

DOI: <https://doi.org/10.36489/saudecoletiva.2021v11i65p6044-6053>

# Cysticercosis deaths in the northeast region of Brazil in 2019

Muertes por cisticercosis em la región noreste de Brasil em 2019

Óbitos por cisticercose na região nordeste do Brasil em 2019

## ABSTRACT

The study aimed to carry out a survey of epidemiological data on the prevalence of infections by cysticercosis in human beings in the northeastern region of Brazil, in the year 2019. The study was made based on the data provided by SINAN-DATASUS, on the subject. The highest number of deaths was found in the state of Ceará. The deaths occurred mostly in male patients, aged 40 to 59 years, with no schooling years. It can be concluded that the persistence of the cases is linked not only to the penetration and magnitude of the disease, but to its neglect on the part of the health authorities and the lack of basic sanitation policies for the population.

**DESCRIPTORS:** Cysticercosis; Epidemiology; Parasitology; Death.

## RESUMEN

El estudio tuvo como objetivo realizar una encuesta de datos epidemiológicos sobre la prevalencia de infecciones por cisticercosis en seres humanos en la región nororiental de Brasil, en el año 2019. El estudio se realizó con base en los datos proporcionados por SINAN-DATASUS, sobre el tema. El mayor número de muertes se encontró en el estado de Ceará. Las muertes ocurrieron principalmente en pacientes varones, de 40 a 59 años, sin años de escolaridad. Se puede concluir que la persistencia de los casos está ligada no solo a la penetración y magnitud de la enfermedad, sino a su descuido por parte de las autoridades de salud y la falta de políticas de saneamiento básico para la población.

**DESCRIPTORES:** Cisticercosis; Epidemiología; Parasitología; Muerte.

## RESUMO

O estudo teve como objetivo realizar um levantamento de dados epidemiológicos acerca da prevalência de infecções por cisticercose em seres humanos na região Nordeste do Brasil, no ano de 2019. O estudo foi feito com base nos dados disponibilizados pelo SINAN-DATASUS, sobre o tema. O maior número de óbitos foi encontrado no estado do Ceará. Os óbitos ocorreram em sua maioria em pacientes do sexo masculino, da faixa etária de 40 a 59 anos, com nenhum ano de escolaridade. Conclui-se que a persistência dos casos está ligada não apenas a penetrância e magnitude da doença, mas sim ao seu negligenciamento por parte das autoridades em saúde e a falta de políticas de saneamento básico para a população.

**DESCRIPTORES:** Cisticercose; Epidemiologia; Parasitologia; Morte.

RECEIVED ON: 01/30/2021 APPROVED ON: 02/16/2021

### Felipe André Sousa Silva

Medical Student; UNIFACID University Center.  
ORCID: 0000-0003-2317-6378

### Maria Clara Leal Pereira

Medical Student; UNIFACID University Center.  
ORCID: 0000-0002-2544-6733

### Maria Victoria Sousa Dias

Medical Student; UNIFACID University Center.  
ORCID: 0000-0002-2943-1934

## Ruth Ravena Luz Carvalho Sousa Cipriano

Medical Student; UNIFACID University Center.  
ORCID: 0000-0002-1312-3048

## Sâmia Gonçalves de Moura

Medical Student; UNIFACID University Center.  
ORCID: 0000-0001-9640-5181

## Augusto Cesar Evelin Rodrigues

Professor at UNIFACID University Center.  
ORCID: 0000-0001-7469-981X

## INTRODUCTION

**W**idely known in the medical literature, the teniasis-cysticercosis complex is considered a group of zoonoses prevalent in Brazil, with high rates of infections annually in our country, especially in the Northeast region, due to the precarious living conditions of this population.

This pathology presents itself as a public health problem, since it is capable of reaching a large number of people who are vulnerable to this type of infection, either because of the clinical condition that it can trigger, or because of the deaths that it may cause.<sup>1</sup>

Man acts as the only definitive host, both for *Taenia solium* and *T. saginata*, and also as an intermediate host, together with pigs, for *T. solium*, developing cysticercosis in their tissues, especially neurocysticercosis, which is the most serious and frequent form of this complex in human beings.<sup>2</sup> This pathology has pleomorphism in its clinic, as the cysticercus has the capacity to lodge in multiple tissues of the host, however it has a predilection for skeletal and nervous muscle tissues, which implies innumerable clinical repercussions.<sup>2,3,14</sup>

In this scenario, when it lodges in the musculature or in subcutaneous tissue, the larva may present few symptoms, since inflammation and formation of a fibrous adventitious membrane occur, followed by calcification. This can cause moderate pain, cramps and fatigue. When it settles in the myocardium, it can lead to cardiac arrhythmias. Along with this, there is also neurocysticercosis,

