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Research Article

IMPACT OF COVID-19 ON THE PROFILE, SEASONALITY AND INCIDENCE OF FEMUR FRACTURE CASES IN BRAZILIAN YOUNG ADULTS

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ABSTRACT

To compare the incidence of femur fractures (ICD S72) in patients aged 15 to 49 in Brazil, in the period before (March to December 2019) and during the COVID-19 pandemic (March to December 2020), based on data from DATASUS, as well as to assess the impact of social isolation on the incidence and demographic profile of affected individuals. An ecological study with data from individuals aged 15 to 49 who had a femur fracture before and during the COVID-19 pandemic, extracted from the DATASUS database. We calculated the incidence and demographic profile of femur fractures and the type of hospitalization. There was a significant increase in the incidence of femur fractures among

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individuals aged 15 - 49 in Brazil during the period of social isolation due to COVID-19. The incidence was 165/100,000 inhabitants during the pandemic and 163/100,000 inhabitants in the same period of 2019 (main increase observed in the 15 - 34 age group and decline in the 35 - 49 age group). The North and Northeast regions showed an increase in the incidence of femur fractures and an increase in emergency hospitalizations related to this condition. On the other hand, there was a decrease in incidence in the Central-West region and in the type of hospitalization described as elective. We conclude that during the COVID-19 pandemic in Brazil there has been an increase in femur fractures in young adults, which may be related to the failure of social isolation measures.

KEYWORDS

Femur fracture; COVID 19; Pandemic.

INTRODUCTION

The COVID-19 pandemic represented a milestone of change in the most diverse sectors of public health. It began on March 11, 2020 and ended on May 5, 2023 by the World Health Organization (Baloch et al., 2020; Ciotti et al., 2020; Souto, 2020). In addition to the direct impact of the disease, the health system faced a series of unprecedented logistical and care challenges (Alencar et al., 2022; Silva et al., 2022; Heinz et al., 2023).

Several health conditions unrelated to COVID-19 have been affected, with significant implications in terms of morbidity and mortality as a result of social distancing, mobility restrictions and lockdowns, which have had wide-ranging and complex consequences for Society (Kaye et al., 2021; Shaukat et al., 2020; Cotrin et al., 2020). These measures may have affected health-related behaviors, physical activity patterns and exposure to fracture risks (Baker et al., 2022; Baloch et al., 2020; Güner et al., 2020).

Femur fractures have a bimodal epidemiological spectrum, affecting the elderly (low-energy) and young people (high-energy trauma) (Silva et al., 2021). Other studies have already assessed the epidemiological impact of the pandemic, but in a different age group and location. In Brazil, femur (hip) fractures in elderly patients and the number of traumas in an institution have already been studied, however, there is still a gap in national data on fractures in young people and high-energy trauma (Baloch et al., 2020; Güner et al., 2020).

The aim was to investigate the incidence of femur fractures (ICD S72) in patients aged 15 to 49 in Brazil, in the period before (March to December 2019) and during the COVID-19 pandemic (March to December 2020), based on data from DATASUS, to assess the impact of social isolation on incidence and the demographic profile of affected individuals.

METHODS

An ecological study carried out by collecting secondary data obtained by reviewing epidemiological bulletins from the Ministry of Health, available on the electronic platform of the Department of Informatics of the Unified Health System (DATASUS) referring to the spatial distribution of femur fractures (code S72 of the tenth international classification of diseases – Femur fracture) in the periods March and December 2019 and March and December 2020, dates that correspond to the period before and during the COVID-19 pandemic,

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respectively (Villeneuve e Goldberg, 2020; Lima et al., 2015).

The data was extracted according to gender (male and female), age groups (15 to 19 years; 20 to 24 years; 25 to 29 years; 30 to 34 years; 35 to 39 years; 40 to 44 years and; 45 to 49 years), administrative regions (North, Northeast, Southeast, South and Midwest) and types of hospitalization (Elective, Emergency, Accidents and other types). The types of hospitalization corresponding to accidents on the way to work, at the workplace or on company business and other types of traffic accidents were grouped together as accidents.

The inclusion criteria for the cases evaluated in this study were only those that were registered during the defined period and reported in the Hospital Information System (SIH). The data was then organized and tabulated using Microsoft Excel 2016, according to the information obtained.

The incidence of femur fractures was calculated per 100,000 inhabitants by the ratio between the number of reported cases and the average population in the period. The estimated variation between periods was calculated as the percentage difference between the number of cases in the periods before and during the pandemic. In addition, the difference in the incidence of fractures between the periods was estimated by the raw difference in rates. The data was analyzed using Stata software (StataCorp. LC) version 11.0.

As these are secondary data extracted from public sources, this type of study does not need to be submitted to and appraised by a Research Ethics Committee, in accordance with Resolution 510 of 2016.

