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PREVALENCE OF TRAUMATIC BRAIN INJURY IN AL KHARJ CITY A RETROSPECTIVE STUDY USING MRI SCAN

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ABSTRACT

Epidemiological tracking of traumatic brain injury (TBI) incidence, prevalence, and outcomes is essential, as traumatic brain injury (TBI) is a major global public health and socioeconomic concern. One of the main causes of traumatic brain injury (TBI) among teenagers, young adults, and the elderly is motor vehicle accidents. Finding out how common TBI is in Al Kharj City is the aim of our study. It is a retrospective, study conducted among patients with TBI. There were 150 individuals with head trauma included in this study. Within 30 days after the accident, MRIs of each person's brain were performed. Throughout the hospital stay, statistical, demographic, clinical, and radiological information was acquired. Two years later, a neurocognitive exam was conducted. Major depressive illness is often noted in patients with lesions of the corpus callosum and cerebral hemisphere. After traumatic brain injury, MRI provides valuable predictive data. The hospital administration may find the data collected helpful in allocating the required resources and in launching educational initiatives among the high-risk populations.

KEYWORDS: Prevalence, MRI, Al Karaj, Brain injury.

INTRODUCTION

Worldwide, traumatic brain injury (TBI) has a high death rate and causes permanent impairment, making it a serious public health concern. Hopelessness, loss, despair or feeling sad are symptoms of depression that conflict with daily activities. Severe disability are caused by traumatic brain injury (TBI) in 150–200 individuals every year. (Kraus and McArthur, 1996).

After a traumatic brain injury (TBI), physical impairments are generally immediately apparent and result in moderate disability, but cognitive and behavioral impairments, which are more common and can be very debilitating, are often overlooked or misunderstood by medical experts. The biggest hardship for patients and their families following a traumatic brain injury (TBI) is the alteration in cognition and behavior, which occurs regardless of the patient's age, social standing, or educational attainment. (Fleminger and Ponsford, 2005; Ponsford et al., 2003).

While no single characteristic characterizes all depressed patients, persistent negativity and melancholy are prevalent qualities. Apathy, low energy, cognitive distortions, and the inability to appreciate routine life activities are some other symptoms. (AlYousefi et al., 2021).

Between 2005 and 2015, there was an increase in the prevalence of depression in Saudi Arabia. (Depression, 2017).

Depression is one of the most prevalent mental health issues among TBI (traumatic brain injury) sufferers. It exceeds the reported rate for the overall population. It is unknown what specifically causes depression following a traumatic brain injury. This differs widely throughout individuals. It might be physiological in character, perhaps brought on by a disruption in neuronal pathways. It might also result from altered neurotransmitters in the cerebrum following a traumatic event. (Chen et al., 2007; Durish et al., 2018; Aletesh et al., 2021).

Following a traumatic brain injury, psychosocial function is impacted, particularly in the first year following the injury for those who have serious depression. (Lin et al., 2010; Rapoport et al., 2006).

Individuals suffering from depression and cerebrovascular illnesses, particularly those with late-onset depressive disorders, exhibit severe administrative dysfunction. ischemia lesions in basal nuclei and deep white matter (Alexopoulos and. Frontostriatal, 2002; Krishnan et al., 2002).

According to LoBue et al. (2018) and Ma et al. (2019), traumatic brain injury (TBI) is regarded as a major risk factor for neurodegenerative disorders, such as dementia and Parkinson's and Alzheimer's diseases. Although many TBI patients are able to overcome neurological dysfunction after a year following injury, approximately 65-89% of patients still experience it (Coronado et al., 2011). Conversely, medical records usually do not gather enough information for research investigations and frequently do not consistently collect comparable data across individuals. We seek to characterize traumatic brain injuries among patients treated in the Emergency Department of two major hospitals in Al Kharj city using the available medical records in order to investigate trends in TBI and the caliber of data accessible in medical records.

