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## Seroprevalence of antibodies IgG/IgM anti-*T. gondii* in women of Coro, Venezuela

*Seroprevalencia de anticuerpos IgG / IgM anti-T. gondii en mujeres de Coro, Venezuela*

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### Abstract

Studies show a high frequency of IgG against *T. gondii*. The aim was to evaluate the seroprevalence of IgG and IgM anti-*T. gondii* in 522 women. 13% of seropositivity IgG+/IgM- and 0.7% IgG+/IgM+ was found. This could be due to the climate characteristics who may decrease the transmission. We recommend the evaluation if the environmental may affect the viability of the oocysts.

**Keywords:** toxoplasmosis; seroprevalence; IgG & IgM; *Toxoplasma gondii*; Venezuela.

### Resumen

Los estudios muestran una alta frecuencia de IgG contra *T. gondii*. El objetivo fue evaluar la seroprevalencia de IgG y IgM anti-*T. gondii* en 522 mujeres. Se encontró 13% de la seropositividad IgG +/IgM- y 0,7% IgG+/IgM+. Esta frecuencia podría deberse a las características del clima. Recomendamos estudiar si el medio ambiente puede afectar la viabilidad de los ooquistes.

**Palabras clave:** toxoplasmosis; seroprevalencia; IgG e IgM; *Toxoplasma gondii*; Venezuela.

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### Introduction

Toxoplasmosis is a worldwide parasitic zoonosis produced by *Toxoplasma gondii*. In immunocompetent individuals, the primary infection is usually asymptomatic, but persists in a latent state throughout life, and can be reactivated in case of immunosuppression (1). The Feline is the definitive host eliminating oocysts in the feces. The mechanisms of human infection are the ingestion of oocysts, blood transfusion, organ transplants and by placental transmission (1-4). Worldwide, the prevalence of toxoplasmosis is high. In America, around 65% of the population has detectable levels of total anti-*Toxoplasma gondii* specific immunoglobulins, where contact with feces of cats has been shown to be the main risk factor (2).

In Venezuela, studies conducted in pregnant women, children and adults at risk (homeless), blood donors and native populations, show a high frequency of specific IgG against *T. gondii* (5-14). However, because it is not a mandatory reporting disease, there is a sub-registration (15). The aim of this study was to evaluate the seroprevalence of IgG and IgM anti-*T. gondii* in women of the Coro in 2008 and 2012.

## Methods

**Design and sample:** A comparative study was conducted with 2008 and 2012 data. 522 women from Coro city, randomly selected, participated in the study and a serum sample were collected.

**Ethical considerations:** All women voluntarily accepted their participation through the signed informed consent. Anonymity and the World Bioethics Congress guidelines as well as Helsinki declaration were preserved.

**Technical information:** IgG and IgM anti-*Toxoplasma gondii* detection in 2008 (n=268) was made by the Microparticle Enzyme Immunoassay (MEIA), using the commercial kit (Toxo IgG and Toxo IgM, AxSYM® assay Abbott), and in 2012 (n=254) with the Fluorescent Enzyme-Linked Assay (ELFA), following the protocol of the manufacturer (VIDAS TOXO IgG and IgM system of bioMérieux® Inc). The reference values of the commercial kit were considered as a diagnostic. The MEIA kit reference values for IgG: positive >2.5 IU/ml and lower negative. For IgM: positive >0.600 IU/ml, negative <0.499 IU/ml and indeterminate 0.500-0.599 IU/ml. The ELFA kit reference values for IgG: positive >8 IU/ml and negative less than 4 IU/ml and indeterminate between 4-8 IU/ml. For IgM: positive >0.65 IU/ml, negative <0.55 IU/ml and indeterminate 0.55-0.65 IU/ml. Any indeterminate sample was repeated to confirm the results.

**Analysis of the data:** Data obtained was entered on to an excel spreadsheet and transferred to SPSS version 21 statistical program for the analysis.

