



## Profile of human anti-rabies care related to accidents with wild animals from 2015 to 2019 in Teresina – PI

### Perfil do atendimento antirrábico humano relacionado a acidentes com animais silvestres no período de 2015 a 2019 em Teresina – PI

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#### ABSTRACT

Human rabies is a notifiable zoonosis of great importance for public health. The present work aimed to evaluate the profile of human anti-rabies care resulting from accidents with wild animals through analyzes of 25,783 SINAN records in the municipality of Teresina-PI from 2015 to 2019. Among the results, 758 accidents with wild animals were observed, with a total prevalence of 2.93%, of which 2.01% (94/4,673), 4.24% (196/4,621), 3.04% (152/4,991), 3.1% (175/5,628) and 2.4% (141/5,870) in 2015, 2016, 2017, 2018 and 2019 respectively. The main species involved were non-human primates (52.13% - 395/758), of the species *Sapajus* sp. and *Callithrix jacchus*. Regarding gender, 59% (445/758) of patients were male. The most frequent level of education was incomplete primary education (14.90% - 14/94). 75.54% (71/94) lived in the urban area. Bites were more frequent (85%), with single injuries (65.09%), superficial (55.32%) and on hands/feet (43.44%), and in 77.65% of cases, serovaccination treatment was indicated, with a dropout rate of 26.60% (25/94). Despite the low prevalence, accidents involving wild animals represent a potential risk of rabies transmission, and these should also be the subject of awareness policies.

**Keywords:** rabies, wild animals, public health, vaccination.



## INTRODUCTION

Rabies is an acute infectious disease caused by a virus that affects mammals, with neurotropic specificity, mainly the Central Nervous System (CNS), causing encephalitis with approximately 100% lethality worldwide (AGUIAR, 2010; WADA et al., 2011; PUGA, 2015). From antiquity to the present day, it has a wide worldwide distribution, and because it is a zoonosis, it is believed that the proximity between humans and animals susceptible to the disease is a challenge for public health, requiring compulsory notification (AGUIAR, 2010 ; BRASIL, 2011; MORAES et al., 2010).

Around 55,000 deaths from rabies in humans are recorded worldwide, with dogs being considered the main transmitter of the disease, not excluding transmission from wild animals (MORAES et al., 2010). But in recent years this number has been decreasing, especially in regions whose goal of eliminating rabies through vaccination of domestic animals and humans is close to eradication. In regions where wild animals, such as hematophagous bats, are participants in the rabies transmission cycle, there is difficulty in controlling them, as they are difficult to monitor (KOTAIT et al., 2007; OPAS, 2012).

The North and Northeast regions of Brazil, stand out when it comes to the number of cases of human rabies. In the period from 2000 to 2017, the Northeast region was responsible for more than half of the cases of human rabies in Brazil (VARGAS, ROMANO & MERCHÁN-HAMANN, 2019; SILVA et al., 2020). Furthermore, the neighbors of the state of Piauí exhibit important particularities related to rabies cases. Maranhão is known as one of the states with the highest prevalence of human rabies cases in Brazil (SILVA et al., 2020). In Ceará, research demonstrated a reduction in cases arising from accidents with dogs and cats, however, it reported an increase in cases arising from accidents with wild mammals (Duarte et al., 2021).

In Piauí state, in 2004, the Animal Pathology Laboratory (ADAPI/Teresina) identified two cases of rabies in hematophagous bats involving the species *Desmodus rotundus* and *Diphylla ecaudata*. The positive diagnosis revealed the importance of bats as reservoirs of rabies in the wild. In 2005, there was an outbreak of rabies in foxes (*Lycalopex vetulus*) in Teresina, and there have been no outbreaks of human rabies since 1989 (PESSOA & PESSOA, 2007), although in recent years, two cases of human rabies from marmoset bites (*Callithrix jacchus*), including two deaths. In this



context, the importance of analyzing data from post-exposure anti-rabies care is evident to improve epidemiological surveillance, as well as better guidance for prevention and control of the disease by responsible institutions (FILGUEIRA et al., 2011).

## **MATERIAL AND METHODS**

A retrospective descriptive observational study was carried out through analysis of records from the Notifiable Diseases Information System (SINAN) from 2015 to 2019 at the Natan Portela Tropical Diseases Hospital in Teresina – Piauí. Data relating to the number of people who were attacked by wild animals were considered. Of the total of 25,783 case files in the period, only information necessary for the study was transcribed into a form adapted from SINAN, without access to patient identification information. The variables analyzed were: the injured population (gender, age group, education level, area of residence in the municipality, time taken to seek care), characteristics of the accident (species involved, condition of the animal, type of exposure, location of the injury, quantity and type of injury, type of treatment indicated and abandonment rate).

