

PREVALENCE OF TOXOPLASMOSIS IN PREGNANT WOMEN TREATED AT SAN DIEGO CLINIC IN BARRANQUILLA, COLOMBIA

Prevalencia de toxoplasmosis en mujeres embarazadas atendidas en la Clínica San Diego de Barranquilla, Colombia

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Abstract

Introduction: Toxoplasmosis is an infectious disease produced by the parasite *Toxoplasma gondii*. The occurrence of the infection during pregnancy generates severe complications for the fetus, leaving important neurological and visual sequelae. TORCH test is used to detect the infection through serological tests.

Objective: To determine the prevalence of Toxoplasmosis in pregnant women treated at San Diego Clinic during 2021, to understand the presence of the disease in Barranquilla.

Methodology: Observational, cross-sectional, retrospective study with a sample of 42 medical records of pregnant women, who underwent a serological test for *Toxoplasma gondii* upon admission to prenatal care. Through a survey, associated risk factors were identified.

Resumen

Introducción: La toxoplasmosis es una enfermedad infecciosa producida por el parásito *Toxoplasma gondii*. La infección durante el embarazo genera complicaciones graves para el feto, dejando importantes secuelas neurológicas y visuales. Las pruebas del grupo TORCH se utilizan para detectar la infección mediante pruebas serológicas.

Objetivo: Determinar la prevalencia de toxoplasmosis en embarazadas atendidas en la Clínica San Diego durante 2021, con el fin de comprender la presencia de la enfermedad en Barranquilla.

Metodología: Estudio observacional, transversal y retrospectivo con una muestra de 42 historias clínicas de embarazadas a las que se les realizó una prueba serológica para *Toxoplasma gondii* al ingresar a control prenatal. Mediante una encuesta, se identificaron los factores de riesgo asociados.

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Results: A prevalence of IgG antibodies of 58.54% was found. 91% of pregnant women were between the ages of 15 to 35 years old; 55% were between 27 to 39 weeks of gestation; 43% were housewives; 45% had completed high school and 95% had a low social economic status.

Conclusions: The prevalence of toxoplasmosis in the sample of pregnant women from the San Diego Clinic is like to those reported in other regional and national studies. A higher prevalence was found among patients with few prenatal controls, low educational level and housewife.

Keywords: Toxoplasmosis congenital, risk factors, pregnant women.

Introduction

Toxoplasmosis is an infection caused by the parasite *Toxoplasma gondii*, which has a high prevalence among pregnant women. It generally leads to an asymptomatic disease that can go unnoticed and can only be identified through specific serological tests during prenatal check-ups¹.

In 2015, it was estimated that between 10% and 20% of the global population was infected with *Toxoplasma gondii*, with prevalence varying depending on climatic conditions that affect the viability of oocysts, as well as hygiene, water quality, and dietary habits. The animals that harbor the parasite in their intestinal tract and excrete it in their feces are felines, both domestic and wild².

Several studies have reported that economic, social, and educational levels are other variables that directly influence the prevalence of toxoplasmosis. For example, in the United States, the prevalence is 23%, in Brazil up to 84%, and in Colombia approximately 60%³. About 50% of the Colombian female population has antibodies against *Toxoplasma gondii*, as do 50-60% of pregnant women, which indicates a high exposure and circulation of the parasite in the country. Therefore, it is inferred

Resultados: Se encontró una prevalencia de anticuerpos IgG del 58,54%. El 91% de las embarazadas tenía entre 15 y 35 años. El 55% tenía entre 27 y 39 semanas de gestación; el 43% eran amas de casa; el 45% había completado la preparatoria y el 95% residía en un nivel socioeconómico bajo.

Conclusiones: La prevalencia de toxoplasmosis en la muestra de embarazadas de la Clínica San Diego es similar a la reportada en otros estudios regionales y nacionales. Se encontró una mayor prevalencia en pacientes con pocos controles prenatales, bajo nivel educativo y ocupación en labores domésticas.

Palabras clave: Toxoplasmosis congénita, factores de riesgo, embarazadas.

that between 0.6% and 3% of pregnant women in Colombia may become infected during pregnancy, with a higher risk for teenagers and a lower risk for women aged 35 or older⁴.

