



# Epidemiological analysis of hand fractures in a tertiary hospital

## *Análise epidemiológica das fraturas de mão em um hospital terciário*

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### ■ ABSTRACT

**Introduction:** Hand trauma is an epidemic occurring due to several factors, such as work accidents and urban violence. This significantly impacts it as it is a vulnerable and important anatomical unit for daily activities and work. Therefore, a more in-depth epidemiological assessment is necessary regarding hand fractures and understanding their high morbidity. **Method:** A descriptive and retrospective study was conducted by analyzing the medical records of patients treated in a tertiary hospital from January 2018 to December 2020. **Results:** 290 patients participated in the study, 85.7% male and 14.3 % female. One hundred thirty-eight individuals were between 20 and 39 years old, representing 47.6%. 51.6% were from the interior of the state of Ceará, and 48.4% were from the capital. The main trauma mechanism associated with fractures was traffic accidents (36.4%), followed by work accidents (26.9%) and firearm injuries (14%). Concerning fractured bones, there was a marked prevalence of phalangeal involvement in all age groups, representing 210 patients (72.4%). **Conclusion:** The present study corroborates the data present in the literature. In this way, the repetition of the prevalence of age group, main trauma mechanisms involved, as well as bones affected by hand fractures is evidenced.

**Keywords:** Epidemiology; Fractures, open; Hand injuries; Emergency treatment; Reconstructive surgical procedures.

### ■ RESUMO

**Introdução:** O trauma de mão constitui uma epidemia, ocorrendo por diversos fatores, como acidentes de trabalho e violência urbana. Isso gera um impacto significativo por ser uma unidade anatômica vulnerável e importante na realização de atividades cotidianas e para o trabalho. Desse modo, faz-se necessária uma avaliação epidemiológica mais aprofundada no que tange, sobretudo, às fraturas de mãos, entendendo sua elevada morbidade. **Método:** Estudo descritivo e retrospectivo, feito por análise de prontuários de pacientes conduzidos em um hospital terciário no período de janeiro de 2018 a dezembro de 2020. **Resultados:** Participaram do estudo 290 pacientes, sendo 85,7% do sexo masculino e 14,3% do sexo feminino. 138 indivíduos tinham entre 20 e 39 anos, representando um total de 47,6%. 51,6% eram do interior do estado do Ceará e 48,4% eram da capital. O principal mecanismo de trauma associado às fraturas foram os acidentes de trânsito (36,4%), seguidos por acidentes de trabalho (26,9%) e ferimentos por arma de fogo (14%). Em relação aos ossos fraturados, houve uma acentuada prevalência do acometimento das falangeanas, em todas as faixas etárias, representando 210 pacientes (72,4%).

**Conclusão:** O presente estudo corrobora com os dados presentes na literatura. Desse modo, é evidenciada a repetição de prevalência de faixa etária, principais mecanismos de trauma envolvidos, bem como ossos acometidos nas fraturas de mão.

**Descritores:** Epidemiologia; Fraturas expostas; Traumatismos da mão; Tratamento de emergência; Procedimentos cirúrgicos reconstrutivos.

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## INTRODUCTION

Accidents that affect the hands are already considered an epidemic, mainly work accidents and those resulting from urban violence, directly affecting the individual's economic situation and quality of life, often causing absence from work and impairment or even incapacity in daily life activities and practical life activities. There are numerous work-related injuries, resulting from traumas such as burns, erythema, fractures, and crushing.<sup>1</sup>

Hands are more vulnerable to fractures than other parts of the body. They constitute approximately 5-20% of all fractures and 40% of upper limb fractures. The underlying causes of these injuries vary considerably according to demographic characteristics<sup>2</sup>.

## OBJECTIVE

The involvement of the hand stands out because it is an important anatomical unit when carrying out daily activities. Therefore, treatment aimed at functional recovery is necessary, which depends on the experience and skill of the professional who will perform such a procedure to achieve a satisfactory result<sup>3</sup>.

