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ORIGINAL ARTICLE

THE EPIDEMIOLOGICAL PROFILE OF TRAUMATIC BRAIN INJURY

PERFIL EPIDEMIOLÓGICO DO TRAUMA CRANIOENCEFÁLICO

EL PERFIL EPIDEMIOLÓGICO DE LA LESIÓN CEREBRAL TRAUMÁTICA

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ABSTRACT

Objective: to investigate the epidemiology of traumatic brain injury occurrences. ***Method:*** a cross-sectional descriptive study with 132 patients in the neurological clinic of an urgency hospital, with data collected through interviews; latter processed in Microsoft Excel and analyzed using SPSS. There was conducted a descriptive analysis for all the variables; the Chi-square Test determined the relationship between the severity of the trauma with sociodemographic characteristics. ***Results:*** Of the 132 patients, 87.9% were male aged 20-29 years old (24.2%), married (47.7%), with an income of one minimum wage (44.7%). Motorcycle accidents accounted for the first traumatic cause (59.8%). There was observed an association between the severity of the trauma and the sociodemographic variables: gender, age, marital status and family income. ***Conclusion:*** the majority of cases were mild trauma; the issue requires studies for planning to prevent such occurrences. ***Descriptors*:** Brain Injuries; Health Profile; Nursing.

RESUMO

***Objetivo*:** investigar o perfil epidemiológico das ocorrências de trauma cranioencefálico. ***Método*:** estudo descritivo transversal com 132 pacientes na clínica neurológica de um hospital de urgência, com dados coletados por meio de entrevistas, posteriormente processados no *Microsoft Excel* e analisados no *SPSS*. Realizou-se análise descritiva para todas as variáveis; o teste qui-quadrado determinou a relação da gravidade do trauma com as características sociodemográficas. ***Resultados*:** dos 132 pacientes, 87,9% eram do sexo masculino na faixa etária de 20 a 29 anos (24,2%), casados (47,7%) com renda de um salário mínimo (44,7%). Os acidentes motociclísticos representaram a primeira causa traumática (59,8%). Observou-se associação entre a gravidade do trauma e as variáveis sociodemográficas: sexo, faixa etária, estado civil e renda familiar. ***Conclusão*:** A maioria dos casos foi de traumatismo leve, o tema requer estudos para planejamento de ações de prevenção dessas ocorrências. ***Descritores*:** Traumatismos Encefálicos; Perfil de Saúde; Enfermagem.

RESUMEN

Objetivo: investigar la epidemiología de las ocurrencias de las lesiones cerebrales traumáticas. ***Método:*** este es un estudio descriptivo transversal conducido con 132 pacientes en la clínica neurológica de un hospital de urgencia, con los datos recogidos a través de entrevistas; posteriormente se procesaron los datos en Microsoft Excel y fueron analizados con el programa SPSS. Se realizó el análisis descriptivo de todas las variables; la prueba de Chi-cuadrado determinó la relación entre la severidad del trauma con características socio-demográficas. ***Resultados:*** de los 132 pacientes, el 87,9% eran varones con edad entre los 20-29 años (24,2%), casados (47,7%), con ingresos de un salario mínimo (44,7%). Los accidentes de motocicleta representaron la primera causa traumática (59,8%). Se observó una asociación entre la gravedad de los traumatismos y las variables socio-demográficas: sexo, edad, estado civil y los ingresos familiares. ***Conclusión:*** la mayoría de los casos fueron traumatismo leve, la cuestión requiere estudios para la planificación de la prevención de este tipo de ocurrencias. ***Descriptores*:** Traumatismos Encefálicos; Perfil de Salud; Enfermería.