It is important to highlight that nearly 90% of pregnant women who present with acute toxoplasmosis during pregnancy are asymptomatic; thus, disease detection relies on serological test results performed during prenatal check-ups. There is an estimated risk of congenital transmission of 10-100% for every 5 out of 1000 pregnant women who are also immunocompromised². The severity of this situation is that it also affects newborns, causing significant disorders whose severity is inversely proportional to the gestational age at which the fetus acquires the infection. In Colombia, between 2 to 10 out of every 1000 live births suffer from congenital toxoplasmosis, with over 3000 infected children born each year, of which approximately 10% are symptomatic, resulting from mothers infected during gestation and producing visual or neurological sequelae from infancy to adolescence⁵.

Among the Colombian female population, a high number of women have been in contact with the parasite; approximately 47% of Colombian

women have antibodies against *Toxoplasma gondii*⁶. Moreover, the frequency of congenital infection in the country, in cities like Bogotá, Barranquilla, and Bucaramanga, is 1, 2, and 1 per 1000 live births with toxoplasmosis, respectively. In contrast, cities like Cúcuta and Riohacha have a lower frequency of infection, with percentages of 0.5 to 0.7 per 1000 live births, respectively⁴. As a result, Barranquilla is among the cities with the highest number of congenital toxoplasmosis cases in the country.

However, the implementation and promotion of hygienic measures are crucial in preventing the disease, as they reduce the likelihood of primary infection in immunocompetent mothers and, consequently, transmission of the disease to the fetus. As it is a highly preventable disease and due to its impact on our community, the objective of this study is to determine its prevalence in pregnant women who were treated at San Diego Clinic in Barranquilla during the year 2021 based on their medical histories, and to establish associated risk factors, as well as to provide new baseline information to better understand the presence of the disease in this city. This information could serve as relevant data for the community and, in general, provide recommendations regarding disease prevention and educational programs.

San Diego Clinic in Barranquilla is a health center that frequently receives pregnant women, and when they attend prenatal check-ups, they are routinely asked to undergo TORCH tests, which include the toxoplasmosis test through the detection of antibodies against *Toxoplasma gondii*, the most commonly used indirect method to identify whether a person has been infected by this parasite².

Methods and materials

Type of the Study: Descriptive, cross-sectional, retrospective study.

Population and Sampling: The universe consisted of pregnant patients who attended prenatal check-ups at the San Diego Clinic in Barranquilla during 2021. The population included 1,975 pregnant women who attended prenatal care at the San Diego Clinic during this period.

From the Records of the Coordination section of San Diego Clinic, 1,975 medical records were found overall, 68 tested positive for toxoplasmosis, of which 42 medical records met the inclusion criteria.

Inclusion Criteria:

- Medical records of pregnant women who underwent relevant laboratory tests for the study, specifically IgG and IgM, ordered upon entry to prenatal care during 2021.
- The detection of specific antibodies (IgM and IgG) against the parasite was performed using the ELISA (Enzyme Linked Fluorescent Assay)⁷ method, applied by the San Diego Clinical Laboratory for etiological diagnosis in this group of 42 patients. The anti-Toxoplasma IgG test was considered positive when titers were greater than or equal to 8.8 UI/mL. The anti-Toxoplasma IgM test was considered positive when titers were greater than or equal to 8.0 UI/mL.
- A survey was completed regarding sociodemographic, biological, and lifestyle risk factors associated with the infection, using information recorded in the medical history.

This information is included in this document to enhance the research on the population attending this healthcare facility, noting that for future studies, it would be ideal to have a larger sample, the in-person application of the survey, and complete laboratory results in the medical records.

Exclusion Criteria: Medical records of pregnant women with inconsistencies in patient information and/or incomplete or missing laboratory data.

This study was approved by the Scientific Committee of the Faculty of Health, Exact, and Natural Sciences and the Ethics/Bioethics Committee of Universidad Libre Seccional Barranquilla, in accordance with the ethical standards of the 1975 Declaration of Helsinki, modified in 1983, with the authors' prior commitment to confidentiality regarding the research data to access patients' medical records.

Data Collection: The data were organized into tables for interpretation and discussion.

Data Analysis: Descriptive statistics were applied for data analysis, using Microsoft Excel; qualitative variable analysis was performed by calculating frequencies and percentages.

Results

For the analysis of the IgG and IgM results, 41 medical records of pregnant women who visited the clinical laboratory at San Diego Clinic were considered. The values of anti-Toxoplasma immunoglobulin G obtained from the ELISA test in these patients ranged from 0 to over 200 UI/mL (Table 1).

Table 1. Range of IgG titers found in pregnant women by ELISA test

IgG Values (UI/ml)	Frequency	Percentage
0 - 7,9	17	41,46
8,0 - 50	12	29,27
51 - 100	9	21,95
101 -200	2	4,88
200	1	2,44
Total	41	100

Source: This table was created by the authors based on data obtained from the files of San Diego Clinic, Barranquilla.

