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Toxoplasmosis in Primiparus Pregnant Women and Their Neonates

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ABSTRACT

The prevalence of primary infection with *T. gondii* in pregnant women and risk of congenital infection in their neonates in various parts of Tehran are unknown. The prevalence rate of antibodies to *T. gondii* ranges from 24% in Tehran to 62.7% in Babol. This study describes the epidemiology of toxoplasma infection in pregnant women in Tehran and risk factors of congenital toxoplasmosis in newborn among preterm infants and full- term infants born from these mothers. A cross sectional study was carried out in 140 primiparus women living in various part of Tehran. Initially from each case a questionnaire was completed by the authorized physician, followed by clinical exams in newborns. The birth certificate was the data source used for such as gestational age, birthweigt, etc. The centrifuged blood specimens from all pregnant women are screened using an assay for Toxoplasma- specific IgM and IgG based on preliminary evidence in Iran. Specific toxo- IgM was positive in 7.1% (90% of them were also IgG positive) , toxo – IgG was positive in 34.3% of mothers. Mean age of IgG positive mothers (22.49±4.22), mean age of IgM positive mothers (19.90± 3.48). There were significantly differences between living place of mothers and IgG positive (p=0.007) . There were significantly differences between living place of mothers (East and central) and IgM positive (Fisher test = 0.023). Elaborating an epidemiological profile and risk correlates might help focus prenatal education and newborn screening strategies. Prenatal screening could be more easily justified in central part of Tehran because low incidence populations detected and probably treatment of mothers infected during pregnancy led to lower rates of transmission to the newborn. In contrast, in eastern part of Tehran due to high seroprevalence rate detected, newborn screening is relatively inexpensive and efficient.

INTRODUCTION

In various parts of Iran, the prevalence of antibodies to *T.gondii* ranges from 24% in Tehran to 62.7% in Amol (4,5). The prevalence of primary infection with *T.gondii* in pregnant women and risk of congenital infection in their neonates in various parts of Tehran are unknown.

Screening for primary infection with *Toxoplasma* during pregnancy is not cost – effective in very low incidence populations. (7,12). The low predictive value of a positive screening test in populations in which *Toxoplasma* infection is rare could result in unnecessary invasive fetal testing or pregnancy termination because of false positive tests(9). Prenatal screening could be more easily justified in low incidence populations if the detection and treatment of mothers infected during pregnancy led to lower rates of transmission to the newborn, but there is doubt that treatment during pregnancy prevents infection of the fetus or reduces sequelae (2,13). In contrast to prenatal screening, newborn screening is relatively inexpensive and efficient. A Danish study found that neonatal screening in an area with low seroprevalence detected infected infants born to untreated mothers in >75% of cases (8). A Polish study reported neonatal testing sensitivity of 86.7% in a region with an incidence rate of 0.55 congenital toxoplasmosis case per 1000 live births (10).

This study describes the epidemiology of *toxoplasma* infection in pregnant women in Tehran and risk factors of congenital toxoplasmosis in newborn among preterm infants and full – term infants borned from these mothers.

MATERIALS AND METHODS

A cross sectional study was carried out between 1999-2000 on 140 primiparus women admitted in delivery ward of four university and state run hospitals with different geographic distribution in Tehran, Iran (Shohada in north, Bou- Ali in east, Hazrat-Rasool in west, Akbarabad in south , and Firoozgar, in central part of Tehran) by multistage methods selected randomly. Initially, a questionnaire was for each case completed by authorized physician, followed by clinical exams in newborns. The birth certificate was the source used for data, such as gestational age, birthweight, etc.

Two ml blood were drown from mothers in day of delivery. Blood samples were centrifuged and transferred to research laboratory. The serum samples were restored in – 20 freezer until the serologic examination were performed on them. The centrifuged blood specimens from primiparus pregnant women are screened using an assay for *toxoplasma* – specific IgM and IgG based on preliminary evidence in Iran, before delivery.