RESULTS

We analyzed 53,110 cases of hospitalizations due to femur fractures that occurred in the SUS in the periods before and during the pandemic, with the profile of the cases being male, between 20 and 24 years old, in the Southeast region and admitted as emergencies. Between the pre-pandemic and pandemic periods, this profile remained the same, with only a change in the second main cause of hospitalization, which was elective in the pre-pandemic period and became hospitalization due to accidents in the pandemic period (Table 1).

Table 1. Changes in the profile of hospitalizations for femur fractures in young adults in the pre- and pandemic periods.

Variables	General	Pre-pandemic COVID-19	During the COVID-19 pandemic	Variation (%)
		N (%)		

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General	53110 (100)	26364 (100)	26746 (100)	1.4
Gender				
Male	43128 (81.2)	21398 (81.1)	21730 (81.2)	0.1
Female	9982 (18.7)	4966 (18.9)	5016 (18.7)	-0.2
Age group				
15 to 19 years old	7733 (14.5)	3824 (14.5)	3909 (14.6)	0.1
20 to 24 years old	11552 (21.7)	5662 (21.4)	5890 (22.0)	0.6
25 to 29 years old	8444 (15.8)	4127 (15.6)	4317 (16.1)	0.5
30 to 34 years old	7164 (13.4)	3556 (13.4)	3608 (13.4)	0.0
35 to 39 years old	6489 (12.2)	3249 (12.3)	3240 (12.1)	0.2
40 to 44 years old	5931 (11.1)	2958 (11.2)	2973 (11.1)	-0.1
45 to 49 years old	5797 (10.9)	2988 (11.3)	2809 (10.5)	-0.8
Region				
North	5411 (10.1)	2569 (9.7)	2842 (10.6)	0.9

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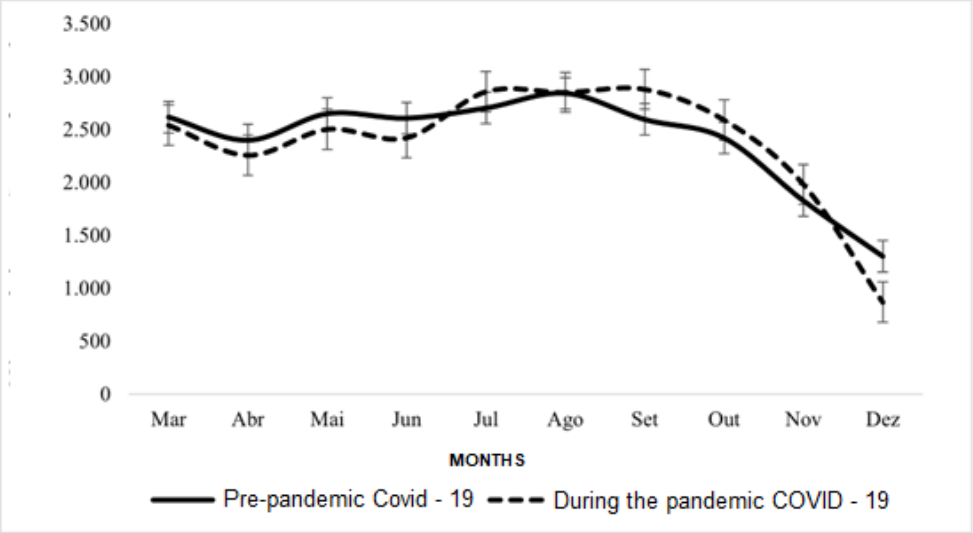
Northeast	15333 (28.8)	7425 (28.1)	7908 (29.5)	1.4
Southeast	28143 (52.9)	14084 (53.4)	14059 (52.5)	0.9
South	12065 (22.7)	6028 (22.8)	6037 (22.5)	0.3
Midwest	7060 (13.2)	3616 (13.7)	3444 (12.8)	-1.8
Tipo de internação				
Elective	4126 (7.7)	2210 (8.3)	1916 (7.1)	-1.2
Urgency	43312 (81.5)	21307 (80.8)	22005 (82.2)	1.4
Accidents	4151 (7.8)	2014 (7.6)	2137 (7.9)	0.3
Other types	1521 (2.8)	833 (3.1)	688 (2.5)	-0.6

Regarding seasonality, hospitalizations for femur fractures in young Brazilian adults seem to have been lower in the period from January to June when the pandemic occurred than in the period before the pandemic until June, as opposed to between August and November (higher numbers during the pandemic) (Picture 1).



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Picture 1. Number of hospitalizations for femur fractures in young adults before and during the COVID-19 pandemic.

The effect of the COVID-19 pandemic on hospitalizations for femur fractures has resulted in an increase of 2/100,000 cases in young Brazilian adults. Furthermore, the pandemic seems to have influenced the increase in incidence in men, in younger individuals (up to 34 years old), in the North and Northeast regions and in the type of hospitalization as an emergency. On the other hand, the incidence decreased in older individuals (35 to 49 years old), in residents of the Midwest region and in elective and other types of hospitalization, such as for other injuries (Table 2).

Table 2.Rate of hospitalizations for femur fractures in young Brazilian adults, according to gender, age group, region and type of hospitalization between the periods before and during the COVID-19 pandemic.

