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The role of the parity and the age in acquisition of Toxoplasmosis among pregnant women in Rabat - Morocco-

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ABSTRACT:
Objectives: This retrospective study was undertaken between 2008 and 2009 to assess the seroprevalence of Toxoplasmosis among pregnant women and the role of the parity, the age and the abortion presence or absence in acquisition of infection *pregnant women* at the National Institute of health in Rabat in Morocco.
Methods: Specific *T. gondii* IgG and IgM were measured by Enzyme-Linked Immunosorbent Assay (ELISA). Datation of the infection was carried out by avidity test. All existing data for every pregnant woman were collected from medical report.
Results: Among 1169 pregnant women of different age diagnosed, 47% were found to be IgG seropositive including 1,5 % of IgM seropositive. The use of IgG avidity test allowed to exclude recent infection among 72,2 % of IgM positive sera. The result of bivariate analysis revealed that the age and parity influenced significantly the seroprevalence rate, whilst the existence of previous spontaneous abortion did not have any significant statistical correlation with the positivity of toxoplasmosis.
Conclusion: This study showed that 53 % pregnant women were susceptible *to T. gondii and considered to be at high risk for toxoplasmosis during pregnancy*. However, the follow-up of pregnancy and Counselling of pregnant women remains essential of the prevention of congenital toxoplasmosis.

KEYWORDS: Toxoplasmosis; Pregnant women; ELISA, Age, Parity, Morocco.

1 INTRODUCTION

Toxoplasma gondii is a well known parasitic zoonosis that is causative agent for stillbirths, eye problems and mental retardation in the children of women who acquire primary infection during pregnancy [1]. Seroprevalence rate of toxoplasmosis in pregnant women varies among different countries, it's depends on the geographic area and lifestyle. Until now, all risk factors for contract the disease are not yet known. However, in Europe, the *Toxoplasmosis* infection can be due to undercooked meat [2]. In Central America and in other developed countries, toxoplasmosis prevalence may be related to socioeconomic status and frequently the presence of stray cats especially climate for the survival of oocysts. In Morocco, according to a cross-sectional study in the Rabat region, toxoplasmosis has been attributed primarily to soil contact and lack of knowledge about the disease [3]. Consideration of the latter as a risk factor for acquiring toxoplasmosis requires monitoring and attention towards this opportunistic infection.

Moreover, serological screening for toxoplasmosis in Morocco was still considered a biological test not required by Doctors. From 2006, National Health of Morocco had developed a *Decree 2519-05; 30 Chaabane 1426 (BO no 5384 of 05 January 2006)* recommended without obligation, the serological screening systematic of toxoplasmosis for pregnant women.

The impact of toxoplasmosis on the health of mother and newborn should not be neglected. The surveillance of toxoplasmosis is mainly based on research of antibodies *IgG* and *IgM T. gondii.* The screening of the disease must be diagnosed early during pregnancy in order to detect early the seroconverssion. This latter is manifested when the pregnant women develop antibodies to *T. gondii*, they "seroconvert" from antibody-negative to antibody-positive. It is also mentioned with the significant increase of antibodies IgG titers with the presence of antibodies IgM. The date of seroconversion can be determined by the avidity test which allows to exclude toxoplasmosis among women under 20 weeks for their pregnancy.

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Given the importance of the disease, we felt it appropriate to update the data on the prevalence of toxoplasmosis in the pregnant population in Rabat region and its surroundings and to complete our exploration of other factors influencing the occurrence of toxoplasmosis, such as age of patient, parity and the presence or absence of a history of abortion.

2 STUDY POPULATION

This retrospective survey was carried out between January 2008 and December 2009 on 1169 pregnant women admitted in toxoplasmosis laboratory in National Institute of Hygiene in Rabat at their first prenatal care visit. All existing data for every pregnant woman were collected from medical report such as; age of patient, parity and the history of abortion

3 SEROLOGICAL TEST

Serum samples were tested for both IgG and IgM *T. gondii* antibodies by using commercial kits by ELISA test (Biorad). Both kits used and the results were interpreted as suggested by the manufacturer. Samples were considered IgG reactive when the antibody concentration was greater than or equal to 9 UI/ml, non-reactive when the concentration was less than 6 UI/ml and undetermined when the concentration was between 6 and 9 UI/ml. For IgM, the results are expressed qualitatively. Samples that was reactive to both anti-*T. gondii* IgG and IgM were confirmed acute infection using an IgG avidity test by ELISA (Platelia Toxo IgG Avidity Kit (Biorad)). An low index of avidity below 0.4 does not exclude a recent primary infection of less than 20 weeks while high index avidity or equal to 0.5 can be excluded. In case of intermediate index of avidity (≥ 0.4 and <0.5), an assay on a second sample was recommended.