## Result

Of the 522 women evaluated, seronegative anti-*Toxoplasma gondii* specificity IgG-/IgM- were 86% (n=451), 13% (n=65) presented IgG+/IgM-. 1% was IgG-/IgM+ (n=2) and 1% was IgG+/IgM+ (n=4). The seroprevalence by year and specificity are shown in Table 1. Women who presented seropositivity to IgM received pharmacological treatment. The distribution according to the specificity of IgG/IgM antibody is shown in Figure 1.

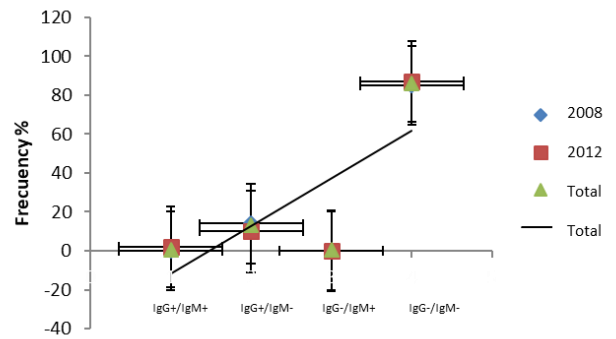
**Table 1.** Seroprevalence of anti-*Toxoplasma gondii* specificity by year. Coro, Venezuela.

Specificity	2008		2012		Total	
	n	%	n	%	N	%
IgG+/IgM+	0	0	4	2	4	0.7
IgG+/IgM-	38	14	27	10	65	13
IgG-/IgM+	1	0,3	1	0,3	2	0.3
IgG-/IgM-	229	85,7	222	87,7	451	86
Total	268	100	254	100	522	100

## Discussion

Toxoplasmosis is the most widespread parasitic zoonosis in nature. It has been shown in all latitudes, in humans, more than 300 species of mammals and around 30 species of birds. It is usually asymptomatic, but it is responsible for many abortions, fetal, perinatal and infant hazard and is the most frequent cause of focal infection of the central

nervous system in patients with AIDS, representing a latent threat for all immunosuppressed patients [2-4].



**Figure 1.** anti-*Toxoplasma gondii* IgG-IgM specificity distribution. 2008-2012. Coro. Venezuela

We found 13% of seropositivity of anti-*T. gondii* IgG+/IgM-, keeping low thru the years. No statistically significant variation ( $p > 0.05$ ) during the follow-up. Positivity both for IgG/IgM was observed only in 0.7% of the 2012 samples, probably a reactivation of a past infection and was 0% on the 2008 samples (Table 1). Our data is in contradiction of the studies in Venezuela WHO show a high prevalence of specific IgG/IgM antibodies in urban areas between 32 [5,6] and 61%, in pregnant women and in individuals at risk (homeless) between 42 and 67% [7-9]. In rural areas it has been reported from 39 to 49% [10]. In native populations: 50% of the Barí of the Sierra de Perijá of Zulia state, 88% of the Güajiba from the Venezuelan Amazon rainforest and 69% from the Piaroa of the Bolívar state [11-14]. High prevalence rates are also observed in the rest of the America: Brazil 66%, Colombia 47%, Mexico 56%, Trinidad and Tobago 39% [16-19]. In Europe, 38% in Croatia [20]. In Asia, 42% to 55% in India, Malaysia and Nepal [21,22].

The IgM seroprevalence remained less than 1% during the years, which shows a very low prevalence of acute infection in this population [23,24]. This low prevalence is also observed in a small group with no pregnant women in Oman [25]. It also proves that both diagnostic techniques (ELFA and MEIA) provide good reproducibility of the results and comparable sensitivity and specificity at the quantitative level of IgG/IgM specific anti-*T. gondii* (Fig 1). The specific IgG/IgM reactivity it is easier to evaluate the stage of the infection since high IgG levels can persist beyond the year and even low levels can remain in past infections. However, a low titer may also be the first stage in the ascending curve of IgG in a recent infection [26,27].