Descriptive statistics were used with simple means and frequencies, using Microsoft Excel software.

## **RESULTS AND DISCUSSION**

It was found that of the 25,783 records analyzed, 758 cases were accidents involving wild animals, which corresponds to a general prevalence of 2.93%. It was observed that the number of cases increased over the years, with prevalences of 2.01% (94/4,673), 4.24% (196/4,621), 3.04% (152/4,991), 3.10% (175/5,628) and 2.4% (141/5,870) for the years 2015, 2016, 2017, 2018 and 2019 respectively. In addition, 94 forms were classified as pre-exposure vaccination, in which it was found that 100% of the patients were Veterinary Medicine students (0.7%). In this sense, Alves et al. (2023) reported that Veterinarians are within the category of professionals most susceptible to rabies, both due to their greater professional proximity to reservoirs and the greater possibility of participating in situations that constitute risk factors, such as an accident with an animal suspected of rabies or handling animals, living or dead, with clinical neurological signs or working in diagnostic laboratories (OLIVEIRA et al., 2020).



Among the 758 cases related to accidents resulting from wild animals, the animal group that presented the highest frequency of aggressions was non-human primates, with 52.13% of cases (395/758), mainly from the species *Sapajus sp.* (Capuchin monkey) and *Callithrix jacchus* (Marmoset), followed by chiropterans with 36.18% (274/758) of cases. The other species involved were foxes (*Lycalopex sp.*) (48/748), agouti (*Dasyprocta leporina*) (32/758) and mucura (*Didelphis sp.*) (8/758), with frequencies respectively 6.38%, 4.00%, 25% and 1.06%. These data are corroborated by the findings of Duarte et al. (2021), who reported that among accidents involving wild animals, 9.35% (16/171) were related to marmosets.

In the monthly distribution, the months with the highest frequencies were August, September and December with 13.83% each (105/758), followed by March with 12.77% (97/758), June and November with 10.64% (81/758) each, May with 9.58% (73/758), October with 6.38% (48/758), February with 5.31% (40/758), April with 3.19% (24/758). In the months of January and July there were no reports of wild animals.

Of the people involved in accidents, 59.8% (446/758) were male, with a higher frequency of accidents in the age groups ranging from 31-50 and 51-80 years, and 40.2% (312/758) were female with a higher frequency of accidents in the age group ranging from 31-50 years. Regarding the time taken to seek care after the accident, it was observed that 61.87% (469/758) sought care within 24 hours, followed by 10.15% (77/758) within 48 hours, 3.56% (27/758) up to 72h and after 72h with 7.78% (59/758) as seen in Table 1.



**Table 1.** Profile of anti-rabies vaccination care resulting from accidents with wild animals in Teresina-PI, 2015-2019 regarding the characteristics of the accident.

