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FACTORS RELATED TO DEATH IN PATIENTS WITH TRAUMATIC BRAIN INJURY FATORES RELACIONADOS AO ÓBITO EM PACIENTES COM TRAUMATISMO CRANIOENCEFÁLICO

FACTORES RELACIONADOS AL ÓBITO EN PACIENTES CON TRAUMATISMO CRANIOENCEFÁLICO Jakeline de Lima Israel¹, Francisco José Oliveira de Queiroz², Thatiana Lameira Maciel Amaral³, Kelly Regina Pires da Silva Caciano^{4,} Patrícia Rezende do Prado⁵

Objective: to identify the epidemiological profile and the factors related to death in critical patients who suffered traumatic brain injury. Method: this is a quantitative, descriptive and cross-sectional study, whose data collection was performed, and the information analyzed in the medical records. Descriptive statistics and Fisher's exact test were used with p-value <0.05 as significant. The results are presented in the table. Results: it was revealed that of the 61 patients, 80.3% were male; 72.1% were <40 years of age; in 72.5% the trauma occurred due to a motorcycle accident; 91.8% were considered serious; 65.5%, circulatory insufficiency; 48.1% had sequelae on discharge due to neurological deficit and 32.7% due to motor deficit and 16.4% died. It was added that males (p-value = 0.02) and circulatory insufficiency (p-value = 0.05) had a correlation with death. Conclusion: it was identified that most of the patients were young men, with motorcycle trauma, they presented severe, with sequels and the death was related to the male sex and the circulatory insufficiency. It is believed that the percentage of deaths was not high, but morbidity was high. Descriptors: Intensive Care Units; Craniocerebral Trauma; Morbidity; Epidemiology; Mortalitty; Patient Care.

RESUMO

Objetivo: identificar o perfil epidemiológico e os fatores relacionados ao óbito em pacientes críticos que sofreram traumatismo cranioencefálico. Método: trata-se de um estudo quantitativo, descritivo e transversal, com coleta de dados em prontuários. Realizaram-se estatísticas descritivas e o teste exato de Fisher adotando-se p-valor <0,05 como significativo. Apresentam-se os resultados em tabela. Resultados: revelam-se que, dos 61 pacientes, 80,3% eram do sexo masculino; 72,1% tinham <40 anos de idade; em 72,5% o traumatismo ocorreu por acidente motociclístico; 91,8% foram considerados graves; 65,5%, insuficiência circulatória; 48,1% apresentaram sequelas na alta por deficit neurológico e 32,7% por deficit motor e 16,4% foram a óbito. Acrescenta-se que o sexo masculino (p-valor = 0,02) e a insuficiência circulatória (p-valor = 0,05) apresentaram correlação com o óbito. Conclusão: identificou-se que a maioria dos pacientes era homens jovens, com trauma por motocicletas, apresentaram-se graves, com sequelas e o óbito relacionou-se com o sexo masculino e a insuficiência circulatória. Acredita-se que o percentual de óbitos não foi alto, porém, a morbidade foi elevada. Descritores: Unidades de Terapia Intensiva; Traumatismos Craniocerebrais; Morbidade; Epidemiologia; Mortalidade; Assistência ao Paciente.

Objetivo: identificar el perfil epidemiológico y los factores relacionados al óbito en pacientes críticos que sufrieron traumatismo craneoencefálico. Método: se trata de un estudio cuantitativo, descriptivo y transversal, cuya recolección de datos fue realizada y analizadas las informaciones en prontuarios. Se realizaron estadísticas descriptivas y la prueba exacta de Fisher adoptando p-valor <0,05 como significativo. Se presentan los resultados en tabla. Resultados: se revelan que, de los 61 pacientes, el 80,3% eran del sexo masculino: 72.1% tenían <40 años de edad: en el 72.5% el traumatismo ocurrió por accidente motociclístico: el 91,8% se consideró grave; 65,5%, insuficiencia circulatoria; 48,1% presentaron secuelas en la alta por déficit neurológico y 32,7% por déficit motor y el 16,4% fueron a muerte. Se añade que el sexo masculino (p-valor = 0,02) y la insuficiencia circulatoria (p-valor = 0,05) presentaron correlación con el óbito. *Conclusión*: se identificó que la mayoría de los pacientes eran hombres jóvenes, con trauma por motocicletas, se presentaron graves, con secuelas y el óbito se relacionó con el sexo masculino y la insuficiencia circulatoria. Se cree que el porcentaje de muertes no fue alto, pero la morbilidad fue elevada. Descriptores: Unidades de Cuidados Intensivos; Traumatismos Craneocerebrales; Morbilidad; Epidemiología; Mortalidad; Atención al Paciente.

