

Testing for toxoplasmic immunity in women of fertile age - are we prepared?

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Abstract. We perform a prospective study based on epidemiologic questionnaire and serology over 280 females. Females were selected from obstetrics departments between 2006 and 2009, being mothers of neonates born with congenital abnormalities, of possible toxoplasmic origin. Positive serology (IgG) was found in 34.3% cases, in 21-30 years old age group. A statistic significant association was found between positive serology for *Toxoplasma gondii* and rural area, with a rate of 32% of abortion/still birth. An important proportion of mothers (22.85%) refused to participate in further studies, 20% of them being within 18-25 years age interval. Only 12.85% of mothers had a test for *T. gondii* infection during their pregnancy. Confirmation of congenital toxoplasmosis diagnosis in 8.6% of neonates was due to IgA testing while specific anti-toxoplasmic IgM were negative.

Keywords: Anti-toxoplasmic serology; Screening; Pregnancy; Mothers; Congenital; Abortion; Still birth.

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Introduction

The screening programs for toxoplasmic infection in women of fertile age were preceded by studies for the appreciation of contamination level in the area in all countries using this type of exam. Lobby among women for performing this test is carried out in Romania by physicians as there is no current national program. In the last years, several centers were enabled to perform serologic analysis for pregnant women. However, these analyses are not organized as a constant follow-up during the whole period of pregnancy but more as a single determination,

without proper interpretation of the data. As a result of this, the female population of fertile age is rather reticent to undergo serologic determination for toxoplasmic immunity. Considering all these, we wanted to appreciate the regional conditions linked to toxoplasmic infection and immunity among women of fertile age in order to establish the proper actions to be taken for the development of a national or regional program of surveillance.

Materials and methods

We performed a prospective epidemiologic questionnaire and a serologic study in 280

mothers selected from obstetrics departments between 2006 and 2009. The inclusion criterion was the birth of a child with abnormalities, possible to be of toxoplasmic origin.

Laboratory diagnosis for the serologic profile of the studied cases was a manual ELISA performed with BioRad equipment and Platelia kits. For IgG positive sera it was accompanied by IgM and/or IgA avidity test. All sera were analyzed in duplicate and the results were checked by the same method performed with a kit from another producer.

Statistic data analysis was made with the Epi Info 2000 and SPSS10 softwares. Standard level of statistic significance was considered $\alpha=0,05$, and the tests used were: χ^2 (Hi-square) test, Mann-Whitney (U) test and Risk Ratio. For frequencies and averages, confidence intervals were calculated.

Results

Group structure according to age and IgG positivity is presented in table 1 and figure 1.

Table 1. Age histogram in the studied group

Serology	Age	Variation
IgG +	18-37 (26.5±5.178)	26.810
IgG -	18-39 (26.5±5.237)	27.426

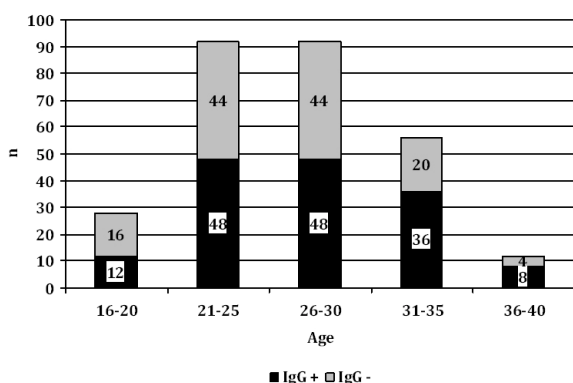


Figure 1. Repartition of mothers according to age and IgG positivity

Data analysis does not show a statistic significant association ($p>0.05$) between age

groups and toxoplasmic immunity, even if the percentage of females with positive serology increase by age. Relation between positive/negative serology and living area showed statistic significant association ($p<0.05$ - Fisher exact, χ^2) between positive serology for *Toxoplasma gondii* and rural area with a risk ratio of 1.83 (figure 2). This comparison was made over a number of 256 females from the whole lot of 280 due to the absence of data in the questionnaire. We did not find any statistic significant association ($p=>0.05$) between rural area and addressability for testing toxoplasmic immunity. Calculating the total number of pregnancies (560) and children resulting from these pregnancies (380) we obtained an abortion + still birth rate of 32% in the analyzed group.

