EPIDEMIOLOGICAL AND CLINICAL-FUNCTIONAL PROFILE OF PATIENTS VICTIMS OF TRAUMATIC BRAIN INJURY: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: The objective was to evaluate the epidemiological and clinical-functional profile of patients with TBI treated at a public hospital that is a reference in trauma care in Goiânia. Methods: It is an analytical cross-sectional study carried out in a trauma reference hospital between March and July 2021. Patients admitted to the wards, coming from the Intensive Care Unit or emergency, who met the eligibility criteria of the research, were evaluated. Information was collected from electronic medical records and applied to the Glasgow Coma Scale, the Montreal Cognitive Assessment, the Functional Independence Measure scale and the Medical Research Council. Results: The sample consisted of 70 individuals, 58% of whom were men, with a mean age of 40.40 (±15.41) years. Weekends corresponded to the days with the highest occurrences and hospitalizations, the main cause of TBI was the motorcycle accident and the use of alcohol was associated in 41.5% of the cases. The diagnosis of mild TBI was the most frequent and cognitive deficit and impairment of functional independence were identified. Conclusions: The biggest victims of TBI treated at a referral hospital for trauma in the state of Goiás are men of working age involved in motorcycle accidents under the influence of alcohol use. Mild injuries predominated and it was identified that the greatest functional repercussions of the individuals were on cognition and independence to perform daily activities.

KEYWORDS: EPIDEMIOLOGY; TRAUMATIC BRAIN INJURY; PUBLIC HEALTH

INTRODUCTION

According to the International Classification of Diseases (ICD 10), Traumatic Brain Injury (TBI) comprises trauma to the scalp, skull and brain1. In Goiás, from January to November 2021, 2,225 hospitalizations due to TBI were reported, 422 in Goiânia alone[2].

The diagnosis of TBI is made according to the trauma history, physical examination, and imaging tests[3] and can be classified as mild, moderate or severe[4]. The individual victim of TBI may suffer impairments in interpersonal, occupational and social functioning[5], which generates a great impact on public health due to socioeconomic and personal losses[6].

Knowing the epidemiological profile of TBI victims is a way to create prevention strategies aimed at reducing these injuries, since TBI can lead to secondary conditions that result in long-term impairment, functional limitation, disability and affect quality of life[5,7].

The literature is still scarce in studies that contemplate this population, mainly in the state of Goiás. In addition, existing studies do not explore the functional profile of these victims even during hospitalization, which is important to know so that it is possible to identify the patient who needs more attention during the hospital stay. This information helps in therapeutic planning with the aim of improving functionality and reducing impacts on health.

In view of this, the objective of the study was to evaluate the epidemiological and clinical-functional profile of TBI victims treated at a public hospital of reference in trauma care in Goiânia.

METHODOLOGY

Study design

It is an analytical cross-sectional study, approved by the Ethics and Research Committee of the institution by CAAE: 40360420.4.0000.0033. It was described following the recommendations of STROBE (Strengthening the Reporting of Observational Studies in Epidemiology).

Location

It was carried out between March and July 2021 at Hospital de Urgências de Goiás (HUGO). Patients admitted to the wards from the Intensive Care Unit (ICU) or emergency were evaluated.

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Participants

Patients aged ≥ 18 years were included; confirmed clinical diagnosis of TBI by the neurosurgery team and who agreed and signed the Free and Informed Consent Form (TCLE). Patients with a previous history of TBI, neurodegenerative diseases and cognitive impairment described in the medical records or reported by the companion were excluded; who were in deprivation of liberty; without companions and who did not have an adequate level of consciousness, according to the Glasgow Coma Scale (GCS), to sign the TCLE and those with incomplete medical records.

Variables

The main outcome of the study was the epidemiological and clinical-functional characterization of the participants. The following were collected: sex, age, day of the week in which the injury occurred, day of the week in which the patient was admitted to the hospital, diagnosis, type of TBI, cause of trauma, factors associated with trauma, type of treatment, ICU stay, time length of stay in the ICU, length of stay in the hospital, death. Additionally, the following data were collected: level of consciousness, cognitive score, level of functional dependency before and after injury, and muscle strength.

Instruments

Initially, patients were screened using the electronic medical record system. The fit patient was invited to participate in the research and explanations about the evaluations were made. After signing two copies of the TCLE, the collection and evaluations began.

The following data were collected from the medical records: name abbreviation, medical record number, sex, date of birth, age, hospitalization data, trauma-related data and clinical data and transferred to the clinical and epidemiological evaluation form created by the researchers.

Soon after, the ECG was applied, which defines the state of consciousness. The individual's reactivity is evaluated through three parameters: eye opening, verbal response and motor response. Each parameter receives a score, with 15 being the maximum score and indicating a normal level of consciousness. Patients with a score of eight or less are considered comatose[8].

