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RESEARCH ARTICLE

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## EPIDEMIOLOGICAL ANALYSIS ON TIBIAL PLATEAU FRACTURES IN PATIENTS TREATMENT AT A TRAUMA HOSPITAL IN THE STATE OF RIO DE JANEIRO

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### ABSTRACT

Tibial plateau fractures pose a risk to the functional integrity of the knee, in addition to having a wide variation in bone healing time, ranging from 10 weeks to 10 months, and having a high incidence of nonunion. **Objectives:** To analyze the epidemiological profile of tibial plateau fractures in patients treated at the orthopedics department of Hospital Geral de Nova Iguaçu. **Methods:** A retrospective, analytical and observational study was carried out at the General Hospital of Nova Iguaçu. Data were collected through the analysis of 70 medical records from July 2021 to July 2022. The information was statistically analyzed using the R-project software, version 3.5.3. Pearson's chi-square test was used to verify the association between the variables. **Results:** There was a prevalence of males, the fourth decade was the most affected, regarding the trauma mechanism, the motorcycle accident was the main causal factor, 31.43% of the patients were classified with Schatzker VI tibial plateau fracture and 54.29% of patients arrived at the hospital by their own means. **Conclusion:** The data presented in the present study demonstrate a public health problem, in view of the risk of serious sequelae, often disabling and/or permanent, caused by tibial plateau fractures, which may be studied in future works.

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## INTRODUCTION

Despite the development in the health area in recent years having had a satisfactory impact on the life expectancy of the world and Brazilian population through advances in the medical field, such as the production of vaccines, development of more effective drugs and diagnostic methods, from the 1980s onwards, external factors have become a serious public health problem.<sup>1-3</sup> According to the World Health Organization, traffic accidents and falls can be considered external causes that affect the population.<sup>4</sup> Tibial plateau fractures pose a risk to the functional integrity of the knee, in addition to having a wide range of bone healing time, ranging from 10 weeks to 10 months, and having a high incidence of nonunion (34%)<sup>5</sup>.

Furthermore, the costs to the country's health and social security system are high due to the momentary or permanent disabilities caused by such fractures.<sup>6</sup> More precisely, costs related to traffic accidents alone add up to around 1.0% of gross domestic product (GDP) in developing countries such as Brazil.<sup>7</sup> Tibial fractures, among all long bone fractures, are the most common, with approximately 300,000 cases per year in the United States and 50,000 per year in Brazil.<sup>8</sup> Tibial fractures have a direct impact on the quality of life of patients with regard to functional recovery and gait quality.<sup>9</sup> Epidemiological studies are essential to develop a better understanding of diseases of the musculoskeletal system, helping in preventive and therapeutic measures. The objective of this study is analyze the epidemiological profile of tibial plateau fractures in

patients treated at the orthopedics department of the general hospital in Nova Iguaçu.

## MATERIALS AND METHODS

A retrospective, analytical and observational study was carried out at the General Hospital of Nova Iguaçu. Data were collected through the analysis of 70 medical records from July 2021 to July 2022. The variables studied were: age, sex, mechanism of trauma, topography of the lesion and arrival at the hospital. The study included patients over 18 years of age, admitted to the hospital's orthopedic clinic, with a diagnosis of fracture of the tibial plateau confirmed by reports of complementary tests attached to the medical records or described in them. The trauma mechanism will be classified according to criteria recommended by the World Health Organization (WHO) expressed in CID-10. Data were collected and organized in an electronic spreadsheet with the help of Microsoft Excel. To carry out the statistical work below with the aid of the R-project software, version 3.5.3. The test to verify the association between the variables was the Pearson Chi-Square test, using p-value and a significance level of 5% as the decision measure.

## RESULTS

There was a prevalence of males, with 77.14% of cases. Of the 70 patients, 45.71% were up to 41 years old, 17.14% were between 41 and 50 years old, 20% were between 51 and 60 years old, 14.29% between 61 and 70 years old and 2.86% above aged 71. (Table 1) Regarding the means of transport used to get to the hospital, 54.29% of the patients arrived at the hospital by their own means, 37.14% were taken by the firefighter, 5.71% were taken by the SAMU (Brazilian Mobile Emergency Service) and 2.86% were taken by CCR-RJ (Company of Highway Concessions), (Table 2).

