Toxocariasis: an epidemiological contribution from Feira region

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Abstract

Toxocariasis and visceral larva migrans are clinical entities underdiagnosed, due to a lack of knowledge in the medical class, and other health professions concerning parasitic infections.

In Portugal, recent prospective studies show that the prevalence rates of Toxocara canis infection in dogs, humans and contamination of soil infection, are alarming.

The present study, sampled 513 persons who live in Feira region. A 17.7% seropositivity level was found. The authors statistically analysed the data by gender, age, occupation, residence, clinical and laboratorial signs, owning dogs and type of exposure.

Seropositive individuals were treated with mebendazole or albendazole on a randomly selected basis.

Key words: toxocara canis, visceral larva migrans, epidemiology, mebendazole, albendazole.

Introduction

The most commonly species accountable for visceral larva migrans (VLM) a nosology entity recognised for the first time by Beaver in 1952, are Toxocara canis, the T. cati (ascarids parasiting cats and dogs) and the Ascaris suum (the pig´s ascarids), which is very similar to the Ascaris lumbricoides.[1]

Around 15 to 20% of dogs in Europe are affected by T. canis (Gentilini et al.) and in Portugal recent surveys point to a third world parasitology.[2,3,4,5]

In terms of public health, young dogs (12 months or less) and adult female (with a mean daily lay of 200.000 eggs) represent the major danger for man and accidental host where the parasites cannot complete its life-cycle reaching the form of an adult worm.[6]

The soil – namely in towns where it is usual to take dogs to public gardens, walks and children playgrounds for their defecation – it is one of the main sources of contamination for man. A study carried out in greater Lisbon has revealed that a 39% prevalence of soil contaminated, in samples of public gardens.[4]

Children, shepherds, hunters, dog breeders and trainers are the main risk groups to catch the disease.[7]

The first case published in Portugal dates from 1976.[8] In 1990, a systematic prospective study carried out in Evora district, 280 asymptomatic individuals were assessed as they were considered in a higher risk to catch VLM and the general prevalence was 11.2% for T. canis.[7]

From a clinical point of view we will be describing – asymptomatic presentations (serology diagnosis), mild presentations (interim symptoms, hardly manifest and characteristic), patent presentations (very variable symptomatology, which can include general symptoms, itching, nausea, vomit, diarrhoea, coughing, asthma, muscular and skeletal pain, irritability, seizures, changes of awareness and other less common manifestations) and eye presentations (in general, seronegative,[9,10] more common in young adults and which can be cause for blindness). The hard, painless and smooth surface hepatomegaly should be valued as suspected of being linked to the VLM, mainly if we are dealing with a child.[11]

Sustained eosinophilia is a very important detail when suspecting the VLM, when the faeces serology test is negative,[12] and most diagnoses are based on serum immunology tests positivity. Several techniques have been used – gel immunodiffusion, electro-immunodiffusion, indirect hemaglutination and immunofluorescence – and used antigens easy to get (somatic antigens of the adult worm), restricting

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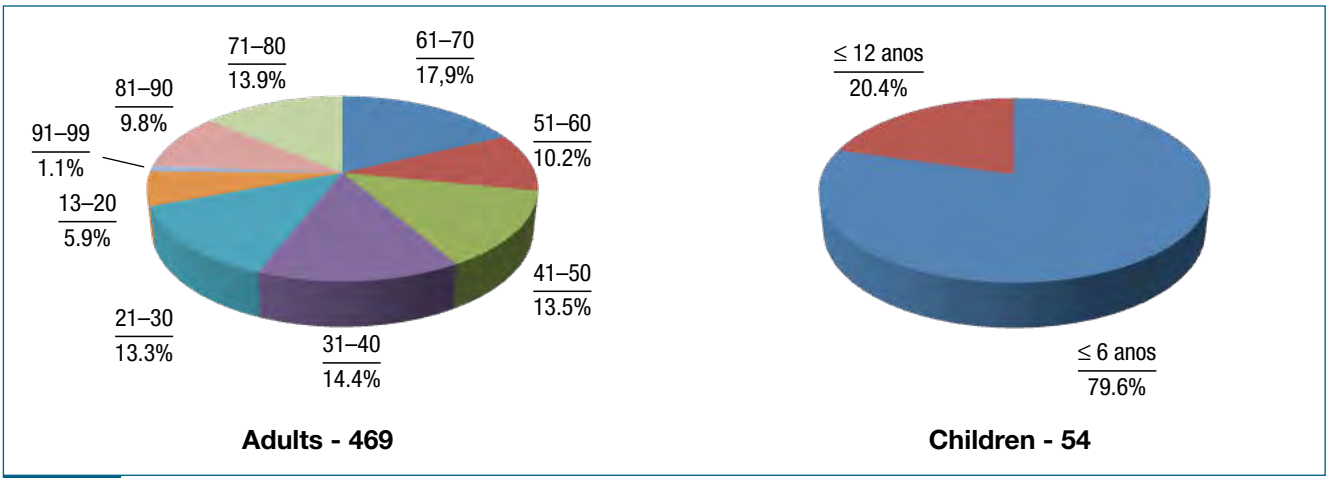