Variables	Rate of hospitalizations for femur fractures		
	Before	During	Variation
General	163	165	2.0
Gender			
Male	267	270.3	3.3
Female	60.9	61.4	0.5
Age group			
15 to 19 years old	23.7	24.7	1.0
20 to 24 years old	32.6	34.1	1.5
25 to 29 years old	24.2	25.4	1.2
30 to 34 years old	20.6	20.9	0.3
35 to 39 years old	19.2	19.0	-0.2

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40 to 44 years old	19.3	19.0	-0.3
45 to 49 years old	22.2	20.5	-1.7
Region			
North	24.7	27.0	2.3
Northeast	23.6	25.1	1.5
Southeast	30.0	30.0	0.0
South	38.6	38.7	0.1
Midwest	39.9	37.8	-2.1
Tipo de internação			
Elective	13.7	11.8	-1.9
Urgency	131.7	135.7	4.0
Accidents	12.4	13.2	0.8
Other types	5.2	4.2	-1.0

DISCUSSION

The COVID-19 pandemic has brought about a series of changes in society's habits. Measures to restrict social interaction have had an impact on the number of hospitalizations, with a decrease in the number of fractures diagnosed in the population around the world and in Brazil (Alencar et al., 2022; Heinz et al., 2023; Miranda et al., 2022; Wilk et al., 2022).

Despite that, this study found that the number of fractures resulting from high-energy trauma such as femoral fractures in young adults rose significantly again in the pandemic period compared to the pre-pandemic period, as opposed to other countries such

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as Germany, which showed that this type of fracture remained the same or fell, reflecting a possible permanent behavioral change (Guerriero et al., 2019).

Comparing the results found, in a Brazilian context, an analysis carried out in Ceará, Instituto Doutor José Frota, in which only one trauma hospital was studied for a period of three months, there was an incease in the average age of patients admitted (from 35.4 years to 38.48 years), while the present study showed that the predominant age was between 15-34 years. When comparing surgical volume, a decrease in surgeries was reported, unlike what was found in the present study where there was an increase (Lopez et al, 2022; Alencar et al, 2022).

When compared to the study carried out by the Federal University of Paraná (Souto., 2020) which assessed the incidence of hip fractures in individuals over sixty years of age and showed a decrease in the period during the pandemic, this study pointed to an increase in the incidence of femur fractures in the young population, caused mainly by high-energy accidents, which reinforces the hypothesis that the age group most affected was precisely the most economically active population, which remained exposed to risk factors, while older individuals were better preserved as a result of preventive measures during the pandemic (Adami et al., 2016)

The study takes into account the 15 to 49 age group, referred to here as young adults (Reimers e Laflamme., 2007) due to the importance of this group in generating income for the country, being the main part of the economically active population and also the most exposed to high-energy trauma. In addition, the data found in this study also points to an unexpected increase in the number of femur fractures from June 2020 onwards, contrary to the expectation of the restrictive and isolation measures imposed during this lockdown period. The increase in cases of fractures in this population during isolation seems to be an indirect sign of what appears to have been a need for non-compliance with isolation measures (Reimers e Laflamme., 2007; Lv et al., 2020) Therefore, it is believed that the impact of the pandemic is related to behavioral changes in search of socio-economic alternatives to generate income in this population.

The increase in the incidence of fractures resulting from high-energy trauma is an unexpected trend, given that restrictive measures should reduce the number of vehicles on the road and the number of people on the streets, as has been reported in some trauma referral centers (Alencar et al., 2022; Reimers et al., 2007).

From the analysis of the data presented, the difference between the incidences in the Brazilian macro-regions is remarkable, such as the increase in the Northeast and North regions, and the decrease in the Midwest region, which seems to have been a reflection of how the pandemic influenced these populations in different ways with regard to femur fractures, demonstrating an apparent regional disparity (Adami et al., 2016; Miranda et al., 2022).

It seems that the increase in the North and Northeast macro-regions demonstrates a possible relationship between the impact of the pandemic and regional socio-economic development in Brazil, something that should be the subject of further studies. Significant epidemiological differences between populations in different regions are caused by cultural differences and lifestyles in each region, as evidenced by the decrease in the Midwest (Baker et al., 2022).

In addition, Reimers observed an increase in hip fractures in regions with lower economic status (defined as high unemployment, low income, welfare recipients and single parent families) (Reimers e

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Laflamme., 2007). Therefore, it can be seen that Brazil followed the same pattern of behavior, with less developed regions showing an increase in fracture incidence rates, which is why socioeconomic status should be emphasized to help reduce the risk of suffering a traumatic fracture (Lv et al., 2020; Kaye et al., 2021).

Even with the pandemic, femur fractures in young adults continued to have an important impact on the Brazilian health system, and their incidence increased during the period studied. The demographic profile showed a difference between the regions of Brazil, with a predominance in the North and Northeast, and a higher incidence in individuals under 35 years old (Alencar et al., 2022; Reimers et al., 2007; Baker et al., 2022).

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