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Analysis of the temporal trend of locomotor system injuries in the pediatric population caused by traffic accidents in Brazil

Abstract

Goal: To analyze the temporal trend and factors associated with locomotor system injuries in the pediatric population by traffic accidents in Brazil, through epidemiological, statistical and bibliographic evaluation.

Methods: It is an epidemiological, retrospective, qualitative/quantitative study with secondary data analysis and cross-sectional typology in the public databases of the Brazilian Ministry of Labor and Social Security, made available by the Federal Government. Health sciences descriptors: "musculoskeletal injuries", "multiple trauma", "traffic accidents" and "pediatrics".

Results: Between 2013 and 2022, 358.821 cases of children and teenagers with injuries of the locomotor system caused by traffic accidents were registered. Motorcycle accidents were the main responsible for this scenario (42.2%).

Conclusion: Musculoskeletal injuries caused by traffic accidents in children are important causes of morbidity and mortality. In this context, the insertion of public policies directed to the awareness of the population about the seriousness of the case and the exposure of data such the ones in this study, can provide improvement of this scenario.

Keywords: pediatric musculoskeletal injuries, traffic accident, traffic accident injuries in children

Volume 12 Issue 1 - 2024

Bianca Gabriella de Oliveira,[1] Richard Cicuto,[2] Victor Djrdjrjan Jorge,[3] Ismael Pedro Serpa Paiva de Castro,[4] Lorena Matos Cavalcanti,[5] Laís Cristina Pereira da Silva[6]

[1]Acadêmico de Medicina pela Universidade Salvador-UNIFACS, Brazil
[2]Médico Ortopedista e Traumatologista pelo Hospital São Zacharias Santa Casa, Brazil
[3]Médico residente de Ortopedia e Traumatologia do Hospital Santa Marcelina, Brazil
[4]Médico residente de Ortopedia e Traumatologia do Hospital Santa Marcelina, Brazil
[5]Médico residente de Ortopedia e Traumatologia do Hospital Cleriston Andrade, Brazil
[6]Acadêmico de Medicina pela Universidade Salvador-UNIFACS, Brazil

Correspondence: Bianca Gabriella de Oliveira, Acadêmico de Medicina pela Universidade Salvador-UNIFACS, Salvador, BA, Brazil, Tel +55 800 284 0212, Email bianca.oliveir43@gmail.com

Received: January 29, 2024 | **Published:** February 16, 2024

Introduction

Musculoskeletal injuries are traumas in the locomotor system with functional, physical and/or mechanical changes. Considering the legal issue and the high impact of the high mortality rate and potential years of life lost by accidents in children compromising their development, the socioeconomic and scientific relevance of the theme is emphasized.[1,2]

Injuries are classified as repairable or not, resulting in temporary or permanent disabilities, independently of the case.[3–5] A singular group of patients are children, who have a unique injury risk profile because they are unable to recognize and avoid potential risks on their own.[6–8] Children depend on adults for safety certification in transportation, such as the use of car seats or seat belts. Studies show that children aged 1 to 3 years who were properly transported in the rear seat were less likely to have injuries to the locomotor system such as the abdomen when compared to those who were not properly placed or transported in the front seat.[9]

In the case of motorcycles and bicycles, laws about the use of helmets are associated with lower morbidity and mortality rates.[10] Data show that adolescents riding motorcycles wear helmets less often than adults, which is a risk factor.[11,12] Pedestrians aged 10 and under are vulnerable because of their small physical size and their limited ability to cope with traffic situations, both perceptually, such as locating sounds, assessing speed, peripheral vision, and cognitively, such as interpreting signs.[13]

Considered an important public health problem, injuries caused by automobile accidents in childhood affect the biopsychosocial perspective and consequently the quality of life in this age group, with important repercussions for all other stages of life.[14] Therefore, efforts should not be spared to comply with road safety legislation. This work aims to analyze the temporal trend and factors associated with locomotor system injuries in the pediatric population by traffic accidents in Brazil, through epidemiological, statistical and bibliographic evaluation.[15]

Methods

The present scientific work is a retrospective clinical investigation, through a qualitative and quantitative epidemiological study, whose data were obtained by consulting the databases of the Brazilian Ministry of Health (TABNET), made available by the Brazilian Department of Informatics of the Unified Health System (DATASUS), available at the electronic address (http://www.data-sus.gov.br), accessed during the entire research period. As this is a public domain database, it was not necessary to submit the project to the Research Ethics Committee.[16,17]

The research gathers health data and involves the category of musculoskeletal injuries in children caused by traffic accidents in Brazil during the period from 2013 to 2022, evaluating the incidence by age group, sex, place of care, means of transportation involved, mortality rate and costs with hospital services.

