

## Prevalence of tibial plateau fractures in patients of a public hospital in Piauí

## Prevalência de fraturas de platô tibial em pacientes de um hospital público do Piauí

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**ABSTRACT | OBJECTIVE:** To determine the prevalence of tibial plateau fractures in internal patients at a Public Hospital of Piauí. **MATERIALS AND METHODS:** Fifty medical records with Tibial Plateau Fractures from January 2017 to January 2018 were analyzed. The analysis instrument was a questionnaire composed of relevant information, such as: sex, age, race, injury mechanism, types of fracture and affected side, for data collection. For data analysis we used descriptive statistics with calculations of means, standard deviation and absolute and relative frequencies. **RESULTS:** The highest incidence of fractures was in males (72%). The mean age of the patients was  $38 \pm 13.86$  years, mainly victims of automobile accidents (66%), with the right side most affected (70%) with the highest incidence of oblique fracture (48%). **CONCLUSION:** there is a higher prevalence of fractures of the tibial plateau in males, aged 19-29 years, victim of automobile accidents, with oblique fractures.

**KEYWORDS:** Prevalence. Fractures. Public hospital. Tibial plateau fractures.

**RESUMO | OBJETIVO:** Determinar prevalência de fraturas de platô tibial em pacientes internos em um Hospital Público do Piauí. **MATERIAIS E MÉTODOS:** Foram analisados 50 prontuários com Fraturas de Platô Tibial de Janeiro de 2017 a Janeiro de 2018. O instrumento de análise foi um questionário composto por informações relevantes, como: sexo, idade, raça, mecanismo de lesão, tipos de fratura e lado acometido, para a coleta dos dados. Para análise dos dados utilizou-se a estatística descritiva com cálculos de médias, desvio padrão e frequências absoluta e relativa. **RESULTADOS:** A maior incidência das fraturas foi no sexo masculino (72%). A média de idade dos pacientes foi de  $38 \pm 13,86$  anos, vítimas principalmente de acidentes automobilísticos (66%), sendo o lado mais acometido o direito (70%) com a incidência maior de fratura oblíqua (48%). **CONCLUSÃO:** há maior prevalência de fraturas do platô tibial no sexo masculino, faixa etária de 19-29 anos, vítima de acidente automobilísticos, com fraturas oblíquas.

**PALAVRAS-CHAVE:** Prevalência. Fraturas. Hospital público. Fraturas de platô tibial.

## Introduction

Despite the fact that the development in the health area in recent years has had a satisfactory impact on the life expectancy of the world and Brazilian population through advances in the medical field, such as vaccine production, development of more effective drugs and diagnostic methods, since the 1980s, external factors have become a serious public health problem<sup>1,2,3</sup>. According to the World Health Organization, traffic accidents and falls can be considered external causes that affect the population<sup>4</sup>.

Bone injuries are commonly associated with traffic accidents, which occur when the direct or indirect action of the force exceeds the mechanical resistance of the bone resulting in loss of bone continuity by dividing it into two or more fragments<sup>5</sup>. There are special cases in which the loss of bone continuity is not complete, and the fracture sets in under the action of relatively weak forces<sup>6</sup>.

Fracture is, therefore, the structural break in the continuity of a given bone, epiphyseal plate or an articular surface<sup>7</sup>. Among all fractures, those of the tibial plateau correspond to about 1 to 2% of all fractures<sup>8</sup>. Such fractures result from axial compressive forces applied externally combined or not with valgus or varus stress of the knee joint<sup>9</sup>.