FIG. 1

undesirable crossed reactions with other nematodes. More recently the use of metabolic excretion/secretion (E/S) antigens obtained from L2 larva, from an in vitro culture, under ELISA technique, enabling higher rates of specificity and sensitivity (even in ocular forms) has been used. The definite diagnosis is pathological anatomical (eosinophilic granuloma with a larvae in the centre) which is rarely achieved.[11]

The therapeutic effectiveness of anti-helminthes agents usually used (diethylcarbamazine, tiabendazole and mebendazole) it is not proven enough and preference has been given to mebendazole, due to its less undesirable effects.[13]

In 1994, J. P. Stamford proposes diethylcarbamazine and albendazole as drugs of choice (400 mg bid, for 5 days).[14] In spite of most authors considering VLM as a "benign and self-limitative" disease the option has been the systematic treatment of seropositive individuals, with the target of preventing the consequences, sometimes serious of this anthropozoonosis.[7,11]

Material and methods

From December 1995 to November 1996, a serological study of 513 individuals was carried out, that, in such period, were admitted to Hospital N. S. da Saúde, (n=100), attended the appointments (n=223) or were referred to the Clinical Pathology Service for reasons not directly related with this project (n=190). No inclusion/exclusion criteria were determined.

For the laboratorial diagnosis the EIA (enzyme immunoassay) technique was used with a Hyperion MicroReader III for the readings. The test kits Toxocara canis, used specific excreting purified and inactive antigens and enable to detect IgG and IgM. They are described by the manufacturer as having a 86% sensitivity and 98% specificity with an intra-trial variation rate of 7% and inter-trial of 7.1%. Cases where the ratio between the sample optical density (o.d.) and the cut-off value obtained for the series was 1.100 or higher are deemed positive.

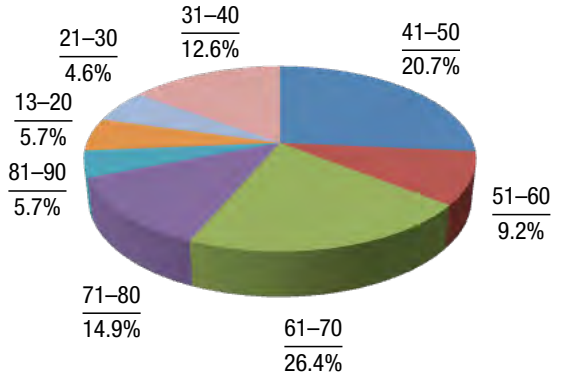
Seropositive patients (n=91) were called for an appointment, in order to evaluate the clinic-epidemiologic context, the need for additional tests (clinical, laboratorial, imaging or any other) and starting the treatment. This was carried out with mebendazole (500 mg tid, for 7 days) or albendazole (400 mg bid), for 5 days) in a random fashion. On the week after conclusion, patients were reassessed from a clinical and laboratorial point of view.

The following groups were excluded from treatment: 6 years old and younger children (n=3), 75 years old and older adults (n=11), stroke patients (n=4) and other diseases conditioning a serious repercussion on the general condition (n=3) and also a pregnant woman and a patient with cryoglobulinemia and multiple serum positive tests.

At the end, two patients died and eight did not attend the appointments or did not make the protocol analytical study.