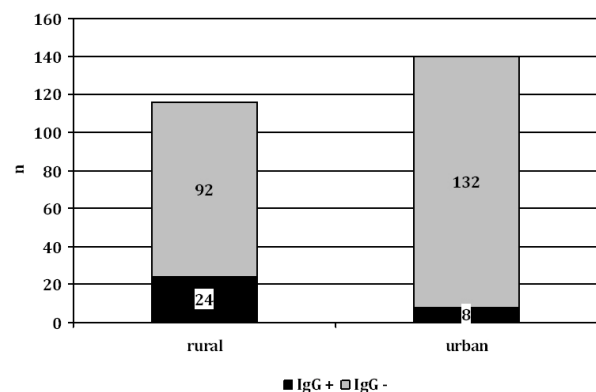


Figure 2. Repartition of cases according to living area and IgG positivity

Classification of females according to the number of pregnancies (parity) is represented in figure 3: 45.7% of them were primiparous, 25.7% of them were at their second pregnancy, 12.85% of them at their third pregnancy, 10% at their fourth pregnancy, 2.85% have had eight pregnancies. A small percentage (2.9%) of females does not remember their exact number of pregnancies, but they declare the child resulting from the actual pregnancy to be their first child born alive (figure 3).

Of all 280 mothers which filled the questionnaire, 77.14% (CI = 66.7%-87.3%) showed their availability to participate in future testing within a national free screening program, while 22.85% (CI = 12.9%-33.4%) of

them did not want to participate anymore; 20% (CI = 11.38%-31.27%) of them were within 18-25 years age interval.

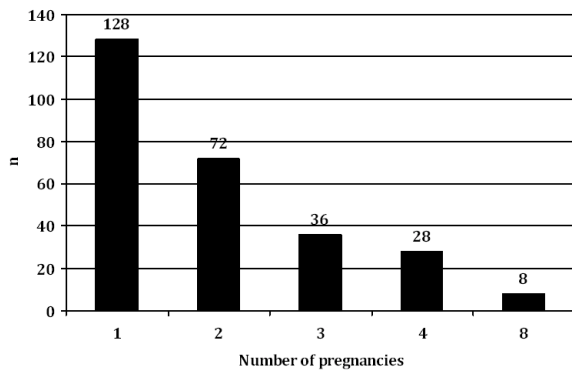


Figure 3. Repartition of cases according to number of pregnancies

Only 12.85% (CI = 6.1%-23.3%) of mothers had a test for *T. gondii* infection while a statistical significant percentage ($p = 0.0155$) of them, 87.14% (CI = 76.7%-93.9%) were never checked for the infection.

Discussions

Association between age groups and toxoplasmic immunity, are similar to the majority of publish data (Dunn et al., 1999; Joynson and Wreghitt, 2001). Our data strongly suggest that more actions have to be done among female population and general physicians in order to emphasize the importance of proper testing and interpretation of the results for toxoplasmic immunity, especially during fertile age. Confirmation of congenital toxoplasmosis diagnostic in 8.6% of neonates was due to IgA testing while specific anti-toxoplasmic IgM were negative. The estimated incidence of congenital infection varies according with methods used for the laboratory diagnosis and the lack of screening programs at national or regional level. Researchers from Poland found an incidence of 0.55/1000 newborns when the screening procedure was based on the detection of specific IgM in blood from phenylketonuria cards, and an incidence of 1.08/1000 when the screening was based both on detection of IgM and IgA (Petersen and Eaton, 1999; Sørensen et al., 2002).

Considering the overall risk of fetal transmission being 30% (but variable, according to pregnancy stage) leads the authors of a study performed in several European centers to a number of 700 to 3000 potential cases of congenital toxoplasmosis/year. We diagnosed 46 neonates as having congenital toxoplasmosis, from a total number of approximately 16,000 births (0.3%), similar with literature data (Wilson and McAuley, 2004). The absence of statistic significant associations may be explained by the small number of cases and by the decrease of pregnancies number with age. We did not find statistic significant association between positive IgM and IgA and a particular age group. Association between rural area and infection with *T. gondii* as well as for other parasitic infections is frequent in infectious pathology and is cited commonly in the case of toxoplasmosis (Ambroise-Thomas and Garin, 1984; Joynson and Wreghitt, 2001; Wilson and McAuley, 2004).

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