Craniofacial trauma in Brazilian child victims of traffic accidents: A single-trauma center analysis

Isla Camilla Carvalho Laureano[1,C,D], Tatiana Farias Teódulo Palitot[2,B], Alidianne Fábia Cabral Cavalcanti[1,C,E], Alessandro Leite Cavalcanti[1,A,C,E,F]

[1] Department of Public Health Dentistry, Faculty of Dentistry, State University of Paraíba, Campina Grande, Brazil
[2] Dom Luiz Gonzaga Fernandes Emergency and Trauma Hospital, Campina Grande, Brazil

A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;
D – writing the article; E – critical revision of the article; F – final approval of the article

Dental and Medical Problems, ISSN 1644-387X (print), ISSN 2300-9020 (online) *Dent Med Probl.* 2021;58(4):441–445

Address for correspondence
Alessandro Leite Cavalcanti
E-mail: alessandrouepb@gmail.com

Funding sources
National Council for Scientific and Technological Development (CNPq) – Fellowship of Research Productivity (Process No. 302850/2016-3)

Conflict of interest
None declared

Acknowledgements
The authors would like to thank the hospital administrator of the Dom Luiz Gonzaga Fernandes Emergency and Trauma Hospital in Campina Grande, Brazil.

Received on August 5, 2020
Reviewed on September 15, 2020
Accepted on September 20, 2020

Published online on October 12, 2021

Abstract

Background. Road traffic accidents are a significant public health problem and a major cause of economic loss globally.

Objectives. The aim of the study was to describe the epidemiological profile of child victims of traffic accidents and the prevalence of craniofacial trauma in a municipality in the northeastern region of Brazil.

Material and methods. A documentary study was carried out through the analysis of the medical records of the traffic accident victims hospitalized in emergency wards in the municipality of Campina Grande, Paraíba, Brazil, from January to December 2016. A total of 1,884 medical records were evaluated, among which 85 (4.5%) referred to children aged 0–12 years. The information related to the sociodemographic profile of the victims, traffic accidents and clinical variables was collected. The data was analyzed using descriptive and inferential statistics, and a 5% level of significance was adopted.

Results. The victims were predominantly males (64.7%) and 9–12-year-old children (43.5%). Most accidents were recorded in the evening (48.2%) and on the weekend (32.9%). Among the victims, 37.6% were involved in motorcycle accidents. Craniofacial injuries were found in 44.7% of the children. Most victims were not admitted to the intensive care unit (ICU) (80.0%). Craniofacial trauma was significantly associated with motorcycle ($p = 0.043$) and automobile accidents ($p = 0.013$).

Conclusions. Our findings suggest that motorcycles are the vehicles most frequently involved in traffic accidents, which predominantly affect males and children aged 9–12 years, and result in a high prevalence of craniofacial trauma.

Keywords: epidemiology, child, maxillofacial injuries, motorcycles

Cite as
Carvalho Laureano IC, Teódulo Palitot TF, Cabral Cavalcanti AF, Cavalcanti AL. Craniofacial trauma in Brazilian child victims of traffic accidents: A single-trauma center analysis. *Dent Med Probl.* 2021;58(4):441–445. doi:10.17219/dmp/127668

DOI
10.17219/dmp/127668

Introduction

Throughout the world, many families are devastated by the loss of a child due to an unintentional injury, which makes these deaths a serious public health problem.[1] Unintentional injuries are those caused by traffic accidents, drowning, falls, burns, and poisoning.[1] According to the Global Burden of Disease Study,[2] the global prevalence of injuries in transport accidents was approx. 241 million individuals in 2016, and studies have shown that these accidents represent the main etiology of craniofacial trauma among children.[3,4]

The consequences of trauma in the craniofacial region can include any combination of bone, soft tissue or dental injury.[5] The location and pattern of the injury depend on the interrelation between the etiology of the injury and the magnitude of the impact as well as on the characteristics of the victim's developmental stage.[6] Bone flexibility, the presence of dental germs, the smaller size of the paranasal sinuses, the greater cranium/face ratio, and the thick buccal fat pad make children more likely to endure craniofacial trauma.[7] A mechanism of injury involving greater impact, such as a traffic accident, is required for this trauma to occur.[4]

