I J S | International Journal of Sciences

Published online 07 15, 2021
ISSN 2763-5392

Tuberculosis and botulism (pathologies still neglected): a literature review

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To cite this article:

Albuquerque, J.O.; Vasconcelos, C.O.; Silva, E.G.S.; Silva, E.V.; Freitas, G.V.H.; Júnior, I.J.S.; Barboza, J.O.; Souza, L.M.S.; Melo, M.M.G.C.; Filho, P.C.B.B.; Oliveira, Y.S.; Álvares, E.B.S.O; Lopes, A.R.O. **Tuberculosis and botulism (pathologies still neglected): a literature review.** *International Journal of Sciences.* Vol. 2, No. 1, 2021, pp. 10-13. ISSN 2763-5392.

Received: 06 29, 2021; **Accepted:** 06 30, 2021; **Published**: 07 15, 2021

Abstract: Tuberculosis and botulism are just two of the many pathogens that bacteria can cause. The microorganism that causes tuberculosis, *Mycobacterium tuberculosis*, has a very ancient origin, being widely studied and discussed, yet it is a neglected disease. Botulism has worldwide distribution, in which it affects isolated people or can even cause family outbreaks, generally related to the production and preservation of food. The article aims to describe, through a bibliographic survey, two of the main diseases caused by bacteria: botulism and tuberculosis that are still neglected. Bacteria are present in various environments and are microorganisms prone to emanating diseases, most pathologies caused by bacteria are easy to prevent, however, they are not treated with due importance, becoming neglected diseases. The issue of control is always on the side of how to deal with the disease, both from a medical and individual perspective.

Keywords: Tuberculosis. Aerobic Bacteria. Actinobacteria. Gram-positive

1. Introduction

Bacteria are major disease-causing and exist since the beginning of humanity, the pathogenesis caused by these, are easy to contagion, since they are present in all environments and are invisible to the naked eye. The main treatment of diseases caused by bacteria is done by the use of antibiotics, but the incorrect use of these drugs is contributing to the reappearance of several diseases that were no longer so common, not only this, but are also providing the appearance of super bacteria, these that are resistant to the use of antibiotics (BIOLOGY NET, 2020). Experts from the World Health Organization (WHO) say that if no action is taken, resistant super bacteria will cause about 10 million deaths by 2050 (ELPAIS, 2020).

Tuberculosis and botulism are just two of the many pathogenesis bacteria can cause. Tuberculosis, even though it is widely studied and discussed, it is still a neglected

disease. In 1993, the WHO declared the tuberculosis situation as a state of emergency, since it alone could not combat frequent cases. In the 21st century it is admirable that there is still a huge worldwide objection to the correct diagnosis and treatment of tuberculosis (KOZAKEVICH and SILVA, 2015).

Botulism has a worldwide distribution, in which it affects isolated people or may even cause family outbreaks, usually related to the production and conservation of food. It is considered a public health disease due to its severity and high lethality (FIGUEIREDO et al, 2006). According to the WHO, botulism toxins are some of the most lethal substances known to medicine. It can be caused by the entry of the bacteria through bruises and wounds, or by the ingestion of contaminated food (MINHA VIDA, 2020).

From this approach, the objective of this article is to describe through a bibliographic survey, two of the main diseases caused by bacteria, botulism and tuberculosis.

2. Methodology

The article in question was produced through the help of bibliographic research, using digital platforms such as Scielo and Google Scholar, and the virtual health library (VHL/DeCS), having a descriptive character and with the intention of causing reflection on the themes of botulism and tuberculosis, addressing its concepts, treatments and preventions.

The inclusion criteria determined for the selection of articles were: texts available in full, articles Portuguese and English from 2004 to 2020. Exclusion criteria were clinical cases, theses and opinions.

3. Results and Discussion

Tuberculosis

The microorganism causing tuberculosis, *Mycobacterium tuberculosis*, has its very ancient origin, with records of the disease in Egyptian mummies, in ancient Chinese writings, in excerpts from Biblical Hebrew books, among others, making tuberculosis one of the oldest diseases of humanity. Studies lead us to believe that at first, tuberculosis was a zoonosis, and that its causative microorganism was a predecessor variant of *Mycobacterium bovis*. Probably the dissemination occurred by the consumption of contaminated milk or meat (KOZAKEVICH and SILVA, 2015).

In the 18th century tuberculosis became a major epidemic that caused the infection of almost 100% of the European population. Known as the "great white plague" this epidemic has spread for more than 300 years, and it is still perpetuated in several countries, including Brazil. In 1908 a diagnostic test was developed by Florence Seibert that is used to this day; but only in 1921 was the creation of an effective vaccine, in the Pasteur Institute, made by Calmmet and collaborators (KOZAKEVICH and SILVA, 2015).

Tuberculosis has a long latency period, affecting mainly the lungs, and patients with the potential transmitting bacillifeous pulmonary form. Respiratory symptoms are those who have cough for three weeks or more, which are often neglected by health professionals. The clinical manifestations of tuberculosis may present acutely and severely (less common) or more insidiously and slowly (more common). In the insidious form, the main symptoms are low fever, night sweats, unappetite and inexpressive physical examination (PASCHOAL et al, 2018).

The diagnosis of tuberculosis is made mainly by sputum smear microscopy, which is indicated for all respiratory symptoms and also for monitoring during treatment, being mandatory at the end of the 2nd, 4th and 6th month of treatment, by the identification of bacilli through molecular culture and method. (PASCHOAL et al, 2018).

Culture is indicated for suspects of persistently negative pulmonary tuberculosis on direct examination and for the diagnosis of extrapulmonary forms such as meningoencephalocele, renal, pleural, bone or ganglion. Culture is also indicated in cases of suspected bacterial resistance to drugs, followed by sensitivity test (SILVAJR, 2004).

