Toxoplasmosis among women with habitual abortion

Muna M. Al-Hamdani [1] and Nadham K. Mahdi [1]

داء المقوّسات بين المصابات بالإجهاض المتكرر

منى محمد الحمداني وناظم كاظم مهدي

خلاصة : تم استقصاء دور داء المقوسات لدى الأمهات كعامل اختطار يُفضي إلى الإجهاض المتكرر . فوجد أن اختبار التراص الدموي غير المباشر كان إيجابيا عندما يتراوح المعيار بين 32:1 وبين 2048:1 بتواتر أكبر في المصابات بالإجهاض المتكرر (18.5%) بالمقارنة بمجموعه النساء ذوات الحمل السوي (5.9%) . لقد لوحظ ارتفاع الانتشار الإجمالي للأضداد (الأجسام المضادة) تدريجيا مع ارتفاع السن ، حيث وصل إلى 23.7% في الفئة العمرية 35-45 سنة . ولم تلاحظ أية فروق بين النساء في المجموعات الاقتصادية الاجتماعية المختلفة . وتوصلت هذه الدراسة إلى أن أضداد داء المقوسات أكثر انتشارا بين السيدات اللاتي يقتنين قططا في بيوتهن بالمقارنة بمن لا يقتنين القطط .

ABSTRACT The role of maternal toxoplasmosis as a risk factor for habitual abortion was investigated. The indirect haemagglutination test was positive in a titre of 1:32 to 1:2048 much more frequently in women with habitual abortion (18.5%) than in the normal pregnancy group (5.9%). The overall prevalence of antibodies gradually increased with age, reaching 23.7% in the age group 35–45 years. No differences were found among women in different socioeconomic groups. The study suggests that toxoplasma antibodies are more prevalent in women with cats at home than in women who do not possess cats.

La toxoplasmose chez les femmes ayant eu des avortements à répétition

RESUME Le rôle de la toxoplasmose maternelle comme facteur de risque d'avortements à répétition a été examiné. Le test d'hémagglutination indirecte était positif avec un titre compris entre 1:32 et 1:2048 de manière bien plus fréquente chez les femmes ayant eu des avortements à répétition (18,5%) que dans le groupe de femmes ayant une grossesse normale (5,9%). La prévalence générale des anticorps augmente progressivement avec l'âge, atteignant 23,7% dans le groupe d'âge des 35-45 ans. Aucune différence n'a été constatée entre les femmes des différents groupes socio-économiques. Cette étude laisse à penser que la prévalence des anticorps de la toxoplasmose est plus importante chez les femmes qui ont des chats à la maison que chez celles qui n'en ont pas.

[1] *Department of Microbiology, College of Medicine, University of Basra, Basra, Iraq.*

Received: 13/05/96; accepted: 17/06/96

Introduction

Habitual abortion is one of the most distressing problems in obstetrics, particularly in those who have no successful pregnancies [1]. Habitual abortion is generally defined as three or more consecutive spontaneous abortions. Spontaneous abortion has been associated with maternal transmission of *Toxoplasma gondii* to the fetus [2]. Controversial reports have appeared regarding its role in habitual and sporadic abortion [3–5]. Habitual abortion affected about 4% of pregnant women attending antenatal health care centres in Basra in 1994. Therefore, the aim of this first case-control study was to determine the prevalence of toxoplasma antibodies in a group of women with habitual abortion.

Subjects and methods

This case-control study was carried out on 200 women attending the outpatient gynaecology clinic of Basra Maternity Hospital and the antenatal clinic in the Hay Al-Shuhadae Health Centre between October 1994 and May 1995. The study group comprised 81 women with habitual abortion and 119 normal pregnancy women who had no history of abortion. Their ages ranged from 15 to 45 years. Clinical examination and laboratory investigations were carried out for those with habitual abortion in order to exclude other causes of fetal wastage such as malformation of the genital tract, diabetes mellitus, renal disease or Rhesus incompatibility. All the women examined were interviewed to ascertain sociodemographic, medical and obstetric information.