Tibial plateau fractures are a risk to the functional integrity of the knee, in addition to having a wide variation for the time of bone healing, ranging from 10 weeks to 10 months, and of having a high incidence of non-consolidation (34%)<sup>10</sup>. In addition, 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>11</sup>. More precisely, costs related only to traffic accidents add up to about 1.0% of the gross domestic product (GDP) in developing countries, such as Brazil<sup>12</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>13</sup>. Although there are no recent data from the Ministry of Health on trauma associated with Tibial Plateau Fracture, taking into account the sample of the study by Albuquerque et al.<sup>8</sup>, in which he reports that 52.3% were victims of automobile accidents and 22.6% suffered associated injuries, the need for proactive actions in search of the reduction of traffic accidents is explicit. In addition to all these aspects, tibial fractures have a direct impact on the quality of life of patients regarding functional recovery and quality of gait<sup>14</sup>.

Knee stiffness is one of the most relevant sequelae in tibial plateau fractures, when the initial post-operative joint mobilization care is not emphasized in the rehabilitation protocols. Joint incongruence, poor axial alignment and instability are limitations, which, if not properly corrected, result in post-traumatic osteoarthritis<sup>15</sup>.

In view of the above, epidemiological studies are essential tools for covering the cause of the injury and developing public policies to mitigate the causes. The objective of this research was to determine the prevalence of tibial plateau fractures in a Public Hospital in the state of Piauí, as well as to identify factors such as age, sex, trauma mechanism, types of trauma as well as the etiology related to tibial plateau fractures.

## Materials and methods

This is a documentary research composed of 50 medical records related to Tibial Plateau fractures recorded from January 2017 to January 2018 of a Public Hospital in Piauí, in Teresina. These records were analyzed retrospectively, descriptively, with a quantitative approach to the data. The survey was carried out through an active search in the medical records bank of the hospital in question.

The active research on the medical records base was carried out from September to November 2018 by a single researcher. The analysis of the medical records was based on a form previously developed by the researchers in order to obtain the following data: sex, age (years), race, mechanism of injury, type of fractures and affected side.

The results were tabulated in a spreadsheet for later production of charts using Microsoft Excel® Software. The statistical survey is descriptive through representation by absolute and relative frequencies.

The study followed the standards for conducting research on human beings through resolution No. 466/12, having previously been approved by the Research Ethics Committee (CEP) of the Centro Universitário Maurício de Nassau-UNINASSAU, according to Protocol No. 2805162, CAE 95097318.2 .0000.5193 and the Public Hospital of Piauí.

## Results

In this study, 50 medical records of patients who went to a Public Hospital in Piauí after suffering some trauma resulting in a tibial plateau fracture were analyzed. The information collected is represented in graphs and tables, where the results were presented in quantitative and percentage data.

The mean age of the sample was  $38 \pm 13.86$ . The distribution by age group is shown in table 1.

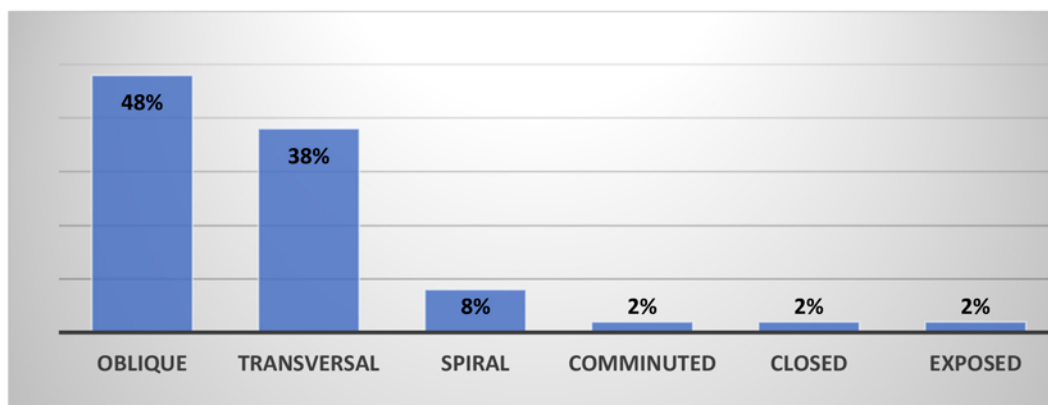
**Table 1.** Absolute and relative frequency of sex, age and injury mechanism of fractures of the tibial plateau according to medical records of a public hospital in the state of Piauí