The lower frequency of infection by *T. gondii* found in this study comparative with others carried out in the country could be due to the climate characteristics of the Coro city, with high temperatures (24-34°C), clay soils of acidic pH (4,5-5,5) and strong trade alisios winds [28], which probably affect the viability of the oocysts, decreasing the possibility of transmission.

We recommend keeping the follow-up of the seroprevalence of infection by *T. gondii* in Venezuela, with the evaluation of the risk factors in the infected people

and to study if the environmental characteristics may have consequences of the on the viability of the oocysts.

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## Conflict of Interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

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## Disclaimer

The views expressed in the submitted article are all author's own and not an official position of the institution or funder.

## Bibliographic References

- Dabanch P J. Zoonosis. Rev Chil infectología [Internet]. 2003;20:47-51. Disponible en: [http://www.scielo.cl/scielo.php?script=sci\\_arttext&pid=S0716-10182003020100008&lng=en&nrm=iso&tlng=en](http://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0716-10182003020100008&lng=en&nrm=iso&tlng=en). DOI: [10.4067/S0716-10182003020100008](https://doi.org/10.4067/S0716-10182003020100008)
- Hill D, Dubey JP. *Toxoplasma gondii*: transmission, diagnosis and prevention. Clin Microbiol Infect [Internet]. 2002;8(10):634-40. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/12390281>. PMID: [12390281](https://pubmed.ncbi.nlm.nih.gov/12390281/)
- Mimica F, Muñoz-Zanzi C, Torres M, Padilla O. Toxoplasmosis, zoonosis parasitaria prevalente en Chile: recuento y desafíos. Rev Chil infectología [Internet]. 2015;32(5):541-9. Disponible en: [https://scielo.conicyt.cl/scielo.php?script=sci\\_arttext&pid=S0716-10182015000600008](https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0716-10182015000600008). DOI: [10.4067/s0716-10182015000600008](https://doi.org/10.4067/s0716-10182015000600008). PMID: [26633111](https://pubmed.ncbi.nlm.nih.gov/26633111/)
- Marfín-Hernández I. Toxoplasmosis congénita: una mirada al problema. Rev Biomed [Internet]. 2004;15(3):181-90. Disponible en: [http://www.uady.mx/sitios/biomedic/revbiomed/pdf/rb041\\_536.pdf](http://www.uady.mx/sitios/biomedic/revbiomed/pdf/rb041_536.pdf)
- Díaz-Suárez O, Parra AM, Araujo-Fernández M. Seroepidemiología de la toxoplasmosis en una comunidad marginal del municipio Maracaibo, estado Zulia, Venezuela. Invest Clin [Internet]. 2001;42(2):107-21. Disponible en: <http://produccioncientificaluz.org/index.php/investigacion/article/view/10238>
- Chacín-Bonilla L, Sánchez-Chávez Y, Estévez J, Larreal Y, Molero E. Prevalence of human toxoplasmosis in San Carlos Island, Venezuela [Internet]. Interiencia. 2003;28:457-62. Disponible en: <http://www.redalyc.org/articulo.oa?id=33908305>
- Triolo-Mieses M, Traviezo-Valles L. Seroprevalencia de anticuerpos contra *Toxoplasma gondii* en gestantes del municipio Palavecino, estado Lara, Venezuela. Ksmera [Internet]. 2006;34(1):7-13. Disponible en: <http://produccioncientificaluz.org/index.php/ksmera/article/view/4764>