METHODS

This study employs a retrospective cross-sectional design. Every patient who had suffered a head injury was gathered. from January 2023 to October 2023.

Participants in the study were 150 consecutive patients who had been admitted to the King Khalid and Prince Sattam Hospitals in Al-Kharj city due to head injuries. The study (PSAU-2023 ANT 12/42PI) was authorized by the Institutional Review Board of Prince Sattam University. All of the cases ranged in age from 10 to 72 years old and had a Glasgow coma scale score of 13 to 15. Individuals with spinal cord injuries and those with profound cognitive impairment were not allowed to participate in the research. However, patients who had a history of psychological illnesses prior to a head trauma were also not included in this research. Out of the 150 patients, 69.9% had injuries from motor vehicle accidents, 31.8 instances from falling from a height, and 26.2 cases from struggles. 150 patients provided signed consent to take part in this study. Additionally, the MMSE (Mini Mental State Examination) was used to evaluate cognitive skills. Furthermore, a neurological evaluation was conducted utilizing the Glasgow Expanded Outcome Score, or GOSE. All patients underwent radiological evaluation using an MRI and clinical evaluation using the EDSS at baseline. Magnetic resonance imaging (MR) was obtained at the radiology department as part of the routine clinical assessment in the neurosurgery departments of the affiliated hospitals. All the scans were evaluated by a neurologist skilled in assessing structural neuroimaging exams, who was blind to the results of a mental test. Based on current protocols from US registries and the World Health Organization, a data gathering form was created. Data was manually gathered from the patients' medical records by one neurosurgery resident and one scientific researcher skilled in data collecting and coding techniques. We analyzed our data using ANOVA (Analysis of Variance) and SPSS 13.0. In all situations, the Glasgow outcome scale was extended. A chi-square nonparametric analysis was used to analyze the results, together with pupillary abnormalities, head trauma mechanism, and Glasgow coma score for both sexes.

RESULTS

150 cases with head injury were included in our study. All the study participants have completed the inclusion criteria. 124 (82.6 %) males and 26 (17.3 %) females. 44 cases (29.3%) of traumatic brain injury (TBI) have been reported in children between the ages of 0 and 18; the majority of these cases (48.3%) occur in the 0–6 age range, with the 10–14 age range coming in second (21.4%). There were 93 instances (61.5%) of adult TBI patients, ranging in age from 18 to 73. The majority of these cases fell into the 36–59 age group, accounting for 49 (32.6%), followed by the >60 age group (30%), and the 19–35 age group (18%).Head injuries were most commonly caused by falls (53.3%) and traffic accidents (24%), then assault (14.7%) and struck by/or against (8%).

According to the distributions by location of occurrence, the majority of injuries happened at home (33.4%) and in transportation areas (25.3%), with industrial or construction sites (12.6%), sports and recreation areas (12%), farms or other primary production locations (9.3%), and other places coming in second.

The outcomes of magnetic resonance imaging show that there are lesions in both the cerebral hemisphere and the corpus callosum, as well as different axon injuries with separated cerebral hemispheres. Patients with lesions of the cerebral hemisphere and brainstem, as well as those with lesions of the cerebral hemisphere and corpus callosum, are frequently diagnosed with major depressive disorder. In patients with cerebral hemisphere lesions alone, epidural hematoma, cerebral hemisphere lesions, and corpus callosum lesions combined with encephalomalacia, the worst degree of consciousness is observed. The various forms of TBI are depicted by axial MRI images in (fig. 2-4).

Table 1: Demographic characteristics of TBI patients within the emergency departments.