Variables analyzed		Absolute frequency (n)	Reported frequency (%)
Gender	Male	36	72%
	Female	14	28%
Injury Mechanism	Automobile accident	33	66%
	Fall from own height	07	14%
	Fall in sports	06	12%
	Others	04	08%
Age	19 – 29 years	29	58%
	30 – 39 years	8	16%
	40 years	12	26%

According to table 1, it is observed that of the 50 records analyzed, 34 are male patients (72%). Still according to table 1, it is possible to observe that the highest prevalence in the injury mechanism of Plateau Tibial Fractures is car accidents 33 (66%), followed by a fall from height 7 (14%), a fall in sports practice 6 (12%) and another 4 (8%).

Graph 1 represents the classification by type of fracture observed in the analyzed medical records. Thus, 24 were oblique (48%), followed by 19 transverse (38%), 4 spiral (8%), 1 comminuted (2%), 1 closed (2%) and 1 exposed (2%). The affected side is more evident, the right with 35 (70%).

**Graph 1.** Distribution of victims according to the type of fractures



## Discussion

According to Albuquerque et al.<sup>8</sup>, the predominance of males is due to the fact of their greater vulnerabilities and exposure to risk situations, the use of greater physical strength during physical activities and manual labor or the dangerous desire for speed and speed. disregard for traffic laws.

Data similar to those found in this study were reported by Júnior et al.<sup>16</sup> who showed an 85.2% prevalence of male tibial shaft fractures in 123 patients who were victims of car accidents, justifying the male prevalence, due to the fact that they submitted to risky situations, consumption of alcoholic beverages, among others. Similarly, in this study, the major cause of tibial plateau fractures also occurred due to automobile accidents.

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 were 15 to 24 years old and 25 to 34<sup>17</sup>. Such result is in agreement with the results found in this study. a study in which the most prevalent age group was 19 to 29 years (Table 1).

Also regarding the age group, elderly patients who have fractures caused by lower energy trauma (falling from their own height), according to the AO classification (alphanumeric method of classifying Tibial Plateau Fractures) may possibly be related to decreased mineral density bone<sup>16</sup>.

According to Watson et al.<sup>18</sup>, in younger patients, the fragments tend to be larger and "wedge", due to shear forces (tangential and opposite loads applied in an angular direction), and in elderly patients it is more common we find pure depression fractures, which are usually caused by lower energy trauma.

As seen in Table 1, the main injury mechanisms of tibial plateau fractures found in this study were automobile accidents 33 (66%), followed by falls from height 7 (14%), falls in sports practice 6 (12%) and others 4 (8%).

In this sense, Marín-Leon et al.<sup>19</sup> found an increase in the number of automobile accidents in Campinas, where the car fleet increased from 39 to 61 for every 100 inhabitants, with special contribution from motorcycles because they are faster in traffic, due to the low cost and the ease of financing these vehicles.

Rapid urbanization, driver fatigue, disobedience of signs, speeding, drinking alcohol 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 in order to mitigate such factors<sup>20</sup>.

As for the type of fracture, the most common found in this study was the one with an oblique stroke (Figure 1). The oblique fracture occurs when one bone end is subjected to a sudden twist or turn, at the same time that the other end remains fixed, for this reason it becomes more prevalent in automobile accidents, due to the trauma being of greater energy for destabilizing knee joints<sup>21</sup>.

Among the tibial plateau fractures, the most observed are 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>18</sup>.

It is important to note that this is a study with a small sample (50 medical records) and a relatively short time frame (1 year), in addition to covering only one hospital that receives orthopedic trauma in the state of Piauí. As a bias, it can be mentioned that the study hospital is a reference in the state for non-serious traumas, which may have directed the results presented here to a higher prevalence of traumas resulting from automobile accidents.