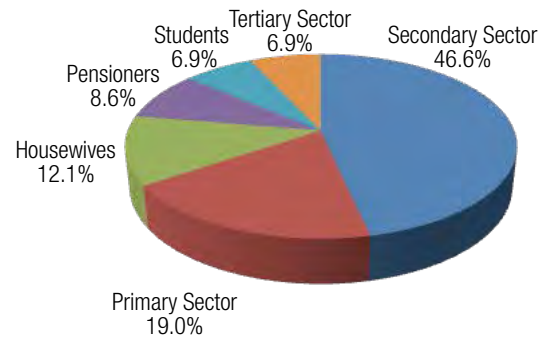
Results

From the 513 individuals studied (254 female, 205 male, 34 boys and 20 girls), 91 were deemed serum



Adults - 87

FIG. 2



Occupation - 58

FIG. 3

TABLE I

	Positive	Total	%
Argoncilhe	4	20	20
Canedo	4	12	33.3
Fiães	5	14	35.7
Lobão	3	11	27.3
Lourosa	11	141	7.8
Mozelos	4	18	22.2
N. Regedoura	3	20	15
P. Brandão	6	31	19.4
Rio Meão	5	10	50
Sanguêdo	4	11	36.4
S. M. Feira	6	59	10.2
S. M. Lamas	3	12	25
S. J. Vêr	5	22	22.7
S. P. Oleiros	14	67	20.9
Miscellaneous	14	65	21.5
Total	91	513	17.7

positive (17.7%).

The sample age distribution is shown in *Fig 1*. (459 "adults" – age > 12 years – and 54 children ≤ 12 years).

Regarding the group distribution, serology was positive in 19.9% of adults (n=87), 7.4% of children (n=4), 17.6% of men (n=36), 20.1% of women (n=51), 8.8% of boys (n=3) and 5.0% of girls (n=1).

Seropositivity was higher on the 5th and 7th decades of life (n=18 and 23, respectively), *Fig. 2* and, regarding children, it was slightly less in those aged ≤ 6 years (7%) than those aged ≤ 12 years old (9.1%).

As for the geographical distribution, highly percentile values were noticed in industrial and rural areas, and the lower values were registered in urban areas (*Table 1*).

Among the patients studied and treated (n=58), 36 were women (62.1%), 50 had dogs (n=94), 26 also had cats and other animals and three were hunters (5.2%). The contact with dogs was considered very close in 26% of cases, frequent in 30%, episodic in 42% and inexistent in one case (2%).

Concerning occupations, it was verified a predominance of the secondary (43.1%) and primary (19%) sector (*Fig. 3*).

About 45% of patients (n=26) presented or mentioned breathing problem (asthma or equivalent and chronic bronchitis), 17.2% (n=10) liver problems (cirrhosis, steatosis, hepatomegaly or enzyme changes of unclear cause), 15.5% (n=9) skin changes (pruritus, hives, nodules, vasculitis), 12.1% (n=7), changes of bowel movement (chronic constipation, recurring diarrhoea) and 3.4% (n=2) epilepsy. A case of a stroke in the retina vein was reported. Five patients (8.6%) were parasited by Ascaris lumbricoides and 19 (32.8%) were asymptomatic and did not refer significant pathological background.

With treatment, there was a reduction in the optical density in 33 cases (56.9%), increase in 23 (39.7%) and it was kept in two (3.4%). As for the eosinophil

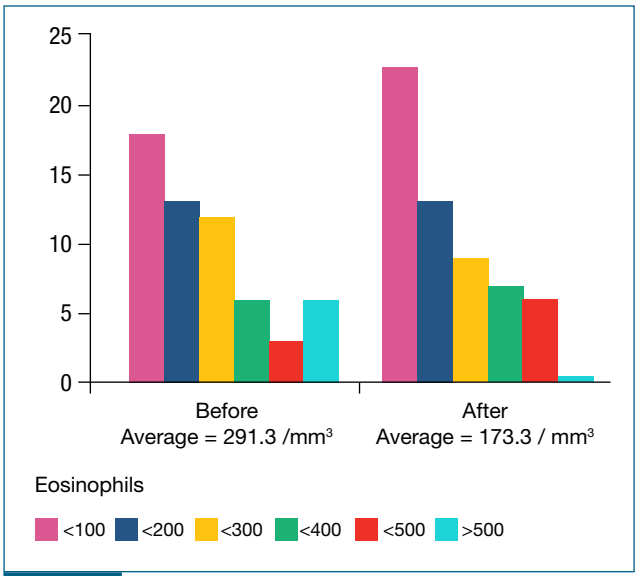


FIG. 4

count, it was verified a reduction in 31 cases (53.4%), increase in 21 (36.2%) and kept in six (10.4%) see also *Fig. 4*. A safe relation was not verified between changes in optical density and changes in the eosinophil count and as for the clinical manifestations, only in the case of skin changes it seems to exist a trend to a negative variation in optical density (*Figs. 5 and 6*).

