

# An estimation of the frequency of gestational toxoplasmosis in the Brazilian Federal District

## Contribuição para a estimativa da frequência de toxoplasmose em gestantes do Distrito Federal

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### ABSTRACT

*Acute infections by the protozoan Toxoplasma gondii during pregnancy (gestational toxoplasmosis) are known to cause serious health problems to the fetus (congenital toxoplasmosis). In Brasília, there have been few studies on the incidence of toxoplasmosis. This report summarizes a retrospective study performed on 2,636 selected pregnant women attended by the public health system of Guar, a satellite-City of Braslia. In this survey, 17 cases of gestational toxoplasmosis were detected; 15 of which were primary maternal infection and the remaining 2 were consistent with secondary maternal infection. These results suggest an annual seroconversion rate of 0.64 percent (90 percent confidence interval: 0.38, 0.90).*

**Key-words:** Toxoplasma. Gestational toxoplasmosis. Morbidity. Federal District. Brazil.

### RESUMO

*Infeces agudas pelo protozorio Toxoplasma gondii durante a gravidez (toxoplasmose em gestantes) so conhecidas por causar srios problemas de sade ao feto (toxoplasmose congnita). Em Braslia, estudos sobre a incidncia da toxoplasmose so escassos. Este relato resume um estudo retrospectivo realizado com um grupo selecionado de 2.636 gestantes assistidas pelo sistema pblico de sade do Guar, Cidade-satlite de Braslia. Nesta investigao, foram detectados 17 casos de toxoplasmose gestacional; 15 dos quais casos de infeco materna primria, e os 2 restantes consistentes com infeco materna secundria. Estes resultados sugerem uma taxa de soroconverso anual da ordem de 0,64 por cento (intervalo de confiana de 90 por cento: 0,38; 0,90).*

**Palavras-chaves:** Toxoplasma. Toxoplasmose gestacional. Morbidade. Distrito Federal. Brasil.

Toxoplasmosis is caused by infection with the protozoan parasite *Toxoplasma gondii*. Acute infections acquired during pregnancy (gestational toxoplasmosis) are known to cause serious health problems when the microorganism is transmitted to the fetus (congenital toxoplasmosis), including ocular and neurological sequels, seizures, blindness and death<sup>1</sup>. Nonetheless, manifestations of congenital toxoplasmosis may not become apparent until the second or third decades of life<sup>2</sup>. In Brazil, official statistics from the Ministry of Health (<http://tabnet.datasus.gov.br/cgi/sim/obtm.htm>) state that toxoplasmosis alone is responsible for on average 90 deaths a year. However, there is a lack of data on the morbidity posed by

this zoonosis. Several studies (reviewed by Camargo)<sup>1</sup> have shown that 50 to 80% of all Brazilian women in childbearing age exhibit IgG antibodies to *T. gondii*. Therefore, 20 to 50% are susceptible to this infection. In various states of the Country, serological surveys have confirmed steady rates of infection during pregnancy: for instance 1.7% and 1.8% in the states of Santa Catarina<sup>2</sup> and Paran, respectively<sup>3</sup>.

In Braslia, denomination of the metropolitan region that comprises the Brazilian capital city, statistics on the incidence of toxoplasmosis are generally scarce or dispersed. Only the regional public Health System of Taguatinga, a satellite-city in the outskirts of Braslia, releases data regularly on the total

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Recebido para publicao em 7/1/2004

Aceito em 8/5/2005

number of cases notified in that area, that totaled 46 cases in the first semester of year 2000 (<http://www.saude.df.gov.br/saude/11not11b.asp>). Unfortunately, cases of congenital or gestational toxoplasmosis are not currently assessed. In this scenario, elaborating epidemiologic surveys and determining expectancy rates might aid in the implantation of targeted prenatal education and newborn screening strategies with the goal of preventing morbidity associated with the disease.

In this report, we present results of a pilot study that provided an estimation of the frequency of gestational toxoplasmosis in the satellite-city of Guará, located within the geo-economical limits of the Brazilian Federal District. For that purpose, a retrospective study was performed investigating serologic records of pregnant women admitted from January to December 2000 in prenatal programs of the public regional hospital of Guará (HRGu) and the 3 public health centers of that city. This investigation was conducted by screening individual medical records for indication of gestational toxoplasmosis among the women studied. Taking into account that: *i*) most women are submitted to prenatal tests for toxoplasma-specific IgG and IgM whenever admitted to prenatal follow up, and those susceptible are re-tested on a bimonthly basis, and *ii*) the diagnostic procedures for toxoplasmosis in the regional public health system are standardized, using enzyme-linked immunosorbent assay (ELISA) as described by Camargo<sup>1</sup>, a total of 2,636 pregnancies were selected that presented IgM and IgG levels < 1:64.