## METHOD

This is a cross-sectional, analytical study with a quantitative approach, carried out through a retrospective and descriptive analysis of a database from the Instituto Doutor José Frota (IJF), a tertiary hospital located in Fortaleza-CE, between September 2021 and June 2022, regarding hand fractures. The subjects involved in the study were patients with hand fractures admitted to the hospital between January 2018 and June 2022. The study was approved by that institution's Research Ethics Committee (CEP) under opinion number 5,069,371.

Data for the epidemiological characterization of patients were recorded using an online questionnaire in Google Forms format, in which there were variables such as sex, age group, origin, mechanism of trauma, and hand and bones affected.

Quantitative data were organized in a spreadsheet using the Microsoft Excel 2019 program. Descriptive statistical analyses were performed. Categorical variables were expressed as a percentage or frequency, as well as determination of the p-value, Fisher's exact test, or Pearson's Chi-square, with  $p < 0.005$  being assigned as data of statistical relevance. The data is presented in tables and graphs.

## RESULTS

Two hundred ninety patients participated in the study, 85.7% male and 14.3% female. One hundred thirty-eight individuals were between 20 and 39 years old, representing 47.6%. Of the patients studied, 148 were from the interior of the state of Ceará (51.6%) and 139 (48.4%) from the capital, as represented in Table 1.

**Table 1.** Demographic characteristics of patients with hand fractures at Instituto Doutor José Frota.

Variables	Participants (n)	Value (p)
<b>Sex</b>		
Masculine	244 (85.7%)	0.002
Feminine	43 (14.3%)	
<b>Age range</b>		
0-19 years	43 (14.8%)	
20-39 years old	138 (47.6%)	
40-59 years old	79 (27.2%)	
Over 60 years old	30 (10.3%)	
<b>Origin</b>		
Fortaleza-CE	139 (48.4%)	0.106
Interior of the CE	148 (51.6%)	

CE: Ceará.

Source: authors (2022).

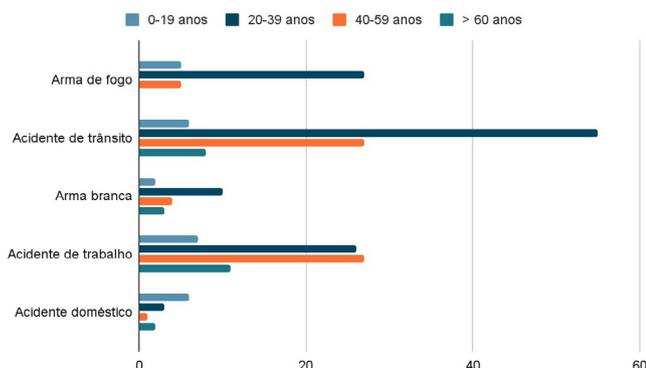
Furthermore, according to the data studied, the main trauma mechanism observed was traffic accidents (36.4%), followed by work accidents (26.9%) and firearm injuries (14%). Furthermore, 58.8% of patients had their left hand affected, and 38.7% had their right hand, followed by 2.7% who had both hands, as shown in Table 2.

**Table 2.** Characteristics related to patients' hand trauma.

Trauma mechanism	Participants (n)	Value (p)
Fire gun	37 (14%)	
White gun	19 (7.2%)	
Traffic accident	96 (36.4%)	
Work accident	71 (26.9%)	0.001
Domestic accident	12 (4.5%)	
Fall	15 (5.7%)	
Others	14 (5.4%)	
<b>Affected hand</b>		
Right	108 (38.7%)	
Left	164 (58.8%)	0.125
Both	7 (2.7%)	

Source: authors (2022).

