











Osteomyelite: epidemiological analysis of the disease in Brazil between 2009 to 2019

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ABSTRACT

Introduction: osteomyelitis is a bone infection characterized by progressive destruction of the cortical bone and medullary cavity and is a relevant disease because of its likely deleterious consequences for patients. **Objective:** to analyze the epidemiological profile of patients affected by osteomyelitis in Brazil during the period from 2009 to 2019. **Method:** a cross-sectional descriptive study, with a documental approach, by means of secondary data collected from the UHS Department of Informatics (DATASUS). The data are related to hospital morbidity due to osteomyelitis during the years 2009 to 2019, with the period evaluated from January 2009 to December 2019. **Results:** there were 183,975 hospitalizations for osteomyelitis in Brazil. The Southeast region had the highest prevalence of the number of cases (38.88%) and reached a higher mortality rate than the other regions. It was noted that the ages most affected by the disease are between 30 and 39 years old. Finally, it was found that in all regions the male sex is more affected than the female sex. **Conclusion:** In the study some risk groups were verified; among them were males, age between 30-39 years, and the Southeast region due to the high mortality rate from the disease. The high prevalence of the disease and its high morbidity and mortality reinforce the need for early diagnosis and adequate treatment.

Keywords: Epidemiology, Infections, Osteomyelitis.

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RESUMEN

Introducción: La osteomielitis es una infección ósea caracterizada por la destrucción progresiva del hueso cortical y la cavidad medular y es una enfermedad relevante debido a su probable eliminación para los pacientes. **Objetivo:** Analizar el perfil epidemiológico de los pacientes afectados por osteomielitis en Brasil durante el periodo 2009-2019.

Método: Estudio descriptivo transversal, con enfoque documental, a través de datos secundarios recogidos en el Departamento de Informática del SUS (DATASUS). Los datos se refieren a la morbilidad hospitalaria debida a la osteomielitis durante los años 2009 a 2019, y el período se evaluó de enero de 2009 a diciembre de 2019. **Resultados:** Hubo 183.975 hospitalizaciones para la osteomielitis en Brasil. La región sureste tuvo la mayor prevalencia del número de casos (38,88%) y alcanzó una tasa de mortalidad más alta que las otras regiones. Se notó que las edades más afectadas por la enfermedad son entre 30 y 39 años. Finalmente, se encontró que en todas las regiones el sexo masculino es más afectado que el sexo femenino. **Conclusión:** En el estudio hubo algunos grupos de riesgo; entre ellos, los varones, de entre 30 y 39 años y la región sureste debido a la alta tasa de mortalidad debida a la enfermedad. La alta prevalencia de la enfermedad y su alta morbilidad y mortalidad refuerzan la necesidad de un diagnóstico precoz y un tratamiento adecuado.

Palabras clave: Osteomielitis, Epidemiología, Infección.

INTRODUCTION

Osteomyelitis is a bone infection characterized by progressive destruction of the cortical bone and medullary cavity, the main etiology being open fractures or major orthopedic reconstruction procedures^{1,2,3}. Even with a decrease in mortality to approximately 2% today, it remains a relevant disease because of its probable consequences, among them bone necrosis^{1,3-6}. Osteomyelitis has been classified in several ways, taking into consideration criteria such as location of the process, extent of bone involvement, host immune status, comorbidities and type of etiologic agent.⁷⁻¹¹ Bacteria adhere to bone due to adhesins, they are what contribute to gravity^{5,6,7,8}.

The diagnosis can be made by history and clinical examination, despite the current sophistication of imaging methods. Regarding symptomatology, fever, chills, abscesses, edema and local erythema may occur^{1,3,9}. Besides the clinical examination it is important to investigate history of trauma, surgical procedures, fractures and infections, and on physical examination it is important to look for diminished pulses, perforating ulcers, cellulites and fistulas.^{10,11,12}

To assist in the diagnosis, some exams are requested. Laboratory tests include the isolation of the agent, blood culture, C-reactive protein, CBC, ESR,

acid alpha-glycoprotein dosage. Imaging exams that can collaborate in the investigation are bone X-rays, which present alterations after the 10th day of the beginning of the disease, Computerized Tomography, Magnetic Resonance and Ultrasonography of the lesion. After diagnosis, the management of the disease includes hygienic measures, wound care, antibiotic therapy, depending on the suspected germ, and surgical management^{5,13,14,15}.