- León de Bracho D, Sanoja C, Granadillo A. Seroepidemiología de la infección por *Toxoplasma gondii* en embarazadas. Ksmera [Internet]. 2001;29(2):185-97. Disponible en: <http://www.produccioncientifica.luz.edu.ve/index.php/ksmera/article/view/4686>
- Riera L, Cárdenas E, Bullones X, Traviezo L, Perdomo R, Bonfante-G R. Incidencia y prevalencia de toxoplasmosis en embarazadas que acuden a la consulta prenatal de dos ambulatorios del estado Lara. Rev TALLERES. 2001; 7: 181.
- Álvarez González LC, Rojas Moreno EM. Detección de anticuerpos anti *Toxoplasma gondii* en una comunidad rural en el estado Trujillo Venezuela. Academia [Internet]. 2003;2(3):36-8. Disponible en: <http://revistas.saber.ula.ve/index.php/academia/article/view/5951>
- Chacín-Bonilla L, Sanchez-Chavez Y, Monsalve F, Estevez J. Seroepidemiology of Toxoplasmosis in Amerindians from Western Venezuela. Am J Trop Med Hyg [Internet]. 2001;65(2):131-5. Disponible en: <http://www.ajtmh.org/content/journals/10.4269/ajtmh.2001.65.131>. DOI: [10.4269/ajtmh.2001.65.131](https://doi.org/10.4269/ajtmh.2001.65.131)
- De La Rosa M, Bolívar J, Perez HA. Infección por *Toxoplasma gondii* en amerindios de la selva amazónica de Venezuela. Med (Buenos Aires) [Internet]. 1999;59(6):759-62. Disponible en: [http://medicinabuenosaires.com/revistas/vol59-99/6/v59\\_n6\\_759\\_762.pdf](http://medicinabuenosaires.com/revistas/vol59-99/6/v59_n6_759_762.pdf)
- Díaz-Suárez O, Estévez M J, García P M, Cheng-Ng R, Araujo B J, García P M. Seroepidemiología de la toxoplasmosis en una comunidad indígena Yucpa de la Sierra de Perijá, Estado Zulia, Venezuela. Rev Med Chil [Internet]. 2003;131(9):1003-10. Disponible en: <https://scielo.conicyt.cl/pdf/rmc/v131n9/art06.pdf>
- Devera R, Blanco Y, Amaya I, Muñoz R, Pérez K. Seroprevalencia de *Toxoplasma gondii* en una comunidad indígena del municipio Cedeño, estado Bolívar, Venezuela. Saber [Internet]. 2013;25(11):83-9. Disponible en: <http://www.redalyc.org/articulo.oa?id=427739461009>
- Organización Mundial para la Salud. Reglamento Sanitario Internacional (2005) Áreas de trabajo para su aplicación. 2007 [citado 15 de enero de 2019];31. Disponible en: <https://www.who.int/ihr/AreasofworkES.pdf>
- Barbosa IR, de Carvalho Xavier Holanda CM, de Andrade-Neto VF. Toxoplasmosis screening and risk factors amongst pregnant females in Natal, northeastern Brazil. Trans R Soc Trop Med Hyg [Internet]. 2009;103(4):377-82. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/19211119>. DOI: [10.1016/j.trstmh.2008.11.025](https://doi.org/10.1016/j.trstmh.2008.11.025). PMID: [19211119](https://pubmed.ncbi.nlm.nih.gov/19211119/)
- Gómez Marín JE. Toxoplasmosis: Un problema de Salud Pública en Colombia. Rev Salud Pública [Internet]. 2002;4(2):7-10. Disponible en: <http://www.scielo.org.co/pdf/rsap/v4s1/v4s1a03.pdf>
- Adesiyun AA, Ganta K, Seepersadisingh N, Gooding R, Ramsewak S. Seroprevalence and risk factors of *Toxoplasma gondii* infection among pregnant women in Trinidad and Tobago. Rev Panam Salud Pública [Internet]. 2008;23(3):164-70. Disponible en: <https://pdfs.semanticscholar.org/05ca/91ee9fcd6258112af4c534a589bcc868306e.pdf>. DOI: [10.1590/s1020-49892008000300003](https://doi.org/10.1590/s1020-49892008000300003)
- Alvarado-Esquivel C, Sifuentes-Álvarez A, Narro-Duarte SG, Estrada-Martínez S, Díaz-García JH, Liesenfeld O, et al. Seroepidemiology of *Toxoplasma gondii* infection in