	2015		2016		2017		2018		2019	
	n	%	n	%	n	%	n	%	n	%
	94		196		152		175		141	
<b>Search for Service</b>										
24h	64	68,0	82	41,8	42	27,6	152	86,5	129	91,4
48h	15	15,9	13	6,6	42	27,6	1	0,5	6	4,3
72h	08	8,5	9	4,5	6	3,9	4	2,2	-	-
+72h	07	7,4	22	11,2	7	4,6	17	9,7	6	4,3
Not Informed	-	-	48	24,4	-	-	-	-	-	-
<b>Animal Conditions</b>										
suspect	44	46,8	104	53,0	-	-	9	5,1	19	13,4
Healthy	08	8,5	53	27,0	44	28,9	35	20,0	13	9,2
Missing/Dead	42	44,8	14	7,1	-	-	97	55,4	77	54,6
Not informed	-	-	23	11,7	74	48,6	34	19,4	19	13,8
<b>Type of exposure</b>										
Bites	85	85,0	92	46,9	105	68,0	134	76,5	108	78,8
Scratch	10	10,0	11	5,6	7	4,4	8	5,0	11	8,0
Direct contact	03	3,0	11	5,6	5	3,1	1	0,5	7	5,1
Licking	02	2,0	-	-	-	-	4	2,2	1	0,7
Pre-exposition	-	-	54	27,5	-	-	31	17,7	3	2,1
Not informed	-	-	28	14,2	39	24,5	2	1,1	7	5,0
<b>Number of injuries</b>										
Unique	62	65,9	81	41,0	78	51,4	113	64,5	94	66,6
Multiple	29	30,8	21	11,0	36	23,6	34	19,4	28	19,8
Not informed	03	3,1	94	48,0	38	25,0	33	18,8	19	13,4
<b>Type of injuries</b>										
Superficial	52	55,3	49	25,0	56	36,8	73	41,5	77	56,2
Deep	39	41,4	59	30,0	53	34,8	67	38,2	34	24,8
No Identification	03	3,1	88	45,0	43	28,4	44	25,1	26	18,8
<b>Location of the wound</b>										
Hands/feet	43	43,4	49	30,0	65	42,7	63	36,0	63	44,6
Arms	31	31,3	26	16,0	22	14,4	25	14,2	14	9,9
Legs	19	19,1	34	21,0	24	15,7	46	26,2	27	19,1
Head/neck	05	5,0	5	3,0	6	3,4	13	7,4	11	7,8
Chest	01	1,0	5	3,0	1	0,6	8	5,0	1	0,7
Not informed	-	-	8	5,0	33	21,7	32	18,2	25	17,7
<b>Agressor species</b>										
Wild Canid/felid	6	6,3	0	0,0	2	1,31	9	5,14	8	5,67
Bats	34	36,1	21	11,0	39	25,6	49	28,1	56	37,5
Non-human primates	49	52,1	15	8,0	43	28,2	60	34,2	27	19,1
Production animals	-	-	32	17,0	2	1,31	11	6,29	10	7,09
Others	5	5,31	12	6,0	0	0,0	12	6,83	43	30,4
Not informed	-	-	116	59,0	66	43,4	18	10,28	0	0,0

Notifiable Diseases Information System (SINAN).

In the evaluation regarding the type of exposure, the most frequent was biting with 85% of cases, while scratching, direct contact and licking represented 10%, 3% and 2% respectively. Regarding the quantity and type of injury, 62 (65.95%) of the cases reported it as a single injury, while 29 (30.85%) described as multiple injury.



Only three (3.19%) cases did not contain a description of the number of injuries. Regarding the type of wound, superficial was described in 52 cases, deep in 39. Only three did not report the type of wound. Hands/feet were the sites with the highest frequency of injuries with 43.44% (43/99), followed by upper limbs 31.31% (31/99) and lower limbs with 19.19% (19/99). In five cases there was more than one location of aggression on the body (Table 1). In 46.81% (44/94) of visits, the animal's condition was considered suspicious, in 44.68% (42/94) the animal was reported missing, and in 8.51% (8/94) it was reported as healthy.

Regarding the type of treatment, serovaccination was indicated in 77.65% of cases, and only vaccine in 22.35%. There was a treatment abandonment rate of 26.60% (25/94), as shown in Table 2. Veloso et al. (2011) report that adult men are the ones who abandon treatment the most, and the main causes of abandonment are related to lack of information regarding the importance of post-exposure treatment, lack of guidance regarding the treatment protocol and lack of time to carry out the treatment.

**Table 2.** Profile of anti-rabies vaccination care resulting from accidents with wild animals in Teresina-PI, 2015-2019, regarding the indicated treatment and treatment abandonment rate.

	2015		2016		2017		2018		2019	
	n 94	%	n 196	%	n 152	%	n 175	%	n 141	%
<b>Recommended Treatment</b>										
Vaccination	21	23,0	47	23,9	35	23,1	-	-	26	18,4
Serotherapy+vaccinat	73	77,0	75	38,2	84	55,2	-	-	97	68,7
Pre-exposition	0	0,0	39	19,8	12	7,89	09	6,3	09	6,38
Exemption from treatment	0	0,0	01	0,51	1	0,65	5	3,5	05	3,54
Not informed	0	0,0	34	17,3	19	12,5	-	-	04	2,82
<b>Interruption of treatment</b>										
Yes	25	26,6	34	17,3	30	19,7	-	-	06	4,2
No	69	73,4	145	73,9	113	74,3	-	-	24	17,2
Not informed	0	0,0	17	8,6	9	6,0	-	-	111	78,7

Notifiable Diseases Information System (SINAN).