Due to differences in anatomical development, craniofacial trauma can be considered uncommon in children when compared to adults,[8] but facial injuries to soft tissues occur more frequently in children.[7,9] Studies indicate that there is a general increase with age in the incidence of facial trauma and a decrease in the incidence of head trauma.[8] However, some studies have reported an increasing incidence of craniofacial trauma with increasing age.[3,5]

In a retrospective cross-sectional study carried out in the United Arab Emirates, it was observed that from a total of 475 craniofacial injuries, 6.5% occurred in the 1st decade of the patient's life and 18.4% in the 2nd one.[5] A retrospective cohort study carried out in the United States that used the 2012 Kids' Inpatient Database found that out of 20,070 cases of craniofacial trauma, 35.4% occurred between 0 and 10 years of age, and 63.7% between 11 and 20 years of age.[3] Transport accidents were the main etiological factor.[3] A cross-sectional survey carried out in the state of Paraíba, Brazil, revealed that 14.4% of the victims of transport accidents were children and adolescents, with head trauma being 5 times more frequent in the age group 0–4 years as compared to children aged 5–9 years.[10]

Craniofacial injuries in the pediatric population can have negative esthetic and functional effects, causing disfigurement, morbidity, and potential growth and development disorders. Moreover, they cause a great economic burden for families and health systems.[3,6] Therefore, the need to characterize the profile of the victims of craniofacial injuries from this population group and to analyze the different causes of these injuries makes this study relevant. Such knowledge would allow the planning of efficient first aid to obtain relevant recovery, the evaluation of the distribution of work teams, the determination of the related public policies, and assistance in calculating costs for health services.[11] Considering these factors, the aim of this study was to describe the epidemiological profile of child victims of traffic accidents and the prevalence of craniofacial injuries in a municipality in the northeastern region of Brazil.

Material and methods

Ethical statement

This study was approved by the Research Ethics Committee of the State University of Paraíba, Campina Grande, Brazil (protocol No. 2.154.228), according to the guidelines contained in Resolution No. 466/12 of the National Health Council.

Study design and location

This documentary study was carried out through the analysis of the medical records of the victims of traffic accidents hospitalized in emergency wards in the municipality of Campina Grande, Paraíba, Brazil. The municipality has an estimated population of 407,472 inhabitants (data for 2018), a Human Development Index (HDI) of 0.72 and a Gini coefficient of 0.58.[12] The study was developed at the Dom Luiz Gonzaga Fernandes Emergency and Trauma Hospital in Campina Grande, Brazil – a referral institution for the care of trauma patients.

Inclusion and exclusion criteria

The inclusion criteria comprised the medical records of children of both sexes aged 0–12 years who were the victims of traffic accidents involving pedestrians, cyclists, motorcycles, and automobiles, and were hospitalized for at least 24 h. The medical records of the victims who were hospitalized at the time of data collection, and therefore were not yet available in the Medical Archive and Statistics Service, were excluded. Those that showed a percentage of missing information above 10% were also excluded.

Pilot study

A pilot study was conducted to evaluate the research methodology, to verify the reliability of the data collection instrument and to assess the presence of possible inconsistencies. The pilot study was carried out with 100 medical records of the victims of traffic accidents that happened in 2015; they were not used in the final sample.

Data collection

In total, 1,884 medical records of the traffic accident victims hospitalized in the period from January

to December 2016 were evaluated. Data collection was carried out by 3 properly trained researchers between May and December 2017. The following information was recorded: sex; age (0–4 years, 5–8 years, or 9–12 years); care shift (morning (06:00–11:59), afternoon (12:00–17:59), evening (18:00–23:59), or night (00:00–05:59)); day of the week; type of accident (motorcycle, automobile, cyclist, or pedestrian); presence of craniofacial trauma; trauma in other anatomical regions (ribcage, abdominal region, upper limbs, lower limbs, or hips); surgical treatment; admission to the intensive care unit (ICU); and outcome (discharge, transfer, or death).