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INTRODUCTION

The Traumatic Brain Injury (TBI) is a major public health problem in Brazil, although there is no consent about its impact on the databanks of the Brazilian Government. Its severity is related to the fact that it changes forever the skills and perspectives of the individual victim, and it can significantly change the lives of family members involved.[1,2] It is defined as the result of an anatomical injury or functional impairment of the scalp, skull, meningeal or brain, as a result of pathophysiological mechanisms that begin with the accident and extend for days or weeks. Thus, TBI can be classified concerning the mechanism in a closed or probing; considering the severity, it may be mild, moderate and severe; in relation to the morphology, it can present extracranial injury, skull fracture and intracranial injuries.[3,4]

Among the main reasons of brain injury from trauma there are automobile, bicycles and motorcycle accidents; physical injuries from falls, assaults by firearms and bladed weapon, sporting and pedestrian accidents. It is significant that the TBI highlights in terms of magnitude and, above all, as a cause of death and disability, particularly among young people, and it is the most common neurological cause of morbidity and mortality in the United States.[5]

Studies show that 1,700,000 cases of TBI occur annually in the United States, including 275,000 hospitalizations, 52,000 deaths, and about 80,000 to 90,000 people presenting inability to long-term brain injury.[6]

Traumatic injuries related to traffic accidents are the leading cause of death between 10 and 29 years old in Brazil. Aged between 5 and 9 years old represents 40% of deaths and 18% between 1 and 4 years old, with the head trauma the leading cause of mortality and sequelae in these age groups.[7]

This is a cross-sectional study with elderly pedestrians hospitalized by crushing in a public referral hospital in urgency of Teresina, in the period of 2010 and 2011. It found that the region of the head and lower limbs were the most affected body regions (28.8%), calling attention to the fact that most of the deaths occurred just among the victims of head trauma, corresponding to 5.5%.[8]

Victims of TBI who did not evolve to death may have deficiencies and temporary or permanent disability, interfering with the individual's ability to perform his functions, and physical, cognitive, behavioral and emotional losses, important rehabilitation spending and greater difficulty in psychosocial and family reintroduction.[3,9]

Given the complexity of the TBI consequences, it is considered necessary to deepen knowledge about the subject to better planning and organizing its assistance. In this sense, it was defined as research question: "What is the epidemiology of traumatic brain injury in the neurological clinic of an urgency hospital?" To answer it, there was drawn to investigate the epidemiology of head trauma occurrences in the neurological clinic of an urgency hospital, adopting as

METHOD

This is a descriptive transversal study conducted at the neurological clinic of a referral urgency hospital in the city of Teresina-PI.

The study sample consisted of 132 patients of both sexes, aged older than or equal to 18 years old, admitted to the neurological clinic with a diagnosis of TBI and expressed its acceptance verbally and in writing according to their signing of the Consent Free and Clear Term.

Data collection was conducted from January to March 2015 through interviews with patients and their caregivers, using a form prepared by the authors of this study, containing questions concerning the socio-demographic profile of trauma and head trauma data. Clinical trauma data were confirmed by searching the records.

After collecting the data, there were coded, transcribed into Microsoft Excel spreadsheet application, exported and analyzed with the Statistical Package for Social Sciences (SPSS), version 19.0, generating up tables. The descriptive analysis was performed with all variables, including position measurements and the measure of variability for quantitative variables. We used the Chi-square test to analyze the relationship between the severity of the trauma with the socio-demographic characteristics of patients with traumatic brain injury, and the values with $p<0.05$ considered statistically significant.

All the course of the research complied with the ethical principles adopted in Resolution N 466/2012 of the National Health Council and work is supported by the Research Ethics Committee in Human Beings University Center - UNINOVAFAPI, an opinion N 924,095 and CAEE 38090214.4.0000.5210.

RESULTS

We analyzed 132 occurrences of TBI patients treated at the neurological clinic in

an urgency hospital, in the period from January to March 2015.

Table 1. Distribution of traumatic brain injury patients admitted to the neurological clinic of a hospital urgency room. Teresina, 2015.

