The Seroprevalence of Toxoplasmosis Among Reproductive-Age Women in Ankara a Central Anatolian City Turkey

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OBJECTIVE: The objective of this study is to investigate seroprevalence of toxoplasmosis among reproductive-age women in rural and urban areas in Ankara, a central Anatolian city in Turkey.
STUDY DESIGN: A total of 321 reproductive-age women from Karagedik, rural area and 1732 from Gazi university hospital, urban area, have been included in this study. Rural and Gazi university hospital parts of the study have been conducted December 1997 - May 1998 and January 1998- December 2005 respectively. All women were screened for toxoplasma Ig G antibodies in their serum. Samples with >6 IU were considered positive for Toxoplasma gondii immunoglobulin G antibodies.
RESULTS: Seropositivity in rural and urban areas was 44.7% and 40.7% respectively. There was no statistically significant difference between two groups. Higher seropositivity has been observed in both groups as the age increases. However, in both study groups logistic regression revealed that seropositivity was not significantly associated with age, education, and occupation.
CONCLUSIONS: Since high rate of prevalence and the half of the cases have been acquired during reproductive years, it seems to be beneficial to screen all pregnant women during pregnancy in Ankara, Turkey.

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Key Words: Toxoplasmosis, Seroprevalence; Turkish women

Prevalence of toxoplasmosis is higher in places where uncooked meat consumption is common (35%-71%)[1-3] and also in warm, moist climate and poor hygiene regions (78%), [4] or both.[5,6] Since many European countries have high prevalence of toxoplasmosis it is mandatory to screen all pregnant women, including France, Austria, Switzerland and Hungary. [7-9] By contrast, since prevalence of toxoplasmosis is low in UK and USA [10,11] routine screening is not recommended.

Routine screening and educational program for toxoplasmosis are not recommended by Health Ministry of Turkey. Eating uncooked meat is common habit especially in eastern part of Turkey. Keeping pets including cats and dogs is a part of life in the rural area. Hence, we expect high prevalence of toxoplasmosis in Turkey. There have been some reports indicating a prevalence rate of between 39.9-60.4%. 12-14 There is no study that compares the toxoplasmosis prevalence in rural and urban areas. Studies that will identify seroprevalence in rural and urban areas and potentially risk factors on the seroprevalence of toxoplasma infection will be helpful in order to improve toxoplasmosis infection prevention programs.

We aimed to investigate seroprevalence of toxoplasmosis among reproductive-age women in rural and urban area and to see whether there is any difference among them.

Material and Method

Serum and data were collected from two different areas. The first group is the residence of rural area near Ankara, Karagedik region. The second group belongs to residents of Ankara city who have relatively better socioeconomic status than rural area residents. In addition to toxoplasmosis serology, data related to age, education, profession, parity have been collected.

In Karagedik, a rural area, 40 km distance to Ankara, the majority of people lack health insurance. In this area, income mainly comes from agriculture, cattle breeding and transportation. There are also some families who have relatives living in Europe as immigrants. Their primary origin comes from eastern part of Turkey. This part of study has been conducted December 1997-May 1998. A total of 321 women were included in the study in this region. All rural area women interviewed in a standard fashion using a questionnaire designed for the study. After the consent from the patients taken, venous blood samples (5 ml) of both groups drawn and were transported immediately to the laboratory to separate sera and stored at –70 ^{o}C until examination.

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Urban area group was consisted of antenatal patients of Gazi University Hospital Department of Obstetrics and Gynecology, Ankara, capital city of Turkey located in the middle Anatolia where better antenatal care is available, so that it was possible to obtain necessary information necessary for the study from the files. There is routine antenatal screening for toxoplasmosis at Gazi University hospital January 1998-December 2005, of the 1732 women, educational and professional status and toxoplasma Ig G test results were obtained from the files of the patients.

For both groups, specimens were analyzed using the toxoplasma immunoglobulin G immunoassay test (Access Immumoassay System Beckman Coulter, USA). Test results were reported in International Units (IU), samples with >6 IU were considered positive for Toxoplasma gondii immunoglobulin G antibodies.

As a statistical method Chi-square test was used where appropriate. In addition to this, for age, educational status and occupation logistic regression test was performed. Dichotomous dependent variable was presence or absence of toxoplasmosis antibody. While occupation and educational status were independent dichotomous-categorical variables, age was continuous variable. SPSS 7.5 program was used for statistical analyses.

Results

In this study, 321 women from rural area, and 1732 women from urban area have been included. When socio-demographic factors of two groups are compared, it has been found that women living in rural area had lower educational and professional status and health insurance rate than women living in urban area ($p<0.05$) (Table 1).