58.54% of the pregnant women tested positive for anti-Toxoplasma IgG, indicating that they had been in contact with the parasite before their pregnancy. On the other hand, the remaining 41.46%, who tested negative, represent the more susceptible pregnant population at risk of parasitic infection during their pregnancy (Table 1).

Table 2 presents the sociodemographic information, personal and family medical history documented in the 42 medical records of pregnant women obtained from the Records of Coordination at San Diego Clinic.

Table 2, Part I shows that 91% of the pregnant women were aged between 15 to 35 years, 95% belonged to low socioeconomic status (1 and 2), and 88% were urban residents, with 45% living in municipalities near Barranquilla. The vast majority of the pregnant women were from the municipality of Soledad, while others were from Luruaco, Sabanalarga, Malambo, Palmar de Varela, and even the Bolívar department. Most of those residing in Barranquilla were from the southwestern and metropolitan localities, particularly the southeastern locality. Only 1 resided in the northern-central historical locality.

Regarding education level, most had completed primary education (36%), secondary education (45%), and technical training (17%); 43% were homemakers. Additionally, 23 of the pregnant women (55%) were between 27 to 39 gestational weeks.

Table 2, Part II indicates that 33% of the pregnant women went to a minimum of 4 to 6 prenatal check-ups. Notably, 10 of them (24%) did not attend any subsequent appointments after their first visit. The data also reveals personal medical histories, with 5% presenting diabetes, hypertension, and malnutrition; 7% had iron-deficiency anemia, and 5% were living

Table 2. Information obtained from clinical records of pregnant women from the files of San Diego Clinic of Barranquilla during the year 2021*- Part I

Sociodemographic Characteristics		n	Percentage (%)
AGE (years)			
15- 25		21	50
26 – 35		17	41
36- 45		3	7
> 45		1	2
POPULATION TYPE			
Urban		37	88
Rural		5	12
SOCIO-ECONOMIC LEVEL			
Low Status	1	34	81
	2	6	14
Medium Status	3	1	2
	4	1	2
LOCATION			
Southwest		10	24
Southeast		6	14
North-Historic Center		1	8
Metropolitan		5	12
Riomar		1	2
Outside of Barranquilla		19	45
EDUCATIONAL LEVEL			
Elementary school		15	36
Secondary school		19	45
Professional undergraduate		1	2
Technician-Technologist		7	17
JOB PROFILE			
Housewife		18	43
Student		6	14
Private company employee		2	5
Employee of a public company		6	14

Sociodemographic Characteristics	n	Percentage (%)
Farmer	3	7
Merchant	1	2
Not declared in Medical History	6	14
GESTATIONAL WEEKS		
1 – 12	6	14
13 – 26	11	26
27 – 39	23	55
> 39	2	5

Source: This table was created by the authors based on data obtained from San Diego Clinic, Barranquilla.

Table 2. Information obtained from clinical histories of pregnant women from the San Diego Clinic of Barranquilla during the year 2021*- Part II

PRENATALS CHECKUPS		
Periodicity	n	Percentage (%)
None	10	24
1 – 3	11	26
4 – 6	14	33
7 or more	7	17
PERSONAL PATHOLOGICAL BACKGROUND		
Background	n	Percentage (%)
Gestational arterial hypertension	2	5
Iron deficiency anemia	3	7
Early perinatal death	2	2
Malnutrition	2	5
Gestational Diabetes	2	5
Antiphospholipid Antibody Syndrome	1	5
Epilepsy	1	2
	1	2
Asthma	1	2
None	34	61

(continued)

Table 2. Information obtained from clinical histories of pregnant women from the San Diego Clinic of Barranquilla during the year 2021*- Part II (continued)

PERSONAL INFECTIOUS BACKGROUND		
Background	n	Percentage (%)
HIV – AIDS	2	5
None	40	95
FAMILY PATHOLOGICAL BACKGROUND		
Background	n	Percentage (%)
Diabetes	4	10
High Blood Pressure	2	5
None	38	90
PSYCHOSOCIAL RISK		
Risks	n	Percentage (%)
Emotional Tension	2	5
Depressive Mood	2	5
Neurovegetative symptoms	2	5
Family support almost always	7	17
Family support always	14	33
Absent	33	79

Source: This table was created by the authors based on data obtained from San Diego Clinic, Barranquilla.

with HIV/AIDS. Family medical histories showed that 10% had diabetes and 5% had hypertension. Furthermore, 33% reported having family support, while 33 of the 42 medical records studied indicated a lack of this psychosocial support.