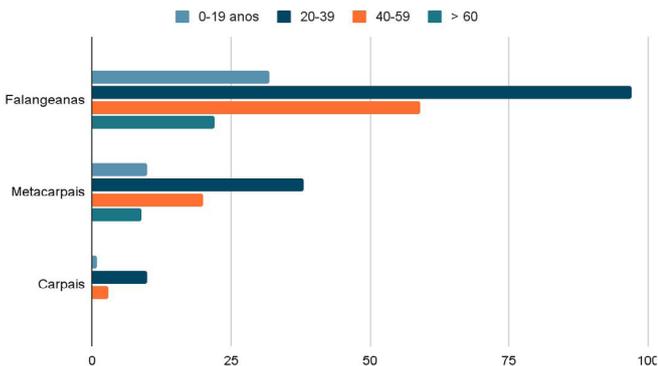
Regarding the mechanism of trauma related to hand fractures, the main attribute was traffic accidents in most age groups. However, for the sample between 40 and 59 years old, there was a predominance of fractures resulting from work accidents (Graph 1).



Source: authors (2022).

Graphic 1. Distribution of trauma mechanisms by age group.

Concerning fractured bones, there was a marked prevalence of phalangeal involvement in all age groups, representing 210 patients (72.4%). It stands out, above all, in patients aged between 20 and 39 years (Graph 2).



Source: authors (2022).

Graph 2. Distribution of fractured bones by age group.

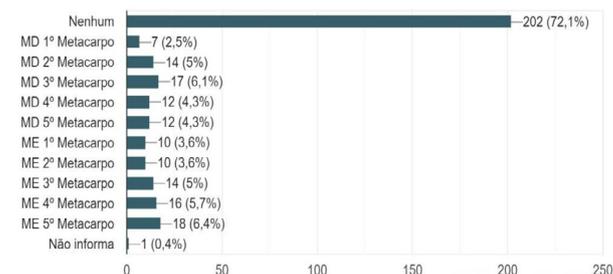
Graphs 3 to 6 show the distribution of patients by fractured bone and affected finger and hand.

## DISCUSSION

Among the limbs and their functions in the human organism, one stands out due to the great complexity and roles played, such as the ability to transmit and capture sensations and the performance of delicate movements or those requiring strength. These attributions allow human beings to produce activities necessary for their existence, such as carrying out work

Acometeu metacarpo:

280 respostas

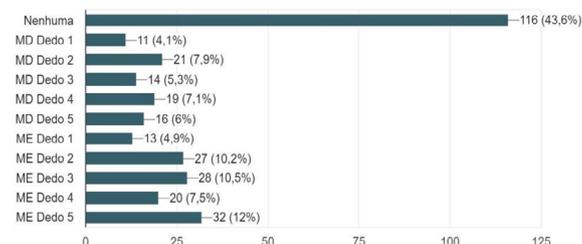


Source: authors (2022).

Graph 3. Distribution of patients with metacarpal fracture by affected finger and hand. MD: right hand; ME: left hand.

Acometeu Falange Proximal

266 respostas

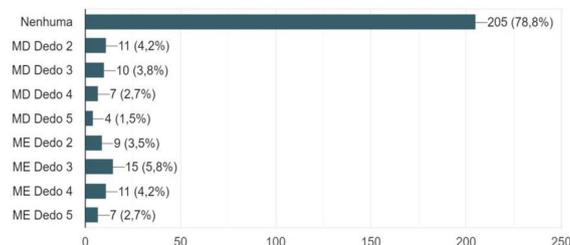


Source: authors (2022).

Graph 4. Distribution of patients with proximal phalanx fracture by affected finger and hand.

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260 respostas

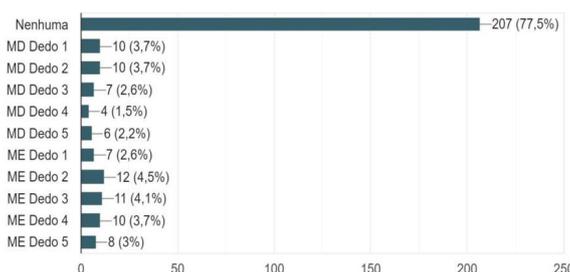


Source: authors (2022).

Graph 5. Distribution of patients with middle phalanx fractures by affected finger and hand. MD: right hand; ME: left hand.

Acometeu Falange Distal

267 respostas



Source: authors (2022).

