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Epidemiological importance of bacterial meningitis

Lívia Mirelly Ferreira de Lima Almeida^{1*}, Francisca Luana da Silva², Fabíolla Almeida Calazans³, Taciana Targino de Lima dos Santos⁴, Bruna Izabel da Silva⁵, Maria Eduarda de Andrade Galvão⁶, Jakeline Najara da Conceição Interaminense⁷, Caroline Dayane da Silva Bacelar⁸, Anna Carina Rocha Nascimento⁹, Manuelle de Araújo Holanda¹⁰, Alessandra Patricia Coatss do Nascimento¹¹, Rosane Barbosa de Oliveira¹², Maria Aparecida Franceska Macedo¹³, Careli Pereira Brandão¹⁴

1. Academic in Pharmacy. University Center of Vitória de Santo Antão-UNIVISA, PE.
- 2-4 Nurse - Hospital das Clínicas -UFPE
5. Academic in Pharmacy. University Center of Vitória de Santo Antão-UNIVISA, PE.
6. Nursing - UNIFACOL
7. Nurse of the Health Department - SES-PE
8. Nursing - UNIVISA
9. Nurse of the Health Department - SES-PE
10. Nurse - Hospital das Clínicas -UFPE
- 11-13 Nursing - UNIFACOL
14. Nursing - Hospital das Clínicas -UFPE

E-mail adresse: Lívia Mirelly Ferreira de Lima Almeida (liviamirelly06@gmail.com), Francisca Luana da Silva (luanarosa2107@gmail.com), Fabíolla Almeida Calazans (fabiollacalazans@yahoo.com.br), Taciana Targino de Lima dos Santos (tacitargino@gmail.com), Bruna Izabel da Silva (bruna.202128045@univisa.edu.br), Maria Eduarda de Andrade Galvão (meduardaagalvao03@gmail.com), Jakeline Najara da Conceição Interaminense (jakelineinteraminense@gmail.com), Caroline Dayane da Silva Bacelar (caroline.202218016@univisa.edu.br), Anna Carina Rocha Nascimento (annacarina06@gmail.com), Manuelle de Araújo Holanda (manuelleholanda@hotmail.com), Alessandra Patricia Coatss do Nascimento (ale.coatss@hotmail.com), Rosane Barbosa de Oliveira (rosybarbosa20@icloud.com), Maria Aparecida Franceska Macedo (cydaalbuquerque4017@gmail.com), Careli Pereira Brandão (carelibrandao@hotmail.com)

*Corresponding author

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Abstract: Bacterial meningitis is an infection that affects the layers that cover the central nervous system, called meninges and can be caused by viruses, fungi and bacteria, in some cases the evolution of the disease is rapid and lethal if not diagnosed and treated quickly. In Brazil it is endemic with high rate. With regard to cases of meningitis, epidemiological surveillance plays an important role in spreading information and making us understand the behavior of the disease in the population. Therefore, this study aimed to raise aspects related to the importance of the epidemiology of bacterial meningitis in Brazil, through a brief literature review. Meningitis is classified as diseases of immediate compulsory notifications and their notification should be tied to the recommendation guide established by the Ministry of Health. Such investigation is carried out with the objective of informing the clinical definition that is occurring in a given region as well as the source of infection. Above all, it is known that in Brazil there is still a lot of underreporting of cases, which causes difficulty in the collection of epidemiological data in certain regions and in the knowledge about the disease and its manifestation in the population.

Keywords: Epidemiology; Bacterial meningitis; Central nervous system; Public health problems; Epidemiological surveillance.

1. Introduction

In Brazil, meningitis is considered an endemic disease, presenting cases of the disease throughout the year, as expected, with the occurrence of occasional outbreaks and epidemics. The seasonality of bacterial meningitis is more common in autumn-winter than in spring-summer. Males are also the most vulnerable to the disease, and can be caused by bacteria, viruses, fungi and parasites. Viral and bacterial meningitis are the most relevant for public health, taking into account the magnitude of its occurrence and the potential to produce outbreaks. Although it is commonly caused by microorganisms, meningitis can also come from an inflammatory process, such as a carcinogenic process that metastases to meninges, lupus, reaction to some drugs, head trauma and brain surgeries. (BRAZIL,2021). There are three main etiological agents causing meningitis: *Neisseria meningitidis*, *Streptococcus pneumoniae* and *Haemophilus influenzae*. (FONSECA, 2021).

We can assume that meningitis is a serious public health problem, with important morbidity and mortality rates in the Brazilian territory, besides being an infection capable of infecting anyone in different age groups, especially infants, those over 60 years of age, pregnant women, lactating women and immunosuppressed individuals. (SILVA; MEZAROBBA, 2018).

