Int. J. Curr. Res. Med. Sci. (2020). 6(12): 7-14

International Journal of Current Research in Medical Sciences

ISSN: 2454-5716

(A Peer Reviewed, Indexed and Open Access Journal)

www.ijcrims.com

Original Research Article

Volume 6, Issue 12 -2020

DOI: http://dx.doi.org/10.22192/ijcrms.2020.06.12.002

Prevalence of toxoplasmosis in Iranian pregnant women: A systematic review and meta-analysis

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Abstract

Introduction: Toxoplasma is a forced intracellular protozoan with a worldwide prevalence.The aim of this study was evaluated prevalence of toxoplasmosis in Iranian pregnant women.

Methods: The methods used in this systematic review have been developed based on the Checklist Guidelines (PRISMA).The study includes cross-sectional studies, case studies, and cohort studies, and excludes case studies, letters to editors, case reports, clinical trials, study protocols, systematic reviews, and reviews.

Results: **A** total of 264,398 women were evaluated. All studies were retrospective. A total of 14 studies from 13 provinces that met the inclusion criteria were reviewed .According to the random effect model, the prevalence of Toxoplasmosis in 264,398 women was 52% (95% in the confidence interval 0.51-0.53 for $I^2 = 99.3$).

Conclusion: Including; Observance of personal and social hygiene standards, use of safe and healthy food and water, good and complete cooking of foods prepared from meat and meat products, thorough and thorough washing of vegetables and fruits that may be contaminated with Toxoplasma, avoid Cats and anything that may be contaminated with cat feces.Also, determining their serum status for toxoplasmosis and being informed promptly and promptly of any change in serum titer from negative to positive (seroconvergen) on a monthly basis during pregnancy with a physician can greatly prevent the transmission of infection to the fetus.

Keywords: toxoplasmosis, pregnancy, Iran

Introduction

Toxoplasma is a forced intracellular protozoan with a worldwide prevalence(1).A wide range of hosts, including humans, domestic mammals, and birds, become infected(2).The sexual cycle of this parasite takes place in the intestines of felines, which leads to the formation and excretion of oocysts through their feces, and humans and other warm-blooded vertebrates are indirectly infected with the parasite by eating it(3).The results of serological studies to estimate the prevalence of infection among ethnic groups in geographical areas of different countries have been very variable(4).The serum prevalence of infection in women of childbearing age is between 4 and 100%. In Europe, Asia, Australia and the United States, the incidence of congenital infections during pregnancy is between 1 and 310 per 10,000 pregnancies(5).If a woman becomes infected with Toxoplasma gondii for the first time during pregnancy, there is a possibility that the parasite will be transmitted from mother to fetus and an abnormality or abortion may occur in the fetus(6).The clinical picture of congenital toxoplasmosis may be different depending on the

time of infection during pregnancy, so that fetal death, nerve or eye damage, or asymptomatic infection can be expected(7)..Therefore, early detection of the time of onset of primary infection in pregnant women is important to protect the mother and fetus(8).Antibody screening programs are performed to detect Toxoplasma infection in pregnant women in some countries(9..When specific Toxoplasma antibodies are detected in the serum, it must be determined whether the infection occurred during or before pregnancy, so it is important to determine the exact time of onset of infection(10).For this purpose, it is necessary to identify IgM, IgG and IgA antibodies specific to Toxoplasma and to determine their titer to determine the onset of infection.Infection of people with a normal immune system to toxoplasmosis is often asymptomatic(11). Complications such as miscarriage, microcephaly, hydrocephalus, mental retardation, brain calcification, blindness and fetal death will follow.Knowing the population of girls and women who are not immune to Toxoplasma can be a good criterion for understanding the population of women at risk of miscarriage or fetal death due to Toxoplasma due to Toxoplasma, as well as the incidence of tuberculosis in children (12). Appropriate measures should be taken against this important section of the society in order to prevent congenital toxoplasmosis and its complications.

Methods

Inclusion criteria (eligibility criteria)

The methods used in this systematic review have been developed based on the Checklist Guidelines (PRISMA).The study includes cross-sectional studies, case studies, and cohort studies, and excludes case studies, letters to editors, case reports, clinical trials, study protocols, systematic reviews, and reviews.

Participants: The main purpose of the study was to evaluate the Prevalence of toxoplasmosis in Iranian pregnant women. The findings were collected according to the report.Sampling methods and sample size: All observational studies, regardless of their design, were included in the systematic review.The minimum sample size was 25 patients or more.