Table 1. Distribution of the children according to sociodemographic characteristics, accident features and clinical characteristics

Variables	*n* (%)
Sex	
male	55 (64.7)
female	30 (35.3)
Age [years]	
0–4	16 (18.8)
5–8	32 (37.6)
9–12	37 (43.5)
Care shift	
morning (06:00–11:59)	12 (14.1)
afternoon (12:00–17:59)	27 (31.8)
evening (18:00–23:59)	41 (48.2)
night (00:00–05:59)	5 (5.9)
Day of the week	
Sunday	18 (21.2)
Monday	14 (16.5)
Tuesday	12 (14.1)
Wednesday	7 (8.2)
Thursday	15 (17.6)
Friday	9 (10.6)
Saturday	10 (11.8)
Type of accident	
motorcycle	32 (37.6)
automobile	13 (15.3)
cyclist	21 (24.7)
pedestrian	19 (22.4)
Craniofacial trauma	
yes	38 (44.7)
no	47 (55.3)
Other regions injured (*N* = 60)	
ribcage	3 (5.0)
abdominal region	6 (10.0)
upper limb	15 (25.0)
lower limb	32 (53.3)
hip	4 (6.7)
Surgical treatment	
yes	46 (54.1)
no	39 (45.9)
Admission to ICU	
yes	17 (20.0)
no	68 (80.0)
Outcome (*N* = 82)	
discharge	77 (93.9)
transfer	3 (3.7)
death	2 (2.4)

Unless marked otherwise, *N* = 85. ICU – intensive care unit.

Statistical analysis

The data was tabulated and analyzed using the IBM SPSS Statistics for Windows software, v. 20.0 (IBM Corp., Armonk, USA). Data analysis involved descriptive (absolute and percentage distributions, mean (*M*), median (*Me*), and standard deviation (*SD*)) and inferential statistics (Pearson's χ^2 test). A significance level of 5% was adopted.

Results

The prevalence of traffic accidents affecting children was 4.5% (n = 85), with a mean age of 7.55 ±3.64 years and a median age of 8 years. The victims were predominantly males (64.7%), with a sex ratio of 1.8:1. Regarding age, the most frequently affected group was 9–12-year-olds (43.5%). Regarding the time of injury according to the care shift and the day of the week, most accidents were recorded in the evening (48.2%) and on the weekend (32.9%). Among all the victims, 37.6% were involved in motorcycle accidents. Craniofacial trauma occurred in 44.7% of the victims. Considering other anatomical regions, the highest frequency was observed for lower limb injuries (53.3%). Surgical treatment was required in 54.1% of cases. Only 20.0% of the victims required admission to ICU and 2.4% of the injuries resulted in death (Table 1).

Table 2 presents the distribution of craniofacial trauma injuries according to such variables as sex, age and type of traffic accident. Craniofacial trauma was significantly associated with motorcycle (p = 0.043) and automobile accidents (p = 0.013).

Table 2. Distribution of the child victims of traffic accidents involving craniofacial trauma according to sex, age group and type of accident

Variables	Craniofacial trauma		*p*-value
	yes (*N* = 38)	no (*N* = 47)	
Sex			
male	24/55 (43.6)	31/55 (56.4)	0.788
female	14/30 (46.7)	16/30 (53.3)	
Age [years]			
0–4	10/16 (62.5)	6/16 (37.5)	0.252
5–8	12/32 (37.5)	20/32 (62.5)	
9–12	16/37 (43.2)	21/37 (56.8)	
Motorcycle accident			
yes	10/32 (31.3)	22/32 (68.8)	0.043*
no	28/53 (52.8)	25/53 (47.2)	
Automobile accident			
yes	10/13 (76.9)	3/13 (23.1)	0.013*
no	28/72 (38.9)	44/72 (61.1)	
Cyclist accident			
yes	6/21 (28.6)	15/21 (71.4)	0.087
no	32/64 (50.0)	32/64 (50.0)	
Pedestrian accident			
yes	12/19 (63.2)	7/19 (36.8)	0.074
no	26/66 (39.4)	40/66 (60.6)	

Data presented as number (percentage) (*n*/*N* (%)). * statistically significant.

Discussion

Injuries resulting from traffic accidents are the 8th leading cause of death in all age groups, and the main etiology among children and young people from 5 to 29 years of age.[13] Epidemiological data indicates that low- and middle-income countries suffer from a higher burden of traffic injuries and deaths.[13] A report published as the global status report on road safety by the World Health Organization (WHO) revealed that systematic data collection in trauma databases, which gather information on the epidemiology of injuries, clinical interventions and health outcomes, is essential for preparing programs to improve clinical quality and for the development of effective prevention strategies.[13]

The present study, conducted in a referral center for the care of trauma patients, revealed a low percentage (4.5%) of child victims of traffic accidents. According to the Mortality Information System of the Brazilian Ministry of Health, in the years 2014–2018, 3.5% of the total number of deaths from traffic accidents (192,686) regarded children aged up to 14 years, with a decline of almost 40.0% in the period.[14] This result demonstrates the importance of measures that were implemented in the country to control this type of accidents after the adoption of the Brazilian Traffic Code in 1997, which defined attributions to the agencies linked to traffic, and established norms and penalties for road users.[15] The use of car seats for infants and young children, and mandatory rear seat transportation for children up to 10 years of age[16] may have contributed to the lower frequency of accidents in this population group.