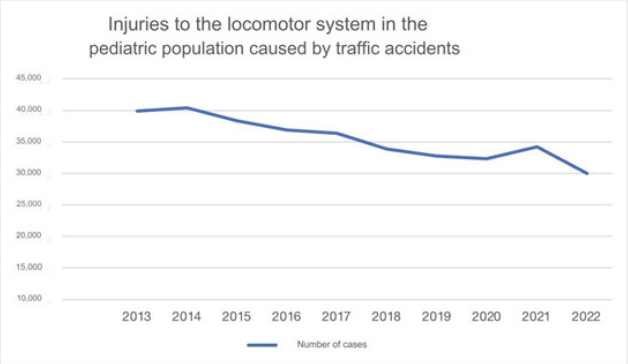
The study sample consisted of children and adolescents with musculoskeletal injuries who were victims of automobile accidents in Brazil during the years 2015 to 2021. Traumatic mechanisms that did not correlate with musculoskeletal injuries were not included in the sample, and traumatic injuries caused by other causes were also

excluded. Microsoft Excel 2019 was used to analyze and prepare the data and graphs. The search period in the databases used was from May 15, 2023 and June 20, 2023.

To build the theoretical foundation, articles available in the SciELO, PubMed and LILACS databases were used. The terms "musculoskeletal injuries", "multiple trauma", "traffic accidents" and "pediatrics" were chosen, coming from the Health Sciences Descriptors platform at the electronic address <https://decs.bvsalud.org/>. The selection criteria of the articles included those that address relevant aspects regarding orthopedic injuries in children caused by traffic accidents.

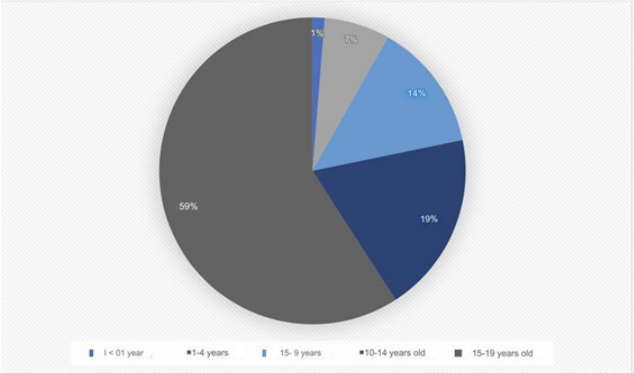
Results

Between 2013 and 2022, 358.821 cases of children and adolescents with locomotor system injuries caused by traffic accidents were recorded. From 2014 onwards, there was a significant decrease in this number when compared to subsequent years, from 40.426 in 2014 to 29.995 in 2022 (Graph 1).



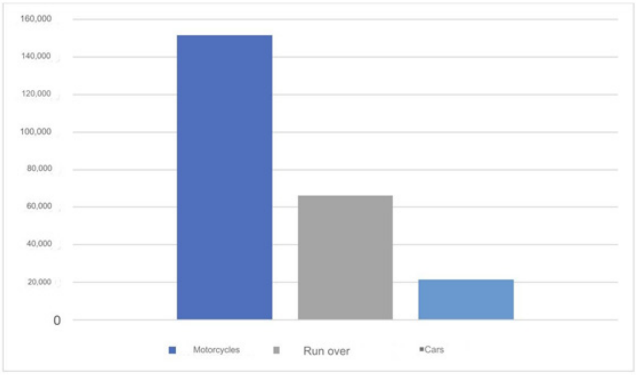
Graph 1 Injuries of the locomotor system in the pediatric population caused by traffic accidents.[16]

The age group of children under 1 year old accounted for 1.2% of cases, 6.9% (1 - 4 years), 13.5% (5 - 9 years), 19.1% (10 - 14 years) and 59.1% (15 - 19 years) (Graph 2). The highest incidence occurred in the Southeast region (36.6%) with the state of São Paulo registering 69.135 occurrences, the highest number in the period. Males accounted for 75.8% of the records. In relation to the number of deaths, there were 5.282 (mortality rate of 1.47 per 100,000 inhabitants).