Infection during pregnancy was identified based on the occurrence of maternal seroconversion according to the following independent criteria: *1*) detection of specific IgM in dilutions  $\geq$  1:64, or *2*) a minimum four-fold rise in the specific IgG levels in comparison with the titer stated on the woman's former test. For this study, a case was considered positive whenever a following confirmatory test (i.e. repetition) was present in the woman's record. Considering the group studied, the criteria above are consistent with active toxoplasmosis<sup>1-6</sup>, characterizing primary and secondary gestational toxoplasmosis, respectively. Statistical analysis was performed determining the confidence interval for each estimation, setting the level of confidence at 90 percent ( $z = 1.65$ ).

Based on the above criteria, 17 cases of gestational toxoplasmosis were found within the universe of pregnancies studied, of which 15 were diagnosed by specific IgM antibodies against *T. gondii*, amounting to 0.57% (90% confidence interval (CI): 0.34, 0.80) of primary maternal infection. The two remaining cases were diagnosed by the four-fold IgG increase criterion, giving 0.08% (90% CI: 0.01, 0.15) secondary maternal infection. Taken together, these results suggest an overall seroconversion rate of 0.64 percent (90% CI: 0.38, 0.90). The data above is summarized in Table 1. As this was a preliminary study, the influence of factors such as age, ethnicity or social-economical group were not considered.

In summary, our results reveal that the frequency of primary toxoplasma infection among pregnant women (0.57%) is relatively low in our region when compared to states such as Santa Catarina (1.7 percent) and Paraná (1.8 percent), this being nonetheless noteworthy, since it significantly exceeded the

**Table 1 - Individual cases of gestational toxoplasmosis (absolute number) and seroconversion rates (percentage) for primary and secondary infections found among the 2,636 pregnancies studied.**

| Index/Status        | Cases | Seroconversion rate           |
|---------------------|-------|-------------------------------|
| Primary infection   | 15    | 0.57%<br>(90% CI: 0.34, 0.80) |
| Secondary infection | 2     | 0.08%<br>(90% CI: 0.01, 0.15) |
| Total               | 17    | 0.64%<br>(90% CI: 0.38, 0.90) |

90% CI – 90 percent confidence interval

frequency of secondary infection ( $P < 0.001$ ) and accounted for 88.2% of the seroconversion occurrences identified in the present study.

Although our results do not allow precise determination of the prevalence of congenital toxoplasmosis, expectancy rates are usually helpful for implementing public health policies for infectious diseases. Taking into account that 46,500 live newborns were delivered at the capital's public health system in the year 2000 ([http://www.saude.df.gov.br/download/dados\\_estatisticos.zip](http://www.saude.df.gov.br/download/dados_estatisticos.zip)), the incidence of primary maternal infection was extrapolated to estimate a frequency of gestational toxoplasmosis raging from 3.4 to 8 per 1,000 live births that year. It is important to consider that 80% of all cases of primary toxoplasmosis in pregnancy result in ocular lesion or late neurological disorders in the child<sup>2</sup>. Therefore, our results suggest a yearly average of 212 children at risk for developing sequels from primary maternal toxoplasma infection. Unfortunately, our estimation probably underestimates the total number of newborns carrying the congenital form of the disease in Brasília, since this work was based on data from the public health system only, without considering pregnancies attended by the regional private health system. In addition, a stringent cut-off limit was set in order to minimize inclusion of false-positive cases or borderline results. Furthermore, even though a social-economical analysis was not included, it should be considered that the city of Guará may not accurately represent the entire Federal District, since the outskirts are generally recognized to have lower standards of sanitary infrastructure. Future assessments on the seroconversion rate among pregnant women resident in such areas would help increase the accuracy of the estimation determined in this study, which may feature from now on as a referential index on the status of the toxoplasmosis issue in the Brazilian Federal District and in Brazil as a whole.

The incidence of gestational toxoplasmosis varies greatly between regions, but is recognized to be widely distributed throughout the globe. The practice of routine serologic screening for maternal toxoplasma infection in countries such as France and Austria has proven to greatly reduce the incidence of the congenital form of the disease<sup>6</sup>. In Brazil, such practice is not generally implemented, due in part from failure to enforce legal obligations. Consequently much data on the incidence of toxoplasmosis is unavailable. Such a lack of screening for onset of congenital toxoplasmosis predisposes countless newborns throughout the Country to development of late consequences, which could have been minimized by an early postnatal intervention.

## ACKNOWLEDGEMENTS

The authors are greatly indebted to Dr. Rosane Santos Grisolia, from the Regional Laboratory of Guar, for her advisory role on technical issues and interpretation of results. The authors also thank the University of Braslia for assistance in the development of this study.

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