It is estimated that more than 1 million cases and 200,000 deaths worldwide occur annually as a result of bacterial meningitis. The brain accompanied by the meninges, as well as any other part of the body, can be affected by infections. Certain microorganisms have a narrow or total preference for the CNS, but others may affect not only the organs, but also the brain. The damage caused by these agents in nerve tissue can result in neuronal or neuroglial lesions, or by the production of toxins that cause deleterious effects to the immune system (inflammatory response). (SILVA; MEZAROBBA, 2018).

The clinical manifestation of this pathology may present variability according to the patient's age and disease duration. It is characterized by the presence of nonspecific symptoms. Nonspecific findings include: fever, anorexia and food rejection, diarrhea and emesis, symptoms of upper respiratory tract infection, myalgia, lethargy, tachycardia, hypotension, photophobia and some skin manifestations, and petechiae, purpuras and maculopapular rash are commonly visualized. Meningeal irritation manifests with neck stiffness, back pain, Kernig sign and Brudzinski sign. Not always, especially in children, signs of meningeal irritation are observed. (TEIXEIRA, 2018).

CSF culture is the "gold standard" for diagnosis, as it allows differentiation between the forms of bacterial and viral meningitis. Thus, the main tests to complete the suspicious diagnosis are: culture, CSF chemo cytological examination, direct bacterioscopy, latex agglutination and polymerase chain reaction. Bacterial meningitis can be fatal in 50% of cases if

left untreated. Even when diagnosed early and treated appropriately, 8 to 15% of patients die, usually between 24 and 48 hours after the onset of symptoms. In addition, 10 to 20% of survivors are prone to permanent sequelae, including brain damage, hearing loss, and learning disabilities. (TEIXEIRA, 2018). Meningitis is considered an endemic disease in Brazil, with high morbidity and lethality rates, and studies addressing the aspects of bacterial meningitis, for a better understanding of its behavior in the country and in its states. (PIMENTEL, 2019)

Meningitis is included in the group of diseases with immediate compulsory notifications and should follow a recommendation guide established by the Ministry of Health, which indicates how should be the clinical management of this patient, what information is necessary and important to make the notification, definition of the suspected and confirmed case and the cases discarded, among other information. This investigation is carried out with the objective of informing the clinical characterization that is occurring in a given region and the source of infection.

According to the Department of Surveillance and Health, the investigation of cases occurs by filling out the Meningitis Investigation Form, after confirmation, the cases are classified as: meningococcal disease, tuberculous meningitis, meningitis by other bacteria, unspecified meningitis, aseptic meningitis, meningitis by another etiology, meningitis by hemophile and pneumococcal meningitis. (BRAZIL, 2019).

2. Methodology

This is a descriptive and exploratory bibliographic review study, in which aspects related to the importance of epidemiology in cases of bacterial meningitis were addressed, where articles published between 2018 and 2022 were analyzed. The literature was surveyed in the literature with a search in the following databases: Latin American and Caribbean Literature on Health Sciences (LILACS), Virtual Health Library (VHL), Medical Literature Analysis and Retrieval System Online (Medline) and National Center for Biotechnology Information (PubMed). The following descriptors in Portuguese and English were used to search the articles: "Epidemiology", "Bacterial meningitis", "central nervous system", "public health disorder" and "Epidemiological surveillance" in PubMed, the descriptors in English were used.

The inclusion criteria defined for the selection of articles were: articles available in English; articles in full that portrayed the theme related to integrative review and articles published and indexed in these databases in the last five years. We use the following filters: clinical trials; free full text; last 5 years and research with humans. Both the analysis and synthesis of the data extracted from the articles were carried out in descriptive way, making it possible to observe, count, describe and classify the data, in order to gather the knowledge produced on the theme explored in the review. Studies that

escaped our inclusion criteria were excluded.

3. Results and Discussion

Regarding the etiological agent of the disease, it can be observed that in the period of 10 years, there was a prevalence of Meningococcal Meningitis (MM), with 42.96% of the 143 cases reported. (PIMENTEL, 2020) According to Araújo (2020), regarding the occurrences of Bacterial Meningitis, in 27% of the cases it was not possible to identify the etiological agent, therefore, these were classified only as Bacterial Meningitis.

Based on the studies, it was observed that the rate of occurrence of bacterial meningitis is high, but the rate of viral meningitis is more expressive, i.e., viral meningitis is the most frequent etiology, however, bacterial is reported as a condition of great importance. However, identification is extremely important, although it is not possible in many cases due to the indiscriminate use of antibiotics and scarce training of professionals.

Studies have demonstrated some factors are associated with the risk of meningitis contamination, such as: social factor, because children often remain in greater contact, and in isolated environments, which facilitates the transmission of the disease. In addition, this age group is characterized by presenting a certain immaturity of the Central Nervous System. It was also scored that deficient nutritional aspects, involvement of the immune system caused by radiotherapy, chemotherapy, treatment with prolonged corticosteroids and traumas to the central nervous system (PIMENTEL; ARAUJO, 2020; MAGELLAN; SILVA, U.S.; TEIXEIRA, 2018).