The initial phase of the disease is non-specific, but if well evaluated, correlating the clinical history with the physical examination and the epidemiology of osteomyelitis, it is possible to make an early diagnosis and thus avoid the dissemination of the disease and the worsening of the patient's condition.^{16,17} The effectiveness and timing of the treatment are directly related, and the earlier it is started, the more effective and resolute it is. Taking into account the morbidity and mortality of the disease, its complications and the beginning of treatment, it is of utmost importance the epidemiological study of the disease, since it is a disease that can bring serious sequelae, but if diagnosed early it can evolve with a highly favorable prognosis.^{12,13,14}

Osteomyelitis can be caused by several etiological agents, which are directly related to the prognosis of morbidity and its treatment with antibiotic therapy, interfering in the choice of medication,

the need or not for association and the time of treatment.^{13,14} We can cite the following etiological agents: *Staphylococcus aureus*, *Staphylococcus aureus multiresistentes*, *Enterobacter sp.*, *Klebsiella sp.*, *Acinetobacter sp.*, *Pseudomonas sp.* and those with polymicrobial involvement.^{13,14,15,18}

Given the economic and social importance of the disease, it is important to conduct research, such as this study, to identify the population most susceptible to morbidity and thus intervene effectively and resolutely. The objective of this study is to analyze the epidemiological profile of patients affected by osteomyelitis in Brazil during the period from 2009 to 2019, to define the epidemiology of the risk groups of morbidity, enabling a better knowledge about the disease and subsequently allowing interventions to avoid damage to both the patient and the health system.

METHODS

A cross-sectional descriptive study was carried out, with a documental approach, using secondary data collected from the Department of Informatics of the Unified Health System (DATASUS)¹⁹. DATASUS is a department whose mission is to promote modernization through information technology to support the Unified Health System (UHS) and make available information on the population's health care, the health care network, hospital and outpatient networks, health records, financial resources, and demographic and socioeconomic data.

The data collected for this study refers to hospital morbidity due to osteomyelitis during the years 2009 to 2019. To conduct the current research, secondary data available at DATASUS were inserted, through the search by the code of the International Classification of Diseases and Health Problems (ICD-10), using the code M86, referring to osteomyelitis.

The ICD-10 search revealed data on morbidity that were available on the platform, and for the research, the data were selected based on inclusion and exclusion criteria, which are cited below. Inclusion criteria were secondary data on morbidity for the period January 2009 to December 2019; data on the profile of the disease, including gender, age group, and involvement by region of hospitalization;

number of hospitalizations and number of deaths from the disease. Exclusion criteria were the available data that were not collected due to hospitalizations by ICD-10 M86.

The data obtained in the research were selected according to the criteria cited in the study and were schematized in tables in order to allow comparison of hospitalizations and deaths annually, by gender, age group and region. After the schematization in tables, it became possible to make a quantitative and descriptive analysis of the data, defining the epidemiological profile of the Brazilian population when it comes to osteomyelitis.

RESULTS

During the period studied, there were 183,975 hospitalizations for osteomyelitis in Brazil. The Southeast region had the highest prevalence of the number of cases (38.88%), followed by the Northeast (30.64%), South (15.01%), Center-West (8.42%), and North (7.03%). It was noted that the Southeast reached a mortality rate of 1.6 deaths per 100 hospitalized patients, followed by rates of 1.16 in the Northeast, 0.99 in the South, 0.81 in the Midwest, and 0.37 in the North.

The national analysis of osteomyelitis mortality obtained a mortality rate of 1.26 deaths for every 100 hospitalized patients. Regarding the age range, it was noted that the ages most affected by the disease were between 30 and 39 years (16.25% of the cases) and considering that the age range of 20 to 49 years covers almost half, 47.54%, of the cases in the country.

It was found that in all the regions analyzed and studied, males were more affected than females. The male gender is responsible for 70.87% of the hospitalizations in Brazil for osteomyelitis.

DISCUSSION

From 2009 to 2019, there were 183975 hospitalizations for osteomyelitis in Brazil. In the present study some risk groups were verified; among them were males, age between 30-39 years, and the Southeast region due to the high rate of mortality from the disease. For this reason, studies

and research involving the prevalence, mortality, and need for hospitalization for osteomyelitis are so important and fundamental.