The issue of control is always on the side of how to deal with the disease, both from the point of view of the medical perspective and from the individual perspective. Control presents itself in different forms and levels, over the years, delimited by a fine and fluid line between individual and group that often disgroups, reaffirming its disciplinary and controlling posture (GONCALVES, 2000).

botulism

Botulism is a serious disease and can be considered a medical and public health emergency. It is a disease that is the result of a potent action of the neurotoxin of protein origin, produced by the anaerobic spore-forming bacterium Clostridium botulinum. This disease usually occurs by eating food, in which the toxin was elaborated by the bacterium. It has a sudden occurrence, characterized by selective neurological manifestations, of dramatic evolution and high mortality of 30 and 65% (CERESER et al, 2008).

Botulism is a disease of compulsory notification (Ordinance of the Ministry of Health No. 1,943, of Oct. 18, 2001). Because it is of high severity and has a risk associated with the ingestion of contaminated food, a case of botulism is considered an outbreak, which requires immediate notification and an investigation through epidemiological surveillance of the site (BARBOZA et al, 2011). Despite being a disease that has high severity, it is little diagnosed by health professionals, thus leading to late and ineffective treatments. There are outbreaks of botulism in all continents and remain causing risks to public health, but the number of cases and lethality have been decreasing due to the use of botulinum antitoxin serum (FIGUEIREDO et al, 2006).

According to Barboza et al (2011), the first case of botulism notified to the Health Surveillance Secretariat in Brazil occurred in 2002; however, since 1999, the Coordination of Surveillance of Water and Food Transmission Diseases has carried out the surveillance of botulism. It has been reported that the first epidemic outbreak of botulism in Brazil occurred in Rio Grande do Sul in 1958, where 9 people died after consuming homemade fish.

Clostridium botulinum is a gram-positive bacillus,

actinobacteria that develops in anaerobic medium is a producer of spores frequently found in soil, in vegetables, vegetables, fruits, aquatic sediments and human feces, can also be found with the normal inhabitant of the intestinal tract of horses, cattle and birds, and can multiply and be eliminated in large quantities by feces. The spores that are produced by *Clostridium botulinum* are the most resistant forms found among bacterial agents, this can survive for about 30 years in the liquid medium, and in dry medium can survive longer (CERESER et al, 2008).

According to the Center for Disease Control and Prevention (CDC), seven types of *Clostridium botulinum* (from A to G) are described, where types A, B, E and F cause human diseases and almost unique types of animals. The types are differentiated from their antigenic characteristics of the neurotoxin they produce. Botulinum toxin acts on the blockade of voluntary motor neuromuscular junctions and autonomic cholinergic, which will prevent stimulation of motor fibers. The disease is characterized by cranial nerve paralysis, paralysis of the descending flaccid muscle, which may involve the breathing muscle. In addition to acting reaching the pre-synaptic membranes, where it prevents the release of acetylcholine in nerve endings, which will cause paralysis (SOBEL *et al,* 2004).

Botulinum toxin causes four types of diseases in humans: food botulism, wound botulism, intestinal colonization in adults and child botulism. Food botulism occurs by ingestion of toxins performed by *C. botulinum*, and the other three types occur by infection, multiplication and production of toxins in wounds or in the gastrointestinal tract (CERESER *et al*, 2008).

Food botulism is considered a disease of extreme severity, having an acute evolution, which causes digestive and neurological disorders. When foods containing the toxin are ingested, the toxin that is absorbed will be transported via hematogenous to sensitive neurons, causing food botulism, and ingestion of the spores of C. botulinum present in the food will cause child botulism (CERESER *et al*, 2008).

Infant botulism can occur in very young children due to the absorption of the toxin produced a live, in the intestine of the child. The absence of the protective microbiota allows the germination of ingested *C. botulinum* spores and the production of the toxin in intestinal light to take place. This germination of spores in foods that are consumed is promoted by anaerobic conditions, and to destroy the spores of foods that are contaminated, they should be heated to 130°C for 30 minutes (CERESER *et al*, 2008).

The clinical picture of pathogenesis in general, in the four categories, is basically the same. Within the first symptoms has variation in nausea, vomiting, abdominal pain, diarrhea and constipation. In relation to neurological signs may manifest through headache, visual difficulties such as diplopia, dilated pupil, eyelid ptosis, nystagmus, ophthalmoplegia, dysphagia, dry mouth, throat and tongue, descending paralysis, progressive muscle weakness, being initiated in the cervical region and extending to the upper limbs, thorax and lower limbs, also possessing gastric dilation, paralyzed ileus, urinary retention , loss of muscle control, respiratory impairment and generalized fatigue. Respiratory impairment is considered one of the main causes of death (BARBOZA *et al*, 2011).

In relation to prevention, especially for food, procedures are aimed at preventing the germination of spores from multiplying microorganisms and producing Toxins from *C. botulinum* in food. It is necessary to have a good sterilization of food, which is a decisive factor for the prevention of botulism and also a conservation of food and refrigeration temperature or even freezing. Foods that are canned that are with stewed cans need to be destroyed, rejected or disposed of immediately. A health education in the population is essential, in addition to children under two years of age should not consume honey, because the disease of infantile botulism is strongly associated with the consumption of contaminated honey (FIGUEIREDO *et al,* 2006).

4. Conclusions

Due to the facts mentioned, it is possible to observe that bacteria are present in various environments and are microorganisms prone to emanated diseases. Most of the pathologies caused by bacteria are easy to prevent, but are not treated with due importance, becoming neglected diseases. Most pathologies circulate for a long time in the human body and end up creating resistance to drug treatment, thus making them difficult to treat.

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