Serum samples. Sera were separated by blood centrifugation at 3000 rpm for 5 minutes. Samples were stored at −20°C until needed.

Serological tests. Toxo-HA test (SAS), which is an indirect haemagglutination test (IHAT) for the detection of toxoplasma antibodies (IgG and/or IgM), was based on the work of Jacobs and Lunde [6] and Karim and Ludlam [7]. The titre which was considered significant was 1:32. All positive sera were further confirmed by using the indirect immunofluorescent antibody test (IFAT). It was performed in the usual manner using antigen, and anti-human globulin fluorescein-labelled sera and control sera from Biomerieux Laboratories (Lyon, France).

Statistical analysis. The chi-square (χ^2) test or, where appropriate, Student *t*-test were used as a test of significance. Differences were recorded as significant whenever the probability (P) was less than 0.05. In addition, the odds ratio and 95% confidence intervals of the odds ratio were estimated for a single 2 × 2 table (to determine whether there was a crude disease-exposure association).

Results

The major characteristics of the habitual abortion group and the normal pregnancy group are compared in Table 1. Out of 81 patients with habitual abortion, 15 (18.5%) had a positive antibody titre (Table 2). Among the normal pregnancy group, 7 out of 119 women (5.9%) had a positive antibody titre. The difference is statistically highly significant ($\chi^2 = 7.6$; $P < 0.01$). The risk of developing habitual abortion among women who were seropositive was 3.6 times the risk of developing habitual abortion among women who were seronegative. The distribution of toxoplasma antibody titres is illustrated in Table 3. A total of 22 sera which were positive in the IHAT were also positive in the IFAT.

Table 1 **Characteristics of women included in the study**

Characteristic	Habitual abortion group			Normal pregnancy group		
	Mean ± *s*	No.	%	Mean ± *s*	No.	%
Age (years)	29 ± 7.9[a]			27 ± 6.93		
15–24		29	36		51	43
25–34		30	37		52	44
35–45		22	27		16	13
Parity	3.8 ± 2.5[b]			4.0 ± 2.6		
0–3		50	62		70	59
4–7		25	31		39	33
8–12		6	7		10	8
Occupation						
Worker		14	17		9	8
Non worker		67	83		110	92
Education						
Low		61	75		94	79
Moderate to high		20	25		25	21
Economic status						
Low		16	20		50	42
Moderate		55	68		60	50
High		10	12		9	8

[a] *t = 1.85; P > 0.05* [b] *t = 0.41; P > 0.05* s = *standard deviation*

Table 2 **Results of Toxo-HA test for toxoplasmosis in different groups of subjects**

Toxo-HA test	Habitual abortion group		Normal pregnancy group	
	No.	%	No.	%
Seropositive[a]	15	18.5	7	5.9
Seronegative	66	81.5	112	94.1
Total	81	100.0	119	100.0

[a] *Titre ≥ 1:32* $\chi^2 = 7.6$; *P < 0.01*
(Odds ratio = 3.6; 95% confidence interval 0.33–2.23)

Table 3 **Distribution of toxoplasma antibody titres among seropositive women**

Titres of Toxo-HA test	Habitual abortion group		Normal pregnancy group	
	No.	%	No.	%
1:32	3	20.0	4	57.1
1:128	4	26.7	2	28.6
1:512	4	26.7	1	14.3
1:2048	4	26.7	0	0
Total	15	100.0	7	100.0

Analysis of toxoplasma antibody prevalence in relation to abortion history at presentation revealed that the prevalence rate increased with a greater number of previous abortions. Women with five or more abortions had the highest prevalence rate of

Table 4 **Frequency of toxoplasma antibodies in relation to history of previous abortions**

Number of previous abortions	Number tested	Positive* No.	%	Negative No.	%
None	119	7	5.9	112	94.1
3	52	9	17.3	43	82.7
4	16	3	18.8	13	81.3
≥5	13	3	23.1	10	76.9