Search strategy

The searches were performed by two independent researchers and the purpose of the search was to find published studies from 1/1/2000 to 11/30/2020.Studies published in MEDLINE were searched through PubMed, EMBASE through Ovid, the Cochrane Library.For studies published in other languages, national database (Magiran and (SID, KoreaMed and LILACS) and for searching unpublished studies OpenGrey (www.opengrey.eu/) and the WHO Clinical Trials Register (who.int/ictrp) And we searched for ongoing studies.To ensure the adequacy of the studies, a list of relevant research sources or studies found by the search was read.Systematic review articles were searched using MESH phrases and open phrases in accordance with print standards.After the MEDLINE strategy was finalized, the results were compared to search other databases.Keywords used in search strategy were: toxoplasmosis , pregnancy, Iran.

Select study and extract data:

The two researchers independently analyzed the titles and abstracts of the articles according to the eligibility criteria.After deleting additional studies, the full text of the studies was collected based on the eligibility criteria and information about the authors if necessary.General information (relevant author, province and year of publication), study information (sampling technique, diagnostic criteria, data collection method, research conditions, sample size and risk of bias) and output scale (prevalence of Toxoplasmosis) were collected.

Quality evaluation

The developed scale of Hoy et al. Was used to evaluate the quality of the method and the risk of bias in each observational study.This is a 10-item scale to assess the quality of studies according to their external validity (items 1 to 4 of the target population, sampling framework and minimum participation bias) and internal validity (items 5 to

9 of data collection, problem statement, Evaluates the research scale and data collection tools while item 10 evaluates the data analysis bias.The risk of bias was measured by the two researchers independently and the differences were resolved by agreement.

Collecting data

All eligible studies were included in the data collection after systematic review and the data were integrated using the accumulation diagram.The random effects model was evaluated based on the overall prevalence of the disease among the participants.The heterogeneity of the initial studies was assessed using the I^2 test.In addition, subgroups were analyzed to determine heterogeneity based on participants age, year of publication, and country.Finally, a meta-analysis was performed in STATA14 statistical software.

Results

Study selection

A total of 333 articles were extracted through initial searches in various databases.Out of 333 essential studies identified by analyzing titles and abstracts, 291 studies were omitted due to irrelevant titles.Out of 30 existing studies, 14 articles were deleted. Out of the remaining 30 studies, 14 studies had study criteria. (figure 1).

Research specifications:

A total of 264,398 women were evaluated. All studies were retrospective. A total of 14 studies from 13 provinces that met the inclusion criteria were reviewed.Among these studies, 2 studies were from Tehran, and the remained studies were from Zahedan, Isfahan ,Hamadan, Khoramabad, Ramsar, Gonabad, Tabriz, Yazd, Bojnourd, Jahrom, Nikshahr, and Gilan.The risk of bias was low in most studies. The main method of data collection was medical records and questionnaires. (Table 1).

Meta-analysis of the frequency of Toxoplasmosis:

According to the random effect model, the prevalence of Toxoplasmosis in 264,398 women was 52% (95% in the confidence interval 0.51-0.53 for $I^2 = 99.3$) (Figure 2).

Table 1: Characteristics of the included studies.

Author	Year	City	Patients	Prevalence	Age	Duration
Ebrahimzade[19]	2011	Zahedan	221	30.8%	15-44	--
Cheraghipour[20]	2010	Khoramabad	390	31%	--	2006-2007
Hoseini[21]	2014	Ramsar	289	58.8%	--	--
Fallah[22]	2005	Hamadan	576	33.5%	--	2003-2004
Salehi[23]	2017	Gonabad	262	16.4%	--	2013-2014
Eskandarian[24]	2007	Isfahan	255	63%	24(15-42)	--
Dalimi[25]	2011	Tabriz	300	26.3%	18-35	--
Anvari[26]	2014	Yazd	181	32%	13-40	2013
Jalali[27]	2014	Bojnourd	211	31%	--	--
Maani[32]	2020	Jahrom	370	29.5%	--	--
Mousavi[28]	2014	Nikshahr	183	10.3%	--	--
Gharavi[29]	2002	Tehran	4120	68%	--	--
Kalantari[30]	2013	Gilan	175	27.4%	27.6	--
Rouzbahani[31]	2014	Tehran	2120	1362-64%	--	2013-2014

