


Sociodemographic, clinical profile and factors related to Traumatic Brain Injury

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ABSTRACT

Introduction: Traumatic brain injury (TBI) is defined as all aggression that can cause anatomical injury or functional involvement of the scalp, skull bones, meninges, brains. Traffic accidents, motorcycle accidents, falls and urban violence are among the main occurrences of trauma, more common in evils. The mechanism of trauma can be penetrating, or blunt and brain lesions can be classified as primary and secondary. Trauma is a preventable public health problem, with high morbidity rates in an economically and socially active age group. **Objective:** Identify, in the scientific literature, articles describing the epidemiological profile and factors related to traumatic brain injury. **Methods:** Narrative and descriptive bibliographic research, using specific health sciences descriptors: craniocerebral trauma; cerebrovascular trauma; traumatic brain injuries; closed head trauma; penetrating head trauma, which were crossed with the general descriptors: health profile, epidemiology. Complete scientific articles, available in full, free of charge, written in the Brazilian

Portuguese (Brazil) and published from January 2017 to April 2022 were included. Results: the material this research of 11 articles, it is possible to identify that the highest frequency of TBI occurs in victims aged between 20 and 30 years, demonstrating to affect economically active young people on society. Males had the most frequent occurrence of TBI in all articles analyzed, ranging from 76.2% to 94.0%. Females, on the other hand, had a variation from 6.0% to 23.8%. With about to the severity of the TBI, the mild TBI ranged from 4.1% to 38.3%, the moderate TBI ranged from 4.1% to 92.7% and the severe TBI ranged from 1.6% to 91.8%. Regarding the etiology of TBI, motorcycle accidents predominated (19.0% to 72.5%), followed by a fall (3.4% to 25.0%), hit-and-run (3.6% to 18.0%), car accidents (2.2% to 16.4%), physical aggression (2.4% to 11.0%), tool using a firearm (2.3% to 11.0%), and bicycle accidents (1.0% to 4.1%). Regarding clinical manifestations, the lowering of the level of consciousness prevailed, followed by headache, periorbital hematoma, vomiting, otorrhagia, convulsion, anisocoria and rhinorrhea. Regarding the type of treatment, the conservative presented a frequency of 31.1% to 86.4% and the surgical presented a frequency of 9.7% to 68.8%. The mean hospital stay ranged from 6.2 to 11 days and the frequency of death ranged from 9.5% to 38.6%. **Conclusion:** Regarding the epidemiological profile of TBI in Brazil, in the years 2017 to 2022, young male individuals prevailed, victims of motorcycle accidents, manifested by lowering the level of consciousness, being performed conservative treatment and remaining treatment and leaving for one to two hospitalized weeks in the hospital.

Keywords: Traumatic Brain Trauma, Cerebrovascular Trauma, Traumatic Brain Injuries, Closed Head Trauma, Penetrating head Trauma, Health Profile, Epidemiology

1 INTRODUCTION

Traumatic brain injury (TBI) is defined as any injury caused by external trauma, with functional impairment or anatomical injury to the scalp, skull bones, meninges, brains, with temporary or permanent brain changes⁽¹⁻⁵⁾.

Traffic accidents, motorcycle accidents, fall and physical violence are among the main occurrences of TBI, being more common in males⁽²⁻⁹⁾.

The mechanism of trauma can be penetrating or blunt and brain lesions can be classified as primary, which occur at the time of trauma, and secondary, which evolve over hours and days after the occurrence of the initial lesion, caused by inadequate supply of nutrients and oxygen to cells ^(2-4,7).

Trauma is a preventable public health problem, with high morbidity and mortality rates in an age group of productive, economically and socially active people ^(2,4,6,10-13). Thus, it is important to know the epidemiological profile and factors related to traumatic brain injury, so that it can be possible to contribute to the prevention of deaths considered preventable, through health education strategies.

2 OBJECTIVE

Identify, in the scientific literature, articles describing the epidemiological profile and factors related to traumatic brain injury.

3 METHOD

This is a narrative and descriptive bibliographic research, using the specific Descriptors in Health Sciences (DeCS): Craniocerebral traumas; Cerebrovascular trauma; Traumatic Brain Injuries; Closed Head Trauma; Penetrating cranial traumas, which were crossed with the general descriptors: Health Profile; Epidemiology. Full scientific articles, available in full, free of charge, written in the Portuguese (Brazil) language and published from January 2011 to April 2022 were included.

