IJMPES International Journal of
Medical Parasitology & Epidemiology Sciences

http://ijmpes.com
doi 10.34172/ijmpes.2022.06
Vol. 3, No. 1, 2022, 23-25
eISSN 2766-6492

Brief Report

A Retrospective Study on the Seroprevalence of Anti-*Toxocara canis* Antibodies in the Human Population of a Romanian City

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Abstract
Ascariasis is frequently diagnosed in the dog population, and *Toxocara canis* is the main agent that causes larva migrans syndrome in humans. In big cities, the number of pets is constantly increasing, especially canids. In Romania, in addition to dogs with owners, a large number of dogs without owners are found in public green spaces. Timisoara is one of the largest cities in Romania, with a population of approximately 306.462 people. In the present study, the seroprevalence of anti-*T. canis* antibodies was investigated in different age groups using the ELISA method. The samples were taken and analyzed in a private laboratory. The results indicated a major deficiency in the control of ascariasis in animals. The overall seroprevalence recorded in 371 individuals who were referred to the laboratory during 2017-2020 was 22.64%. The elderly were the most affected (39.39%) and children were the least affected (7.4%) groups.
Keywords: Human, Seroprevalence, Larva migrans

Received: December 15, 2021, **Accepted**: December 24, 2021, **ePublished**: January 1, 2022

Introduction

Toxocariasis is a zoonosis frequently reported among the human population. Toxocariasis in humans is mainly caused by the larvae of *Toxocara* spp. which do not complete their maturation in the human body. They cause several characteristic syndromes such as LMO, LMV, and neurotoxocarosis (1-3). There are numerous sources of infestation; however, the soil is the main source, especially in children (geophagy). Additionally, poor hygiene, the consumption of contaminated vegetables and insufficiently cooked meat, along with the consumption of organs from different paratenic hosts, can be important sources. The liver is a frequently consumed organ from species such as large (4,5) and small ruminants (6), pigs (7), and chickens (8).

In the human body, the larvae are noticed by the immune system and initially produce an inflammatory process, followed by eosinophilia and the massive production of cytokines and immunoglobulins (3,9). Serological tests provide a definite diagnosis in the case of human toxocariasis. ELISA is a commonly used laboratory method. Various commercial kits that are used in immunology today mostly use Toxocara excretory-secretory (TES) antigens to detect IgG class antibodies. A major disadvantage of using TES antigens is the inaccuracy of the results generated by them, which is related to potential cross-reactivity with other parasites (10-12). Moreover, the detection of IgG antibodies may indicate a previous infection or exposure of the body to the parasite and not an ongoing infection. Therefore, the diagnosis of toxocariasis in humans is based on the combination of clinical symptoms and positive serological results (13).

The purpose of the present study was to identify positive cases of human toxocariasis in the municipality of Timisoara (Timis county), using the ELISA technique. The results obtained can be correlated with the prevalence of ascariasis in dogs with or without an owner, as well as the prevalence of parasitic elements in public spaces. Therefore, veterinarians can help in breaking the epidemiological chain, and the human population can be informed about the concrete epidemiological situation and the possible locations and sources of infestation.

Materials and Methods

During 2017-2020, 371 blood samples were taken from

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237 women and 134 men. The investigated persons were divided into 4 age groups: children aged 0-14 years old (n = 108), young people aged 15-24 years old (n = 33), adults aged 25-64 years old (n = 197), and seniors aged > 65 years old (n = 33). From each individual, 1 mL of blood was collected in Kima vacutainers, with a yellow cap and a capacity of 5 mL. The obtained serum samples were analyzed using the ELISA technique in a private laboratory in the city of Timisoara, Romania. The kit used in this study was NovaLisa *Toxocara canis* IgG (NovaTec Immundiagnostica GmbH). Samples with an absorbance value greater than 10% were considered positive, and those with a value less than 10% were considered negative. Then, the obtained results were statistically analyzed using GraphPad Prism. *P*-value was obtained using Fisher's exact test, 2x2 contingency table. The results were compared in terms of gender and age.

Results and Discussion

The seroprevalence of anti-*T. canis* antibodies was found to be 22.64% (84/371) during 2017-2020 in Timisoara, Romania, which is higher compared to other studies conducted in Europe during the same period. In Sicily, the seroprevalence among the human population was only 8% (14), and it was 3.6% in the Czech Republic (15). The values close to those obtained in Romania were reported in Asian countries including Iran during 2017-2018. The seroprevalence was reported to be 17.99% in Brazil (16).

The most affected age group was > 65 years old, with a seroprevalence of 39.39% (13/33). High percentages were also recorded in the age groups of 25-64 years (28.93%) and 15-24 years (18.18%). Children were the least affected group; in other words, the seroprevalence in the 0-14 age group was 7.4% (8/108). The results obtained are contrary to those obtained by other researchers in the studies carried out on the African continent. In Ghana, the prevalence was high in the age group of 0-15 years (53.5%) (17). Extremely high percentages were identified in primary school children in Nigeria. The prevalence was 86.1% using the Western blot method (18). These differences are due to the poor standard of living and hygiene in African countries. Another explanation for the low seroprevalence in Romania can be the constant vigilance and supervision of children by their mothers in playgrounds and public parks. Many of the parks in the city of Timisoara have public fountains, where children can frequently wash their hands. Additionally, many parks are covered with rubber material, thus eliminating the soil as the main source of infection. In an extensive study, Gheorghe et al investigated the prevalence of parasitic elements in public parks with or without dog pens, children's playgrounds, and dog pens in Timisoara. Fecal samples, as well as soil and sand samples from sandpits (from playgrounds and dog paddocks), were collected and processed. The eggs of *Toxocara* spp. were present with a percentage of 0.57% in fecal samples and 1.15%-3.46% in soil samples. These eggs were not identified in sandpits (19,20). Therefore, parks are among the sources of human infection, and the parasitic elements come from both stray and owned dogs which are not properly dewormed. In the present study, the high seroprevalence among the human population, especially among the elderly, may be due to close contact between them and pets. A major source of infestation can be the hair of dogs and cats. Generally, elderly people adopt an animal to avoid loneliness. They choose to spend most of their time with a dog or a cat. They eat or even sleep with their pets. Unfortunately, not all animal owners are responsible, and many choose not to deworm their animals. Therefore, they represent a danger to their health through the irresponsibility they show.

In the present study, extremely significant differences were recorded between the age groups of 0-14 and 25-64 years ($P = 0.0002$) and significant differences between the age groups of 0-14 and > 65 years ($P = 0.0011$). Although women were more affected compared to men (23.20% versus 21.64%), the statistical differences between the two genders were insignificant ($P = 0.8026$).

Conclusion

Considering the results recorded by other authors globally (15), the seroprevalence obtained in the present study is high. Therefore, it is necessary to adopt additional measures to prevent infestation, starting from the elimination of parasitic elements from the external environment (soil, sandpits, etc.) and finishing with deworming and frequent examination of the feces of dogs with and without owners using coproscopic techniques.

Author Contributions

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Conflict of Interests

The authors declare that they have no conflict of interest.

Ethical Issues

Not applicable.

Funding

Not applicable.

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