**Widely known in the medical literature, the teniasis-cysticercosis complex is considered a group of zoonoses prevalent in Brazil, with high rates of infections annually in our country, especially in the Northeast region, due to the precarious living conditions of this population.**

which is the most serious clinical presentation. The cysticercus installs in the nervous parenchyma, which can lead to nerve compression, vasculopathies and neuronal death. The most common clinical manifestations are: headache, seizures, psychological disorders and absence crises.<sup>4,5</sup>

As it is related to precarious living conditions, the World Health Organization (WHO), between 2008 and 2015, included the complex teniasis/cysticercosis in the subgroup of neglected zoonoses, aiming to control the so-called neglected tropical diseases.<sup>6,7</sup> From this perspective, the study aimed to carry out an epidemiological survey of deaths caused by human cysticercosis in the Northeast region in 2019. Such search is relevant due to the social character that this disease has, since it is categorized as neglected. Therefore, looking for consolidated data that show the real picture of this disease in the Northeast region will expand the literature on the subject, as well as providing visibility and greater investments in the prevention, control and treatment of this disease.

## METHOD

This is a descriptive, cross-sectional, analytical, documentary study, carried out based on the data obtained by consulting SINAN-DATASUS, which is an epidemiological database, in electronic form and the sources consulted for the theoretical basis were taken from online databases, such as PUBMED and SciELO. The consolidated data is in the public domain, which allows it to be con-

sulted by any researcher. The results were collected in December 2020. The cases surveyed were from the nine states that make up the northeastern region of Brazil, related to the time period of one year (2019), through the PUBMED and SciELO databases, observing the following variables: age group, gender and years of schooling. All deaths that occurred and registered with SINAN-DATASUS were included in the nine states that make up the northeast region (Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Sergipe, Alagoas and Bahia). The cases registered in SINAN-DATASUS were excluded from the study, in which the patients were from other regions of the country. After collecting the data, they were analyzed using ab-

solute and relative numbers and proportions based on 100 and the results were presented through tables and graphs for better understanding.

Because of this, the study did not require the approval of the Ethics and Research Committee (CEP), however, the researchers undertook to watch over the principles set out in Resolution No. 510, of April 7th, 2016.

## RESULTS

Table 1 shows the deaths due to human cysticercosis by Region/Federation Unit, according to the age group in 2019. From these data it is possible to infer that the age groups with the greatest involvement were those from 40 to 49 years - 06

deaths (27,27%) and 50 to 59 years old 06 deaths (27,27%).

According to Table 2, it is possible to observe the relationship between the educational level and the number of deaths due to human cysticercosis in the northeastern region of Brazil in 2019. The highest number of deaths occurred among those who had less schooling, with a total of six deaths (27,27%). However, there is a regular distribution of 4 deaths (18,12%) for the other age groups.

According to Table 3, the distribution of deaths by Region/Federation Unit according to residence and sex, was concentrated in the male population with a total of 15 deaths (68,18%), which is more than half when compared to the number absolute number of female deaths, which

TABLE 1. Deaths due to human cysticercosis, according to age group and Region/Federation Unit. Brazil. 2019.

FEDERATION UNIT REGION	AGE GROUP							TOTAL
	20 TO 29 Y/O	30 TO 39 Y/O	40 TO 49 Y/O	50 TO 59 Y/O	60 TO 69 Y/O	70 TO 79 Y/O	80 TO 89 Y/O	
NORTH EAST	2	2	6	6	1	3	2	22
MA	-	-	-	-	-	-	-	1
PI	-	1	1	-	-	-	-	1
CE	2	-	1	2	1	2	1	9
RN	-	-	1	1	-	-	-	2
PB	-	-	-	-	-	1	-	1
PE	-	-	1	-	-	-	-	1
BA	-	1	2	3	-	-	1	7

Source: MS/SVS/CGIAE - Mortality Information System - SIM.

TABLE 2. Deaths due to human cysticercosis, according to level of education and Region/Federation Unit. Brazil. 2019.

REGION / FEDERATION UNIT	WHITE	BLACK	BROWN	IGNORED	TOTAL
Northeast Region	2	1	19	-	22
Maranhão	-	-	1	-	1
Piauí	-	-	1	-	1
Ceará	1	-	8	-	9
Rio Grande do Norte	-	-	2	-	2
Paraíba	-	-	1	-	1
Pernambuco	-	-	1	-	1
Bahia	1	1	5	-	7

Source: MS/SVS/CGIAE - Mortality Information System - SIM.

were 7 (31,81%). Of the total number of deaths, 7 (31,81%) were residents of the state of Ceará, whose number of deaths is almost double that of the state with the second highest number of deaths, Bahia, with 4 deaths (18,18%).