**Table 1. Frequency distribution by age group**

Variable		Frequency	Percentage (%)
Gender	Women	16	22
	Male	54	77,14
Age	< 40 years	32	45,71
	41 - 50 years	12	17,14
	51 - 60 years	14	20,00
	61 - 70 years	10	14,29
	71 - 80 years	2	2,86

**Table 2. Means of transport used to get to the hospital**

Variable		Frequency	Percentage (%)
Means of transport to the hospital	GSE*	26	37,14%
	Own Means	38	54,29%
	CCR*	2	2,86%
	SAMU*	4	5,71%

Note: GSE: Firefighter CCR: Brazilian Company of Highway concessions; SAMU: Brazilian Mobile Emergency Service

The motorcycle accident was the main type of trauma with 48.57%. followed by top level drop with 20%. About 5.71% were victims of car accidents, 2.86% were victims of bicycle falls, sharing the same results with direct trauma to the knee (Table 3).

**Table 3. Trauma Mechanism**

Variable		Frequency	Percentage (%)
Trauma mechanism	Running over	6	8,57
	Car	4	5,71
	Bike fall	2	2,86
	Motorcycle	34	48,57
	Fall	8	11,43
	Top level drop	14	2
	Direct trauma	2	2,86

As for the classification of tibial plateau fractures, there was a predominance of Schatzker VI, with 31.43%. Followed by Schatzker I with 25.72%, Schatzker II with 20%, Schatzker III with 11.43%, Schatzker IV and V with 5.71%. (Table 4)

**Table 4. Schatzker Classification**

Variable		Frequency	Percentage (%)
Tibial plateau	Schatzker I	18	24,72
	Schatzker II	14	20
	Schatzker III	8	11,43
	Schatzker IV	4	5,71
	Schatzker V	4	5,71
	Schatzker VI	22	31,43

## DISCUSSION

The present study corroborates with Albuquerque et al.<sup>10</sup>, where the predominance of males is due to their greater vulnerabilities and exposure to risk situations, the use of greater physical strength during physical activities and manual work, as well as the disrespect speed limits and traffic laws. Data similar to those found in this study were reported by Júnior et al.<sup>11</sup> who showed a male prevalence of 85.2% of tibial diaphyseal fractures in 123 patients who were victims of car accidents, justifying the male prevalence, due to the fact that they undergo situations risks, consumption of alcoholic beverages, among others. In a study also carried out in the state of Piauí, evaluating the profile of victims of motorcycle accidents, it was noted that the age group with the highest prevalence was 15 to 24 years and 25 to 34<sup>12</sup>. This result is in line with the results found in this study. study in which the age group with the highest prevalence was up to 40 years. Still on the age range, elderly patients who present fractures caused by low-energy trauma (fall from standing height), according to the AO classification (alphanumeric method of classification of Tibial Plateau Fractures) may possibly be related to a decrease in mineral density bone<sup>11</sup>. Similar to the results found, other authors report that the main injury mechanisms of tibial plateau fractures were car accidents 33 (66%), followed by falls from standing heights 7 (14%), falls during sports activities 6 (12%) and others 4 (8%). In this sense, Marín-Leon et al.<sup>13</sup> found an increase in the number of car accidents in Campinas, where the car fleet increased from 39 to 61 per 100 inhabitants, with a special contribution from motorcycles because they are faster in traffic, because of their low cost and the ease of financing these vehicles. Rapid urbanization, driver fatigue, disobeying traffic signs, speeding, ingestion of alcoholic beverages and other drugs in developing countries are the causes that contribute to the increase in traffic accidents, which makes it necessary to develop public policies to in order to mitigate such factors.<sup>14</sup> Among the tibial plateau fractures, the most observed are those of moderate to high energy: bicondylar injuries and the combination of shear and pure depression of the lateral tibial plateau and are generally associated with meniscal and/or ligament injuries<sup>15</sup>, diverging from our study, but most of the injuries consisted of metaphyseal dissociation (Schatzker VI). Among the means of transport for trauma patients, the countryside ambulance was the predominant means of Transportation.<sup>16</sup> In the present study, patients arrived at the hospital by their own means.

## CONCLUSION

Knowing the epidemiology of tibial plateau fractures becomes essential to describe the morbidity, disability and limitations of the victims, as well as to define the most important target for prevention. The data presented in the present study demonstrate a public health situation, in view of the risk of serious, often disabling and/or permanent sequelae caused by fractures of the tibial plateau, which were still studied in later works. Given this scenario, preventive measures associated with public awareness, especially motorcycle and car drivers, should be encouraged. Furthermore, it is expected that the results presented here provide subsidies for the establishment

of organization and structuring strategies for health services to serve the population.

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