- pregnant women in a public hospital in northern Mexico. *BMC Infect Dis* [Internet]. 2006;6(1):113. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/16839423>. DOI: [10.1186/1471-2334-6-113](https://doi.org/10.1186/1471-2334-6-113). PMID: [16839423](https://pubmed.ncbi.nlm.nih.gov/16839423/)
20. Punda-Polić V, Tonkić M, Capkun V. Prevalence of antibodies to *Toxoplasma gondii* in the female population of the County of Split Dalmatia, Croatia. *Eur J Epidemiol* [Internet]. 2000;16(9):875-7. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/11297231>. PMID: [11297231](https://pubmed.ncbi.nlm.nih.gov/11297231/)
  21. Akoijam BS, Shashikant S, Singh S, Kapoor SK. Seroprevalence of *Toxoplasma* infection among primigravid women attending antenatal clinic at a secondary level hospital in North India. *J Indian Med Assoc* [Internet]. 2002;100(10):591-2, 594-6, 602. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/12452512>. PMID: [12452512](https://pubmed.ncbi.nlm.nih.gov/12452512/)
  22. Andiappan H, Nissapatorn V, Sawangjaroen N, Nyunt MH, Lau Y-L, Khaing SL, et al. Comparative study on *Toxoplasma* infection between Malaysian and Myanmar pregnant women. *Parasit Vectors* [Internet]. 2014;7(1):564. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/25498432>. DOI: [10.1186/s13071-014-0564-9](https://doi.org/10.1186/s13071-014-0564-9). PMID: [25498432](https://pubmed.ncbi.nlm.nih.gov/25498432/)
  23. Martínez Méndez D. Seroprevalencia de la Toxoplasmosis en mujeres no embarazadas en Venezuela. *Rev Soc Ven Microbiol* [Internet]. 2009;29(1):49-51. Disponible en: <https://www.siicsalud.com/dato/resiic.php/120949>
  24. Martínez Méndez D. Seroprevalencia de toxoplasmosis en mujeres no embarazadas. *Salud i Ciencia* [Internet]. 2011;18(7):647-8. Disponible en: [https://www.siicsalud.com/saludciencia/pdf/sic\\_187.pdf](https://www.siicsalud.com/saludciencia/pdf/sic_187.pdf)
  25. Alzaheb RA, Al-Amer O. The seroprevalence and risk factors of toxoplasmosis among female undergraduate university students in Saudi Arabia. *Oman Med J* [Internet]. 2017;32(6):486-91. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/29218125>. DOI: [10.5001/omj.2017.93](https://doi.org/10.5001/omj.2017.93). PMID: [29218125](https://pubmed.ncbi.nlm.nih.gov/29218125/)
  26. Montoya JG. Laboratory Diagnosis of *Toxoplasma gondii* Infection and Toxoplasmosis. *J Infect Dis* [Internet]. 2002;185(s1):S73-82. Disponible en: <http://www.ncbi.nlm.nih.gov/pubmed/11865443>. DOI: [10.1086/338827](https://doi.org/10.1086/338827). PMID: [11865443](https://pubmed.ncbi.nlm.nih.gov/11865443/)
  27. Durlach RA, Kaufer F, Carral L, Hirt J. Toxoplasmic lymphadenitis-Clinical and serologic profile. *Clin Microbiol Infect* [Internet]. 2003;9(7):625-31. Disponible en: <https://core.ac.uk/download/pdf/82000581.pdf>. DOI: [10.1046/i.1469-0691.2003.00575.x](https://doi.org/10.1046/i.1469-0691.2003.00575.x). PMID: [12925102](https://pubmed.ncbi.nlm.nih.gov/12925102/)
  28. Instituto Nacional de Estadística. <http://www.ine.gov.ve/documentos/see/sintesisestadistica2013/estados/falcon/documentos/SituacionFisica.htm>. [citado 15 de enero de 2019]

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**Authors Contribution:**

**SGY, MLC, SHN and MMD:** conceived and designed the study, collected the clinical and experimental data, analyze the data and prepared the manuscript. The manuscript has been read and approved by all named authors.