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INTRODUCTION

According to the Ministry of Health, traumatic brain injury (TBI) is understood as any injury from an external trauma that causes anatomical changes in the scalp, meninges, brain or blood vessels resulting in momentary or permanent brain changes.¹

It turns out that TBI is one of the most frequent causes of morbidity and mortality worldwide and generates a strong social impact. It is estimated that every fifteen seconds there is a new case of TBI every week, and every five minutes one of these people develops to death and another one acquires permanent sequelae as a result of the trauma.² The increase in incidence is particularly noticeable in developing countries.³

It is known that in the United States, TBI is the third most frequent cause of death among young people and adults⁴ and it is estimated that, annually, 1.7 million cases of TBI are recorded with 52 thousand deaths, for about 80% of trauma deaths in children.¹

It is estimated that, in Brazil, the mortality rate from TBI is between 26.2 and 39.3 cases per 100 thousand inhabitants, ⁴ being responsible for high mortality rates, ¹ with a higher prevalence among young males. ^{1, 5-6} It is reported that, every half a million individuals admitted to the Brazilian hospitals by TBI, about 75 to 100,000 will die. ⁵

It is believed that TBI has become a public health problem of both social and economic impact due to the long-term consequences that can affect the functional performance of individuals, 7 as well as behavioral, cognitive and motor deficits that make it difficult to social interaction, making them unable to manage their own lives and generally dependent on caregivers, which can lead to emotional distress and social isolation.⁸

In this sense, it is fundamental to identify the epidemiological profile and determinants of TBI, especially in the North region, due to the restriction of data on this public health problem in this Brazilian region.

OBJECTIVE

• To identify the epidemiological profile and the factors related to death in critical patients who suffered traumatic brain injury.

METHOD

This is a quantitative, descriptive and cross-sectional study of patients who suffered from TBI and were admitted to an Intensive

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Care Unit in the city of Rio Branco, Acre, Brazil, from February to November 2017.

It is reported that the ICU surveyed is part of one of the largest hospitals in the North that, in an emergency and emergency situation, serves the State of Acre and patients from other states such as Rondônia and Amazonas. It should be noted that this unit has eighteen beds, all of them active and maintained with funding from the Unified Health System (UHS). It is inferred that the main pathologies treated in this unit are TBI, polytrauma, sepsis, congestive heart failure and cerebrovascular accident.

The study population was composed by individuals suffering from traumatic brain injury, over 18 years of age, admitted to the ICU.

The data was collected by means of an appropriate form to obtain medical records information. They were listed as independent variables: age; sex; color; profession; marital status; diagnosis; cause of TBI; the day it occurred (weekday or weekend); alcohol use; type of accident; comorbidities; severity of TBI; renal failure; Glasgow in and out; length of hospital stay; treatment behavior; type of injury; clinical aspects; surgical procedure and sequels, the dependent variable being death by TBI.

Data collection on the World Federation of Neurological Surgeons (WFNS) scale, which takes into account the Glasgow Coma Scale (GCS) and the motor deficit was used to evaluate patients with subarachnoid hemorrhage, an important factor in the evaluation of patients with cranioencephalic trauma. The scale is varied by five degrees:

DEGREE I - GCS with value 15, without motor deficit;

DEGREE II - GCS with values between 13 and 14, without motor deficit;

DEGREE III - GCS with values between 13 and 14, with motor deficit;

DEGREE IV - GCS with values between seven and 12, with or without motor deficit;

DEGREE V - GCS with values between three and six, with or without motor deficit.

Fisher's exact test was used to evaluate the factors related to death, and a correlation was considered when p-value <0.05. Data was entered in Excel 2010 (Microsoft, USA) by analyzing them by the SPSS program, version 17.0 (SPSS Corp., Chicago, USA).