Table 4 shows the deaths by Region/Federation Unit, according to color/race, where the largest number of deaths due to human cysticercosis was concentrated in the self-declared brown population, 19 deaths, which represents about 86,36% in relative numbers. These data are in agreement with the epidemiological studies that show that the rates of infection and deaths

TABLE 3. Deaths per residence by sex, according to Region/Federation Unit. Brazil. 2019.

FEDERATION UNIT REGION	NONE	1 TO 3 Y/O	4 TO 7 Y/O	8 TO 11 Y/O	IGNORED	TOTAL
NORTH EAST	6	4	4	4	4	22
MA	-	1	-	-	-	1
PI	-	-	-	1	-	1
CE	2	1	2	2	2	9
RN	1	-	1	-	-	2
PB	1	-	-	-	-	1
PE	-	1	-	-	-	1
BA	2	1	1	1	2	7

Source: MS/SVS/CGIAE - Mortality Information System - SIM.

TABLE 4. Deaths per residence by color/race according to Region/Federation Unit. Brazil. 2019

REGION / FEDERATION UNIT	MALE	FEMALE	TOTAL
Northeast Region	15	7	22
Maranhão	-	1	1
Piauí	-	1	1
Ceará	7	2	9
Rio Grande do Norte	2	-	2
Paraíba	1	-	1
Pernambuco	1	-	1
Bahia	4	3	7

Source: MS/SVS/CGIAE - Mortality Information System - SIM.

are the highest among the largest population, which corresponds to pardos - most of the Brazilian ethnic group - and to the data from national registrations, in which they affirm that the greatest part of the Brazilian population is made up of non-white individuals (brown, black).<sup>12,14</sup>

Of the deaths that occurred in Ceará (09 deaths), only 01 deaths occurred in whites (11,11%) and 08 (88,88%) in browns and of the 07 deaths in Bahia, 01 (14,66%) in whites, 01 (14,66%) in blacks and 05 (70,78%) in browns. In Maranhão, Piauí, Paraíba and Pernambuco, all cases occurred in mixed races.

## DISCUSSION

It is possible to observe in the region that the state with the highest num-

ber of deaths was Ceará with 09 deaths (40,0%). This state was also the only one that presented death in the age group of 20 to 29 years: 02 deaths (9,09%). This may be associated with a greater state of vulnerability in its population, thus justifying the amount of fatal outcomes of the disease.

Studies have shown that cysticercosis is more common in patients over 40 to 60 years of age, which is corroborated by data obtained from SINAN-DATASUS. This occurs because the incubation time and symptom manifestation are long, given that infection by the ingestion of *Taenia solium* eggs usually occurs in the younger age groups (childhood and adolescence), and the diagnosis and appearance of symptoms and deaths will take place in the older age groups (over 40).<sup>9</sup> As for the

majority of cases that occurred in the state of Ceará, it can be associated with a worse health condition of this population or even with an improvement in the health system, in the sense of diagnosing this pathology in relation to the other states in the region.<sup>1</sup>

As most deaths occurred in individuals of working age, this represents a great loss to the contribution and income scenario, as they are economically active individuals.

When we associate deaths with education, we realize that they reflect the vulnerability of people with less education, since individuals with less education seek less health services. 14 As for the cases in the portion of the population with a higher level of education, it can be justified, despite the disease being transmitted through the ingestion of viable *T. solium* eggs, due to the diversity of forms of contagion, such as water, food, dirty hands or retroperistalsis.<sup>9,12,14</sup> The state of Ceará presented deaths among all educational levels, 2 deaths (9,09%) in people with no education, 1 death (4,5%) in the range of 1 to 3 years of schooling and in other levels of education, presented 2 deaths (9,09%) in each, respectively. Such data may suggest precarious health indicators in the state, as well as difficult access to health services.<sup>1</sup>

The teniasis-cysticercosis complex has a cosmopolitan distribution and this contributes to this becoming a public health problem in locations that have precarious sanitary and socioeconomic conditions, which cause its perpetuation. This is observed in relation to the higher number of deaths due to cysticercosis in individuals with less education 1,8, in addition to limiting the possibility of meat exports.<sup>8,12</sup>

The results disagree with other studies in which the majority of individuals affected by the disease were female. However, due to the social stigmas presented by men in seeking medical services, it is possible to infer that the fatal outcomes are linked to not seeking health services in a timely manner, or to the total ignorance of the signs and symptoms of the disease.<sup>9,13,14</sup>

There is a very large disparity between the number of cases and ethnicities, revealing a very high prevalence of deaths among people of color/brown race. Historically in Brazil, white individuals have better standards of living and access to health and basic sanitation services, unlike non-white individuals who do not have access to health and basic sanitation services, or even education, when compared to white individuals.<sup>9,10,14</sup> Associated with this, this portion of the population is numerically superior to the others in Brazil, according to IBGE data, which could justify these findings.

