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EPIDEMIOLOGY OF HUMAN RABIES IN BRAZIL: A BRIEF REVIEW

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Abstract: Rabies is a disease of great importance in public health, as it is considered a viral zoonosis that affects all mammals, and is 100% lethal in most cases, and cures have been considered very rare since its discovery. The objective of this study was to carry out a review of the disease and cases of human rabies in Brazil, differentiating the aggressor species and region, in order to provide technical and scientific information about rabies to veterinary students, veterinarians and other health-related professionals.
Keywords: Rabies, epidemiology, zoonoses, lyssavirus

INTRODUCTION

Rabies is a serious acute viral infectious disease that affects mammals, including man, and is characterized as a progressive and acute encephalitis with a lethality rate of approximately 100%. It is caused by a virus of the genus Lyssavirus, of the Rabhdoviridae family (BRASIL, 2022).

In nature, the rabies virus is maintained by occasionally interrelated cycles, called urban and wild, aerial and rural cycles. The urban cycle refers to rabies in domestic dogs and cats; aerial cycle refers to rabies in bats, the rural cycle refers to rabies in herbivores, which mainly involves cattle and horses and in which the main vector is the vampire bat. The sylvatic cycle is represented by rabies in wild terrestrial mammal species, with emphasis on wild canids (BATISTA et al., 2007; BRASIL, 2008) The air cycle of rabies is currently of great importance for the maintenance of the virus in a Geographical area. The different species of bats, hematophagous or not, are susceptible to the virus, with the possibility of transmitting it and presenting symptoms, which always progress to death (BRASIL, 2008).

Transmission occurs through the saliva of infected animals, mainly through the bite, and can also be transmitted by scratching and/or licking these animals (BRASIL, 2022). However, the epidemiology of rabies depends on the natural hosts that facilitate the passage of the virus from an infected individual to another susceptible (RODRIGUEZ et al., 2007). Rabies is a disease that can be controlled, particularly in the urban cycle, as it is highly preventable, allowing efficient intervention measures both with humans and with the source of animal infection (COSTA et al, 2000). In Brazil, disease control began in 1973, when the National Rabies Control Program (PNCR) was created with the objective of eliminating human rabies transmitted by dogs and cats and controlling canine rabies. (MINISTRY OF HEALTH, 2014).

The virus is present on all continents, with the exception of Australia and Antarctica. The high adaptability of the virus, which can adopt different species as reservoirs, allows for this wide distribution. Worldwide, the disease is responsible for about 60,000 human deaths annually and, in the vast majority of cases, dogs are the source of the infection. Although the disease is considered eradicated in some countries, it is still common in two-thirds of them (OIE, 2020; PAHO, 2022). Given the importance of this disease, the objective of this work is to review the literature using scientific data on the epidemiology of rabies in Brazil.

MATERIALS AND METHODS

The present study presents itself as a descriptive and retrospective analysis of scientific articles related to the epidemiology of human rabies in the national literature. The study encompasses cases of human rabies that occurred in Brazil, aggressor species and region, and as a research, information from secondary data that are available at the secretary of health surveillance in Brazil,

in addition to selected articles for their composition on the following platforms : pubmed, google scholar and SciELO.

EPIDEMIOLOGICAL SITUATION OF RABIES IN BRAZIL

Analyzing the historical evolution of the disease in the country, it appears that before the 1940s there were fewer than 10 cases of human rabies per year. Between 1943 and 1947, the cases increased to approximately 15 cases/year, with an increase of about 30 average annual cases, in the period from 1963 to 1967. (TAKAOKA, 2000).

Within this context, the National Rabies Prophylaxis Program was instituted in Brazil in 1973 as one of the priority programs of the National Health Policy, through an agreement signed between the Ministry of Health, Ministry of Agriculture, Central de Medicamentos, Pan -American Health Organization/PAHO and the World Health Organization/WHO (BRAZIL, 2016).

The objective of the program was to promote systematic activities to combat human rabies, through the control of rabies in domestic animals and the treatment of people bitten or at risk of infection, who had contact with rabid animals (ITO; MEGID, 2016). In the last years of the 20th century, between 350,000 and 400,000 human patients/year were treated in the country (BRASIL, 2000).

It is noteworthy that the creation of the rabies vaccination program enabled the development and implementation of technical norms for the control of the disease, elaboration of a standard in the production and control of immunobiologicals used in the control of rabies and also in the supply of the State Departments of Health (ITO; MEGID, 2016). In the historical series from 1999 to 2017, Brazil went from 1,200 dogs positive for rabies in 1999 (including mostly variants 1 and 2, typical of these animals), to 11 cases of canine rabies in 2020, all identified as variants of animals. wild animals (BRAZIL, 2022).

In 2010, the Ministry of Health definitively changed the vaccines used in routine and in canine and feline rabies vaccine campaigns by cell culture vaccines, as they are safer and more effective in converting protective titers in these animals. This vaccine is available free of charge in the SUS for the vaccination of dogs and cats in massive campaigns and for routine demands (BRASIL, 2022).

Since 1995, the states of Santa Catarina and Rio Grande do Sul have not carried out massive annual canine and feline vaccination campaigns. Until 2015, Paraná carried out vaccination campaigns for dogs and cats only in municipalities bordering Paraguay. Thus, it is observed that rabies in Brazil has different levels of endemicity in different regions of the country. In the South region, urban rage is under control. The other regions of the country still have cases of urban rabies (BATISTA et al., 2007).