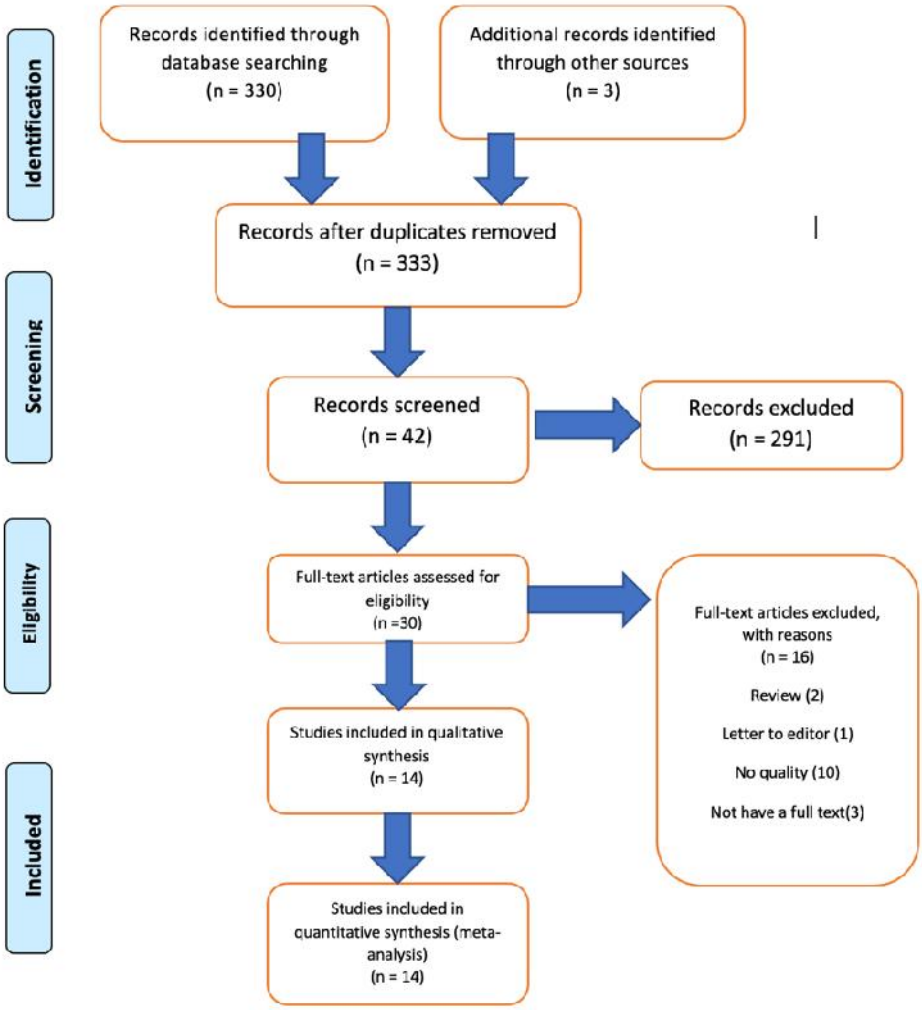

Figure 1:PRISMA flow diagram

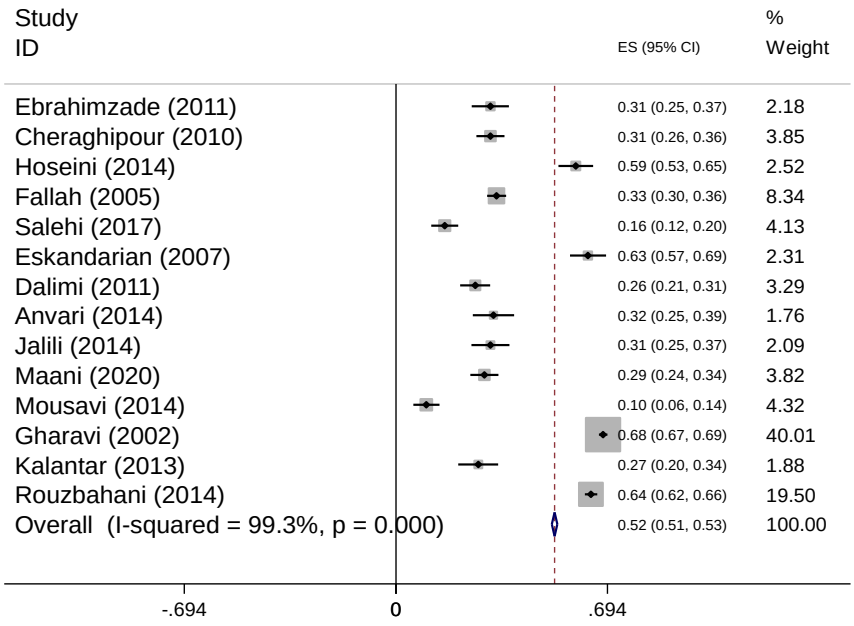

Figure 2: Meta-analysis of the Prevalence of toxoplasmosis in Iranian pregnant women