Thus, there is a need to explore more on the topic, with more scientific research to be able to distinguish risk factors and create social goals and actions aimed at the need to promote information of public utility, preventive measures, inspection and education campaigns to avoid further accidents and raise awareness of the need for traffic safety to reduce the number of injuries, improve care for patients suffering from a fracture of the tibial plateau and decrease the number of accidents and reduce the time away from work and as well as reducing complications.

## Conclusion

In the studied population, it was observed that there is a higher prevalence of fractures of the tibial plateau in males, aged 19-29 years, victim of automobile accidents, with oblique fractures, with the affected side more present on the right.

The need for further clinical research is emphasized in order to elucidate the epidemiological profile of patients with tibial plateau fractures, in addition to increasing the theoretical body on the subject, which is still little explored. The relevance of new research that addresses functional evolution, possible complications and impacts on the quality of life of such patients is also emphasized in order to promote public policies for prevention and treatment protocols to speed up the return to activities and improve quality of life.

## Author contributions

Cunha FVM participated in the design, statistical analysis, discussion and correction. Batista TL and Mendes JLCF participated in the conception, collection and writing of the manuscript.

## Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

## References

1. Mendes ACG, Sá DA, Miranda GMD, Lyra TM, Tavares RAW. Assistência pública de saúde no contexto da transição demográfica brasileira: exigências atuais e futuras. *Cad Saúde Pública*. 2012;28(5):955-964. doi: [10.1590/S0102-311X2012000500014](https://doi.org/10.1590/S0102-311X2012000500014)
2. Campolina AG, Adami F, Santos JLF, Lebrão ML. A transição de saúde e as mudanças na expectativa de vida saudável da população idosa: possíveis impactos da prevenção de doenças crônicas. *Cad Saúde Pública*. 2013;29(6):1217-1229. doi: [10.1590/S0102-311X2013000600018](https://doi.org/10.1590/S0102-311X2013000600018)
3. Camargos MCS, Gonzaga MR. Viver mais e melhor? Estimativas de expectativa de vida saudável para a população brasileira. *Cad Saúde Pública*. 2015;31(7):1460-1472. doi: [10.1590/0102-311X00128914](https://doi.org/10.1590/0102-311X00128914)
4. Lemos CAG, Jorge MT, Ribeiro LA. Perfil de vítimas e tratamento de lesões por causas externas segundo atendimento pelo Centro de Reabilitação Municipal de Uberlândia, MG – Causas externas e fisioterapia. *Rev Bras Epidemiol*. 2013;16(2): 482-92. doi: [10.1590/S1415-790X2013000200022](https://doi.org/10.1590/S1415-790X2013000200022)
5. Loi F, Córdova LA, Pajarinen J, Lin TH, Yao Z, Goodman SB. Inflammation, fracture and bone repair. *Bone*. 2016;86:119-30. doi: [10.1016/j.bone.2016.02.020](https://doi.org/10.1016/j.bone.2016.02.020)
6. Dutton M. Fisioterapia ortopédica, exame, avaliação e intervenção. 2.ed. Porto Alegre: Artmed; 2010.
7. Kisner C, Colby LA. Exercícios Terapêuticos. 5.ed. Barueri: Manole; 2009.
8. Albuquerque RP, Hara R, Prado J, Schiavo L, Giordano V, Amaral NP. Estudo epidemiológico das fraturas do platô tibial em Hospital de Trauma nível I. *Acta Ortop Bras*. 2013; 21(2):109-15. doi: [10.1590/S1413-78522013000200008](https://doi.org/10.1590/S1413-78522013000200008)