4 RESULTS

Six articles ⁽¹⁴⁻¹⁹⁾ were selected from the intersection of the specific descriptor: Craniocerebral traumas with the general descriptor: Health Profile. Four other articles ⁽²⁰⁻²³⁾ were selected from the intersection of the specific descriptor Craniocerebral traumas with the general descriptor Epidemiology. Only one article ⁽²⁴⁾ was selected by crossing the specific descriptor Traumatic Brain Lesions and the general descriptor Health Profile. No other articles were found through the bibliographic search, crossing all other specific descriptors with all other general descriptors. The material of this research consisted of 11 articles that will be presented below in tables and figures:

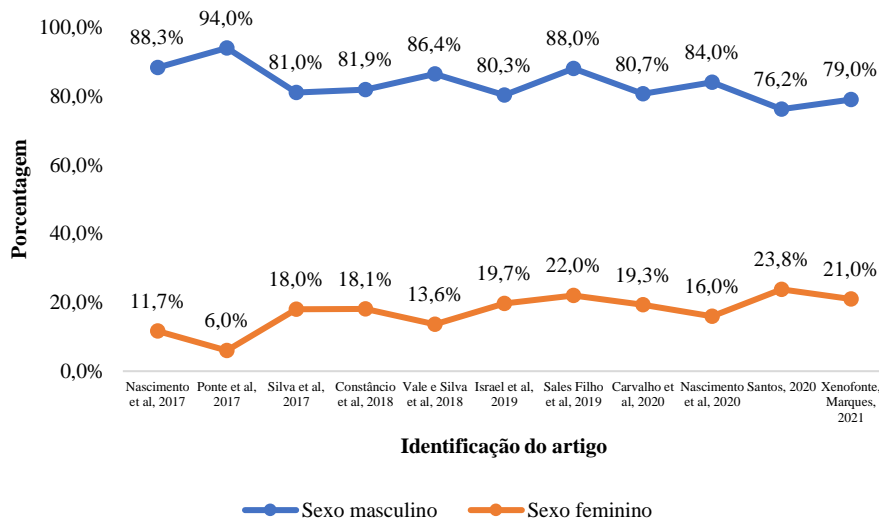
Table one. Age group of the victims. Brazil, January/2017 to April/2022.

| Author, year | Age group (years) | | Author, year | Age group (years) | |
|--------------------|-------------------|-----------------|-------------------------|----------------------------|--------------------|
| Birth et al, 2017 | 0-10: 10,2% | 51-60: 5,5% | Sales Filho et al, 2019 | 0 to 10: 10.1% | 51 to 60: 6.7% |
| | 11-20: 14,8% | 61-70: 3,1% | | 11 to 20: 14.2% | 61 to 70: 6.4% |
| | 21-30: 21,9% | 71-80: 3,9% | | 21 to 30: 20.2% | 71 to 80: 2.6% |
| | 31-40: 19,5% | > 80: 2.3% | | 31 to 40: 20.2% | 81 to 90: 4.9% |
| | 41-50: 18,8% | | | 41 to 50: 14.2% | > 91: 0.4% |
| Bridge et al, 2017 | < 18: 14.5% | 40 to 49: 4.5% | Carvalho et al, 2020 | 18 to 29: 37.7% | 40 to 49: 14.3% |
| | 18 to 19: 6.0% | 50 to 59: 7.2% | | 30 to 39: 25.0% | 50 to 59: 10.0% |
| | 20 to 29: 27.7% | > 60: 6.0% | | | > 60: 13.0% |
| | 30 to 39: 24.1% | | | | |
| Silva et al, 2017 | 1 to 10: 11.0% | 41 to 50: 13.0% | Birth et al, 2020 | Average age of 38 years | |
| | 11 to 20: 16.0% | 51 to 60: 9.0% | | | |

| | | | | | |
|--------------------------|---|---|--|-------------------------|---|
| | 21 to 30: 22.0% 31 to 40: 15.0% | > 60: 14.0% | | | |
| Constância et al, 2018 | 1 to 9: 3.8% 10 to 19: 14.0% 20 to 29: 26.4% 30 to 39: 17.8% | 40 to 59: 21.4% 60 to 74: 9.0% > 75: 7.6% | | Santos, 2020 | < 1: 2.4% 1 to 4: 5.1% 5 to 9: 4.3% 10 to 14: 3.8% 15 to 19: 7.7% 20 to 29: 17.7% 30 to 39: 15.0% 40 to 49: 12.8% 50 to 59: 10.8% 60 to 69: 8.2% 70 to 79: 6.8% > 80: 5.4% |
| Vale e Silva et al, 2018 | 2 to 11: 3.4% 12 to 17: 12.5% | 18 to 59: 80.7% > 60: 3.4% | | Xenophon, Marques, 2021 | < 1: 1.6% 1 to 4: 4.5% 5 to 9: 4.0% 10 to 14: 4.0% 15 to 19: 9.6% 20 to 29: 22.5% 30 to 39: 17.5% 40 to 49: 12.3% 50 to 59: 8.7% 60 to 69: 6.4% 70 to 79: 5.1% > 80: 3.8% |
| Israel et al, 2019 | < 40: 72.1% > 40: 27.9% | | | | |

According to the table above, it is possible to identify that the highest frequency of TCE occurs in victims aged between 20 and 30 years, demonstrating to affect economically active young people for society.

Figure 1. Identification of articles according to the sex of patients with TAND. Brazil, January/2017 to April/2022.



The figure above shows that males were the most frequent for the occurrence of TOR in all articles analyzed, ranging from 76.2%⁽²⁴⁾ to 94.0%⁽²¹⁾. Females presented a variation from 6.0%⁽²¹⁾ to 23.8%⁽²⁴⁾.