Variables	Average (SD)	Median	Observed Variation	Categories	N (%)
Age (years)					
	42,5 (19,3)	35,7	[17; 85]	11 – 19	10 (7,6)
				20 – 29	32(24,2)
				30 – 39	29(22,0)
				40 – 49	15 (11,4)
				50 – 59	20 (15,2)
				≥ 60	26 (19,6)
Sex					
				Female	16 (12,1)
				Male	116 (87,9)
Marital Status					
				Single	56 (42,5)
				Married	63 (47,7)
				Divorced	2 (1,5)
				Separated	4 (3,0)
				Widower	7 (5,3)
Schooling					
				Illiterate	13 (9,8)
				Elementary	92 (69,7)
				High School	20 (15,2)
				Higher Education	5 (3,8)
				Ignored	2 (1,5)
Family Income					
				< 1 MW	31(23,5)
				1 MW	59 (44,7)
				2 MW	31 (23,5)
				3 MW	6 (4,5)
				> 3 MW	3 (2,3)
				Ignored	2 (1,5)
Total					132 (100)

It was found in Table 1 that the average age of the victims of TBI was 42.5 years old (SD = 19.3), median of 35.7 years old, ranging between 17 and 85 years old. Most of the cases were observed in young adults in the age group 20 to 29 years old, representing 24.2% and between 30 to 39 years old (22%). However, draws attention the number of occurrences among the elderly (19.6%). Analyzing the frequency by sex it is observed that 16 patients (12.1%) were female and 116 (87.9%) male. Regarding marital status, the number of occurrences among single (42.5%) and married (47.7%) were approximate. Analyzing schooling most had primary education (69.7%). With regard to family income of the patients studied, most (44.7%) have income of one minimum wage.

Table 2. Distribution of traumatic brain injury patients admitted to the neurological clinic of a hospital urgency room, according to sex, the etiology of the trauma and the type of injury. Teresina, 2015.

Variables	Sex		
	Female N (%)	Male N (%)	Total N (%)
Etiology of the trauma			
Automobile accident	-	6(100)	6(100)
Bike accident	-	3(100)	3(100)
Motorcycle accident	5 (6,3)	74(97)	79(100)
Laboral accident	-	2(100)	2(100)
Physical aggression	1(20)	4(80)	5(100)
Running over	6(50)	6(50)	12(100)
Lesion by bladen weapon	-	1(100)	1(100)
Lesion by fire weapon	1(50)	1(50)	2(100)
Fall from height	2(28,6)	5(71,4)	7(100)
Fall from the own height	-	12 (100)	12(100)
Ignored	1(33,3)	2(66,7)	3(100)
Type of the lesion			
Brain injury	5(41,7)	7(58,3)	12(100)
Extradural hematoma	-	29(100)	29(100)
Subdural hematoma	3(10,7)	25(89,3)	28(100)
Intraparenchimatosum hematoma	-	2(100)	2(100)
Subarachnoid hemorrhage	6(42,9)	8(57,1)	14(100)
Diffuse axonal injury	1(14,3)	6(85,7)	7(100)
Pneumocephalus	-	10(100)	10(100)
More than one lesion	-	17(100)	17(100)
Ignored	1(16,7)	5(83,3)	6(100)
Other	-	7(100)	7(100)
Total	16(12,1)	116 (87,9)	132(100)

Regarding the external causes of trauma, it can be seen in Table 2 that motorcycle accidents were the leading cause of trauma (59.8%), showing prevalence in male patients (97%), followed by fall from height (9.1%), also with a higher incidence in males (97%). In the female prevails as TBI etiology of the trampling (27.3%), followed by motorcycle accidents (3.8%).

Among the types of the most prevalent injuries in males are the epidural hematoma (100%) and the subdural hematoma (89.3%). In women there is a higher incidence of subarachnoid hemorrhage (42.9%), followed by cerebral contusion (41.7%).

Table 3. Distribution of traumatic brain injury patients admitted to the neurological clinic of a hospital urgency room, according to the severity of the trauma, according to the urgency medical transport, suspicion of the use of alcohol, the etiology of the trauma and the type of injury and treatment. Teresina, 2015.