9. Kfuri Júnior M, Fogagnolo F, Bitar RC, Freitas RL, Salim R, Paccola CAJ. Fratura do Planalto Tibial. *Revista Brasileira de Ortopedia*. 2009;44(6):468-474. doi: [10.1590/S0102-36162009000600002](https://doi.org/10.1590/S0102-36162009000600002)
10. Joslin CC, Eastaugh-Waring SJ, Hardy JR, Cunningham JL. Weight bearing after tibial fracture as a guide to healing. *Clin Biomech*. 2008; 23(3):329-333. doi: [10.1016/j.clinbiomech.2007.09.013](https://doi.org/10.1016/j.clinbiomech.2007.09.013)
11. Fonseca MA. Impacto das fraturas de membros inferiores na qualidade de vida de indivíduos adultos [tese]. Salvador: Escola Bahiana de Medicina e Saúde Pública; 2016.
12. Itami LT, Faro ACM, Meneghin P, Leite RCBO, Silveira CT. Adultos com fraturas: das implicações funcionais e cirúrgicas à educação em saúde. *Rev Esc Enferm USP*. 43(Esp 2):1238-43. doi: [10.1590/S0080-62342009000600016](https://doi.org/10.1590/S0080-62342009000600016)
13. Sunada EE, Ejnisman L, Leal RD, Pailo AF, Malavolta EA, Sakaki MH et al. Estudo biomecânico da rigidez da osteossíntese com placas em ponte em tíbias de cadáveres humanos. *Acta Ortop Bras*. 2010;18(2):66-70. doi: [10.1590/S1413-78522010000200001](https://doi.org/10.1590/S1413-78522010000200001)
14. Nascimento OR, Cemin FS, Moraes M, Barroco RS, Fujiki EW, Milani C. Avaliação da qualidade de vida em pacientes com fratura da tíbia. *Acta Ortop Bras*. 2009;17(4): 211-214. doi: [10.1590/S1413-78522009000400003](https://doi.org/10.1590/S1413-78522009000400003)
15. Stevens DG, Beharry R, Mckee MD, Wadell JP, Schemitsch EH. The long-term functional outcome of operatively treated tibial plateau fractures. *J Orthop Trauma*. 2001;15(5):312-20. doi: [10.1097/00005131-200106000-00002](https://doi.org/10.1097/00005131-200106000-00002)
16. Vieira Júnior ST, Aguiar Júnior AP, Sombra LP, Castro JOA, Alves FRV. Epidemiologia das Fraturas diafisárias de tíbia em um hospital municipal de referência em traumatologia. *Rev Med UFC*. 2017;57(3):12-17. doi: [10.20513/2447-6595.2017v57n3p12-17](https://doi.org/10.20513/2447-6595.2017v57n3p12-17)
17. Santos AMR, Moura MEB, Nunes BMVT, Leal CFS, Teles JBM. Perfil das vítimas de trauma por acidente de moto atendidas em um serviço público de emergência. *Cad Saúde Pública*. 2008; 24(8):1927-38. doi: [10.1590/S0102-311X2008000800021](https://doi.org/10.1590/S0102-311X2008000800021)
18. Watson JT, Schatzker J. Tibial plateau fractures. In: Browner BD, Jupiter JB, Levine AM, Trafton PG, editors. *Skeletal trauma. Basic science, management, construction*. Philadelphia: Saunders; 2003.
19. Marín-León L, Belon AP, Barros MBA, Almeida SDM, Restitutti MC. Tendência dos acidentes de trânsito em Campinas, São Paulo, Brasil: importância crescente dos motociclistas. *Cad Saúde Pública*. 2012; 28(1):39-51. doi: [10.1590/S0102-311X2012000100005](https://doi.org/10.1590/S0102-311X2012000100005)
20. Ministério da Saúde. Redução da morbimortalidade por acidentes de trânsito: mobilizando a sociedade e promovendo a saúde. [Internet]. 2001. Disponível em: [http://bvsms.saude.gov.br/bvs/publicacoes/prog\\_reducao\\_acidentes.pdf](http://bvsms.saude.gov.br/bvs/publicacoes/prog_reducao_acidentes.pdf)
21. Prentice WE. *Fisioterapia na prática esportiva uma abordagem baseada em competências*. 14.ed. Porto Alegre: AMGW; 2012.