The project was approved by the Research Ethics Committee of the State Hospital Foundation of Acre (FUNDHACRE) under the CAAE No. 1336173. The formal requirements contained in the national and international

norms regulating research involving human beings were respected.

It is revealed that of the 61 patients with ITC of the studied ICU, 80.3% were male; 72.1% were under 40 years of age; 72.5% suffered TBI due to motorcycle accident; 27.5%, due to external violence, 72.9% of which occurred on weekdays; 91.8% of the patients presented severe TBI; 68.8% underwent surgery; 31.1% had conservative therapy and 82.7% were considered as having a poor prognosis according to the World Federation of Neurological Surgeons (WFNS) scale (Table 1).

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In the ICU, 86.2% of the patients with respiratory insufficiency were admitted in relation to severity; 65.5% with circulatory insufficiency; 46.2% presented pressure injury; 48.1%, unspecified neurological deficit and 32.7% with motor deficit and, in relation to the outcome, 16.4% died (Table 1)

The male sex (p-value = 0.02) and circulatory insufficiency (p-value = 0.05) were found to be correlated with the occurrence of death in patients with TBI in this ICU (Table 1).

Table 1. Characteristics of patients hospitalized in HUERB ICU victims of traumatic brain injury. Rio Branco (AC), Brazil, 2017.

Variables		%	Death				
	N		No		Yes		ρ-value
			N	%	N	%	
SEX							
Male	49	80.3	39	79.6	10	20.4	
Female	12	19.7	12	100.0	00	00	0.02
Age							
< 40 years	44	72.1	38	86.4	06	13.6	
> 40 years	17	27.9	13	76.5	04	23.5	0.36
CAUSE							
Motorcycle accident	29	72.5	25	86.2	04	13.8	
External violence	11	27.3	09	81.8	02	18.2	0.73
DAY OF OCCURRENCE							
Weekdays	43	72.9	37	86.0	06	14.0	
Weekends	16	27.1	13	81.2	03	18.8	0.65
ΓΒΙ GRAVITY*							
Grave	56	91.8	46	82.1	10	17.9	
_ight/Moderate	05	8.2	05	100.0	00	00	0.17
WFNS SCALE**							
Degree I and II	09	17.3	9	100.0	00	00	
Degree III, IV and V	43	82.7	37	86.0	06	14.0	0.11
CONDUCT							
Surgical	42	68.8	35	83.3	07	16.7	
Clinical	19	31.1	16	84.2	03	15.8	0.93
TYPE OF LESION	.,	31.1		01.2	03	13.0	
Multiple	30	68.2	26	86.7	04	13.3	
Individual	14	31.8	13	92.9	01	7.1	0.53
COMORBIDITIES	• • •	31.0	.5	,,	01		0.55
Respiratory insufficiency	50	86.2	40	80.0	10	20.0	0.07
Circulatory insufficiency	38	65.5	29	76.3	09	23.7	0.05
CONDITION AT DISCHARGE	50	00.0	-/	. 3.3	, , , , , , , , , , , , , , , , , , ,		2.05
Neurological Deficit	25	48.1	22	88.0	03	12.0	0.92
Pressure Lesion	24	46.2	21	87.5	03	12.5	0.59
Motor deficit	17	32.7	14	82.4	03	17.6	0.87
TOTAL	61	100	51	83.6	10	16.4	-

^{*} TBI: traumatic brain injury; ** WFNS: World Federation of Neurologic Surgeons.

DISCUSSION

It should be noted that of the 61 cases of head injury occurred in the period observed, the highest number of cases occurred in males, under 40 years of age, which corroborates 72.1% of the results recorded in the first half of 2014 in Sergipe, when, also, a higher occurrence of TBI was detected in males and younger than 40 years. 9-11

It is reported that in a ICU in Bahia, 84.5% of admitted TBI cases also occurred in males and 53.5% in those younger than 40 years. 13 It is believed that these results are justified by

the greater exposure of men to situations of danger and, possibly, by lifestyle and cultural factors. ¹² It is estimated that 77.3% of the cases registered in the University Hospital of the State of Sergipe were male and 36.4%, under 40 years of age. ¹⁴