The results found are in line with a report that occurred in Teresina-PI (ABREU & CRIZÓSTOMO, 2014), which highlights the importance of domestic dogs with a high frequency of accidents, followed by felines and non-human primates in the transmission of rabies in the region. The relevance of this work is corroborated by a report, in which three cases of human rabies were reported in 2008, as well as in 2012 and 2013, two deaths were confirmed, involving the species *Callithrix sp.* and





*Sapajus* sp. (BRAZIL, 2011). Despite the low prevalence of cases involving wild animals (2.93%), it is important to highlight that these are increasingly important in the epidemiology of rabies, especially the species *Callithrix jacchus jacchus*, possibly with a new variant, with no antigenic or genetics with the variants found in bats and other mammals (FAVORETTO et al., 2001; SOUSA et al., 2013). In this sense, it is possible that this fact could negatively influence treatment (vaccination and serotherapy).

Regarding the sex of those involved, this finding is similar to some reports in which there is a greater frequency of cases in males (GARCIA et al., 1999; BUSATTO et al., 2014). It is believed that this is due to the primitive hunting instinct of men, in addition to the creation of wild animals in the home environment. Furthermore, it is likely that the type of occupation, in which most outdoor work and involving exposure to reservoir animals (whether domestic or wild) are mostly carried out by males, could explain the result found.

Regarding the domicile of those involved, the findings of this work corroborate the report carried out in the state of Pernambuco (SILVA, 2012), which cites the urban area with greater prevalence in relation to the rural area. It is believed that this occurs due to a decrease in the habitat of wild animals as a result of the progressive growth of cities, as well as the search by urban men for places to go for walks in rural areas and the illegal breeding of wild animals in the home environment, thus narrowing the human-animal relationship (PESSOA & PESSOA, 2007). In this context, we emphasize that it would be extremely important to supplement the SINAN form for rabies, including questions related to the type of accident situation, whether during leisure time or professional activity, and also the reasons that led to the possible abandonment of patients to the complete treatment, which would contribute to a more reliable analysis of risk factors.

When investigating the relationship between the number of days of exposure to the virus and the date of notification of care at the Health Unit, as seen in Table 1, they corroborate the report by Garcia et al. (1999), in which he asserts that the search for post-exposure care to the rabies virus is due to the fact that people are aware that the bite is an exposure with a greater risk of virus contamination. However, the variability in seeking care post-exposure to rabies does not always reflect a concern about the disease itself. Veloso et al. (2011) reported that often the search for care may not be linked to rabies, but simply to heal injuries or concern about other



diseases such as tetanus. This may be worrying, considering the lethality of the disease.

Evaluating the types of exposure, the higher prevalence of biting is similar to some results found by Pessoa & Pessoa (2007), Garcia et al. (1999) and Busatto et al. (2014), probably because it is the most frequent way used to defend and attack animals. Most of the injuries were single and superficial. It is then assumed that the factor responsible for this finding is due to the speed with which the individual managed to free himself from the attack of the animal in question. These results differ from the findings made in Teresina, which cite deep wounds more frequently in 2012 in Teresina-PI, probably because they involve other species, mainly dogs and cats (ABREU & CRIZÓSTOMO, 2014).

Regarding the location of the injuries, it is believed that the greater frequency of injuries to the hands/feet and upper limbs is mainly related to the positioning of the victims at the time of the attack, in their defense directing and/or placing their hands or feet in the attempt of self-defense and/or containment of the attacking animal (BUSATTO et al., 2014).

Regarding treatment, although the majority of injuries are superficial, one must take into account the lack of knowledge of the pre-exposure condition of the people involved in the accidents, the fact that most accidents are due to bites and to the hand/feet and the condition of most animals is suspect, which corroborates the indication for serovaccination. Regarding abandonment of treatment, the difficulty of moving from their municipality to the qualified health unit, and the dependence on the husband to do so, may be one of the reasons for abandonment of treatment, since the highest prevalence was of women who reside in the interior (VELOSO et al., 2011).

## CONCLUSIONS

Considering the change in the epidemiological profile of human rabies cases, which involves a reduction in cases related to domestic animals and an increase in cases involving wild animals, it is concluded that accidents involving wild animals may represent an important risk factor for transmission of rabies to humans, especially non-human primates. Furthermore, based on the profile found in this study, and also, adding the fact that awareness campaigns focus mainly on dogs and cats, it is necessary to broaden their focus, to include wild animals as well as expand to the





occupational issue, mainly aimed at expanding pre-exposure vaccination and intensifying health education.

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