Then the Montreal Cognitive Assessment (MoCA) was applied, used to detect mild cognitive impairment. Its score ranges from zero to 30, with higher scores indicating better cognitive function. The original cutoff point is 26 points, however, in the Brazilian adaptation, the cutoff point of 25 points showed greater sensitivity and specificity[9,10].

Then, the Functional Independence Measure (FIM) scale was applied, which assesses the inability of individuals with functional restrictions of various origins in carrying out daily activities. Each activity receives a score from one (total dependence) to seven (complete independence), with a total score from 18 to 126. The level of independence is classified according to the total score, with 18 points indicating complete dependence; 19 to 60 points modified dependency (assistance in up to 50% of the task); 61 – 103 points modified dependency (assistance in up to 25% of the task); and 104 – 126 points complete or modified independence11. Two measurements were performed: before the TBI and after the injury during hospitalization, just for characterization purposes.

Finally, muscle strength was assessed using the Medical Research Council (MRC), a scale that assesses peripheral muscle strength. Six movements are analyzed bilaterally. For each movement, muscle strength is graded between zero (total paralysis) and five (normal muscle strength). The total score ranges from zero (tetraplegia) to 60 (normal muscle strength), a total score below 48 points indicates significant weakness, and below 36 indicates severe weakness[12].

Bias

To reduce the risk of measurement bias, the application of the scales and tests at the bedside was performed by only one researcher.

Study size

To define the sample calculation, the total sample of the study by Passos et al.[13] was used as a reference, since it was a study carried out in a reference hospital in trauma with similar inclusion criteria. The calculation was performed after data collection, using a free online calculator available on the internet. Considering a confidence level of 95% and a 5% margin of error, the sample number was 70 individuals.

181 individuals were screened during the research period, of which 70 were included in the sample. The selection of participants is shown in the flowchart below (Figure 1).

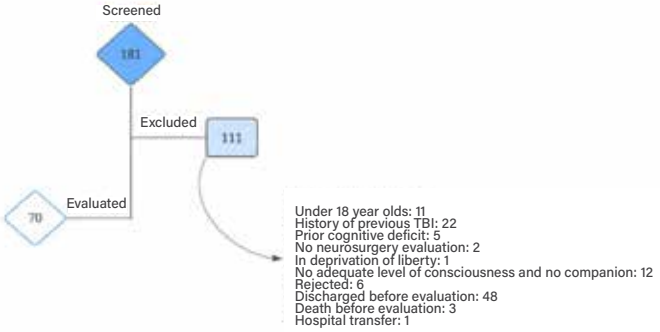

Figure 1: Sample selection flowchart

Statistical analysis

For statistical analysis, the statistical program Statistical Package for the Social Sciences - SPSS (version 20.0) was used. Initially, the Kolmogorv-Smirnov normality test was performed for quantitative variables. Mean and stan-

dard deviation were calculated for normal continuous variables, median and interquartile range for non-normal continuous variables, in addition to percentage and frequency for qualitative variables.

RESULTS

The sample consisted of 58 men (82.9%) and 12 women (17.1%), the mean age was 40.40 (±15.41) years. The epidemiological characteristics related to the lesions are described in table 1.

Variables	Values
Diagnosis	
Mild TBI	38.6%
Moderate TBI	31.4%
Severe TBI	30.0%
TBI type	
Closed	87.1%
Penetrating	12.9%
Type of Treatment	
Conservative	81.4%
Surgical	18.6%
Cause of TBI	
Car accident	12.9%
Motorcycle accident	40%
Fall from height	14.3%
Fall from own height	14.3%
Others	18.5%

Table 1 - Epidemiological characteristics related to the lesion

Mild TBI and the closed type were the most common and conservative treatment was predominant. The most common cause of TBI was the motorcycle accident, additionally, among the factors related to the causes, the use of alcohol stood out in 41.5% of the cases and the accident at work in 14.6%.

Regarding the characteristics of hospitalization, weekends were the most common days for injuries (57.1%) and hospital admission (61.4%). The other characteristics of hospitalization are described in table 2.

Variables	Values
ICU admission	
Yes	55.7%
No	44.3%
Days	18 (±11)
Length of Hospital Stay	16 (26)
Hospital discharge	94.2%
Death	5.8%

Caption: TBI: Traumatic brain injury
Table 2. Characteristics of hospitalization

The clinical-functional characterization of the participants is described in table 3.