Motorcycle accidents, among the causes of TBI, are responsible for 29.0% of the cases registered at the Prado Valadares General Hospital, in Jequié (BA), ¹³ while in the Emergency Hospital of Rio Branco, cases of TBI related to motorcycle accidents reached 72.5%, and of these, 13.8% died. The severity of TBI cases is mainly related to the non-use

of the helmet by motorcyclists, being twice as serious as in those who used the safety equipment.¹⁵

Another aspect, besides the sociocultural and behavioral ones, which is related to the occurrence of traumas, is the ingestion of alcohol associated with recklessness in traffic. 16-7 External violence has shown a significant increase in recent years and aggression are the factor most closely linked to mortality rates, causing about one and a half million fatalities annually and leaving several other victims with side effects. 11

It is analyzed, in relation to the day of occurrence, that 46.9% of the cases of trauma occurred on weekends, a period with a three times greater chance than on the working days. The focus is on the days with 72.9% of the cases, differing from the literature, possibly because of the state of Acre presenting a high prevalence of motorcycles and an increase in external violence. To

It is emphasized, in relation to the severity of TBI, that individuals with signs of hypotension related to the mechanism of trauma, in their majority, have the most severe form. In this regard, one should opt for means that may reverse hypotension, with the use of fluid replacement or vasoactive drugs, in order to minimize neuronal injury, since the patient already presents a critical condition.¹⁶ This finding has an equivalence with the results of this study, since 65.5% presented circulatory insufficiency and 23.0% evolved to death. Therefore, the importance of efficient care measures and the correct manipulation of vasoactive drugs to maintain blood pressure.

In relation to medical conduct, 68.8% were surgical, with 35 deaths recorded. It is the adoption by interventions of the need reduce to intracranial pressure (ICP) and to remove the expansive lesion that compresses the brain regions, performed through external drainage of the ventricles and decompressive craniotomy. 18-9

Among morbidities, respiratory the insufficiency stands out, with 86.2% in 50 cases, of which 40 died. Of the cases registered in 2017 by Santa Casa Misericórdia de Sobral, in the State of Ceará, 30.1% of the patients had complications and 56.0% of them had a pneumonia.⁵ It is intimately related to the high mortality rate identification and early treatment of these lesions and / or secondary complications. The delay of an intervention, in cases of TBI, in irreversible cerebral dysfunctions is found in most cases. 19

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91.8% of the cases were considered serious, and most of them required the use of a mechanical ventilator. The WFNS scale showed that most patients had a poor prognosis, needed an ICU bed and advanced hemodynamic support, which characterized their hospitalization in this unit in which the team should be directed and prepared for this kind of service.²⁰

Another relevant fact is the fact that the majority of the patients were submitted to neurosurgical interventions due to the severity of the clinical picture at the moment of the trauma and to the control of ICP.²¹

Severe injuries are related to neurological sequelae and to incapacitating deficiencies that generate significant socioeconomic and psychological impact. Most of the cases occur in active individuals in whom the severity of the trauma has repercussions on high morbidity, that is, many individuals with sequelae that make social interaction difficult due to behavioral and cognitive disorders⁸, causing serious psychosocial impacts.

It is based on studies that emphasize the characterization of patients with TBI and the variables that lead to death for the creation of practical strategic actions for the improvement of public health policies and traffic education in an attempt to reduce the prevalence of cases and , thus, morbidity and mortality in TBI victims, and this study may contribute in this sense.

It is emphasized that a significant and positive factor of the research is the possibility of including a large number of victims of TBI, which made it possible to draw a more detailed profile evaluating from admission to discharge from the ICU, in addition to alerting to the expressive morbidity of the TBI in young men related to the severity of the lesion resulting, therefore, in circulatory insufficiency.

It is noteworthy the implementation of protocols as another important fact that would facilitate the actions of Nursing enhancing the search for knowledge and favoring a better care and implementation of care to the patient with TBI.²⁰

CONCLUSION

It was possible to observe, with this research, a predominance of young men who suffered a traffic accident or external violence, and, in addition, the conditions on discharge alerted to the severity and repercussion of TBI morbidity, where the majority of patients had admission with high severity (circulatory and respiratory

insufficiency) and hospital discharge with neurological and motor deficits.