Data on profession and/or occupation and religiosity were not found in any analyzed article.

Only two articles identified issues related to race and color. Vale e Silva et al (2018) showed the highest frequency of brown victims (52.3%) followed by white (4.6%). Xenophon, Marques (2021) also showed a higher frequency in brown victims (84.6%) followed by white (6.9%).

Marital status was identified only in one article⁽¹⁷⁾, evidencing individuals without a partner (53.0%) and with a partner (45.3%). Family income was portrayed in only one article⁽²³⁾, evidencing: lower than one minimum wage: 1.4%; minimum wage: 11.4%; from one to five minimum wages: 60.2%; more than five minimum wages: 12.5%.

Comorbidities, smoking and illicit drug use were not reported in any article. Alcohol use was evidenced by Ponte et al (2021), recording a frequency of 14.5%.

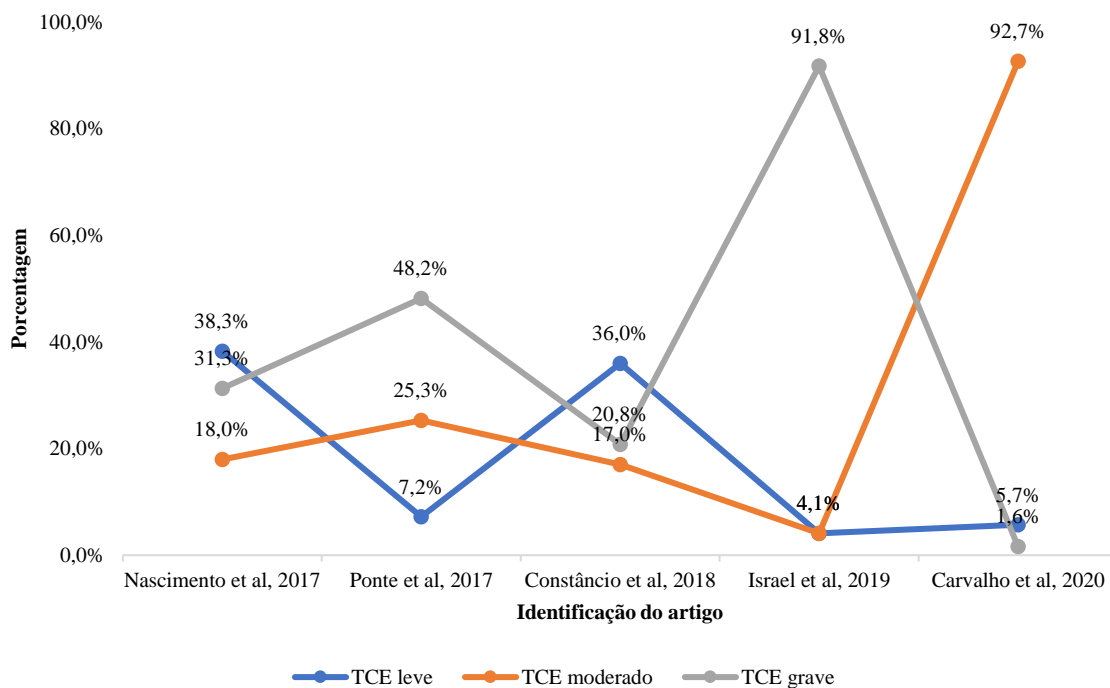
The use of helmets was portrayed in only one article⁽²¹⁾, evidencing the use in only 1.2% of the sample studied.

Translation:

Percentage

Article identification

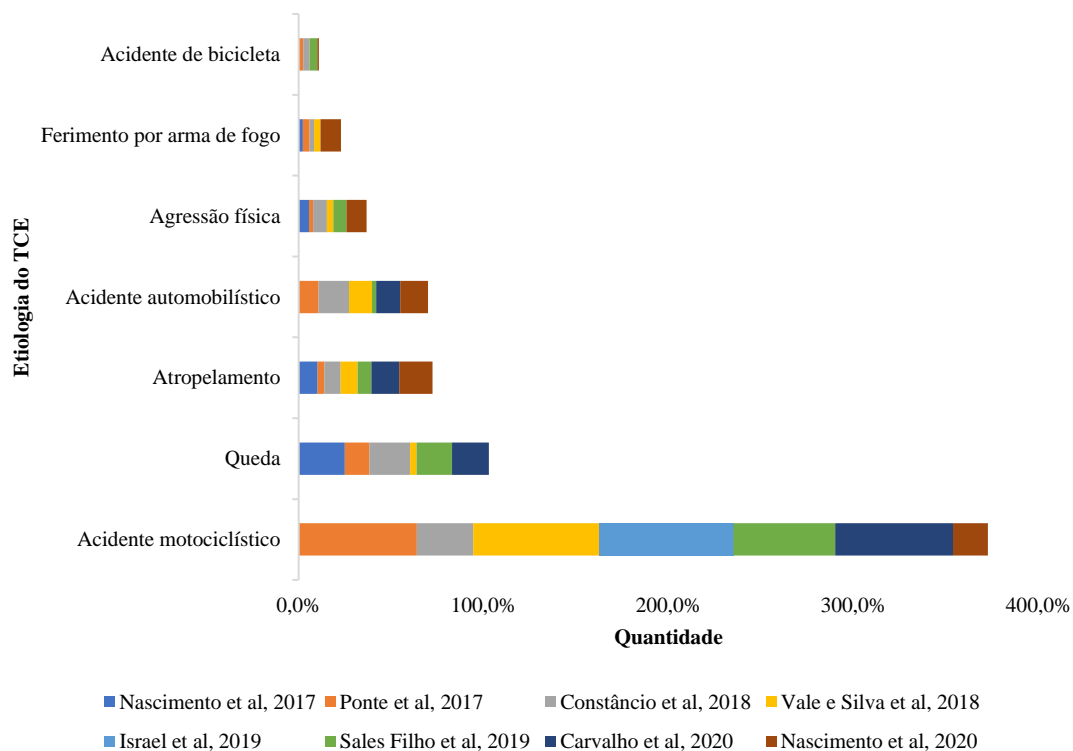
Figure 2. Identification of articles according to the Classification of the ECA. Brazil, January/2017 to April/2022.