Age in years	Frequency	Percentages
<18 years old	44	29.3 %
19 - 35 years old	27	18 %
36 - 59 years old	49	32.6 %
>60 years old	30	20 %

Total	150	100%
Gender		
Male	124	82.6 %
Female	26	17.3 %

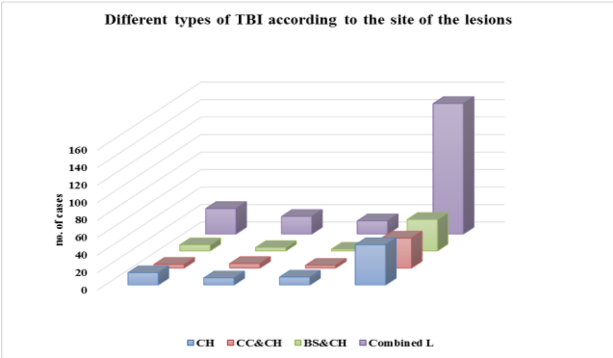

Fig. 1: Different types of TBI according to the site of the lesions. Cerebral Hemisphere (CH) Corpus Callosum (CC) Brain Stem (BS).

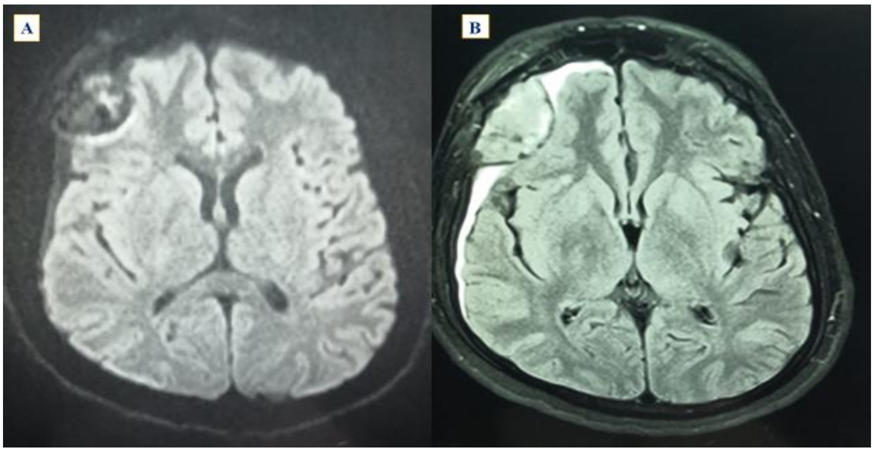

Fig. 2: Axial MRI images A and B show a 35-year-old male with an ipsilateral Temporal (SDH) subdural hematoma and a post-traumatic right Frontal (EDH) epidural hematoma.

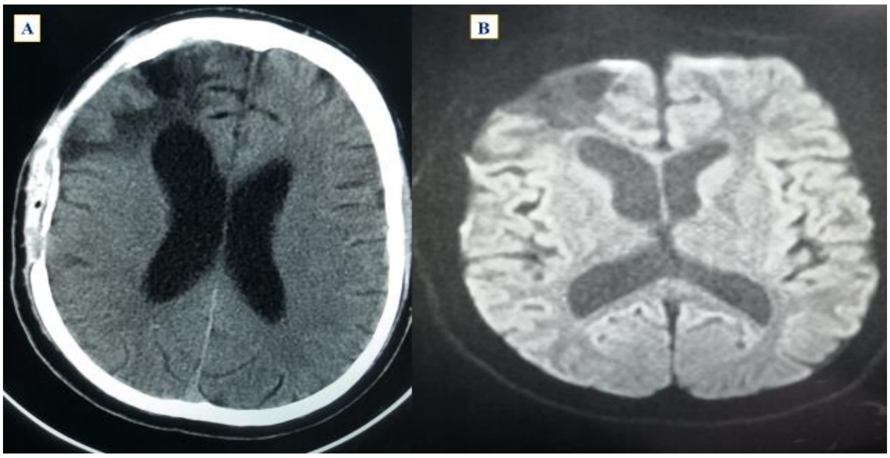

Fig. 3: Axial MRI images A and B show a 35-year-old male with an ipsilateral frontal (SDH) subdural hematoma and a post-traumatic right frontal (EDH) epidural hematoma.