It is important to know the main causes of TBI and its epidemiology so that, in this way, it is possible to define the means for the control and prevention of its risk factors. In tertiary care, the incorporation of an exclusive care plan for patients with TBI is possible, aiming the care directed at neurocritical patients and the intervention directed at the accident site, since the patients are serious and require medical assistance and of Nursing of emergencia aiming at the diminution and the control of the respiratory and circulatory instability.

Training and health education are needed for the families who will take care of the traumatized at home. It is also necessary to optimize and direct the traffic education campaigns, as well as the importance of the use of safety equipment and traffic control, as well as intervention in cases of urban violence to ensure, to all citizens, public roads with good conditions for traffic, safety and the reduction of morbidity and mortality by TBI.

REFERENCES

- 1. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Ações Programáticas Estratégicas, Coordenação Geral de Saúde da Pessoa com Deficiência SAF/Sul. Diretrizes de Atenção à Reabilitação da Pessoa com Traumatismo Cranioencefálico [Internet]. Brasília: Ministério da Saúde; 2015 28]. [cited 2018 Aug Available http://bvsms.saude.gov.br/bvs/publicacoes/d iretrizes_atencao_reabilitacao_pessoa_trauma tisco_cranioencefalico.pdf
- 2. Menezes SS, Leite JBS. Traumatismo Cranioencefálico (TCE): condutas de enfermagem diante da vítima na sala de emergência. Rev COOPEX/FIP [Internet]. 2017 [cited 2018 June 12];8(8):1-14. Available from:
- http://fiponline.edu.br/coopex/pdf/cliente=3 -5a72bca0ac44c168b28b403459f7df60.pdf
- 3. <u>Saatian</u> M, <u>Ahmadpoor</u> J, <u>Mohammadi</u> Y, <u>Mazloumi</u> E. Epidemiology and Pattern of Traumatic Brain Injury in a Developing Country Regional Trauma Center. Bull Emerg Trauma [Internet]. 2018 Jan [cited 2018 June 12];6(1):45-53. Doi: https://dx.doi.org/10.29252%2Fbeat-060107
- 4. Oliveira DMP, Pereira CU, Freitas ZMP. Escalas para avaliação do nível de consciência em trauma cranioencefálico e sua relevância para a prática de enfermagem em neurocirurgia. Arq Bras Neurocir [Internet]. 2014 [cited 2018 June 01];33(1):22-32.

Factors related to death in patients with...

Available from: http://files.bvs.br/upload/S/0103-5355/2014/v33n1/a4284.pdf

- 5. Ponte FR, Andrade AP, Vasconcelos KB, Mourão Netto JJ. Victims of cranio-encephalic traumatism: epidemiological profile in a unit of Intensive therapy. J Nurs UFPE on line. 2017 May;11(5):1826-34. Doi: https://doi.org/10.5205/1981-8963-v11i5a23329p1826-1834-2017
- 6. Santos RBF, Marangoni AT, Andrade AN, Vieira MM, Ortiz KZ, Gil D. Behavioral assessment of auditory processing after cranioencephalic trauma: pilot study. Rev CEFAC. 2013 Sept/Oct;15(5):1156-62. Doi: http://dx.doi.org/10.1590/S1516-18462013005000020
- 7. Schultheis MT, Whipple E. Driving after traumatic brain injury: evaluation and rehabilitation interventions. Curr Phys Med Rehabil Rep. 2014 Sep; 2(3):176-83. Doi: http://dx.doi.org/10.1007/s40141-014-0055-0
- 8. Giustini M, Longo E, Azicnuda E, Silvestro D, D'Ippolito M, Rigon J, et al. Health-related quality of life after traumatic brain injury: Italian validation of the QOLIBRI. Funct Neurol [Internet]. 2014 July/Sept [cited 2018 Aug 15];29(3):167-76. PMID: 25473736
- 9. Magalhães ALG, Souza LC, Faleiro RM, Teixeira AL, Miranda AS. Epidemiology of traumatic brain injury in Brazil. Rev Bras Neurol [Internet]. 2017 June [cited 2018 Aug 14];53(2):15-22. Available from: https://www.researchgate.net/publication/3 20352679 Epidemiology of Traumatic Brain Injury_in_Brazil
- 10. Viana NJ, Bohland AK, Pereira CU. Hospitalization for traumatic brain injury in Sergipe, of 2000 to 2011. Arq Bras Neurocir. 2014;33(4):306-17. Doi: 10.1055/s-0038-1626232
- 11. Machado Neto CD, Carvalho LS, Leite MJ, Lucena GWV, Carvalho AG, Santos GMR. Epidemiology of traumatic brain injury in Brazil. Temas saúde [Internet]. 2016 [cited 2018 Jan 17];386-403. Available from: http://temasemsaude.com/wp-content/uploads/2016/11/conesf16.pdf
- 12. Dalto SG, Escobar E. Traumatic brain injury in a teaching hospital in a city of Campinas, São Paulo, Brazil. Enfermagem Rev [Internet]. 2016 [cited 2018 June 17];19(2):255-61. Available from: http://periodicos.pucminas.br/index.php/enfermagemrevista/article/view/13163
- 13. Reis TMG, Nascimento LS, Freire RS, Nunes EA, Reis IRM. Perfil dos pacientes com traumatismo cranioencefálico em uma cidade de porte médio. C&D Rev Eletrônica Fainor