Variables	Severity of the trauma				Total
	Mild N (%)	Moderate N (%)	Severe N (%)	Ignored N (%)	N (%)
Pre-hospital transport					
SAMU	25(59,5)	12(28,6)	5(11,9)	-	42(100)
Ambulance	46(58,2)	24(30,4)	8(10,1)	1(1,3)	79(100)
Private car	3(33,3)	4(44,4)	1(11,1)	1(11,1)	9(100)
Other	2(100)	-	-	-	2(100)
Suspicion of alcohol use					
Yes	42(62,7)	20(29,9)	5(7,5)	-	67(100)
No	34(52,3)	20(30,8)	9(13,8)	2(3,1)	65(100)
Etiology of the trauma					
Automobile accident	4(66,7)	2(33,3)	-	-	6(100)
Bike accident	2(66,7)	-	1(33,3)	-	3(100)
Motorcycle accident	46(58,2)	24(30,4)	9(11,4)	-	79(100)
Laboral accident	1(50)	-	-	1(50)	2(100)
Physical aggression	4(80)	-	1(20)	-	5(100)
Running over	6(50)	6(50)	-	-	12(100)

Lesion by bladen weapon	1(100)	-	-	-	1(100)
Lesion by fire weapon	1(50)	1(50)	-	-	2(100)
Fall by height	4(57,1)	3(42,9)	-	-	7(100)
Fall by the own height	6(50)	3(25)	3(25)	-	12(100)
Ignored	1(33,3)	1(33,3)	-	1(33,3)	3(100)
Type of lesion					
Cerebral contusion	7(58,3)	5(41,7)	-	-	12(100)
Extradural hematoma	18(62,1)	6(20,7)	5(17,2)	-	29(100)
Subdural hematoma	13(46,4)	12(42,9)	1(3,6)	2(7,1)	28(100)
Intraparenchimatosum hematoma	-	1(50)	1(50)	-	2(100)
Subarachnoid hemorrhage	11(78,6)	3(21,4)	-	-	14(100)
Diffuse axonal injury	1(14,3)	4(57,1)	2(28,6)	-	7(100)
Pneumocephalus	8(80)	2(20)	-	-	10(100)
More than one lesion	9(52,9)	3(17,6)	5(29,4)	-	17(100)
Ignored	5(83,3)	1(16,7)	-	-	6(100)
Other	4(57,1)	3(42,9)	-	-	7(100)
Type of the treatment					
Clinical	45(63,4)	19(26,8)	7(9,9)	-	71(100)
Surgical	31(50,8)	21(34,4)	7(11,5)	2(3,3)	61(100)
Total	76(57,6)	40(30,3)	14(10,6)	2(1,5)	132(100)

Table 3 shows the severity of head trauma according to socio-demographic and clinical variables. Thus, according to the TBI, from the 132 patients with TBI, 57.6% had mild TBI, 30.3% moderate and 10.6% were classified with severe TBI.

It was observed that in relation to the type of pre-hospital transport, most patients were transported to the hospital in the ambulance (59.8%), also representing the victims classified as severe. Then, considering the number of occurrences came to those served by the SAMU (31.8%).

Regarding the suspicion of alcohol use, the numbers were similar, 50.8% said they had consumed alcohol on the day of the accident, against 49.2% who denied alcohol use.

Regarding the severity of trauma and the use of alcohol, it seems that the accident victims with mild TBI (62.7%) had consumed alcohol. Among those classified as moderate TBI there was observed a number of similar occurrences and by 29.9% against 30.8% in the absence of suspicion of use. In contrast, among those with severe TBI, in 13.8% of cases occurred absence of suspected use of alcohol on the day of the accident.

Regarding the etiology of the trauma, it seems that motorcycle accidents accounted for 58.2% of mild TBI, 30.4% of moderate and 11.4% of those considered serious.

Regarding the type of trauma resulting from injury, it was observed that the epidural hematoma was the most frequent type of injury in patients with mild TBI (62.1%) and severe (17.2%) in the latter, considering a single lesion. However in cases classified as moderate, the injury most frequent was the subdural hematoma (42.9%).

From the 132 patients included in the sample, most underwent medical treatment (53.8%). From the analysis of Table 3 it can be inferred that there was an increase of cases of patients with moderate TBI (34.4%) and severe (11.5%), who underwent surgical treatment compared to the group of patients who underwent clinical treatment.

Table 4. Distribution of traumatic brain injury patients admitted to the neurological clinic of a hospital urgency room, according to the severity of the trauma and the epidemiological profile. Teresina, 2015.

