

RESEARCH ARTICLE



Keys to Unlock the Enigma of Ocular Toxocariasis: A Systematic Review and Meta-analysis

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ABSTRACT

Purpose: Ocular toxocariasis (OT) is a zoonotic infection caused by larval stages of *Toxocara canis* and *T. cati*. The current review and meta-analysis aimed to evaluate the global prevalence of OT.

Methods: Five English (PubMed, Scopus, Science Direct, Web of Science, and Google Scholar) databases were explored and 101 articles met the inclusion criteria.

Results: The pooled prevalence (95% confidence interval) of OT was higher in immunological studies (9%. 6–12%) than in studies that applied ophthalmic examination (1%. 1–2%). The lower middle-income level countries had the highest prevalence (6%. 2–12%) as well as the African region (10%. 7–13%). The highest infection rate (4%. 2–7%) was detected in the 1–25 mean age group.

Conclusion: Regular anthelmintic treatment of cats and dogs, and removal of animal feces from public places must be considered.

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A broad range of zoonotic parasitic diseases are transmitted by animals, especially cats and dogs.^{1,2} Toxocariasis is an important neglected tropical disease with a worldwide distribution mainly caused by larvae of the *Toxocara canis* or *Toxocara cati*, which are intestinal ascarid nematodes of canids and felids, respectively.^{3–5} It is estimated that 19.0% (95%CI, 16.6–21.4%) of people worldwide is seropositive regarding *Toxocara* spp. infection.⁶ The eggs are excreted in the feces and they become infective after passing their incubation period in the soil under the favorable circumstances of humid temperate climate,^{5,6} which can ensure their survival for up to one year.⁷ Both definitive and paratenic hosts (chickens, ruminants, pigs, etc.) can be infected via swallowing embryonated eggs in soil or raw vegetables contaminated with the feces of dogs and cats.^{8,9} Humans also get infected via close contact with contaminated soil or consumption of raw/undercooked meat prepared from tissues of paratenic hosts.^{10–12} Humans act as an accidental host and larvae do not develop into adult worms. Ingested larvae penetrate the intestinal mucosa and migrate to various organs, such as liver, lungs, heart, brain, eyes, and skeletal muscle.^{13–15} There are different clinical types of human toxocariasis including visceral larva migrans (VLM), ocular larva migrans (OLM), neurotoxocariasis (NT), and covert toxocariasis (CT).¹⁵

The first case of ocular toxocariasis (OT) was first reported more than 60 years ago in a child with suspected retinoblastoma, in which the *Toxocara* larvae was detected in enucleated eyes with granulomatous lesions.^{16,17} OT and NT are more complicated than other types of infection and OT can be misdiagnosed with retinoblastoma.¹⁸ It is caused by the migration of larvae through the arterial circulation to the eyes, mostly occurs in children, especially after playing in contaminated soils of playgrounds and sandboxes as well as a low level of hygiene.¹⁹ The clinical manifestations of OT mainly depend upon the parasite load, the site of infection, the host's immune response, and the migration pattern of the larvae.²⁰ The common features illustrating OT contain ocular lesions such as peripheral or posterior retina granulomas, chronic endophthalmitis or eosinophilia of the vitreous humor. In juvenile patients, red eye develops, and most often it results in visual loss. However, the clinical signs are distinct in adults or they may not have any typical symptoms.^{19,21} While a L2 larva within the retina is detectable during ophthalmologic examinations, fundus photography, ultrasound biomicroscopy, fluorescein angiography, and optical coherence tomography (OCT) are also useful diagnostic tools.^{22–24} In addition, immunological methods, such as enzyme-linked immunosorbent assay (ELISA) are beneficial in the diagnosis of anti-*Toxocara* larva antibodies in