The classification of the TCE as mild, moderate and severe was described in only five articles, according to the figure represented above.

Translation:
Percentage
Article identification

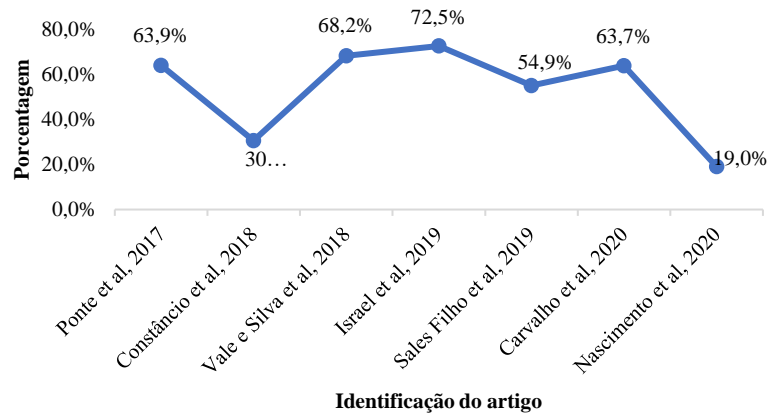
Figure 3. Identification of articles according to the etiology of TCE. Brazil, January/2017 to April/2022.



The etiology of TBI was described in eight articles, predominantly motorcycle accident, followed by fall, trampling, car accident, physical aggression, gunshot wound and bicycle accident, data shown in the figure above.

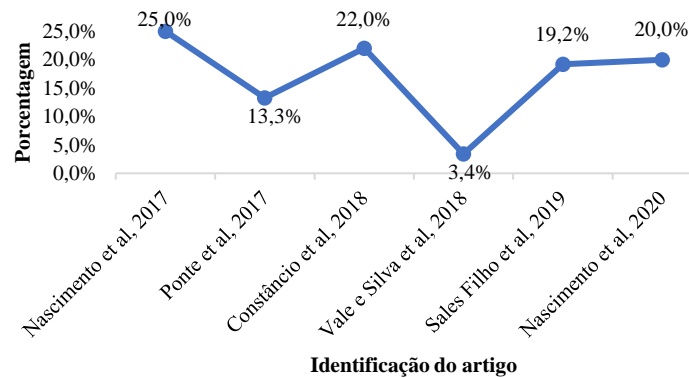
Translation:
TCE etiology
Quantity

Figure 4. Identification of articles according to etiology by motorcycle accident in patients with TBI. Brazil, January/2017 to April/2022.



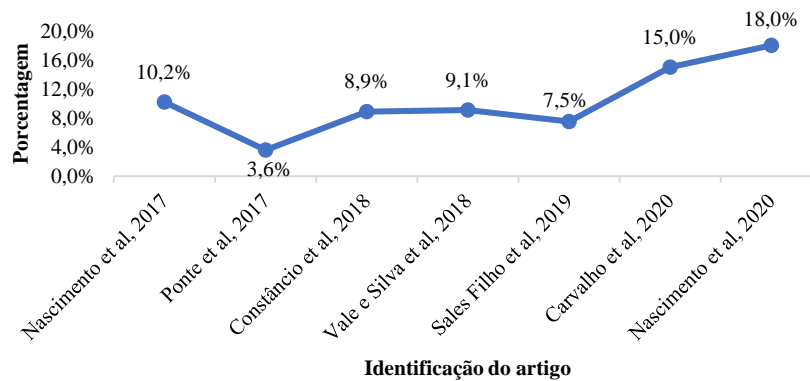
The figure above shows that the frequency of motorcycle accidents ranged from 19.0% ⁽¹⁸⁾ to 72.5% ⁽¹⁵⁾ in the analyzed articles.
 Translation:
 Percentage
 Article identification

Figure 5. Identification of articles according to the etiology by falls in patients with T. Brazil, January/2017 to April/2022.