Graph 6. Distribution of patients with distal phalanx fracture by affected finger and hand. MD: right hand; ME: left hand.

activities, perceiving objects in space, communicating, using and building devices, and even defending themselves. This limb in question is the hand, which is made up of 27 bones, various muscles, ligaments, tendons, vessels, nerves, and tissues. However, it is a comparatively fragile structure, in addition to being very exposed and vulnerable to trauma, which can compromise its ability to function<sup>4</sup>.

In this circumstance, the present study showed a higher prevalence of male individuals (85.7%) compared to female individuals (14.3%), which is in agreement with the study by Vieira et al.<sup>5</sup>, which showed a higher prevalence of males at approximately 92.8%, while females were only 7.14%. The data also agree with those of Albuquerque et al.<sup>6</sup>, who described 65.4% of fracture cases in data collected from male patients from the interior of Ceará. In addition, the data obtained in this sample demonstrate that young adults had a higher incidence [138 (47.6%)] compared to other age groups, which converges with the study by Hill et al.<sup>7</sup>, who described an average age of 27.2 years, in addition to the mode of 21 and 25 years and variation between 1 and 93 years of age. However, when comparing with Albuquerque et al.<sup>6</sup>, who analyzed the epidemiological profile of fractures in Ceará, the average age was 40.7 years; a small difference can be seen in the epidemiological profile when compared to data from specific fractures of the hand bones.

Regarding the mechanism of trauma, the data collected indicate that most of them were due to traffic accidents (36.4%), followed by work accidents (26.9%) and shortly after firearm-related events (14%) and bladed weapons (7.2%), data that are similar to other existing ones, such as those by Vieira et al.<sup>5</sup>, who presented automobile accidents as the main mechanism of trauma (26.2%), followed by accidents of work (19%). It should be added that traffic accidents were also more prevalent in the study by Fonseca et al.<sup>8</sup>, which obtained a 17.5% prevalence.

To restore anatomy and function after a fracture, it is necessary to undergo treatment, which is determined by the presentation of the fracture, the degree of displacement, and the difficulty in maintaining reduction, but, in general, the majority of hand fractures are well managed with conservative treatment<sup>9,10</sup>.

However, in this research, surgical treatment was most observed, in which osteosynthesis with Kirschner wires was mostly the most prevalent, performed in 229 individuals (79%), followed by rigid internal fixation in 27 people (9.3%) and amputation in 18 (6.2%). Conservative treatment (4.5%), closed/open reduction (4.1%), and bone graft (2.8%) were performed less frequently. Surgical treatment with Kirschner wires was used in most of the data collected, following

what was also described by Vieira et al.<sup>5</sup>, in which this treatment was performed in more than 88% of cases.

According to the Ministry of Health, in 2015, there were 5.9 million hospitalizations in the Unified Health System (SUS)<sup>11</sup> in Brazil's 20 to 59 age group. Excluding hospitalizations for pregnancy, childbirth, and the postpartum period, males have the highest number of hospitalizations (51%). These data are in line with what was obtained in the current study, which demonstrated that men were the individuals most affected by hand trauma and that the most prevalent age group was between 20-39 years old.

In the current study, the most affected bones were the phalanges, followed by the metacarpals and, finally, the carpal bones. These data follow the study by Jindal et al.<sup>12</sup>, in which 75% of the fractures evaluated involved phalanges and metacarpals. Of these, the most affected bones were also the phalanges, with 59%.

## CONCLUSION

The present study corroborates the data present in the literature. In this way, the repetition of a pattern of prevalence in young male adults is evidenced, with traffic and work accidents as the main mechanism of trauma, as well as bones affected by hand fractures.

## COLLABORATIONS

- JJLS** Conception and design study, Conceptualization, Data Curation, Final manuscript approval, Investigation, Methodology, Project Administration, Realization of operations and/or trials, Resources, Supervision, Validation, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing.
- YJVG** Analysis and/or data interpretation, Data Curation, Investigation.
- LCL** Analysis and/or data interpretation, Data Curation, Investigation.
- WRSFF** Data Curation, Writing - Review & Editing.
- LMC** Supervision, Writing - Original Draft Preparation.

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