Neurocysticercosis: A Review

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Abstract: The swine acquire the cysticerci by ingesting Taenia solium eggs eliminated by human feces. This parasitic cycle, though important in public health, is essentially benign, both for humans and for pigs. However, when humans accidentally ingest eggs from human feces and become infected with cysticerci, the consequences can be catastrophic. Ingested eggs release as oncospheres that penetrates the gut wall, gain the bloodstream, fixes in tissues and differentiates into cysticercus, and when in the central nervous system causes neurocysticercosis.

Index Terms: Cisticercosis, Neurocisticercosis, Parasitosis, Pig, Public Health, Raw meet, Taenia solium

1 INTRODUCTION

Cysticercosis is one of the most common parasitic infections in the world. Caused by Cysticercus cellulosae, the larval stage of the Taenia solium, it has as a main characteristic the arise in several tissues of the human body of rounded vesicles called cysticerci, which are the characteristic form of this phase of life of the parasite. It is important to note that teniasis and cysticercosis, although similar, are caused by distinct stages in the flatworm life cycle - in teniasis, the intake of rare or uncooked porcine or bovine meat which containing the cysticerci, release the parasite in the gastrointestinal tract, being this place the latter being site of growth and maturation of the parasite until its adult stage, whereas in cysticercosis, the ingestion of Taenia eggs occurs, which hatch in the same tract and migrate through the bloodstream, infecting various organs through the body [1]. This infection is a serious public health problem in several countries, especially in Latin America - with emphasis on Mexico, Peru, Chile and Brazil [2,3]. Endemic factors seems to be related to personal, environmental and family hygiene similarities among developing countries. Overall, it is estimated that 50 million individuals are infected by the complex of teniasis/cysticercosis in the world, and that approximately 50,000 die each year [3]. Human contamination with Taenia solium eggs can occur through various ways, such as by autoinfection in patients suffering from teniasis, by external autoinfection, or by heteroinfection, through contaminated hands, water, and food such as raw vegetables. There are also alternative means of transmission of the parasite eggs, such as coprophagia (mainly for psychopaths or mentally ill, by air or vectored by fly [4]. Despite the wide range of specificities that the disease can reach, this review will focus on the study of neurocysticercosis (NCC), a classification given to the disease when the cysticercus from the parasite egg ingestion is settled in Central Nervous System tissues. Symptoms of this characteristic infestation can range from epilepsy, the most common, to headache, stroke, depression, and also may cause psychiatric disorders [2].

The objective of this review was to gather information from diverse sources about neurocysticercosis in Brazil in order to clarify aspects of its transmission, symptoms and clinical manifestations.

2 METHOD

This review was based on 24 papers, from the national and international literature, covering the period from 1915 to 2003. The articles were mostly taken from the open scientific databases Scielo and PubMed. In the presentation of the condensed information, we used the agglutinated data from the researched articles, as well as citing elements of them such as tables and graphs of these. Variables such as: main affected gender for infection, age class of affected people, residence area of the patients, parasite tropism, tissues and organs mostly affected and frequency of clinical manifestations were analyzed.

3 DISCUSSION AND RESULTS

Regarding the clinical manifestations presented by patients diagnosed with neurocysticercosis, most articles agreed that the most prevalent symptom is the occurrence of epileptic convulsions or seizures [2,5,6], followed by headache, which follows epilepsy in most cases. Only a few number of the researches found headache as the most common symptom, occurring in a greater proportion than epileptic convulsions [4,7,8]. It was also observed that such clinical manifestations can easily be confused with idiopathic epilepsy and chronic headache [9]. One research found a predominance of epileptic seizures in male patients, while in females, a predominance of headache was observed. The same work verified the occurrence of IHT (intracranial hypertension) in approximately 84% of the surveyed patients, a factor that may be related to the verified clinical symptoms [2]. It was also verified the occurrence of psychic disorders in 8% of patients in the same research, with depression being the most present disorder [10], affecting approximately 56% of the studied population, followed by dementia and schizophrenia [2,11], and learning disorders signs to be the less frequent symptom [5]. Depression cases occurred mainly in male patients [10]. Other manifestations have also been observed, such as vascular disorders such as ischemic cerebral infarcts, occurring quite heterogeneously among the studied patients [2,12] - one of the researches stated that neurocysticercosis is one of the main causes of stroke, especially in regions where neurocysticercosis is endemic [12]. Regarding to the gender of the patients with neurocysticercosis surveyed in the researches, there were both articles that affirmed that there was a predominance of men affected by the disease [2,9,13,14,15] (as articles that said that there was a female
predominance among the patients [7,8,15]. One of the studies stated that there is a certain hormonal relationship between the female gender and the infection rate found, indicating that the patient's gender may be a risk factor for the development and evolution of the disease [5]. Some articles found no predominance [16]. Given the contradictions found in the analysis of this variable, the percentage of the gender of all the patients analysed in the surveyed articles was calculated, and the prevalence of the male gender parasitosis was verified, as shown in graph 1.

Regarding the age classes most affected by the surveyed parasitic infection, it was observed the distribution of cases of patients of all ages, but with the majority of cases occurring between the ages of 21 and 50 years old [2,6,14]. The lowest occurrences were observed in the age classes from 71 to 90 years and 0 to 10 years, in ascending order. The results of the measurement of incidence by age group are presented in Graph 2.

Regarding the classification by rural or urban area where patients infected with neurocisticercosis lives, there were again articles which affirmed the prevalence of the rural area as an infection zone [2,7], and articles that affirmed the same of the urban zone [5], with a slight tendency to the prevalence of the urban zone - a result which, especially in recent years, has been increasingly common, especially with the increase of rural-urban migrations and the urbanization of rural areas [16]. Some articles affirm that there is a higher incidence of parasitic infection in rural areas, but in urban areas the disease would present its most severe form [2]. Graph 3 shows the result of the general assessment of the origin of the patients infected with the parasite, evidencing a predominance of the urban environment over the rural in this question.

As a general consideration, there was no predominance of any ethnicity in the researches, being the distribution of the patients was equal between all ethnic groups. Regarding the lethality of this parasitosis, the value ranged between 4.8 and 25%, with a median of 14.75% [2].

3 CONCLUSIONS
From the review of the literature on neurocisticercosis, it can be concluded that such parasitosis is currently one of the most important global public health problem. As concluded in the visualization of its clinical manifestations, cases of neurological problems can be attributed to its occurrence. This parasite is difficult to control among individuals who ingest raw, rare or uncooked meat containing Cysticercus cellulosae and become carriers of Taenia solium, which may ingest their eggs or contaminate the environment, constituting sources of infection. It was also possible to verify that, depending on the number and location of the cerebral cysticerci, surgical removal cannot be performed. Finally, it was verified that areas of calcification in the brain occurs after the death of the Cysticercus, a fact that acidifies the previously parasitized place and generates a deposition of calcium in the surroundings, leading to the fibrosis of the affected areas, which can generate consequences in the encephalon.

REFERENCES
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