Variables	Severity of the trauma								
	Mild		P	Moderate		P	Severe		P
	N	%	Value	N	%	Value	N	%	Value
Gender									
Female	13	10	0,02	3	2,3	0,65	-	-	-
Male	63	48,5	-	37	28,5	-	14	10,8	-
Age (in years)									
11 - 19	6	4,6	0,15	2	1,5	0,65	2	1,5	0,001
20 - 29	24	18,5	-	7	5,4	-	1	0,8	-
30 - 39	15	11,5	-	10	7,7	-	4	3,1	-
40 - 49	6	4,6	-	5	3,8	-	4	3,1	-
50 - 59	13	10,0	-	5	3,8	-	1	0,8	-
≥ 60	12	9,2	-	11	8,5	-	2	1,5	-
Marital Status									
Single	42	35,9	0,003	10	8,5	0,04	4	3,4	0,61
Married	30	25,6	-	23	19,7	-	8	6,8	-
Schooling									
Illiterate	7	5,5	0,52	3	2,3	0,2	2	1,6	0,61
Elementary School	51	39,8		32	25,0		8	6,3	-
High School or Higher Education	17	13,3	-	5	3,9	-	3	2,3	-
Family Income									
< one MW	14	10,9	0,21	9	7,0	0,99	8	6,3	0,001
1 MW	37	28,9	-	18	14,1	-	3	2,3	-
≥2 MW	24	18,8	-	12	9,4	-	3	2,3	-

In the association between trauma severity and the socio-demographic characteristics of patients with traumatic brain injury admitted to the neurological clinic, it was found a statistically significant association in relation to sex with mild severity of trauma (p = 0.02), age with severe trauma (p = 0.001), marital status with mild severity trauma (p = 0.003) and moderate (p = 0.04) and family income with severe trauma (p = 0.001).

DISCUSSION

The epidemiological profile of patients admitted to the neurological urgency hospital clinic, it was made up of males, young, married, trauma victims of motorcycle accidents and fall from height. The main brain injury by these patients was the epidural hematoma, followed by subdural hematoma.

The prevalence of male patients (87.9%) among the victims of injuries from external causes in this study approaches the data of other studies, ranging between 77.8 and 89.6%. This data is confirmed by the higher frequency of men like car and motorcycle drivers.[10-3]

The prevalence of TBI among males and young age it can be explained by the fact that men represent the majority of motorcycle riders, exposing themselves to risk behaviors, irresponsibility and disregard for safety standards in traffic; it allies often the excessive consumption of alcohol and drugs.[14-5]

Considering the age variable, there is a significant frequency of cases among the elderly (26%), with similar results to the survey conducted in a general hospital in the State of Bahia, where we observed a high incidence of TBI in patients aged ≥ 60 years old.[15]

In a cross-sectional study that traced the clinical and epidemiological profile of head trauma occurrences, it showed that most of the patients (55%) were single, and married couples accounted for 32.5% of patients.[16] However, this study presented approximate values as marital status, being married (47.7%) and single (42.5%).

Considering the family income, 44.7% of patients report living with only one minimum wage and 69.7% have only primary education. In a research conducted in Teresina it showed similarity with the results of this study with regard to education, where 65.3% of patients had primary education, and inferred that people with lower socio-economic status are at increased risk of injury caused by all etiologies including traffic accidents.[17]

In this study it was found that the etiology of most of the victims of TBI is related to motorcycle accidents, followed by fall from height; both more frequently in the male population. This prevalence related to males was observed in a study conducted in Petrolina, where it was found that the most prevalent etiology were motorcycle accidents (44.5%), followed by fall (22.78%).[18]

The highest incidence of TBI in males can be justified by the fact that the adults are used to be more irresponsible than females and thus end up suffering more accidents.[19]

This higher frequency is attributed to increased exposure of males to risk factors for TBI, such as motor vehicle accidents and violence, since these perform more often work activities outside of their homes and thus expose themselves more to risky conditions.[20]

The epidural hematoma represented the first most common type of injury in our sample, with a prevalence of 100% in males, followed by subdural hematoma. Several studies also confirm the higher incidence of epidural hematoma in males[18, 21]. However, another study shows the traumatic subarachnoid hemorrhage as the most prevalent type of injury.[16]

In the series of this studymost patients used the ambulance as pre-hospital transport, also representing a greater number of patients classified as severe. Thus, it can be inferred that this feature can be related to the fact that the place of the study is a referral hospital in the State of Piaui, which also serves TBI patients from other States in the Northeast Region of the Country, who use ambulances for transportation.

