



Toxoplasmosis in Blood Donors: A Systematic Review and Meta-Analysis



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ABSTRACT

Transfusion-transmissible infections include pathogens that may cause severe and debilitating diseases. Toxoplasmosis is a cosmopolitan neglected parasitic infection that can lead to severe complications including death in immune-compromised patients or following infection in utero. Multiple studies have demonstrated the transmission of *Toxoplasma gondii* by blood transfusion. The objective of this review was to comprehensively assess the seroprevalence rate of *Toxoplasma* in blood donors from a worldwide perspective. Seven electronic databases (PubMed, Science Direct, Web of Science, Scopus, Cochrane, Ovid, and Google Scholar) were searched using medical subject headings terms. A total of 43 records met the inclusion criteria in which 20,964 donors were tested during the period from January 1980 to June 2015. The overall weighted prevalence of exposure to toxoplasmosis in blood donors was 33% (95% confidence interval [CI], 28%–39%). The seroprevalences of immunoglobulin (Ig)M and both IgG and IgM antibodies were 1.8% (95% CI, 1.1%–2.4%) and 1.1% (95% CI, 0.3%–1.8%), respectively. The highest and the lowest seroprevalences of toxoplasmosis were observed in Africa (46%; 95% CI, 14%–78%) and in Asia (29%; 95% CI, 23%–35%), respectively. Brazil (75%) and Ethiopia (73%) were identified as countries with high seroprevalence. Because positive serology does not imply infectiousness and because seroprevalence is high in some nations, a positive serology test result alone cannot be used as an effective method for donor screening. Future research for methods to prevent transfusion-transmitted toxoplasmosis may derive benefit from studies conducted in areas of high endemicity.

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Although the safety of the blood supply is always under strict control and surveillance, concerns remain regarding transfusion-transmitted diseases [1]. *Toxoplasma gondii* is a transfusion-transmissible infection [2–3]. This unicellular protozoan parasite belongs to the phylum Apicomplexa which is adapted to humans and warm-blooded animals.

Toxoplasmosis affects one-third of the world's population with prevalence rates in developing countries varying between 30% and 60%. Toxoplasmosis predominantly occurs in tropical and subtropical regions [4–5]. *T. gondii* needs 2 hosts to complete its life cycle: the Felidae family as the definitive host and vertebrates like birds and mammals as an intermediate host [5]. The consumption of oocyst-contaminated water, ingestion of raw/undercooked meat containing tissue cysts, and congenital transmission are the main routes of transmission. *Toxoplasma* infection can also be transmitted by blood transfusion and organ transplantation [2,6–12,64].

In general, toxoplasmosis is asymptomatic in immune-competent individuals, whereas severe infection may occur in immune-compromised patients such as transplant recipients, HIV-positive individuals, and cancer patients. In these patients, acute infection or reactivation of latent toxoplasmosis can cause complications with poor prognosis including encephalitis, brain abscess, myocarditis, and chorioretinitis. Acute or recrudescing infections may result in death [13–14].

Transfusion-transmitted toxoplasmosis from asymptomatic donors remains a concern for patients receiving blood transfusions, particularly among immune-suppressed recipients. Because *T. gondii* infection is life-long and most infected individuals are without symptoms, testing is required to identify toxoplasmosis in blood donors [15–20]. During recent years, numerous articles have been published about the epidemiology of toxoplasmosis in blood donors worldwide. The absence of a comprehensive study encouraged us to conduct a global systematic review and meta-analysis to assess the prevalence of antibodies to toxoplasmosis in blood donors.

Methods

Search Strategy

To evaluate the prevalence of positive serologic test results for toxoplasmosis among blood donors, we performed a systematic review screening literature published online and limited to English full text or abstracts. Records identified through 7 databases (PubMed, Science Direct, Web of Science, Scopus, Cochrane, Ovid, and Google Scholar) and related published articles were restricted to the those published from January 1980 to June 2015 (Fig 1). The current research was performed using medical subject headings terms and a combination of several keywords including *Toxoplasma*, *Toxoplasma gondii*, *Toxoplasmosis*, *T. gondii*, *Prevalence*, *Epidemiology*, *Blood donor*, *Transfusion*, and *Blood pack*.

Study Selection and Data Extraction

We included cross-sectional and case-control studies that estimated the prevalence of toxoplasmosis based on serological techniques in blood donors and blood supplies. To evaluate the eligibility for inclusion, articles were reviewed by 2 independent reviewers. Studies that focused on toxoplasmosis in groups unrelated to blood donors were excluded. Then, the desired data were recorded using a data extraction form which included title, year of publication, country, sample size, number of seropositive cases (immunoglobulin [Ig]G⁺, IgM⁺, or both IgG⁺ and IgM⁺), and diagnostic methods. Data on risk factors such as residence, sex, contact with animals, education level, raw or undercooked meat consumption, unwashed vegetables or fruits

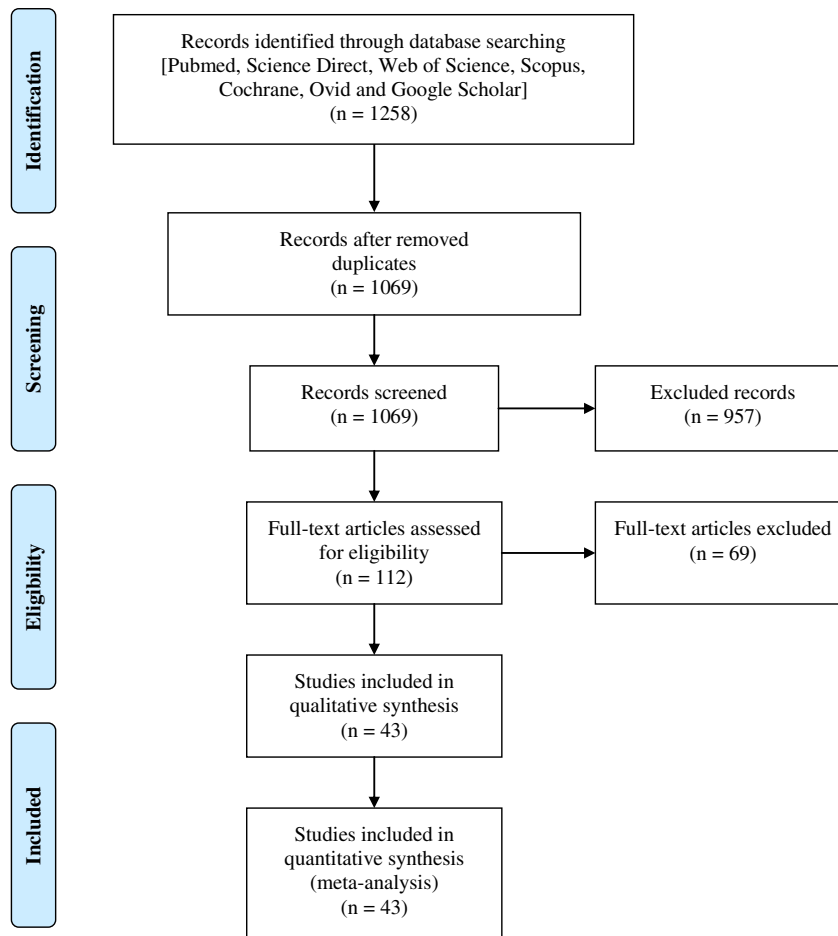


Fig 1. Flowchart describing the study design process.

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