All the articles analyzed in this review regarding meningitis and its clinical manifestation report on the symptoms commonly presented by patients: nonspecific findings include fever, anorexia and food refusal, diarrhea and vomiting, symptoms of upper respiratory tract infection, myalgia, lethargy, tachycardia, hypotension, photophobia and various skin manifestations, being more common petechiae, purpuras and maculopapular rash. Meningeal irritation is also reported that manifests itself with neck stiffness, back pain, Kernig sign and Brudzinski sign.

Regarding demographic characteristics, studies have indicated a prevalence in children under 5 years of age, which fall as a risk group, and the predominant male gender. Having a prevalence in white race/color, however, the findings mentioned by another study differs from the general reality of Brazil, since it was carried out in Bahia where its population is predominantly black. (MAGELLAN, 2018). According to Pimentel (2020), when it comes to seasonality that is concentrated between May and October, he highlighted that June has a higher incidence of cases.

When the progress of the pathology, most of the affected evolve to discharge, but a high mortality rate of the disease can still be scored, since if left untreated, it has a mortality rate of 50%, if there is no early treatment, the survivors presented permanent sequelae including brain damage (FONSECA, 2021).

Studies express that the diagnosis of meningitis, has as "gold standard" is the collection of cerebrospinal fluid, which will make the identification between viral and bacterial forms providing an accurate diagnosis and an adequate treatment. Treatment for bacterial meningitis is done with antibiotic specific to each infectious agent. The main agents are the bacteria *Neisseria meningitidis*, *Streptococcus pneumoniae* and the agent *Haemophilus influenzae* (SILVA, 2018).

Studies have demonstrated the importance of preventive actions through the vaccination immunization program, where vaccines are made available in a combined manner, and have their efficacy proven as a preventive way to reduce risks and injuries. It is worth noting that, after the application of vaccination, there was a decline in the incidence of the disease, thus demonstrating a positive effect on the population and a change in the epidemiological profile. Elucidated by the studies we can affirm that meningitis is a public health problem, thus validating the importance of surveillance of meningitis cases and their compulsory notification immediately, for confirmation and classification of cases, in order to monitor, detect outbreaks, so that prevention measures can be implemented as also monitor resistance to therapeutic forms.

4. Conclusions

The main objective of this article was to conduct a brief literature review on the epidemiological importance of bacterial meningitis. Although this research has limitations because it evaluated secondary data, which may be subject not only to filling failures but also to be accompanied or not by the incompleteness of the information. Above all, it can be concluded that, even though meningitis is a public health problem and immediate compulsory notification, there is still underreporting of cases, which may hinder the collection of epidemiological data in certain regions.

References

- [1] ARAUJO PQ, PENHA R. The epidemiological importance of bacterial meningitis in Brazil. Multidisciplinary Scientific Journal Knowledge Center. Year 05, Ed. 05, Vol. 10, pp. 87-100. May 2020.
- [2] BRAZIL. Ministry of Health. Meningitis: what it is, causes, symptoms, treatment, diagnosis and prevention. 2021. Available in: <<https://www.gov.br/saude/pt/affairs/saude-de-a-a-z/m/meningitis-1/meningitis>>. Accessed March 28, 2022.
- [3] FONSECA ALGP, *et al.* Profile of the Epidemiology of Meningitis in the State of Tocantins between 2010 and 2020. Amazon Science & Health Magazine, Vol. 9, No. 3, 2021.
- [4] MAGALHÃES RS, SANTOS MS. Epidemiological profile of bacterial meningitis in the municipality of Vitória da Conquista - Bahia, from 2008 to 2015. Rev. Ciênc. Avg. Biol., Salvador, v. 17, n. 1, p. 33-39, Jan./Apr. 2018.

4 Almeida, L.M.F.L.; Silva, F.L.; Calazans, F.A.; Santos, T.T.L.; Silva, B.I.; Galvão, M.E.A.; Interaminense, J.N.C.; Bacelar, C.D.S.; Nascimento, A.C.R.; Holanda, M.A.; Nascimento, A.P.C.; Oliveira, R.B.; Macedo, M.A.F.; Brandão, C.P.
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- [5] PIMENTEL LG, *et al.* Epidemiological analysis of bacterial meningitis in the State of Amapá from 2013 to 2018. *Mundo da Saúde Magazine*, volume 44: 372-380, e183- 2019. 2020
- [6] SILVA, HCG.; MEZAROBBA, N. Meningitis in Brazil in 2015: the current panorama. *Arq. Catarin Med.*, v. 47, n. 1, p. 34-46, 2018.
- [7] TEIXEIRA AB, CAVALCANTE JCV, MORENO IC, SOARES IA, HOLANDA FOA. Bacterial meningitis: an update. 2018. *Brazilian Journal of Clinical Analyses*, 50(4), 327-9