischemia and seizures, among others (4). In traumatic brain damage, there may be epidural, subdural, and parenchymal intracranial hemorrhages as well as damage to the gray or white matter including cerebral contusion, axonal lesions, diffuse cerebral edema, and damage to the cerebellum and brain stem (4). Several studies have investigated the primary mechanism of head injury and its therapeutic value, but not many studies are available on the major causes of head injuries (1). This study investigates the varied causes of traumatic brain injury and considers the most frequent causes and relevant symptoms in children.

**Materials and Methods:** In this 3-month cross-sectional study, which was conducted from October to December 2014, 630 patients under 18 years of age with head trauma were admitted to the emergency department of Namazi Hospital, Iran, were investigated. Regardless of gender, these children were in an age range between newborn to 18 yrs. After admission to the hospital, these patients or their attendants were asked about their medical history and vital signs were examined by a 24-hour triage nurse who had successfully completed a triage course. Then, a 24-hour emergency medicine specialist in the emergency department of Namazi Hospital examined the patients and took their medical history; the triage nurse filled out the triage form with directions for using medications and therapeutic measures were described by the emergency medicine specialist. It is worth noting that children who according to the standard triage system were placed in level 1 or 2 due to having multiple traumas including head trauma

were immediately sent to the resuscitation room with careful monitoring. Moreover, the patients who needed radiology or laboratory measures were put in level 3 triage and were monitored after filling out the forms for temporary hospitalization. In 6 hours, it was decided to discharge these patients or hospitalize them. It is worth mentioning that hospitalization includes both staying in the general ward or the intensive care unit. Critically ill patients and those with unstable vital signs who needed surgery were immediately transferred to the operating room. The criteria for inclusion was under 18 years of age and having traumas caused by falling from heights, motor vehicle accidents, the head hitting a hard object, beaten about the head and neck and having multiple traumas. Patients who suffered from trauma in other organs such as the chest, abdomen, spine, or the genital area with no damage to their head, all patients over 18 years of age, patients in whom the kind of mechanism and the place of injury was not clear, and patients whose medical files were incomplete or unclear were excluded from this study. All patients who were hospitalized in the general ward, intensive care unit, or operating room were studied and based on the kind of damage to the head were registered and the relevant information was recorded in their medical data files. In the patients' final medical files, information such as age, gender, injury mechanism, type of damage, and final prognosis, among others, was included. Finally, the results were statistically analyzed by descriptive statistic methods and the chi-square test. It should be said that in compliance with ethical standards, the personal information of patients remained confidential.

**Results:** Among 145 subjects, there were 98 male and 47 female patients with an average age of 5 years. 63 subjects had fallen from a height; 37 had a car accident; 43 had a motorcycle accident; and 2 of the patients were admitted due to beating. Finally, 35 patients were discharged, 44 were released, 43 were hospitalized, and 23 were categorized in level 3 and monitored. Among 115 subjects who had a CT scan order, just 99 of them had it done with 43 subjects having a normal CT scan and 46 of them having an abnormal one. In the latter group, 3 subjects showed an epidural hematoma and contusion; 7 subjects just had contusion; 7 of them had a subdural hematoma and 3 of them had a subdural and an epidural hematoma and 5 skull-base fractures (2 of these 5 subjects had pneumocephali, 6 parietal skull fractures, 1 subgaleal hematoma, 12 occipital fractures and frontal fractures.

**Conclusions:** The results of this study show that many accidental injuries in children are due to parental recklessness, especially in high-risk environments in terms of accidents. Therefore, public education in this regard and educating drivers to be more careful in areas where children are present can play a significant role.

**Keywords:** Accident, children, head trauma