Graph 2 Hospitalizations by age group for trauma caused by traffic accidents.[16]

Motorcycle accidents were the main cause of this scenario, accounting for 42.2% (151.463 cases) of accidents involving children and adolescents. The number of deaths related to this means of transportation was 2.393 (45.3%). Another important mechanism of trauma was run over, corresponding to 18.4% of the records (Graph 3).



Graph 3 Main causes of traffic accidents involving the pediatric population.[16]

The average number of days of hospitalization for locomotor system injuries in the pediatric population is 4.8, totaling 1.725.754 days during the study period. The average cost per hospitalization was R$ 1.221,55. Therefore, the country's hospital expenses were approximately R$ 354.052.180,64 in the last decade.

Discussion

Trauma in childhood is one of the main causes of morbidity and mortality in this population. During the study period, 358.821 cases of traffic accidents involving children were recorded, corresponding to 16.7% of the total number of injuries of the locomotor system by this mechanism during the study period. After the institution, in 2014, of Brazilian law 12.971 that implied administrative sanctions and traffic crimes, there was a decrease in the number of accidents in this category.[18,19]

Although the Brazilian traffic code establishes as a very serious infraction the transportation of children under 10 years old by motorcycles, the main cause of death and traumatic injuries of this population involves this type of vehicle.[17,19,20] Lower limb fractures are more frequent compared to upper limb fractures: femur, tibia, fibula fractures and hip dislocations are the main types of associated trauma.[21,22]

Pediatric femur fractures are relatively frequent, with an incidence of approximately 19 per 100.000. These injuries are usually caused by high-energy trauma, such as motor vehicle accidents or falls.[23] Cases of low energy fractures are rare and may be related to endocrine and metabolic disorders.[22] In contrast to the adult population, most femoral fractures in children are diaphyseal, followed by distal and proximal fractures. Regarding the treatment of these fractures, factors such as the child's age, fracture pattern and location are determinant.[24]

Traction, external fixation or internal fixation with plate and screws or intramedullary rods and cast immobilization are possible treatments of choice. Complications after unilateral femoral fractures include pseudoarthrosis, avascular necrosis, wound infection, refracture and limb length differences.[25,26]

Upper limb fractures are recurrent, although less prevalent in the absolute population. The anatomical involvement with the highest frequency of these fractures is respectively: radius, humerus, clavicle and ulna.[24] Considering the anatomy, the functional repercussion is much more complex due to exposure to temporary or definitive loss of operative independence. Usual activities such as physical activity, writing, brushing teeth, typing and performing occupational functions are intrinsically linked to the integrity of the hands and wrists, and other structures of the upper limb. So, pathologies that may affect

this topography require therapeutic parameters with less acceptance of deviation and complete rehabilitation, representing an important challenge for the pediatric orthopedist in diagnostic and therapeutic management.[27,28,12]

The risk factors that generate traffic accidents are diverse including speed, infrastructure, physical and mental condition of the driver, condition of the vehicle, the use or non-use of personal protective equipment (PPE) - seat belt, helmet, the applicability of traffic safety laws and fatalities. The use of a back seat and seat belt has been shown in several studies to have many benefits in reducing morbidity and mortality and fracture severity. In the case of pedestrian accidents, lack of inhibitory control and risk-taking behavior are strong predictors of pedestrian injuries and deaths in children: running towards oncoming traffic, walking and playing in the roadway are recurrent situations.[29,30]

Conclusion

Musculoskeletal injuries caused by traffic accidents in children are important causes of morbidity and mortality. Femur fractures account for the majority of traumatic injuries in the pediatric population, presenting an important challenge to pediatric orthopedists to avoid complications such as pseudoarthrosis and limb shortening. Illegal transportation on motorcycles associated with the lack of use of personal protection and adult supervision are associated with most of these numbers. In this context, the insertion of public policies aimed at raising awareness of the population about the seriousness of the case and the exposure of data such as these in the study, can provide improvement of this scenario.

Acknowledgments

None.

Conflicts of interest

Authors declare that there is no conflict of interest.

Funding

None.

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Citation: de Oliveira BG, Cicuto R, Jorge VD, et al. Analysis of the temporal trend of locomotor system injuries in the pediatric population caused by traffic accidents in Brazil. *MOJ Food Process Technols*. 2024;12(1):42–45. DOI: 10.15406/mojfpt.2024.12.00297