Table 1: The percent distribution according to socio-demographic characteristics in the study groups

		Karagedik Region (Rural Area) (n=321)	Gazi Hospital (Urban Area) (n=1732)
Education			
	Illiterate	20.9	---
	Literate	10.0	0.5
	Primary school	66.6	32.1
	High School and up	2.4	67.4
Occupation			
	Housewife	97.5	62.6
	Working	2.5	37.4
Social Insurance			
	No	76.9	2.3
	Yes	23.1	97.7

Seroprevalence of toxoplasmosis in rural area and were 44.9% and 40.7% respectively. There was not statistically significant difference of seroprevalence between two groups ($p>0.05$). The only exception to this was fifteen to 19 years of age who had a seropozitivity of 50% in the Karagedik rural area compared 25% in the Gazi Hospital. However, number of patients in this group (10 women) was not sufficient to make a conclusion. Seropositivity has been increased in both groups as the age increases due to cumulative effect. Seropositivity rates according to ages have been evaluated separately in each area. There was no significant difference of Toxoplasmosis Ig G positivity in each rural and urban subgroup (Table 2).

Table 2: Total number end the percent distribution of Toxoplasma seropositivity according to age group in the study groups

Age Group	Karagedik Region (Rural Area) (n=321) Seropositivity %	Gazi Hospital (Urban Area) (n=1732) Seropositivity %	
15-19	50.0	25.0	p>0.05
20-24	36.6	38.0	p>0.05
25-29	33.3	41.0	p>0.05
30 & over	47.7	42.2	p>0.05
Total	44.9	40.7	
	Karagedik region p>0.05	Gazi Hospital	p>0.05

Effect of age, education, professional status on prevalence of toxoplasmosis has been studied using logistic regression analysis. Age was the continuous variable in both groups. Educational status area was defined as literate, illiterate, graduates of primary school (5 years) and secondary school and above (8+). Professional status was dichotomous variable defined as housewife and working. It has been found that none of these variables had affected seropositivity of toxoplasmosis (Table 3).

Table 3: Multivariable logistic regression analysis of the effects of selected factors on Toxoplasma seropositivity

	Factor	Beta	Significance	OR	%95 CI
Karagedik Region (Rural Area) C : -1.5685					
	Age	0.0357	0.0548	1.04	1.00-1.07
	Education (illiterate-literate)	0.1064	NS	1.11	0.66-1.88
	Occupation (Housewife-Working)	0.1905	NS	1.21	0.28-5.20
Gazi Hospital (Urban Area) C : -1,8535					
	Age	0.0493	NS	1.05	0.99-1.11
	Education (Primary school-High school and up)	0.3618	NS	1.05	0.53-2.05
	Occupation (Housewife-Working)	0.0475	NS	1.43	0.71-2.92

C: Constant, OR: Odds Ratio, CI: Confidence Interval

Discussion

In this study, prevalence of toxoplasmosis was slightly higher in rural area than in urban area that was not statistically significant. It has been found that major differences in socioeconomic status did not affect prevalence. In both groups, prevalence rate increases as the age increases, almost one-half of the women have become infected above 30 years of age in both groups due to cumulative effect. Similar prevalence rates have been found in other parts of Turkey.[12-15]

It is apparent that overall prevalence of toxoplasmosis in Turkey is not lower than several countries.[3,16-20] Eating raw meat (mince) is a very common habit in Turkey almost everywhere. It has also been reported that major contributing factor for high rate of toxoplasma infection in Europa is consumption of raw meat. Interestingly, Israel very close to Turkey with similar climate has lower prevalence (21%).[21] It might be not the climate but local factors such as eating habit, sanitary conditions, dealing with animals etc. are the major determinants of toxoplasma infection in this region.

We have found that there has been no significant difference in seropositivity between women who are illiterate and higher educational status, and also between housewives and who have occupations. Again, these findings support that eating habits, mode of life etc. in both urban and rural areas of Turkey could be the major factors affecting prevalence.

High prevalence rates of toxoplasmosis in the rural area might be mainly attributed to cattle breeding and poor sanitary conditions. On the other hand major factor for the high rates of seropozitivity in the urban area might be eating habits (consumption of uncooked meat, insufficiently washed vegetables etc.) and poor individual hygiene even in available facilities.

Zuber et al.[3] have reported that Turkish pregnant women living in Switzerland as immigrants had 53.6% prevalence of toxoplasmosis. It was higher than our findings which could be explained by origin of those people living as immigrants are mostly from eastern and southeastern parts rural areas of Turkey where eating raw mince is a common habit and poor individual hygiene present.

Similar findings have been reported in previously studies carried out in Turkey.[12-15] Since there is a high rate of toxoplasmosis and the half of the cases has been acquired during reproductive years, it seems to be beneficial to screen all pregnant women during pregnancy in Turkey. In order to prevent toxoplasmosis infection and to take it under control in Turkey, training programs targeting pregnant women should be developed and be put into effect.

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