4 STATISTICAL ANALYSIS

Data files were entered and performed on Epi-Info 2007 (version 3.4). Bivariant analysis was used to assess the relationship between *Toxoplasma* seropositive and different risk factors such as age, parity and history of abortion. The chi-square test was used to evaluate significant differences of infection rate in pregnant women of different age; *p* values for significance were set at $p < 0.05$.

5 RESULTS

An total of 1169 pregnant women were studied, the average age of these women was 28.9 ± 6.2 years. Among these women 47% (CI 95%: 44 % - 49,8 %) were positive for IgG antibodies and 1,53 % were positive for IgM antibodies (Table I) . Of the 18 patient who were positive by IgM antibodies, 13 had a high index of avidity of *Toxoplasma* and 5 patients had low or intermediate avidity.

Data from the evaluated risk factors that could be associated with the serological results for anti-*T. gondii* antibodies are presented in Table II. Variables such as age group and parity, showed a significant association ($p < 0,05$) with the presence of IgG antibodies. In the contrast the history of abortion was not statistically significant ($p>0,05$).

Stratified analysis to determine whether there is a relationship between the parity and exposure to infection toxoplasmosis according to age showed that multiparous women who age exceeds 27 years are more often infected ($p <0.05$) (Table III). In contrast, women under 27 years old, the relationship between exposure of nulliparous women and the occurrence of toxoplasmosis is absent ($p> 0.05$). However, the Chi square interaction is not significant ($X^2 = 2.43, p> 0.05$), so that age is neither a confounder nor an effect modifier when it is associated with parity considered susceptible to infection ($p> 0.05$).

6 DISCUSSION

The *T. gondii* IgG prevalence of 47% found in this study is comparable with results of a study in the same area study in which 50,6% of pregnant women were seropositive for IgG to toxoplasmosis [4]. Unfortunately, there is no recent published study concerning this prevalence within general population in our country. Among the first studies of seroprevalence of toxoplasmosis in Morocco made include that of Mekouar et al. (1972) [5] reported a prevalence rate of 52%. Then, twelve years after an investigation by Guessous et al. (1984) within 200 pregnant women in the region of Casablanca were about the same rate of Toxoplasmosis infection and are 51.5% [6]. Until recently, El Mansouri et al reported in their study in the Rabat region, a 50.6% rate of *Toxoplasma* infection among pregnant women [4]. In comparison with our results, it appears that the seroprevalence of toxoplasmosis was decreased by 4% in the study area. This decline could be probably related to a decrease

in the frequency of transmission of the parasite telluric where contact with soil was the greatest risk factor associated with *T. gondii* infection in the Rabat region [3]. Moreover, improved lifestyle including food hygiene can contribute positively to the decline in toxoplasmosis prevalence.

Despite the lower prevalence of toxoplasmosis observed in the study area, the rate remains high compared to the neighbouring Mediterranean countries, like Setif-region Algeria with 32% [7]. This variation in the seroprevalence rate depends on the difference risk factors for acquiring the disease. In Algeria, Chouchan et al. (2008) showed a significant association between the consumption of undercooked meat and acquisition of *Toxoplasma* antibodies. While in Morocco, Laboudi et al. (2009) reported that contact with the ground and illiteracy were considered the main risk factors of contracting toxoplasmosis.

Although the number of cases of IgM reactivity observed in 18 women (1.5%), the detection of this immunoglobulin can not be used as a reliable marker of acute infection [8]. Thus, the contribution of avidity test appears to be effective and reliable tools of excluding infection of less than 4 months [9]. Indeed, application of the avidity test (IgG) in 18 (1,5 %) reactive IgG and IgM sample allowed to exclude a recent infection in 72.2% (13/18) pregnant women.