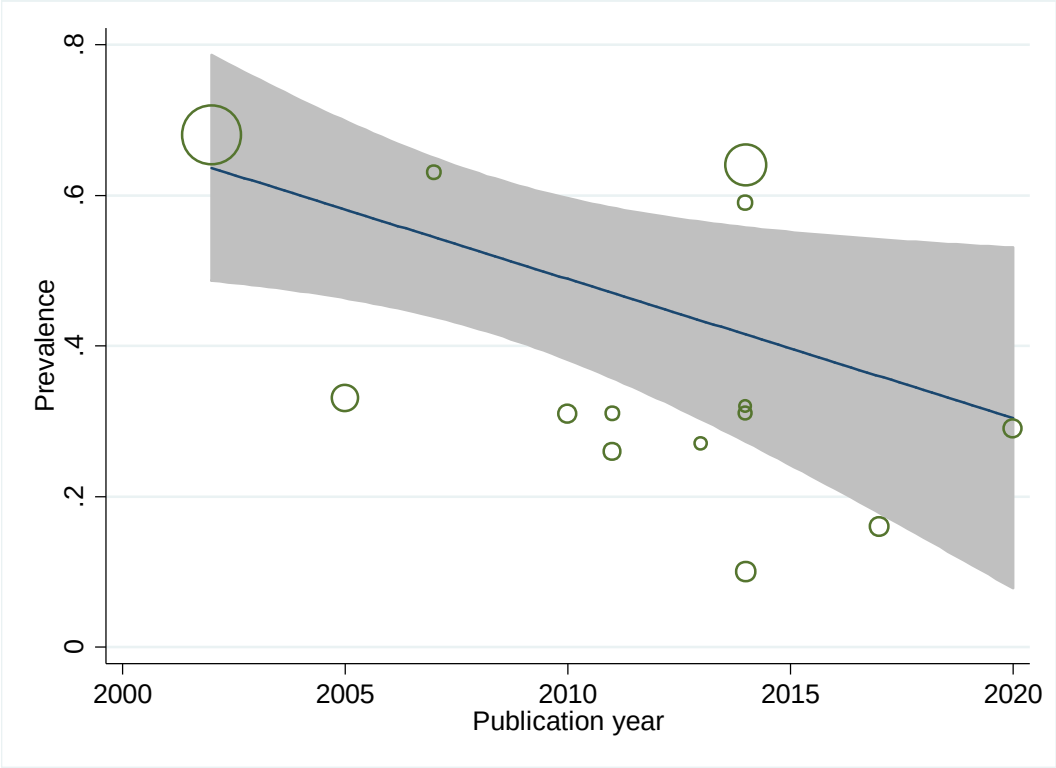

Figure 3:Meta-regression between study publication year and Prevalence of toxoplasmosis in Iranian pregnant women