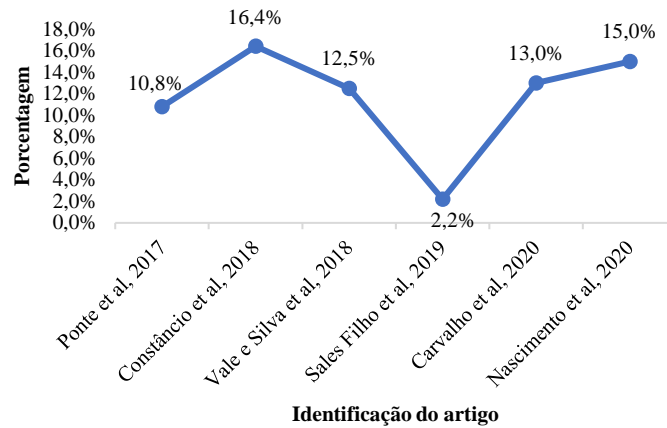
Regarding falls, as shown in the figure above, the variation in the articles analyzed was 3.4% ⁽²³⁾ to 25.0% ⁽²⁰⁾.
 Translation:
 Percentage
 Article identification

Figure 6. Identification of articles according to the etiology of trampling in patients with TAND. Brazil, January/2017 to April/2022.



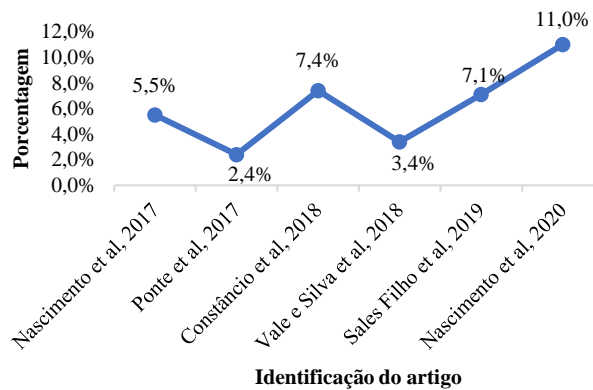
The etiology by trampling presented a variation from 3.6% ⁽²¹⁾ to 18.0% ⁽¹⁸⁾, data of monstrous in the figure above.
 Translation:
 Percentage
 Article identification

Figure 7. Identification of articles according to etiology by car accident in patients with TCE. Brazil, January/2017 to April/2022.



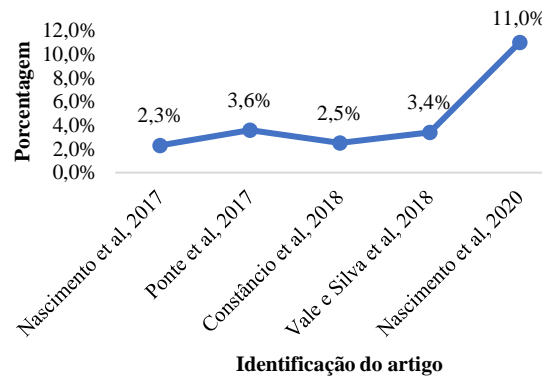
The figure above shows the frequency of TCE by car accident, ranging from 2.2% ⁽¹⁶⁾ to 16.4% ⁽¹⁴⁾.
 Translation:
 Percentage
 Article identification

Figure 8. Identification of articles according to etiology by physical aggression in patients with TAND. Brazil, January/2017 to April/2022.



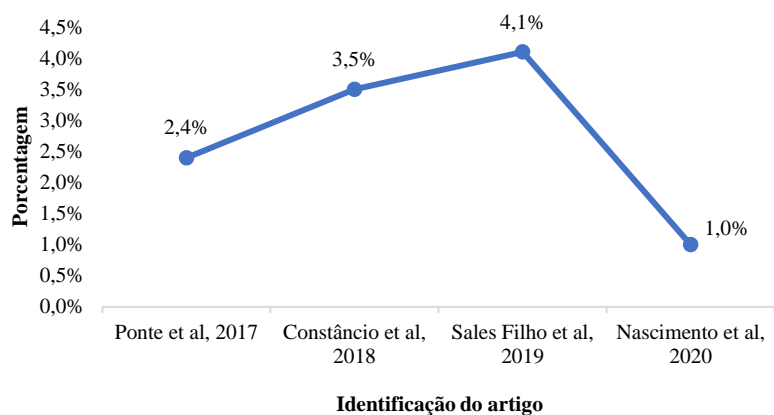
Regarding physical aggression data, the frequency ranged from 2.4% ⁽²¹⁾ to 11.0% ⁽¹⁸⁾ in the analyzed articles.
 Translation:
 Percentage
 Article identification

Figure 9. Identification of articles according to etiology by gunshot wound in patients with TAND. Brazil, January/2017 to April/2022.