## CONCLUSION

The teniasis-cysticercosis complex has a cosmopolitan character, that is, it is linked to human activities, since the human being is the final host of the tapeworm, in its adult form. In this panorama, the teniasis-cysticercosis complex remains with high rates in the Northeast, with emphasis

**The teniasis-cysticercosis complex has a cosmopolitan character, that is, it is linked to human activities, since the human being is the final host of the tapeworm, in its adult form.**

on the state of Ceará, since this state had nine deaths due to cysticercosis, which re-

presents a greater degree of vulnerability of its population. In this perspective, the teniasis-cysticercosis complex continues as a neglected tropical disease, infecting poor people, with low education, who do not have access to primary health services and do not have basic sanitation. This is enhanced by the lack of water, which forces these individuals to consume water from untreated sources, which promotes the infection cycle.

In addition, inland regions have animal husbandry and untapped food consumption, a fact that contributes to the perpetuation of infectious cycles. However, the genesis of the infectious cyclicality of the teniasis-cysticercosis complex is of a social nature and, therefore, to prevent its spread, greater attention from the authorities, health protection campaigns are needed to educate the population about this complex, as well as governmental works that offer basic sanitation services and humanly dignified housing conditions to the population. ■

## REFERENCES

1. Bomtempo, Priscila Taciani, et al. "Impacto da cisticercose na produção de carnes bovina e suína." *Pubvet* 12 (2018): 136.
2. Brito, Katiane Rodrigues de. "Teníase e cisticercose: aspectos clínicos e epidemiológicos." (2018).
3. Brasil, Ministério da Saúde. Banco de dados do Sistema Único de Saúde-DATASUS. Disponível em <http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sim/cnv/obt10uf.def> [acessado em 25 de janeiro de 2021].
4. Chieffi, Pedro Paulo, and Sergio Vieira dos Santos. "Teníase-cisticercose: uma zoonose negligenciada/Taeniasis-cysticercosis: a neglected zoonosis." *Arquivos Médicos dos Hospitais e da Faculdade de Ciências Médicas da Santa Casa de São Paulo* 65.1 (2020): 1-8.
5. Da Silva Targino, Gizia et al. ASPECTOS CLÍNICOS E EPIDEMIOLÓGICOS DA TENÍASE. Mostra Interdisciplinar do curso de Enfermagem, v. 2, n. 2, 2017.
6. Da Silva, Priscilla Elias Ferreira, Fernando Lourenço Pereira, and Catarina Teixeira. "O complexo teníase/cisticercose abordado em um jogo didático para o ensino de ciências." (2016).
7. Garro, F. L. et al. Diagnóstico do complexo teníase-cisticercose bovina em São João Evangelista, Minas Gerais, Brasil. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, v. 67, n. 4, p. 1063-1069, 2015.
8. Magalhães, Fernanda C., et al. "Diagnóstico e fatores de risco do complexo teníase-cisticercose bovina no município de Salinas, Minas Gerais." *Pesquisa Veterinária Brasileira* 37.3 (2017): 205-209.
9. Muniz, Ana Paula Mendes et al. Análise retrospectiva dos casos de cisticercose humana do Hospital de Clínicas da Universidade Federal de Uberlândia-MG, no período de 2000-2017. 2018.
10. Rosa, Ruy Roberto Porto Ascenso, et al. "PERFIL EPIDEMIOLÓGICO DA CISTICERCOSE NO MUNICÍPIO DE CAJUEIRO DA PRAIA, PIAUÍ-BRASIL/EPIDEMIOLOGY OF CYSTICERCOSIS IN CAJUEIRO DA PRAIA, PIAUÍ BRAZIL." *Saúde em Foco* 3.1 (2016): 146-159.
11. Santos, Karina Rodrigues, et al. "Conhecimento de feirantes de mercados municipais da cidade de Parnaíba-PI, sobre teníase-cisticercose." *Revista Brasileira de Educação e Saúde* 10.3 (2020): 79-84.
12. Soares, Thaígra. "CISTICERCOSE, UMA DOENÇA NEGLIGENCIADA, MAS NÃO ESQUECIDA: uma revisão." *Revista Panorâmica online* 19 (2017).
13. Targino, Gizia da Silva, et al. "Aspectos clínicos e epidemiológicos da teníase." (2016).
14. Toledo, Rômulo César Clemente et al. complexo teníase/cisticercose: uma revisão. *Higiene Alimentar*, v. 32, n. 282/283, p. 31-34, 2018.