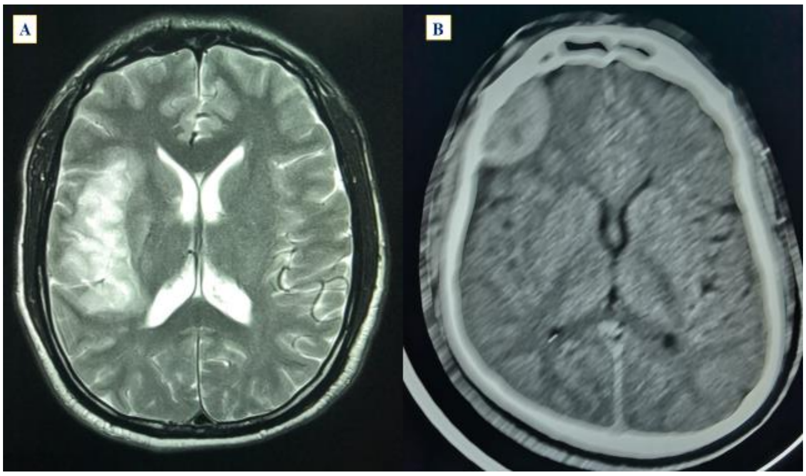

Fig. 4: Male 59-year-old with left parietal minor EDH (epidural hematoma) after trauma: A and B axial MRI.

DISCUSSION

To the best of our knowledge, this project is the first in the nation to pilot a Trauma Registry, detailing the traumatic brain injuries among patients treated at the Emergency Department and evaluating the trends in TBI using the accessible medical records. Our findings show that TBI is a crucial part of trauma care because 150 patients were admitted to the hospital in just three months. Depression is a common result of brain damage. In the twelve months following their accident, around 50% of people impacted experience depression. The majority—roughly two-thirds—are affected in the initial years following brain damage (Fann et al., 2009). Less than 1 in 10 people experience depression on a 12-month average, which is generally significantly lower (Mubaraki et al., 2021). Depression following a head injury is most likely caused by disruption of the amine-containing, biosynthetic neurons that travel via the anterior subcortical white matter or basal ganglia.. Soon after an accident, feelings of loss and dissatisfaction frequently accompany persistent dysphonia symptoms (Alqarny and Alsofyani, 2021). Because of their generally bland personalities, TBI patients may exhibit fewer obvious signs of depression. Depression may be indicated by an irregular or subpar recovery, or a worsening of neurological impairments following an initial period of recovery. Major risk factors for depression include a history of mental illness in the past and poor levels of pre-existing comorbid functioning (Hellewell et al., 2021).

The subjects in this study who initially had the lowest level of consciousness were those who had lesions of the corpus callosum, cerebrum, and solitary cerebral hemisphere. This partially aligned with findings from an earlier investigation that demonstrated a strong correlation between GCS and a corpus callosum lesion, and that patients with a callosal lesion experienced a greater decline in consciousness compared to those with lesions in other locations (Cicuendez et al., 2017; Kotb et al., 2019).

In patients with acute depressive disorder following traumatic brain injury, certain researchers have documented specific involvement of lesions in the left frontal lobe and left basal nuclei (Fedoroff et al., 1992). Other relevant studies of secondary depressive disorders have also discovered decreased metabolic rates in inferior frontal areas in patients with Huntington (Fedoroff et al., 1992) and Parkinson diseases (Mayberg et al., 1990; Jorge et al., 2004). These studies have also found reduced metabolic rates in the lower frontal areas in patients with Parkinson's disease and Huntington's disease.

CONCLUSION

Fall and traffic accident injuries are two of the main causes of traumatic brain injuries, which are a major cause of mortality and morbidity among adolescents, young adults, and the elderly worldwide.

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Conflicts of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Availability of Data and Materials

The data are available upon request from the authors.

Ethics approval

All series of steps that were implemented in this study were in compliance with Ethics Committee of Prince Sattam bin Abdulaziz University Institutional Review Board. (PSAU-2023 ANT 12/42PI).

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