Discussion

In this research, a prevalence of 58.54% was obtained, meaning that 24 pregnant women out of a total of 41 analyzed tested positive for anti-Toxoplasma IgG (Table 1).

These results are similar to those reported by other studies conducted in Colombia, despite geographical, climatic, and cultural variations such as dietary habits and hygiene. For example, Varela et al. (2003) noted that in Colombia, the prevalence of this disease among pregnant women was 59.8%, with the Atlantic Coast being the region with the highest prevalence in pregnant women (63%), while the Central region showed the lowest prevalence (36%)⁸.

Similarly, in Villavicencio (Meta), Castro et al. (2008)⁹ reported a prevalence of 52.5% among 300 pregnant women in 2005, selected from Social State Enterprises (ESEs). In Sincelejo (Sucre)¹⁰, a prevalence of 56% was reported among 100 pregnant women attending prenatal care at maternal and child health centers, including Las Américas, San Vicente, and San Luis. In the same Sucre department, Assia et al. (2011)¹¹ found a prevalence of 74% in a sample of 289 pregnant women from the municipalities of San Marcos, Sincelejo, and Santiago de Tolú using the quantitative anti-Toxoplasma IgG ELISA test. Jácome et al. (2013)¹² found a prevalence of 58% in Valledupar (Cesar) in a study involving 300 pregnant women from the Eduardo Arredondo Daza Hospital, while Rosso et al. (2008)¹³ found a seroprevalence of 46.2% among 955 pregnant women from 12 health establishments located in various geographical areas and socioeconomic strata in Cali.

100% of the patients who tested positive for anti-Toxoplasma IgG in this study were asymptomatic. Lymphadenopathy, which is considered associated with gestational toxoplasmosis in 90% of cases, was not present in any of the pregnant women. However, the presence of symptoms such as headache and fever, not being pathognomonic, introduces the possibility of symptomatic patients being difficult to detect and diagnose¹⁴. Therefore, considering that at least 90% of women with acute toxoplasmosis

during pregnancy are asymptomatic, the diagnosis relies on the results of serological tests^{15, 16}. Additionally, of the 41 patients who presented negative anti-Toxoplasma IgM results (41.46%), only one patient exhibited headache and fever, while the rest were asymptomatic.

A positive anti-Toxoplasma IgM result indicates acute infection. In this test, only one patient among the 42 selected medical records, aged 15, had a result of 7.5 UI/ml, which was considered doubtful by the applied ELFA test, falling between 7.2 – 8.0 UI/ml. This suggests that she may have recently acquired the infection, which certainly poses a risk to fetal health, potentially leading to congenital toxoplasmosis, which can have fatal outcomes. It was also reported that the patient had unquantified fever, joint pain, headaches, and edema, but due to an abscess in the Bartholin gland, which was drained and managed with antibiotics. Furthermore, her medical history did not record the result of the anti-Toxoplasma IgG test for her entry into prenatal care. According to Gómez JE et al. (2007)¹⁷, the best combination to distinguish 100% of cases of acute infections from others is an IgM test combined with an avidity IgG test.

On the other hand, seroconversion is defined as a significant increase in IgG titer between two serum samples taken 3 to 4 weeks apart, which confirms the diagnosis of acute toxoplasmosis^{18, 19}. In our study, it could not be demonstrated that any pregnant woman presented seroconversion; that is, infection with *Toxoplasma gondii* during pregnancy, because access to anti-Toxoplasma serological results during subsequent follow-ups for those pregnant women who showed susceptibility to infection with a negative anti-Toxoplasma IgG result was not available.

Pregnant women who test negative for anti-Toxoplasma IgG (non-immune) should be monitored

monthly with anti-Toxoplasma IgM determinations, rather than just a single serological test during pregnancy; this last consideration is important both at the end of pregnancy and in postpartum diagnosis, especially for those pregnant patients who evade the initial diagnosis^{10, 17, 20}.