Regarding the etiology of TCE by firearm, the figure above shows a variation from 2.3% ⁽²⁰⁾ to 11.0% ⁽¹⁸⁾.
 Translation:
 Translation:
 Percentage
 Article identification

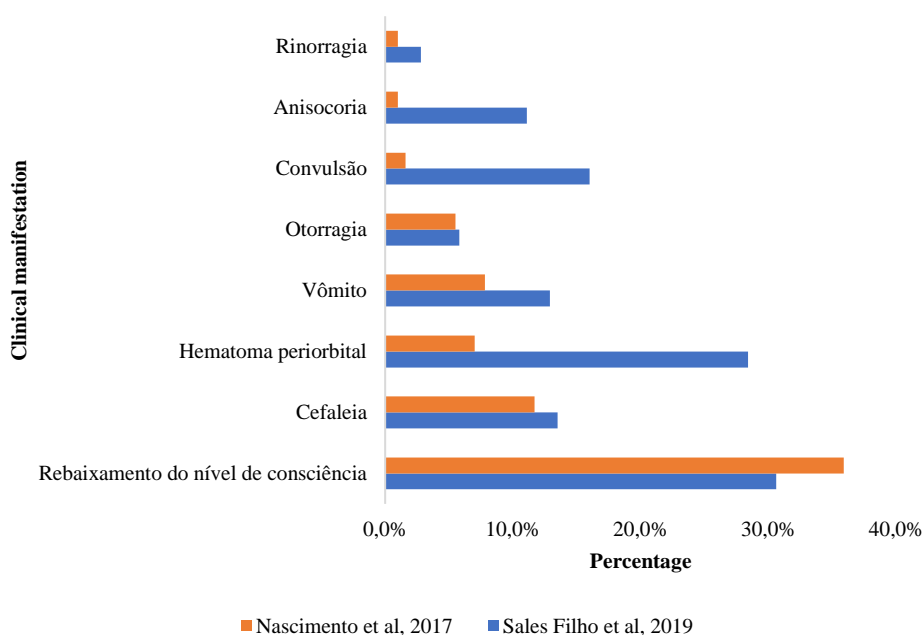
Figure 10. Identification of articles according to etiology by bicycle accident in patients with TBI. Brazil, January/2017 to April/2022.



The data in the figure above show the etiology of TBI by bicycle accident, with a variation from 1.0% ⁽¹⁸⁾ to 4.1% ⁽¹⁶⁾.

Translation:
 Translation:
 Percentage
 Article identification

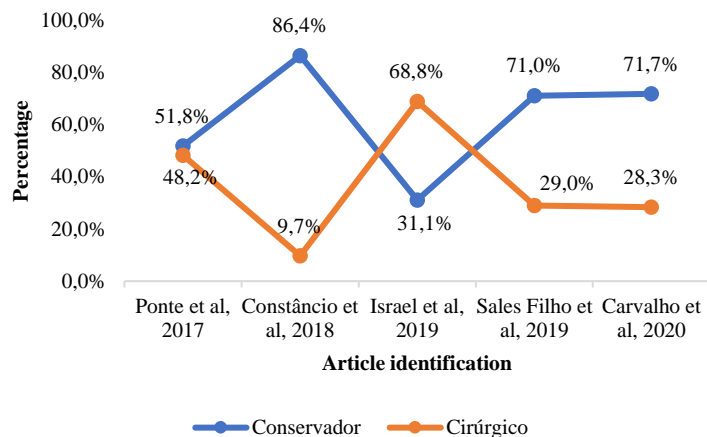
Figure 11. Identification of articles according to the clinical manifestations of patients with TAND. Brazil, January/2017 to April/2022.



Translation:
 Rhinorrhage
 Anisocoria
 Convulsion
 Vomiting
 Periobital hematoma
 Headache
 Lowered level of consciousness

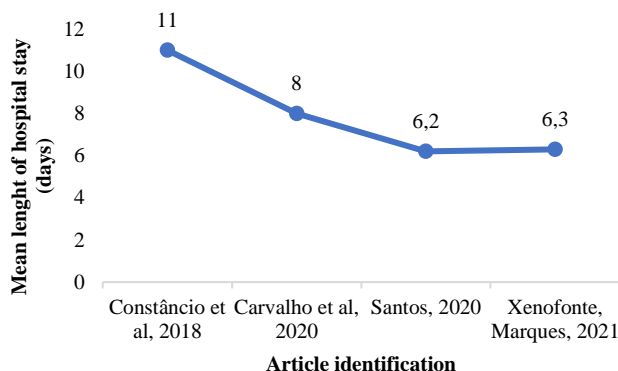
Only two articles ^(16,20) described the clinical manifestations presented by patients with TOR, prevailing the lowering of the level of consciousness, eia, periorbital hematoma, vomiting, otorragia, convulsion, anisocoria and rhinoragia, data shown in the figure above.

Figure 12. Identification of articles according to the type of treatment instituted in patients with TAND. Brazil, January/2017 to April/2022.