Serological test

The evaluation of specific *T.gondii* IgG and IgM antibody were carried out with commercial kits (Clone Systems EIAgen *Toxoplasma* IgG and IgM, Biochem Immuno Systems Italy. S.P.A).

Both kits were used and the results were interpreted as suggested by the manufacturer. Results were calculated qualitatively. The ratio between the average O.D. value of the sample and that of the cut-off. The sample was considered positive, if the ratio was > 1.1 , doubtful, if the ratio was 0.9 but 1.1, negative if the ratio was <0.9. If the result was doubtful, we repeated the test..

Statisyical Analysis

For all continuous variables Student's t test was used to determine significant differences in means. For all categoric variables, chi square values were calculated to determine

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whether there were significant differences in proportions. All analyses were conducted using EPI 6 software.

RESULTS

The age of the studied mothers was 22.67± 4.6 (Range 14 to 42 y). The occupation of majority of mothers were housewife = 136 (98.6%); clark=1 (0.7%), teacher= 1(0.7). Living places of mothers are shown in Table1.

Range of gestational age were 10-41 week, mean = 38.04± 4.86 week, mean weight of neonates was 3098.71 ± 636.12 gm.

Specific toxo –IgM were positive in (10)7.1% [(9) 90% 0f them were IgG positive also], toxo- IgG were positive in (48) 34.3% , of mothers. Mean age of IgG positive mothers (22.49± 4.22), Mean age of IgM positive mothers (19.90± 3.48) (Table 2).

There were significant differences between living places of mothers and IgG positive (x=7.14,df=1,pv=0.007). There were significant differences between living places of mothers (east and central) and IgM positive (Fisher test=0.023) but no significant differences between other places.

There were no differences between IgG positive and IgM positive groups in mean age of mothers, mean gestational age and birthweight of infants.

There were no differences between IgG positive and IgG negative, IgM positive and IgM negative groups in mean age of mothers, mean gestational age and birthweight of infants but nearly significant differences were seen in mean age of mothers between IgM positive and negative groups (Fisher test = 0.058) (Table 3 and 4).

DISCUSSION

The information derived from this study can be used to plan and implant toxoplasmosis screening and treatment programs for pregnant women and newborns. The purpose of the first attempts at systematic serologic screening was to identify pregnant women at risk to try to prevent congenital toxoplasmosis or, if present, to allow for early instigation of treatment. Prenatal screening for maternal *T.gondii* infection during Pregnancy has proved effective as a preventive measure for congenital toxoplasmosis in France (10). The most important fact for the clinician is that patients with a positive IgG titer and a positive IgM IFA or IgM ELISA titers must be presumed to have recently acquired infection with *T.gondii* and be tested further in a reference laboratory. The prevalence of congenital *Toxolpasma. gondii* infection can be estimated from the incidence rate of *T. Gondii* infection acquired during pregnancy by multiplying the figure for the number of mothers who acquire infection during pregnancy by the transmission rate of the parasite to the fetus (9).

The prevalence of Toxoplasma risk factors and previous infection varies from country to country. Results from previous serologic study in different parts of Iran determined fourthy four percent of women in Kerman (not age dependent), 24% in west of Tehran, 75.7% in AMol 62.7% in Ghazvin, 50.8% in Kashan, were toxo-IgG positive(1,3,6).

In present study 34.3% of primiparus women were positive for specific toxo-IgG due to prior *T.gondii* infecion which is more than previous study, 7.1% were positive for specific toxo-IgM due to acute or recent infection. There were significantly differences between east and central part of Tehran for IgG positive mothers (p=0.007). This results is similar to Babol study, may be due to traveling of mothers whom living in this part of city from Mazandaran, and also the positive relation between living of mothers in East and negative IgM (Fisher test=0.023) in compare to central part but no sinificant differences between other places.

Therefore pregnant women in eastern part of city are less susceptible to acute infection in compare to central part of its. Our finding shows seroconversion rate (IgM positive) in pregnant population is 71 per 1000, which is three times more than in US (0.27%) and two times more than France (0.3%) (1).