Emphasizing the need to continuously update secondary data, the Health Secretary, through the Epidemiological Surveillance, must enable the monitoring of epidemiological data and thus interfere in effective ways, encouraging health care units to follow the recommended flow of care for the disease, in order to prevent an increase in the incidence of cases and a better prognosis for affected patients.^{1,3,4,5}

When analyzing the data in this study, we reached epidemiological conclusions of greater involvement by regional delimitation, and the Southeast region had the highest prevalence. This fact may be related to the population density of each region, where proportionally the states with the largest number of inhabitants are more likely to have a higher prevalence of the disease.^{1,3,15} The Southeast region had the highest prevalence of the number of cases of osteomyelitis, followed by the Northeast, South, Midwest and North regions, and when it comes to data from the Brazilian Institute of Geography and Statistics (IBGE)^{16,17} the region with the highest population density is the Southeast, followed by the South, Northeast, Center-West and North.^{17,18}

Addressing the regions of the country, it is also noted that the Southeast region reached a higher mortality rate when compared to the other regions, followed by the Northeast, South, Midwest and North regions. These results can be attributed as a probable cause to the discrepancy in the practice of hygiene measures, the prevalence of surgical procedures, vascular diseases, trauma, use of orthopedic prosthesis and infections, these being the main causes of osteomyelitis in the most affected age group requiring hospitalization.

In all regions analyzed by the study, males are more affected than females. This prevalence is evidenced in epidemiology articles that relate osteomyelitis to traumatic events, such as accidents and surgical procedures, showing the conformity of the study results with other literature.^{18,20,21,22}

This study found a percentage of 70.87% of cases in men, in contrast to the cross-sectional study, which collected data through a questionnaire based on a medical record review, which showed 78.95%

of cases in men.^{15,20,22,23} Maintaining this proportion of more than 70% in the studies evaluated.^{15,18, 20,21,22}

The male sex obtained a greater number of notifications throughout Brazil and during all the years of the surveys used for this article, but considering patients older than 80 years, there is a reversal of the profile of hospitalizations for osteomyelitis, presents a predominance in females, taking into consideration that in this age group the number of women increases over men, there is a direct relationship between the increase in age and an increase in the number of comorbidities for this group.^{15,18,20-23} Regarding the research, the age range most affected by the disease was between 30 and 39 years, and considering that the age range of 20 to 49 years covers almost half of the cases in the country. Studies have shown that the most affected age group is between 30 and 59 years, being the economically active part of the population.^{15,22}

In relation to the epidemiological profile of osteomyelitis and its relationship with fractures, we notice an association of factors such as the degree of contamination of the fracture, the nutritional conditions of the individual, the time between the trauma and the correct care.^{15,24} The average age of patients with fracture-related osteomyelitis was 35 years old, and most of them were male.^{15,20,21,24,25} The probable reasons for the occurrence of osteomyelitis in open fractures may be related to the waste of time from the moment of the accident to the initial operation, as already mentioned, the characteristics of the wounds themselves, high degree of contamination, accident in rural areas, first aid, and removal and transport conditions.^{15,20-25}

In conducting the study it is possible to identify a limitation that can interfere with the data and its full evaluation, since secondary data depend on a flow to be recorded properly and thus can be effectively analyzed. The study has information barriers due to the possibility of gaps in the data records, and this must be taken into consideration. However, several years were evaluated in the research, which allows for a result that is more faithful to reality.

CONCLUSION

The study aimed to analyze the epidemiological profile of the population most susceptible to

osteomyelitis and thus intervene before the incidence of the disease and its complications. The Brazilian epidemiological profile of osteomyelitis is male, aged 30-39 years, and with a higher mortality rate in the Southeast region.

By identifying the risk factors and the epidemiological profile of the morbidity, it becomes relevant to implement public health policies aimed at the care of male patients, young adults and those who have had some trauma with the presence of lesions that may evolve to osteomyelitis.

The disease is still very frequent, even with the measures taken to prevent trauma and infection from evolving into worse prognoses. The difficulty in treating osteomyelitis is evidenced by the multiple range of antibiotic therapies used in these cases and the broad resistance that has been acquired. There are many difficulties involving this comorbidity, and the high prevalence of the disease and its high morbidity and mortality reinforce the need for early diagnosis and adequate treatment.

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