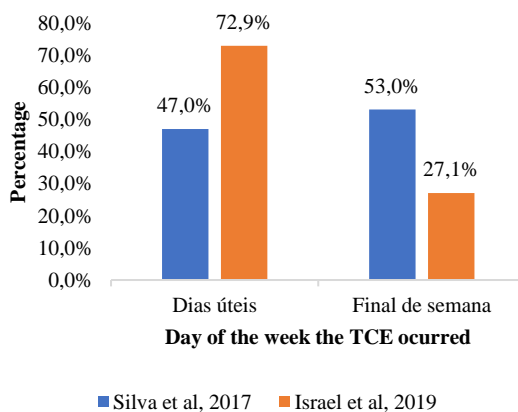
The treatment instituted to victims of TAND was conservative and surgical, as shown in the figure above.

Figure 13. Identification of articles according to the mean time of hospitalization in patients with T. Brazil, January/2017 to April/2022.



The mean hospital stay of patients with T. ranged from 6.2 days⁽²⁴⁾ to 11 days⁽¹⁴⁾, as shown in the figure above.

Figure 14. Identification of the articles according to the day of the week that the ECA occurred. Brazil, January/2017 to April/2022.

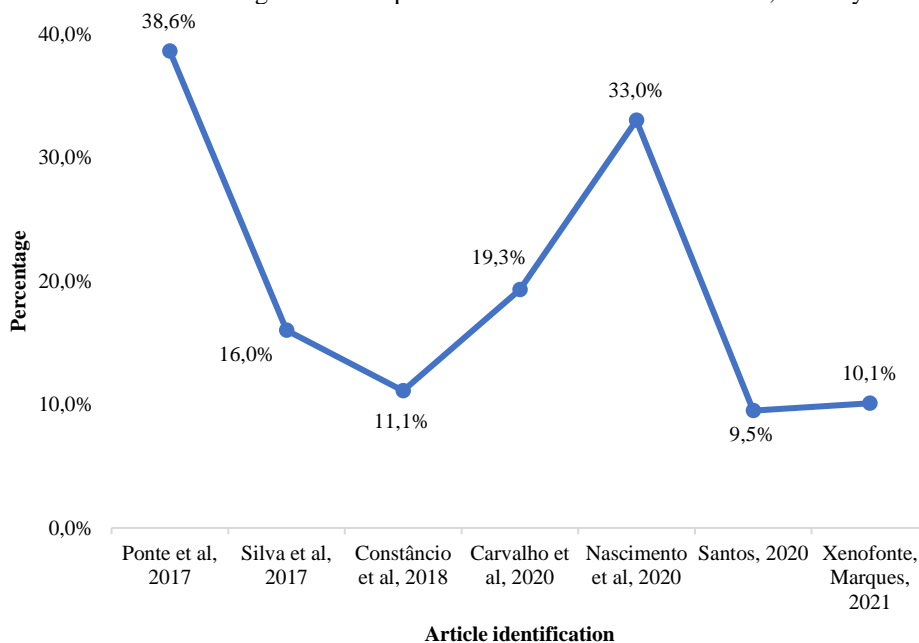


The day of the week that occurred the TOR was evidenced in only two articles ^(15,22), as shown in the figure above.

The period of the day that the TCE occurred and the sequelae related to the victims of T. T. were not identified in any article.

Complications related to TCA were demonstrated only by one article ⁽²¹⁾, evidencing: pneumonia: 56.0%; sepsis: 37.0%; renal insufficiency: 12.0%.

Figure 15. Identification of articles according to death in patients with TAND. Brazil, Brazil, January/2017 to April/2022.



The figure above shows the percentage of death in the analyzed articles, with a variation from 9.5% ⁽²⁴⁾ to 38.6% ⁽²¹⁾.

5 DISCUSSION

In this study, it was possible to identify the profile of patients affected by traumatic brain injury in Brazil from 2017 to 2022.

The analyzed articles showed that the highest prevalence of TCE occurs in the age group from 20 to 39 years. The highest occurrence in this age group is justified due to the reckless behavior of young people and non-compliance with traffic laws, such as the non-use of seat belts by the driver and passenger on public roads in the national territory. Another aspect to be highlighted is the deliberate consumption of psychoactive substance by this age group, which predisposes to impulsive behavior and the presence of feeling of invulnerability ^(7,12,25,26).

The higher prevalence of TCE in males may be related to higher exposure to gender-related behavioral and sociocultural factors, such as risky maneuvers, driving at excessive speeds, adventurous and reckless behavior and higher consumption of alcoholic beverages ^(2,3,26).

Among the etiology of TBI, motorcycle accident stands out, which can cause fatal events, in addition to physical, emotional and social damage. The activity of *the motoboy* requires agility in his work, endangering his physical integrity and safety ⁽²⁷⁾.

The victims of TCE due to accidents involving motorcycles, are young, many without wearing helmets, and who have used alcohol or drugs ^(28,29). In view of the above, it is necessary to monitor traffic laws, as well as to carry out promotion and prevention strategies aimed at public policies, aiming to ensure the safety of young people ⁽²⁷⁾.