In the State of São Paulo, the decision n° 169 published in December 2021 was published, which approves the maintenance of the rabies vaccination of dogs and cats in a routine strategy, vaccination of dogs and cats contacting bats and focus blocking (when applicable). the case) and the suspension of annual vaccination campaigns. In other words, São Paulo is considered an area free of rabies due to the canine variant, as the last case of notification of this variant occurred in 1997 and since then all other reported cases have been caused by variants of wild animals, particularly bats (DIÁRIO OFICIAL, 2021).

According to the Ministry of Health, the Federal Executive Branch responsible for the organization and elaboration of plans and public policies aimed at health promotion, in the period from 2010 to 2022, 45 cases of human rabies were registered in the country. Such data show that of 45 cases, 24 cases had

bats as the aggressor animal, 9 by dog, 5 by felines, 4 by non-human primates, 2 by foxes and in one of them it was not possible to identify the aggressor species (BRASIL, 2022).

With the change in the epidemiological profile of human rabies in Brazil due to the increase in cases with transmission by wild animals, it is clear that wild rabies emerges as a new scenario and a great challenge for epidemiological surveillance (WADA; ROCHA; MAIA-ELKHOURY, 2011). In other words, the importance of the bat as a transmitter of rabies has increased, becoming the main aggressor species in the country. This change in the epidemiological profile of the disease could be explained by several factors, such as the expansion of urban areas, deforestation, lack of planning for urban afforestation, among other environmental factors (CEVS, 2012).

One of the outbreaks of human rabies in Brazilian lands occurred in riverside communities in the Marajó region, at the mouth of the Amazon River. Nearby, there was deforestation by the action of loggers, which made environmentalists point to environmental impacts as one of the causes of the situation. Researchers claim that the removal of tall trees in the forests destroys the housing of bat colonies and drives away animals that would be their prey, which can lead them to approach people and livestock (FERNANDES et al., 2013; PRADO, 2019).

When analyzing the epidemiology of human rabies in Brazil, according to studies, the North and Northeast regions were more likely to have outbreaks of cases of the disease, as they are regions that have difficulty in promoting the control of the disease, both due to lack of information and knowledge about the disease. risk of the disease, as well as the lack of basic sanitation and inadequate health infrastructure, in addition to the financial constraint and being deforestation territories, which facilitates the migration of wild animals to rural communities (PINTO, 2019). In these places, the population lacks basic knowledge about the disease and its transmission cycle involving populations of wild animals. With this, there is a large part of people who maintain contact with wild animals kept in captivity or in the wild, such as wild dogs and non-human primates that often live together with domestic animals such as dogs, cats, horses, among others, leading to interaction between humans, wild and domestic species, which shows the circulation of virus variants maintained and transmitted by these wild animals, reinforcing the importance of immunizing dogs and cats, in addition to information and access to health centers for post-exposure vaccination (DUARTE, 2021).

Continuing education on how to proceed in the face of aggression by animals that pose a risk of transmitting rabies to the population, carried out permanently by health professionals, will lead to better care for people potentially at risk and will facilitate the flow of epidemiological control of rabies, as the population will be duly clarified about the importance of responsible custody of their pets and guided on how to proceed in cases of aggression by mammals (CAVALCANTE *et al*., 2016).

Rabies control in vampire bats is done by applying a paste containing an anticoagulant substance to the captured animals, followed by its release for later dissemination of the product to the other animals in the colony (LIMA et al., 2017). In non-hematophagous bats, control is done through passive surveillance, by sending samples of animals found dead or alive, at unusual times and places (DA SILVA *et al.,* 2021).

Another strategy for controlling rabies in wild terrestrial animals is vaccination with the use of oral bait, as in the case of 24

countries that implemented this program and managed to eliminate rabies in foxes in the last three decades in several areas of Western and Central Europe (FREULING). et al., 2013). Unlike the countries that have adopted this vaccination, Brazil does not use oral vaccination to control rabies in wild animals, as it does not have a license to import the immunobiological because the vaccines are attenuated and recombinant (BRASIL, 2021; CORDEIRO et al, 2016). However, a study carried out by Andrade et al. (1999), with the use of vaccines produced in cultures of NIL-2 cells and used in marmosets *Callithix jachus,* produced good results regarding the production of antibodies by the animals used, but, due to the form of application of the immunobiological subcutaneously, the use becomes unfeasible in free-living animals.

It is undoubted that in areas where the virus circulates in wild species, it is extremely necessary that all dogs and cats are immunized, since these animals can have contact with such species and are of great epidemiological relevance in the transmission of the disease to humans (GLOBAL ALLIANCE FOR RABIES CONTROL, 2015).

CONCLUSION

Surveillance and monitoring of the rabies virus, the implementation and strengthening of surveillance actions in humans exposed to aggression, are of fundamental importance for the non-occurrence of cases. The preservation of the environment is also essential to control cases of human rabies, given that the main aggressor species are bats and the deforestation of their natural habitat causes them to lose their places of shelter and this promotes their migration from nature. to the urban environment, thus being able to spread the disease to humans.

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