According to the information extracted from the 42 medical records (Table 2), the highest prevalence of toxoplasmosis (positive IgG) was found in young women, in weeks 29-39 of gestation, among those with few prenatal check-ups, low educational levels, and occupations related to household chores. These findings could be explained by considering that:

1. 50% were young adult women who generally tend not to be very cautious, which leads them to potentially consume contaminated and possibly harmful foods during their pregnancy. Without proper control at this level, there is a high likelihood that patients will be exposed to infection without early detection.
2. Regarding prenatal check-ups, it was observed that only 17% attended at least 7 appointments, and 24% did not attend any during their pregnancy, a fact that may be related to educational level, social environment, and economic conditions of the pregnant women. According to Cárdenas et al. (2015)²¹, awareness campaigns about the importance of timely diagnosis of gestational toxoplasmosis are necessary due to the risk of congenital toxoplasmosis, its serious consequences, and because it is asymptomatic in 90% of cases²².
3. The socioeconomic level of the majority of these pregnant women is classified as level 1, low-low, whose housing conditions and the environment in which they reside make them more susceptible to infection with these types of microorganisms; these socioeconomic conditions are similar to those reported in the studies by

Rosso et al. (2008)¹³, López et al. (2005)¹ in Armenia, and Castro AT et al. (2008)⁹ in Villavicencio, Jácome in Valledupar¹², where most of the pregnant population belonged to strata between 0 to 3.

It was observed that, similar to the study in Villavicencio⁹, there are several students, employees of companies, and farmers in the group; however, the vast majority are homemakers. Both farmers and homemakers are at greater risk of infection with toxoplasmosis due to their direct contact with animals, as they often need to care for and clean up after them.

The rural population constitutes 12% of the group of pregnant women and is at the highest risk of acquiring the infection, as they are exposed to a variety of animals with which they coexist and have direct contact with the soil²³. However, it was noted that 88% live in the city, thus a prevalence result of 58.54% positives can be explained by the existence of various risk factors such as habits, hygiene, etc., external to the countryside, which also play a fundamental role in the infection.

For pregnant women, there are associated risk factors that, once identified, are the cornerstone of disease prevention. These risk factors include contact with cat feces (the definitive host of the parasite), contaminated meats with cysts, contaminated vegetables, and contaminated hands^{24, 25}.

95% reported no personal history of infectious diseases, with only two of the pregnant women having a history of HIV infection. Mothers with chronic toxoplasmosis who suffer from diseases affecting the immune system, such as Hodgkin's lymphoma, systemic lupus erythematosus, and AIDS, may experience a reactivation of the disease²⁶.

Limitations of the study

This work was conducted with a small sample of medical records of pregnant women and focused on the results of anti-Toxoplasma IgG and IgM serological tests ordered for the patients during their first prenatal check-up. The baseline information for the study is provided by the medical records stored in the Coordination files of San Diego Clinic in Barranquilla. These medical records do not indicate whether the pregnant patients had household pets or if they were aware of the risk factors for *Toxoplasma gondii* infection.

Conclusions

This population of pregnant women shows a high prevalence of anti-Toxoplasma IgG, similar to what has been reported in other regional and national studies. It is noteworthy that the majority of the women included in the study come from low socioeconomic conditions (strata 1 and 2), a factor associated with a higher risk of toxoplasmosis.

Furthermore, there is a greater prevalence of the disease among patients with few prenatal check-ups, low educational levels, and occupations related to household tasks, as evidenced in the study conducted on the population of women in Barranquilla by Chaves - AMA et al.²³, which assessed the level of knowledge about toxoplasmosis in pregnant women attending prenatal consultations. Consequently, educational programs aimed at the entire pregnant population regarding risk factors associated with transmission and recommendations for hygienic practices to prevent *Toxoplasma gondii* infection are crucial for reducing the prevalence of the disease.

Even though the National Institute of Health in Colombia does not classify this parasitosis as mandatory to be reported to departmental health secretariats, it is advisable to maintain surveillance for

health control and prevention, as well as to keep updated information about this zoonotic parasitosis, which would mitigate the consequences for the exposed population and, consequently, the additional costs for the general health system.

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Author contribution

Aracely Garcia contributed to the methodology design, experimental execution supervision, data analysis, manuscript edition and review. Sebastian Consuegra, Yeison Echeverria and Daniela Pájaro contributed equally to data collection, analysis and interpretation of results, and manuscript review. Tammy Pulido contributed to manuscript review and translation. All authors reviewed the results and approved the final version of the manuscript.

Ethics declaration

The study was carried out in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Faculty of Health, Exact, and Natural Sciences and the Ethics/Bioethics Committee of Universidad Libre Seccional Barranquilla (protocol No 24, approved by 03 of May, 2018)

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The conclusions of this article are solely the responsibility of the authors and do not necessarily reflect

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Conflict of interest

The authors declare that there is no conflict of interest in the work carried out.

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