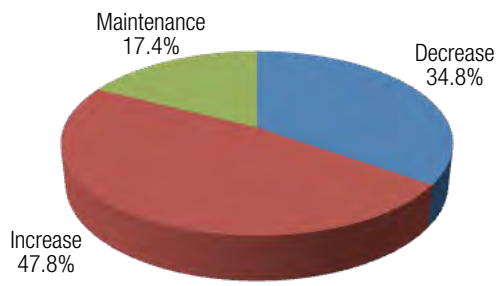
In patients treated with mebendazole, optical density decreased in 54.3% of cases and eosinophilia in 45.8%, whilst with albendazole the values obtained were 60.9% and 47.8% respectively. Regarding the rates of serum negatives, was 40% with mebendazole and 28.6% with albendazole.

Regarding tolerability, changes in the bowel movement were recorded in two cases (3.5%), pruritus and wheezing (one case each) and increase on transaminases in 11 (19%) – with albendazole there were four cases (17.4%) of a slight increase (lower than twice the normal value) and, with mebendazole, four cases (11.4%) of slight increase and three cases (8.6%) of moderate increase (lower to five times the normal value).

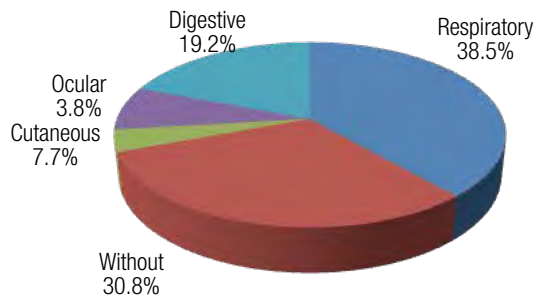
Discussion

In Portugal, prospective studies carried out in the last few years show the infection prevalence by Toxocara canis in canine (69.2 to 89%), [3,5] the soil contamination (3.8 to 39%) [4,15] and the human infection (11.2% in Evora, 1990)[7] are worrying. Being the human infection, a direct function of the presence of viable eggs in the milieu, it is predictable that the prevalence of toxocariasis and the VLM is higher in the Northern Coast, because of moderate temperatures, a considerable degree of atmospheric humidity and weak sun incidence (protection by vegetation).[7] In the present study, the global seroprevalence is 17.7% what seems to confirm what was previously said.

Opposite of what was reported for Great-Britain[10] – serum positive for 2 to 3% of adults and 7 to 14% of children in school age – we verify that it is higher in the first (19%) than in the latter (9.1%). On the other hand, it is worth mentioning the fact the prevalence is frankly higher from the age of 60ties onwards (47%)