When considering age group, the prevalence of IgG antibodies in our study population increased with age (from 40 years). These results statistically significant *($p < 0.05$)* were already observed in 2007 by El Mansouri et al. (2007). Similar observation has been advanced by Berger et al in France who reported that toxoplasmosis infection increases linearly with age [10]. This can be explained by the increase of exposure to infection sources throughout life.

There was no significant association of *T. gondii* infection with the existence of a history of spontaneous abortion. In the contrast, it was statistically significant with the parity. It was also not significant in the study carried out by Breurec et al. (2004). This is probably related to age because multiparous women are generally older than nulliparous women [11]. However, the stratified analysis performed to search for possible relationship between seropositivity for toxoplasmosis and parity for age was inferred that the age does not affect the relationship between gender and infection by *T. gondii* (*$p > 0.05$*). Therefore, the prevalence increases with the number of pregnancies regardless of age. A study in Brazil between 1997 and 1999 showed that pregnancy makes women more susceptible to protozoa [12].

7 CONCLUSION

This study revealed that 47% seropositivity for IgG antibodies for toxoplasmosis in pregnant women. However, 53% of women studied were susceptible during pregnancy. Therefore, data from this study could be used to argue for the establishment of a mandatory screening and serological surveillance of seronegative pregnant women of all ages, and must encourage decision-makers to review the legislation in Morocco that ignores the psychological and physical discomfort endured by these mothers as well as the financial burden imposed by the cost of diagnosis and travel to research laboratory specialist for further biological test.

8 TABLEAUX

Table 1. Prevalence of anti- Toxoplasma gondii IgG and IgM antibodies obtained in pregnant women in Rabat region Morocco between 2008 -2009

Antibodies anti-*T. gondii*	Prevalence n (%)	CI 95%
IgG(+) IgM (-)	530 (45,33)	
IgG(+)IgM (+)	18 (1,53)	
Total IgG(+)	548 (46,87)	44,0% - 49,8%
IgG(-) IgM (+)	3 (0,25)	
IgG(-) IgM (-)	618 (52,86)	
Total IgG(-)	621(53,12)	50,2% - 56,0%

Table 2. Seroprevalence of toxoplasmosis according to age, parity and history of abortion among pregnant women in Rabat region between 2008 - 2009

	Serology			
	Seropositivity (%)	**Seronegativity (%)**	***X²***	***p***
Age (years)				
17-24	137 (42,7)	184 (57,3)		
25 - 29	141 (43,8)	181 (56,2)		
30 - 34	141 (51,5)	133 (48,5)	12,42	*P<0,05*
35 - 39	86 (47,0)	97 (53,0)		
40 - 48	43 (62,3)	26 (37,7)		
Parity				
Nulliparous	239(43,0)	317(57,0)		
pauciparous(1-2 P**)	267(50,2)	265(49,8)	6,52	*p<0,05*
multiparous (≥ 3P**)	42(51,9)	39(48,1)		
Abortion				
NA***=0	428 (47,8)	467 (52,2)	1,36	NS*
NA ≥ 1	120 (43,8)	154 (56,2)		

** NS : No significant, ** : Pregnancy , ***NA : Number of abortion*

Table 3. Stratified analysis according to the parity among pregnant women living in Rabat region (2008-2009)

	Seropositivity (%)	**Seronegativity (%)**	**OR***	**CI****	***P***
Age = 17 – 26					
women Nulliparus	138 (41,2)	197 (58,8)	1,03	0,67 - 1,58	0,86
women Multiparus	50 (42)	69 (58)			
Age = 27 – 36					
women Nulliparus	86 (44,8)	106 (55,2)	1,31	0,92– 1,87	0,11
women Multiparus	187(51,7)	175(48,3)			
Age = 37-48					
women Nulliparus	15 (51,7)	14 (48,3)	1,12	0,50 - 2,50	0,78
women Multiparus	72 (54,5)	60 (45,5)			

*Chi square of interaction: 0,76 ; P = 0,68; *OR : Odd ration, **CI : Confidence Interval*

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