The majority of victims in this study were males, which is consistent with data from WHO,[13] and with previous studies carried out by researchers in Brazil,[10,17–19] Sudan,[6] Portugal,[20] and India.[21] It could be inferred that this male predominance exists because of cultural and social restrictions for unsupervised female outdoor activities as compared to male activities.[6,22]

The incidence of transport accidents was higher among older children. While younger children generally suffer from trauma due to low-intensity forces, such as falls, older children are more likely to be exposed to high-intensity forces, such as those resulting from traffic accidents, because as they grow, their trauma profile becomes similar to that observed in adults.[4,7] In addition, when they are young, children are protected by their parents against harmful events.[3]

Regarding the time and day of the week of traffic accidents, the concentration of events in the evening and on weekends corroborates other findings.[10,17,23,24] The greater number of accidents at dusk may be associated with poor visibility, stationary vehicles, speeding, disrespect for signs, and the use of alcohol or drugs.[23] The higher occurrence of accidents on weekends may be related to risky traffic behavior, such as exceeding the speed limit, disrespecting traffic rules and driving under the influence of alcohol.[10] However, the Brazilian "dry law" from 2008 reduced the legal alcohol blood level from 0.06 g/dL to 0.02 g/dL.[16,25] Later, in 2012, any alcohol blood concentration among drivers was considered illegal.[26] These measures proved to be important in reducing hospital admissions due to traffic accidents, the length of hospital stay and hospital expenses.[27]

Regarding the type of vehicle involved in the accident, motorcycles were the most common, as reported by other authors,[10,18,28] followed by accidents involving cyclists and pedestrians. According to WHO, more than half of all traffic deaths involve vulnerable road users, such as pedestrians, cyclists and motorcyclists.[13] In the present study, the prevailing involvement of motorcycles in traffic accidents might be due to the fact that this vehicle is the predominant means of transportation for the population of a lower socioeconomic status in small- and medium-sized Brazilian cities.[10] Other factors, such as little or no protection used by motorcyclists,[17] difficulty in making motorcycles visible for other drivers, inappropriate traffic behavior, and the lack of respect for traffic laws,[28] may contribute to the higher number of traffic accidents involving motorcycles.

Thus, to reduce the number of traffic accidents, additional informational and educational measures must be taken, and safer protection devices must be developed.[29] In fact, correct helmet use can reduce the risk of fatal injuries by up to 42% and the risk of head injuries by 69%.[13] Fastening seat belts reduces the mortality of front seat occupants by 45–50%, and the risk of death and serious injury among rear seat occupants by 25%. In addition, restrictive laws for children regarding their seating in vehicles can lead to a 60% reduction in deaths.[13] The prevalence of craniofacial trauma was similar to that reported in a previous study.[18] Factors such as speed, the victim's position, the lack of use of safety devices, and impact geometry are mainly responsible for injuries due to traffic accidents.[30]

Statistically significant associations between craniofacial trauma and accidents involving motorcycles and automobiles were observed. Motorcyclists are vulnerable to these injuries due to little or no protection during an accident.[17] In addition, in general, automobile accidents produce greater impact than other types of accidents, resulting in more serious and complex craniofacial injuries.[3]

Limitations

There are some limitations to this study. It was impossible to investigate cause-and-effect relationships due to the cross-sectional design, and there may have been incomplete data from some of the medical records. Nevertheless, this research presents relevant epidemiological data about traffic accidents as a public health problem in children up to 12 years of age, providing knowledge about the risk factors for craniofacial trauma, so that better surveillance and continuous education on traffic safety can be implemented.

Conclusions

Older male children are the predominant victims of traffic accidents. There is a greater frequency of accidents involving motorcycles, with a high prevalence of craniofacial trauma.