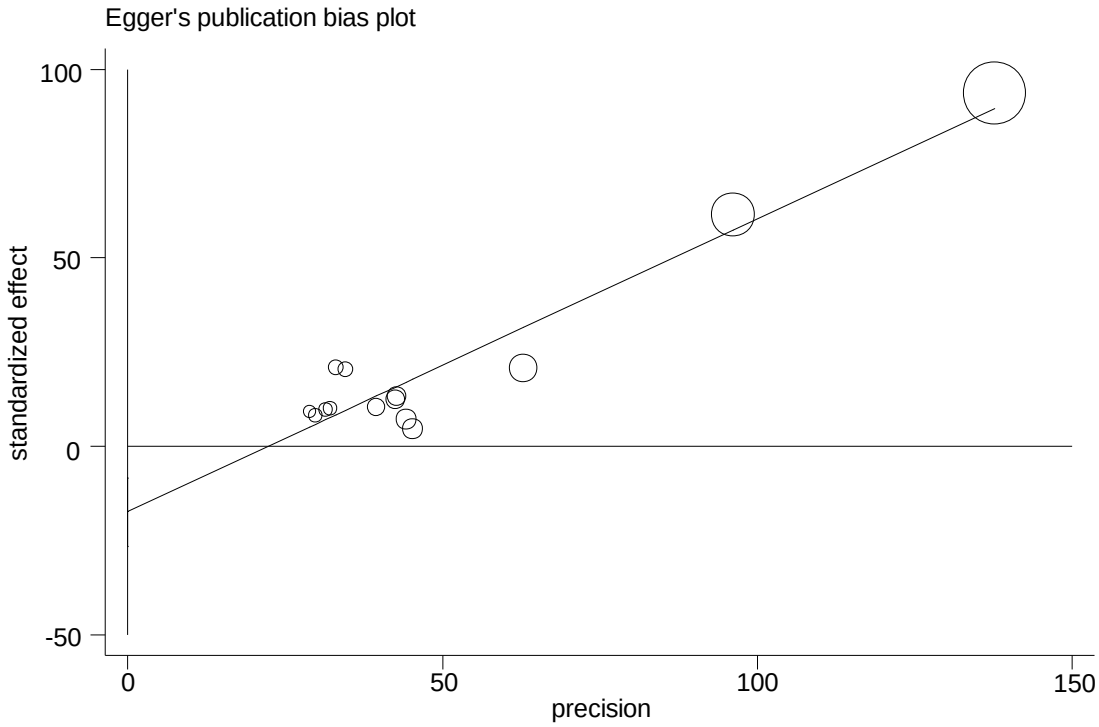

Figure 4:Egger's funnel plot for publication bias

Discussion

According to the random effect model, the prevalence of Toxoplasmosis in 264,398 women was 52% (95% in the confidence interval 0.51-0.53 for I^2 = 99.3) .A recent study estimated a global prevalence of 33.8% for latent toxoplasmosis in pregnant patients. It was also showed that there was significant higher prevalence in countries with low income and low developmental status(33).Toxoplasmosis manifests as a chronic infection in healthy adults and as an acute and fatal disease in immunocompromised individuals, with10% of deaths in the United States and up to30% in people with AIDS in Europe.This disease is especially important in pregnant women, which causes abortion or severe brain and eye injuries in the fetus and newborn.These lesions can include microcephaly, hydrocephalus, cerebral calcification, chorioretinitis, which results in complications such as mental retardation, deafness, blindness, and so on (14).Studies also show an association between high maternal antibody levels against Toxoplasma gondii and an increased risk of developing schizophrenia in later years in offspring (15).Humans are mainly contaminated by eating undercooked contaminated ears and parasite-resistant vegetables and fruits, as well as by placenta (16).The incidence of newly acquired infection depends on the risk of infection in the area and the amount of population that has not been previously infected.Therefore, accurate information on the prevalence of toxoplasmosis in each region is essential (17).The highest prevalence in the world is in France with at least 50% of the serum population being positive.In Iran, many studies have been conducted in this regard, which indicates the prevalence of infection throughout the country.Congenital toxoplasmosis occurs when a pregnant woman develops an acute infection during pregnancy (18).Women with an efficient immune system and a positive serum can be sure of the health of their fetus against congenital toxoplasmosis.The rate of transmission in the embryonic period in the first, second and third trimesters is 10% to 25%, 30% to 54% and 60% to 65%, respectively.Measures that can be taken in this regard include personal care measures that should be applied especially by pregnant women and negative serum. Including; Observance of personal and social hygiene standards, use of safe and healthy food and water, good and complete cooking of foods prepared from meat and meat products, thorough and thorough washing of vegetables and fruits that may be contaminated with Toxoplasma, avoid Cats and anything that may be contaminated with cat feces.Also, determining their serum status for toxoplasmosis and being informed promptly and promptly of any change in serum titer from negative to positive (seroconvergen) on a monthly basis during pregnancy with a physician can greatly prevent the transmission of infection to the fetus.

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How to cite this article:
Mania Kaveh. (2020). Prevalence of toxoplasmosis in Iranian pregnant women: A systematic review and meta-analysis. Int. J. Curr. Res. Med. Sci. 6(12): 7-14.
DOI: http://dx.doi.org/10.22192/ijcrms.2020.06.12.002