Variables	Values
Glasgow Coma Scale	14 (3)
MoCA	16 (±5)
MRC	54 (18)
MIF	
Prior	126 (0)
Current	67 (79)

Caption: ICU: Intensive care unit; ( ) : interquartile range; ±: standard deviation

Table 3. Clinical and functional characteristics of the sample

The ECG score represents a confused level of consciousness, where participants might not be able to locate themselves in time and space. Regarding the MoCA, the sample presented a score corresponding to the presence of mild cognitive impairment. In the assessment of muscle strength, the score was above the cutoff point for significant weakness, and in terms of functionality, the individuals had complete independence to carry out their daily activities prior to the TBI and it was impaired after the trauma.

Regarding the functional classification according to the FIM, 44.3% of the sample was classified as modified dependence in 50% to carry out their daily tasks after the TBI.

DISCUSSION

The main findings of our study were that the main victims of TBI are men, with a mean age of 40 years, with injuries classified as mild. Motorcycle accidents were the major cause of TBI in our sample and alcohol use was present in most cases.

The literature states that the main victims of TBI in Brazil are male and this fact is probably due to the greater exposure of men to risky environments and situations[14,15,16]. Despite agreeing with our findings[6,17], the literature indicates a varied age range starting from 18 years[18]. It is common to find more reports of mild cases of TBI in Brazilian studies[17,18,19], however, some authors report difficulties in finding this data due to not completing complete medical records[20].

Traffic accidents have been leading the causes of TBI, especially in places where traffic laws and the use of protective equipment are not respected and inspection and preventive measures are not yet effective[21]. Some Brazilian studies also identified motorcycle accidents as the main cause of TBI[13,15,18]. Associated with this injury mechanism, the use of alcohol is frequently reported in the literature[22], in addition to a greater number of incident records and hospital admissions on weekends[13], as found in our study. This fact can be explained by the fact that the weekend is the period when people seek more entertainment, fun and leisure, which can influence behavior and result in thoughtless and irresponsible attitudes, such as the association of alcohol and driving[19].

The length of hospital stay found was the longest so far,

the literature indicates an average of 5 to 11 days of hospitalization[16,18,22]. Only the study by Smart et al[23] presented data similar to ours on ICU admissions, but the literature explains that the supply of ICU beds in hospitals that receive this patient profile varies[7], which may influence the results of other studies. In-hospital death is not as common, as found in our study, the literature describes rates of up to 22% for this population[24].

The literature indicates an average of 11 to 13 on the ECG, but these values are related to the moment of hospital admission and not during hospitalization as in our study[17,20,22]. It also indicates an average of 14 to 18 points in the MoCA in individuals after TBI, a result found in our study. However, it differs on its application in individuals with TBI, as it does not seem to be ideal for differentiating the level of cognitive impairment in relation to the extent of the brain injury. However, it proved to be sensitive to detect cognitive impairment in individuals with TBI due to its wide coverage of the domains of cognitive function[25,26].

Individuals who are victims of TBI, in addition to cognitive deficits, have physical sequelae that impair physiological efficiency and muscle strength and that impact functionality and independence to act on their lives and perform day-to-day activities[27,28,29]. In the study, muscle strength was assessed using the MRC and the sample had a score above the cutoff point corresponding to significant weakness. The functionality was evaluated through the FIM.

Only the study by Brooks et al.[30] used the FIM to evaluate individuals after one year of severe or moderate TBI, who obtained an average of 114 points, which represents complete or modified independence for carrying out daily activities. However, these individuals were evaluated after one year of injury and all were in rehabilitation programs, which may have influenced the result.

The literature is scarce in describing the functionality and muscle strength of individuals after TBI using the MRC and the FIM as assessment scales. Furthermore, this seems to be the first study that evaluated strength and functionality even during hospitalization, which limited the discussion of these topics. It is necessary to carry out more epidemiological studies that explore the profile of TBI victims, the causes, the factors associated with the injury, the relationship and the impact on independence and functionality, so that more effective prevention strategies can be created and the impacts social and health are reduced.

In addition, knowing the epidemiological and clinical-functional profile of TBI patients treated at institutions helps the multidisciplinary team to screen those who most need attention and in therapeutic planning even during hospitalization, so that long-term impacts are minimized.

As a main limitation of the study, the evaluation instruments stand out, which are not properly validated for TBI, however, there are no protocols or recommendations for exclusive evaluation instruments for TBI described in the literature.

CONCLUSION

In conclusion, it was identified that the main victims of TBI treated at a reference trauma hospital in the state of Goiás are men of working age involved in motorcycle accidents under the influence of alcohol. Despite the diversification in the diagnosis, mild lesions predominated. It was identified that the greatest functional repercussions of individuals were on cognition and independence to perform daily activities.

It is suggested that more studies that investigate this profile of individuals be carried out to know the functionality both in hospitalization and after hospital discharge. It is also suggested that functional scales be standardized for this type of injury and assessment protocols be created to better understand the deficits presented by this population.

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