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Toxocariasis and asthma: a relevant association

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The article by Figueiredo et al.,[1] published in the current issue of *Jornal de Pediatria*, provides important information about clinical and epidemiological investigation into toxocariasis in the pediatric population. The study analyzes the association of *Toxocara canis* infection with some variables, such as asthma, cough, recurrent pneumonia, hepatomegaly, and eosinophilia, among others, in infants and children treated at public outpatient clinics of Pediatrics, Immunology and Pneumology. This cross-sectional study was motivated by the diverse clinical manifestations of toxocariasis and its association with asthma. Of 208 patients, 106 were asthmatic. Association measures were established between variables and positive serology for *Toxocara canis,* considering a p = 0.05 as statistically significant. All of 114 who were seropositive (54.8%) for *Toxocara canis* received thiabendazole. In 86.6% of cases, infection was subclinical; and 13.4% concerned the visceral larva migrans syndrome (VLMS).

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Toxocariasis is a parasitic infection. It was described by Beaver et al.[2] in 1952 as VLMS, after being detected in three children with pulmonary disorders, hepatomegaly, and eosinophilia. The larva of *Toxocara canis* was detected in one of the liver biopsies.

There are three clinical forms of toxocariasis:[3] a) VLMS – characterized by frequent fever, pulmonary disorders, hepatomegaly, eosinophilia, among others; b) ocular toxocariasis – described by Wilder[4] in 1950, based on enucleated eyes, with suspected retinoblastoma. Ocular toxocariasis is characterized by eye pain and hyperemia, reduced visual acuity, strabismus, and leukocoria, with the following types of ophthalmic disorders: retinal granuloma (located on the posterior pole or in the peripheral retina), endophthalmitis, uveitis, keratitis, vitreous abscess and optical neuritis; c) covert toxocariasis – less frequently diagnosed form whose major symptoms include abdominal pain, hepatomegaly, occasional eosinophilia, and lower limb pain.

Of the causative agents of VLMS[3] in human beings, *Toxocara canis* is the agent most frequently found in the tissues of these patients. Puppies younger than 10 weeks of life are the typical reservoir of *T. canis*, as they are infected transplacentally. Human beings, especially children, become infected when, after contact with contaminated soil, mainly in parks and gardens, they ingest infective eggs (geophagy, onychophagy, by placing their fingers in their mouths).

Jacob et al.,[5] analyzing 40 cases of VLMS, obtained the following clinical findings: pallor (70%), abnormal pulmonary auscultation (60%), hepatomegaly (50%), splenomegaly (20%), fever and adenomegaly (15%). In 13 cases, referral

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occurred due to: recurrent bronchospasm, pneumonia, and severe respiratory failure. Other pulmonary disorders have been reported in visceral toxocariasis:[3] Löeffler's syndrome, chronic pneumonia, eosinophilic pneumonia, and wheezing baby syndrome.[6]

The diagnosis[5] of toxocariasis is based on clinical manifestations and on lab exams, especially ELISA and complete blood count (pronounced eosinophilia), usually greater than 2,000 eosinophils/mm^3. Treatment consisted of the following drugs: thiabendazole, albendazole, cambendazole, among others. In the acute phase, antihistamines, corticosteroids, and bronchodilators are also used. Thiabendazole can be given in the dose of 25 mg/kg for five to seven days; in this case, clinical symptoms may abate, although eosinophilia and elevated ELISA titers persist for several months or even years.[3] Prevention of toxocariasis includes the following measures: early treatment of puppies; avoiding exposure, especially of children, to dog litter (earth, sand), mainly in public places; reduction of the population of untreated dogs.

Epidemiological studies in different countries[3] have revealed a prevalence of soil contamination by *T. canis* eggs between 10.2 and 60%, whereas in humans seroprevalence has ranged from 1.8 to 13.65%. Anaruma Filho et al.[7] observed a 23.9% seroprevalence of infection in the region of Campinas and a soil contamination around 14%. In a study carried out with children in Brasília, Campos Jr. et al.[8] found a 21.8% seroprevalence in children treated at public services and a 3% rate in those treated in privately-owned laboratories.

In the article written by Figueiredo et al.,[1] published in the current issue of *Jornal de Pediatria*, the authors conducted a clinical and epidemiological investigation into toxocariasis in 208 children aged between 1 and 14 years, of whom 106 were asthmatic. They used ELISA (TES antigen with previous uptake by *A. suun*), and levels above 1/320 were considered positive. They found an association between *T. canis* infection and the following clinical, epidemiological, and laboratory variables: puppies at home ($p \leq 0.006$), contact with soil ($p \leq 0.0002$), asthma ($p \leq 0.005$), especially in those older than three years ($p \leq 0.001$), hepatomegaly ($p \leq 0.003$), eosinophilia ($p \leq 0.01$), elevated IgE levels ($p \leq 0.0007$) and malnutrition – height/age ratio ($p \leq 0.03$). They did not find an association with geophagy, recurrent pneumonia, and increased levels of IgG, IgA and IgM, among others.

Figueiredo et al.[1] observed a 54.8% seroprevalence for *T. canis*, which is much higher than that reported in other Brazilian studies.[7,8] They attribute this to the fact that children do not represent the general population, since they were selected from a sample of outpatients. The association of seropositivity with puppies at home observed in this study was also reported by Jacob et al.[5] and Worley et al.[9] Differently from these authors, they did not find any association of *T. canis* with geophagy.

The association of seropositivity with asthma, observed in the current article, was also reported by Buijs et al.[10] who related not only to asthma, but also to recurrent bronchitis, hospitalization, and increase in specific IgE levels. With regard to cough and history of three or more episodes of pneumonias, Figueiredo et al.[1] did not find an association with seropositivity. In the study conducted by Jacob et al.[5] with 40 cases of VLMS, 13 patients had respiratory disorders, characterized by recurrent bronchospasm, pneumonia and respiratory insufficiency. These authors also observed high levels of serum immunoglobulins, which was not observed by Figueiredo et al.[1] Still concerning the association with respiratory disorders, Soares et al.[6] drew special attention to the symptoms of visceral larva migrans in wheezing babies.

Associations of *T. canis* infection with hepatomegaly, eosinophilia, and increased IgE, levels commonly described in toxocariasis, were confirmed by Figueiredo et al.[1] and by other authors.[5,9] In the referred article, the authors did not find an association of *T.* canis infection with malnutrition (height/age ratio), which was not observed by Worley et al.[9]

In conclusion, based on literature data and on the study carried out by Figueiredo et al.,[1] pediatricians should be more deeply concerned with toxocariasis when patients present with asthma – especially children older than three years – hepatomegaly, eosinophilia, increased IgE levels and positive epidemiology. Further studies should be conducted in Brazil, using a methodology that allows for a more in-depth investigation about the possible role of toxocariasis as a trigger of asthma.

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