ORCID iDs

Isla Camilla Carvalho Laureano https://orcid.org/0000-0002-6621-1834
Tatiana Farias Teódulo Palitot https://orcid.org/0000-0002-2667-7525
Alidianne Fábia Cabral Cavalcanti https://orcid.org/0000-0002-7779-2478
Alessandro Leite Cavalcanti https://orcid.org/0000-0003-3572-3332

References

1. Peden M, Oyegbite K, Ozanne-Smith J, et al., eds. *World Report on Child Injury Prevention*. Geneva, Switzerland: World Health Organization; 2008. https://apps.who.int/iris/bitstream/handle/10665/43851/9789241563574_eng.pdf;jsessionid=963B1FD95F4EFE07CEDDCEE24454009D?sequence=1. Accessed May 25, 2020.
2. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet*. 2017;390(10100):1211–1259. doi:10.1016/S0140-6736(17)32154-2
3. Massenburg BB, Sanati-Mehrizy P, Taub PJ. Surgical treatment of pediatric craniofacial fractures: A national perspective. *J Craniofac Surg*. 2015;26(8):2375–2380. doi:10.1097/SCS.0000000000002146
4. Naran S, MacIsaac Z, Katzel E, et al. Pediatric craniofacial fractures: Trajectories and ramifications. *J Craniofac Surg*. 2016;27(6):1535–1538. doi:10.1097/SCS.0000000000002837
5. Al-Khateeb T, Abdullah FM. Craniomaxillofacial injuries in the United Arab Emirates: A retrospective study. *J Oral Maxillofac Surg*. 2007;65(6):1094–1101. doi:10.1016/j.joms.2006.09.013
6. Almahdi HM, Higzi MA. Maxillofacial fractures among Sudanese children at Khartoum Dental Teaching Hospital. *BMC Res Notes*. 2016;9:120. doi:10.1186/s13104-016-1934-5
7. Kellman RM, Tatum SA. Pediatric craniomaxillofacial trauma. *Facial Plast Surg Clin North Am*. 2014;22(4):559–572. doi:10.1016/j.fsc.2014.07.009
8. Chandra SR, Zemplenyi KS. Issues in pediatric craniofacial trauma. *Facial Plast Surg Clin North Am*. 2017;25(4):581–591. doi:10.1016/j.fsc.2017.06.009
9. Gassner R, Tuli T, Hächl O, Rudisch A, Ulmer H. Cranio-maxillofacial trauma: A 10 year review of 9,543 cases with 21,067 injuries. *J Craniomaxillofac Surg*. 2003;31(1):51–61. doi:10.1016/s1010-5182(02)00168-3
10. Cavalcanti AL, de Araujo Lino TH, Sarmento de Oliveira TB, et al. Head and maxillofacial injuries in child and adolescent victims of automotive accidents. *ScientificWorldJournal*. 2014;2014:632720. doi:10.1155/2014/632720
11. Jin KS, Lee H, Sohn JB, et al. Fracture patterns and causes in the craniofacial region: An 8-year review of 2076 patients. *Maxillofac Plast Reconstr Surg*. 2018;40(1):29. doi:10.1186/s40902-018-0168-y
12. Brazilian Institute of Geography and Statistics (IBGE). Brasil/Paraíba/Campina Grande. Panorama. https://cidades.ibge.gov.br/brasil/pb/campina-grande/panorama. Accessed May 5, 2020.
13. World Health Organization. Global status report on road safety 2018. https://www.who.int/publications/i/item/9789241565684. Accessed June 14, 2020.
14. Ministry of Health (Brazil). Brazilian Mortality Information System (SIM). http://ghdx.healthdata.org/series/brazil-mortality-information-system-sim. Accessed May 5, 2020.
15. The Brazilian Traffic Code instituted by Law No. 9503/1997 of September 23, 1997 [in Portuguese]. Official Journal of the Union. September 24, 1997. http://www.planalto.gov.br/ccivil_03/leis/l9503compilado.htm. Accessed May 25, 2020.
16. Brazilian Law No. 11705 of June 19, 2008 [in Portuguese]. Official Journal of the Union. June 20, 2008. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11705.htm. Accessed April 17, 2020.
17. Cavalcanti AL, Costa Ferreira FH, Olinda RA, Nascimento Padilha WW, Cabral Cavalcanti AF. Motorcycle-related cranio-maxillofacial injuries among Brazilian children and adolescents. *Biomed Pharmacol J*. 2017;10(4):1603–1609. doi:10.13005/bpj/1271