Factors related to death in patients with...

Israel JL, Queiroz FJO de, Amaral TLM et al.

[Internet]. 2016 July/Dec [cited 2018 June 15];9(2):203-10. Available from: http://srv02.fainor.com.br/revista/index.php/memorias/article/view/574

14. Rodrigues LS, Santos ACFS, Mota ECH, Santos LR, Silva BM, Melo KC. Evaluation of the needs of family members of traumatic brain injury patients. Rev baiana enferm. 2017;31(2):e20504.

10.18471/rbe.v31i2.20504

- 15. Magalhães A, Souza L, Faleiro R, Teixeira A, Miranda A. Epidemiology of traumatic brain injury in Brazil. Rev Bras Neurol [Internet]. 2017 [cited 2018 July 18];53(2):15-22. Available from: https://revistas.ufrj.br/index.php/rbn/article/viewFile/12305/EPIDEMIOLOGIA%20DO%20TRAUMATISMO%20CRANIOENCEF%C3%81LICO%20NO%20BRASIL
- 16. Sutlovic D, Scepanovic A, Bosnjak M, Versic-Bratincevic M, Definis-Gojanovic M. The role of alcohol in road traffic accidents with fatal outcome: 10-year period in Croatia Split-Dalmatia County. Traffic Inj Prev. 2014;15(3):222-7. Doi: http://dx.doi.org/10.1080/15389588.2013.80 4915.
- 17. Rocha G, Shor N. Motorcycle accidents in the municipality of Rio Branco in the State of Acre: characterization and trends. Ciênc saúde coletiva. 2013 Mar;18(3):721-31. Doi: http://dx.doi.org/10.1590/S1413-81232013000300018
- 18. Diccini S, Ribeiro R. Enfermagem em neurointensivismo. Rio de Janeiro: Atheneu; 2018.
- 19. Moon JW, Hyuncorresponding DK. Decompressive Craniectomy in Traumatic Brain Injury: A Review Article. Korean J Neurotrauma. 2017 Apr;13(1):1-8. Doi: https://dx.doi.org/10.13004%2Fkjnt.2017.13. 1.1
- 20. Federizzi DS, Werlang SJ, Badke MR, Freitag VL, Silva GS, Ribeiro MV. Nursing in the Assistance to Traumatic Brain Injury in a University Hospital. J Health Sci [Internet]. 2017 [cited 2018 May 17];19(2):177-82. Available from: http://pgsskroton.com.br/seer/index.php/JHealthSci/article/view/4013
- 21. Silva FS, Carvalho Filha FSS. Trauma skull brain as a problem of public health: an integrative review of the literature. Reon Facema [Internet]. 2017 Jan/Mar [cited 2018 Apr 15];3(1):389-95. Available from: http://www.facema.edu.br/ojs/index.php/Re OnFacema/article/view/170/8611

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