In contrast, in a study conducted in a surgical emergency of a public hospital in Florianópolis, it was observed that 63.2% of patients were transported to the hospital by private car. Have patients who were transported by ambulance from SAMU, accounted for 13.2% of the sample.[22]

Regarding suspection of alcohol use, the numbers were similar, most studies examining its occurrence. In a study, it was concluded that 50% of the injuries requiring hospital care are related to alcohol consumption.[22] In a study that traces the clinical and epidemiological profile of TBI occurrences in a hospital in the city of Barbacena, 40% of patients admitted to hospital showed alcohol use.[16]

In a research carried out in the Southern Region of the Country, it found that a history of alcohol use was the only variable that showed a statistically significant association with the severity of TBI.[22] However, in this study prevailed a greater number of severe TBI in the population who reported not having used alcohol on the day of the accident. However, it should be noted that some patients feel afraid or embarrassed to mention alcohol before the accident, even though the privacy and confidentiality of the survey data.

Regarding the type of damage resulting from trauma, it was noted that the epidural hematoma was the most common type of lesions in patients with mild and severe TBI. In cases classified as moderate, in turn, the injury most frequent was the subdural hematoma. In contrast, in a cross-sectional survey conducted in São Paulo, it was found that the type of the most significant injury in mild, moderate and severe TBI was subgaleal hematoma. Subarachnoid hemorrhage presented itself numerically representative only in severe TBI. It notes that in this study there was used to evaluate the type of injury findings on CT scan of patients victims of TBI, which differs from this study, which was based on data recorded in the medical record.[23]

Regarding the treatment performed, most patients in this study underwent clinical or conservative treatment, and the surgery was mostly found in moderate and severe TBI patients. This finding corroborates with another study in which the type of treatment more accomplished in TBI victims was conservative (77.18%), justified by a higher frequency of mild trauma.[16]

It is observed in this study a higher frequency of mild trauma, followed by moderate and severe, respectively. Approaching another study that addressed this issue, it was found occurrence of 53.4% of mild trauma; 25.7% moderate and 20.8% severe.[18] However, other authors contradict this finding, showing severe TBI rate of 15.6%.[23] Therefore, more than the number of moderate TBI (2.0%).

This study found a statistically significant association between trauma severity and socio-demographic variables: gender, age, marital status and family income. Thus, one can infer that actually, to be male and married sex increase the possibility of mild traumatic brain injury occurrence; being married increases the possibility of moderate TBI and belonging to the age group between 20 to 29 years old there is family income of a minimum wage; it significantly increases the probability of severe head trauma occurrence.

CONCLUSION

The epidemiological profile of TBI patients was represented more frequently in males aged between 20 to 29 years old, married and with elementary school. Motorcycle accidents were the leading cause of trauma, followed by fall from height and running over, both with the same proportion. Among the types of lesions, it showed a greater representation of epidural hematoma and subdural hematoma. Concerning the severity of the trauma, it was found that most of the events were mild trauma cases and the most popular means of transport is the ambulance. In most accidents it was observed so register of suspected use of

alcohol, although with values close to the absence of the record of this suspicion. Clinical treatment was mostly among injured ones.

The results showed statistically significant association between some variables from the demographic profile with the severity of TBI. Thus, being male and married sex increases the possibility of mild traumatic brain injury occurrence, be married increases the possibility of moderate TBI and belonging to the age group between 20 to 29 years old, with a family income of a minimum wage increase significantly the probability of severe head trauma occurrence.

It is expected that these results can contribute to the recognition of the epidemiological profile of victims of Traumatic Brain Injury admitted to the neurological clinic in an emergency referral hospital. As well, the issue requires further studies to expand knowledge about this phenomenon, for planning to prevent such occurrences.

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