18. Quaresma Rêgo IC, Martins Vilarinho SM, Freitas Rodrigues CK, de Almeida Ramos Correia PV, Cintra Junqueira JL, Oliveira LB. Oral and cranio-maxillofacial trauma in children and adolescents in an emergency setting at a Brazilian hospital. *Dent Traumatol*. 2020;36(2):167–173. doi:10.1111/edt.12515
19. Cabral Cavalcanti AF, de Medeiros Lucena B, Sarmento de Oliveira TB, Cavalcanti CL, d'Avila S, Cavalcanti AL. Head and face injuries in automobile accidents and associated factors in a city in northeastern Brazil. *Pesqui Bras Odontopediatria Clin Integr*. 2017;17(1):e3753. doi:10.4034/pboci.2017.171.30
20. Ferreira P, Barbosa J, Amarante J, Insua-Pereira I, Soares C, Silva A. Changes in the characteristics of facial fractures in children and adolescents in Portugal 1993–2012. *Br J Oral Maxillofac Surg*. 2015;53(3):251–256. doi:10.1016/j.bjoms.2014.12.002
21. Arvind RJ, Narendar R, Kumar PD, Venkataraman S, Gokulanathan S. Maxillofacial trauma in Tamil Nadu children and adolescents: A retrospective study. *J Pharm Bioallied Sci*. 2013;5(Suppl 1):S33–S35. doi:10.4103/0975-7406.113290
22. Costa RC, Medeiros da Nóbrega JB, de Andrade Dantas EL, Damascena LC, Lacerda Protásio AP, Gondim Valença AM. Profile of hospitalizations and deaths from craniofacial fractures in Brazilian children and adolescents: An ecological study. *Pesqui Bras Odontopediatria Clin Integr*. 2016;16(1):99–111. doi:10.4034/PBOCI.2016.161.11
23. Lima Bastos YG, de Andrade SM, Soares DA. Characteristics of traffic accidents and victims treated through a pre-hospital service in a city in southern Brazil, 1997/2000 [in Portuguese]. *Cad Saude Publ*. 2005;21(3):815–822. doi:10.1590/s0102-311x2005000300015
24. Quevedo Miguens SA Jr., Borges TS, Becker Dietrich LA, Oliveira MC, González Hernandez PA, Kramer PF. A retrospective study of oral and maxillofacial injuries in an emergency hospital in southern Brazil. *Pesqui Bras Odontopediatria Clin Integr*. 2016;16(1):339–350. doi:10.4034/PBOCI.2016.161.36
25. Ministry of Infrastructure (Brazil)/National Traffic Council. Resolution No. 277 of May 28, 2008 [in Portuguese]. Official Journal of the Union. May 28, 2008. https://www.diariodasleis.com.br/busca/exibelink.php?numlink=1-48-34-2008-05-28-277. Accessed January 9, 2020.
26. Brazilian Law No. 12760 of December 20, 2012 [in Portuguese]. Official Journal of the Union. December 21, 2012. http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12760.htm. Accessed March 28, 2016.
27. Mello Jorge MHP, Koizumi MS. Traffic accidents causing victims: Possible reflection of the dry law on hospital admissions [in Portuguese]. *Rev ABRAMET*. 2009;27(2):16–25. https://repositorio.usp.br/item/001793661. Accessed May 25, 2020.
28. Campos Golias AR, Caetano R. Accidents between motorcycles: Analysis of cases that occurred in the state of Paraná between July 2010 and June 2011 [in Portuguese]. *Cienc Saude Colet*. 2013;18(5):1235–1246. doi:10.1590/S1413-81232013000500008
29. Cavalcanti AL, Barros de Alencar CR. Injuries to the head and face in 0–4-year-old child victims of fatal external causes in Campina Grande, PB, Brazil. *Turk J Pediatr*. 2010;52(6):612–617. http://turkishjournalpediatrics.org/uploads/pdf_TJP_845.pdf. Accessed May 25, 2020.
30. Olayemi AB, Adeniyi AO, Samuel U, Emeka OA. Pattern, severity, and management of cranio-maxillofacial soft-tissue injuries in Port Harcourt, Nigeria. *J Emerg Trauma Shock*. 2013;6(4):235–240. doi:10.4103/0974-2700.120362