Similar results detected by Massachusetts studies in which, Infants whose mothers were born in Asian refugee origin countries were 8.9 times more likely to de born with congenital toxoplasmosis than those with mothers born in the US.

In our opinion all pregnant women, regardless of educational attainment, need culturally and linguistically appropriate prenatal education regarding infection with *T. gondii*. Mothers from eastern part of Tehran (who immigrated or traveling from Mazandaran) as like as Amol study, are at the lowest risk of acute toxoplasmosis infection in pregnancy period and lowest risk of congenital toxoplasmosis in their infants. In contrast, infants of mothers from other parts of Tehran are at the highest risk of congenital toxoplasmosis infection due to highest rate of acute toxoplasma in infection in mothers. Elaborating an epidemiological profile and risk correlates might help focus prenatal education and newborn screening strategies. Prenatal screening could be more easily justified in central part of Tehran because low incidence populations detected and probably treatment of mothers infected during pregnancy led to lower rates of transmission to the newborn. In contrast, in Eastern part of Tehran due to high seroprevalence rate detected, newborn screening was relatively inexpensive and efficient.

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Table 1. **The numbner living place of mothers by IgM and IgG**

Place	IgG		IgM	
	-	+	-	+
South, Akbarabadi	39	10	45	4
West, Hazrat- Rassol	12	4	14	2
Central Firoozgar	9	6	12	3
North and East	32	28	59	1
Total	92	48	93	10

Table 2. **The number and percent of age of mothers by IgM and IgG**

Age of mothers	≤18	19-29	30-39	≥40	Total
	No (%)	No (%)	No (%)	No (%)	No (%)
IgG-	18(20)	67(74.4)	4(4.4)	1(1.1)	90(100)
IgG+	8(17.4)	35(76.1)	3(6.5)	0(0)	46(100)
Total	26(19.1)	102(75)	7(5.1)	1(0.7)	136(100)
IgM-	4(40)	6(60)	0(0)	0(0)	10(100)
IgM+	22(17.5)	96(76.2)	7(5.6)	1(0.8)	126(100)
Total	26(19.1)	102(75)	7(5.1)	1(0.7)	136(100)

Table 3. **The number and Percent of gestational age by IgM and IgG**

Gestational age	<24 W	25-29 W	30-37 W	≥38 W	Total
	No (%)	No (%)	No (%)	No (%)	No (%)
IgG-	1(1.5)	3(4.4)	4(5.9)	60(88.2)	68(100)
IgG+	1(4.3)	0(0)	6(26.1)	16(69.6)	23(100)
Total	2(2.2)	3(3.3)	10(11)	76(83.5)	91(100)
IgM-	1(1.2)	3(3.7)	8(9.8)	70(85.4)	82(100)
IgM+	1(11.1)	0(0)	2(22.2)	6(66.7)	9(100)
Total	2(2.2)	3(3.3)	10(11)	76(83.5)	91(100)

Table 4. **The number and percentage of birthweight by IgM and IgG**

Birthweight	≤999	1000-1499	1500-1999	2000-2499	2500-2999	≥3000
	No(%)	No (%)	No(%)	No (%)	No(%)	No (%)
IgG-	1(1.1)	1(1.1)	2(2.2)	6(6.6)	21(23.1)	60(65.9)
IgG+	1(2.2)	2(4.4)	0	1(2.2)	8(17.8)	33(73.3)
Total	2(2.2)	3(3.3)	10(11)	76(83.5)	91(100)	93(68.4)
IgM-	1(0.8)	3(2.4)	2(1.6)	6(4.7)	28(22)	87(68.5)
IgM+	1(11.1)	0(0)	0	1(11.1)	1(11.1)	6(66.7)
Total	2(1.5)	3(3.2)	2(1.5)	7(5.1)	29(21.3)	93(68.4)

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