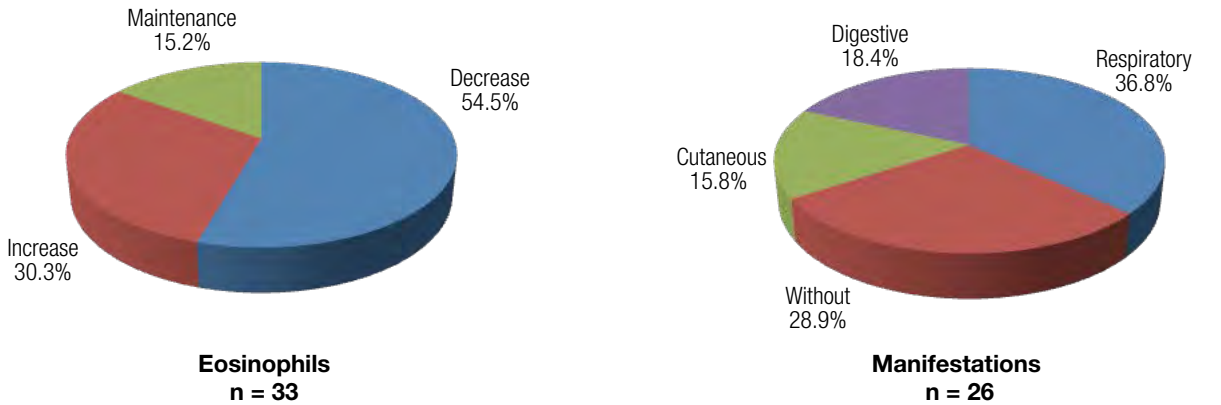
Eosinophils
n = 23



Manifestations
n = 26

Optical density positive variation.

FIG. 5



Optical density negative variation.

FIG. 6

than in adolescents and young adults (up to 40 years old) – 22.9%.

In spite of being generally accepted the idea of a closer contact between men, boys and dogs (what would have repercussions as a higher infection risk), we did not find statistically significant differences between genders in adult age and children.

It seems to us very relevant that 86.2% of patients studied had dogs (in Evora, 57.1% of families had dogs)[7] and in 26% of cases, the contact had been considered as very close (prolonged physical contact, sharing the bed).

Regarding the higher number of infected workers (46.6%) we think that will be a reflection of the fact that in Feira area the industrial activity is predominant, and agriculture and commerce are hardly expressive.

In a study carried out by Soulsby, in 1983, 2% of individuals were positive for choroid retinitis, 10% for uveitis, 17% of asthmatics and 29% of those with hepatomegaly.[11] In our study, we have seen a relatively low level of asymptomatic individuals (32.8%) – a reflex of studying a type of population – and rates significantly higher of patients with breathing problems (45%), hepatic (17.2%) and cutaneous (15.5%) reason why it seems important to us that prospective studies in these groups, in a way to try to know better the nature and extent of the problem.

The therapeutic effectiveness of the commonly used anti-helminthes in the treatment of this anthropozoonosis is not yet sufficiently proven, being used as indirect criteria, a symptomatic improvement and the increase of eosinophil count. However, if drugs are to be effective the larva destruction would imply a higher antigenic exposure and it should be expected the appearance or acute symptoms and a more "live" immunologic response. This way, we decided also to test how the optical density evolved and verified that we cannot define a consistent pattern as a response to therapy. On the other hand, and different from what could be expected, mean eosinophilia decreased considerably (40%), what can also due to the fact that determinations were made after treatment and not during it.

From the analysis of how the previously parameters evolved it seems licit to state there are no statistically significant differences between mebendazole and albendazole. Lastly, it should be highlighted the considerable number of cases of increase in transaminases with both drugs, a fact that can be related with its toxicity or with an eventual therapeutic effectiveness, if we accept the destruction of larva residing in the liver would trigger local inflammatory phenomenon with hepatocellular destruction.

Conclusions

Toxocariasis and VLM are underdiagnosed clinical entities, due to lack of knowledge that the medical profession and other health professionals have on parasitic diseases, in general. This way and in terms of Public Health, such diseases will have an increasingly higher importance.

In the Portuguese society, the follow up of pets by the vets, is not that frequent and on the other hand, it is common the habit of giving children small dogs – with whom they have repeated and very close contact (even sharing the bed where they sleep). Considering that apart of these aspects, it also often happens that dogs defecate (or are taken to defecate) in residential areas, public gardens and children´s playgrounds where children (and also adults) play on the ground, it is understandable how important it is a better knowledge of this parasitic disease.

Carrying out this study in Feira area has confirmed high serum prevalence in all ages, and such area should be considered as endemic. As a consequence, the health authorities will be warned to the fact and should be performed training sessions with family doctors, having as a target to increase the diagnostic acuity and encouraging the publicity of preventive character steps, such as those recommended by the American Public Health Association (Benenson, 1975)[11] - 1) to prevent and treat soil contamination by dogs and cats feces, in areas immediately adjacent to homes, in children´s playgrounds and public gardens 2) deparasitation of dogs and cats aged 6 months or lower and, subsequently, in accordance with vets instructions (to destroy the feces during and after the treatment); 3) to inform families as to the origin of infections and the means to fight it; 4) to wash hands always after working the soil and before eating. ■

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