The consumption of alcoholic beverages and/or illicit drugs may be associated with the occurrence of traffic accidents with TCA, because they are psychoactive substances that act as a depressor of the central nervous system, resulting in the reduction of attention and in the modification of perceptions and behaviors. Alcohol consumption is the third most important risk factor for disabling sequelae and deaths in young individuals, being very associated with TBI that occurs due to motorcycle accidents ^(4,22).

Capacete is one of the main safety devices for personal protection, and is intended for protection of the head against impacts caused by knocks, reducing injury rates by 69.0% and death by 42.0%. After the implementation of the law (Resolution CONTRAN N°453/2013; N°680/2017; N°846/2022 and N°940/2022) that makes the helmet mandatory, a decline in the rate of morbidity and mortality due to TBI was evidenced, thus observing a protective effect of the helmet ^(4,28-33).

The use of helmets on motorcycle drivers and passengers and people using bicycles, skates and skateboards contributes to the reduction of the frequency of severe TBI. Thus, it should be reinforced the population that the use of helmets can be a protective and contributing factor to minimize the occurrence of serious injuries ⁽³⁴⁾.

Glasgow Coma Scale (ECG) is the scale used to assess the severity of The TOR from the assessment of the level of consciousness, based on a numerical value, which scores three parameters: ocular opening, better verbal response and better motor response. The final score of the scale may vary from 3 to 15 points, and a score of 3 to 8 indicates a severe TOR; a score of 9 to 12 indicates a moderate TOR and a score of 13 to 15 indicates a mild TOR. The patient with a score of 15 has a preserved level of consciousness, while the patient with a score less than or equal to 8 on the scale, evidences a state of urgency, requiring immediate action and tracheal intubation, to protect the airways, in an attempt to reverse the condition ^(2,3,8,10,12,35).

The main age group affected by TCE caused by falls are the elderly, which occurs by the processes of physiological changes resulting from aging, related to disease, reduction of physical capacity and unfavorable environment, favoring the risk of tripping and slipping. Measures such as the modification of the environment, the use of lighting and non-slip floors should be highly encouraged to family members, to prevent the occurrence of falls in this age group ^(2,36,37).

In the mechanics of The ECA by automobile accident, the impact of the brain occurs against the rigid surface of the skull, due to the acceleration-deceleration mechanism, caused by the change in the speed

of the brain inside the cranial box, causing injury and rotation in the encephalic parenchyma, with microscopic lesions of the axons ⁽⁷⁾. The application of speed limits, the use of seat belts, the regulation and reduction of the consumption of alcohol and illegal drugs are the main prevention tools for the ECA ⁽³⁸⁾.

Head trauma from gunshot wounds causes about 2/3 of the deaths at the trauma scene and more than 90% of the victims die as a direct result of this act. It is related to primary and secondary injury and the damage to brain tissue resulting from the projectile is related to the release of energy and caliber of the projectile. Owners of firearms should keep them locked and in a safe place, mainly to minimize the occurrence of accidents in the pediatric public ⁽³⁹⁾.

The treatment instituted for patients with TAND may be conservative or surgical. In conservative treatment, cardiovascular and respiratory function stabilization occurs, with hemorrhage control, hypovolemia control and ventilatory support, to maintain adequate cerebral perfusion and prevent secondary lesions. Surgical treatment, on the other hand, is indicated for the drainage of blood clots with expansive effect, resulting from acute intracranial hematomas ^(3,4,36,39,40).

Regarding the days of the week related to the higher occurrence of TCE, at the weekend there is a greater number of occurrences, due to less supervision of the roads, more festive events and an increase in alcohol consumption ⁽⁴¹⁾.

A percentage of patients affected by TCE evolve with death, which is often related to the occurrence of respiratory failure caused by uncal herniation due to brain stem injury. Early diagnosis and appropriate treatment minimize the occurrence of death in victims of TAND ⁽³⁹⁾. Patient mortality is related to the severity of the cranial lesion, which translates as an important prognosis of these TAND victims ⁽³⁾.

6 CONCLUSION

The results of this study allowed describing the sociodemographic, clinical profile and factors related to TCE, from the analysis of studies developed in Brazil and published between the years 2017 and 2022.

Regarding the sociodemographic profile, it was observed that the TCE occurs more frequently in young individuals (20 to 39 years of age), male, brown, single and with complete high school.

Regarding the clinical profile, it was evidenced that TOR usually occurs on weekends, being classified as moderate to severe, according to the Glasgow coma scale, receiving conservative treatment, with an average hospitalization of two weeks. The main factors related to the occurrence of TBI were motorcycle accident, falls, hit-and-run accidents and car accidents.

It is necessary to increase the strictness in traffic laws and supervision, especially at weekends, as well as investment in awareness actions about safety devices (such as seat belts, helmets, non-ingestion of alcoholic beverages when driving and abandonment in the consumption of illicit substances).

Knowing the profile of Victims of TCE is extremely important to establish prevention measures for this epidemic, which affects individuals who remain with disabilities and sequelae.

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