* *Titres of Toxo-HA ≥ 1:32*
χ^2 = 7.05; P > 0.05

Table 5 **Prevalence of toxoplasma antibodies in relation to selected variables**

Variables	Number tested	Positive No.	%	Statistical significance
Age (years)				
15–24	80	3	3.8	$\chi^2 = 10.62$
25–34	82	10	12.2	$P < 0.01$
35–45	38	9	23.7	
Occupation				
Worker	23	4	17.4	$\chi^2 - 1.11$
Nonworker	177	18	10.2	$P > 0.05$*
Education				
Low	155	16	10.3	$\chi^2 = 0.3$
Moderate–high	45	6	13.3	$P > 0.05$*
Economic status				
Low	66	6	9.1	$\chi^2 = 4.97$
Moderate	115	11	9.6	$P > 0.05$*
High	19	5	26.3	

**Not significant*

toxoplasma antibodies. However, the difference was statistically not significant ($\chi^2 = 7.05$; $P > 0.05$) (Table 4).

The seropositivity to *T. gondii* significantly increased with age only, while the differences were statistically not significant in relation to occupation, education and economic status (Table 5).

Table 6 **Prevalence of toxoplasma antibodies in relation to the presence of a cat at home**

Toxoplasma antibodies	Cat present No.	%	Cat absent No.	%	Total No.	%
Present	17	15.3	5	5.6	22	11.0
Absent	94	84.7	84	94.4	178	89.0
Total	111	100	89	100	200	100

χ^2 = 4.82; P < 0.05
(Odds ratio = 3.04; 95% confidence interval 0.07–2.15)

A statistically significant difference in the prevalence of toxoplasma antibodies was found between women living in homes with cats (15.3%) and those without (5.6%) ($\chi^2 = 4.82$; $P < 0.05$) (Table 6). The risk of developing antibodies among women exposed to cats was three times higher than that among those who were not exposed.

Discussion

Toxoplasmosis commonly occurs in adults, usually in a mild or asymptomatic form. Therefore, the method of choice in the diagnosis is by the detection of specific antibodies in the patient's serum [*8,9*]. The serological data of this study indicate that there was a clear association between toxoplasma infection and habitual abortion. Similar observations have also been made by Langer [*10*] and Hingorani et al. [*11*]. These findings are not in agreement with other studies which failed to confirm this association [*3,12,13*].

In the present study, patients with habitual abortion had higher antibody titres than

did the group of normal pregnancy. This finding is supported by Jones et al. [*14*] who reported that a significantly greater incidence of abortion occurred in patients with high antibody titres. Although there is a positive serological test for this organism in women with no history of habitual abortion, the connection of serological evidence and isolation of *T. gondii* from the endometrium, placenta or the products of conception is essential. Nevertheless, serological tests before and during pregnancy or for specific IgM would also confirm the diagnosis.

Regarding the previous history of abortion, there has been a suggestion that *T. gondii* is an etiological factor of abortion, particularly where fetal losses were greater than three [*11*].

The present study showed that the rate of seropositivity to *T. gondii* among women who had cats in the house was significantly higher (15.3%) than those without such contact (5.6%). This finding is in accordance with those reported by other workers [*15–17*]. The risk of developing toxoplasmosis among those who had cats was three times greater than those not living with cats.

To the best of our knowledge, this work is the first attempt in Iraq to provide information on the frequency of antibody titres among pregnant women, and to investigate the possible role of *T. gondii* infection in habitual abortion. The connection between serological evidence and the isolation of *T. gondii* from infected tissue is essential for confirmation. Regular serological screening before pregnancy or very early in pregnancy will allow recognition of maternal infection.

References

1. Howie PW. Abortion and ectopic pregnancy. In: Whitefield CR, ed. *Dewhurst's texbook of obstetrics and gynaecology for postgraduates*, 4th ed. Oxford, Blackwell, 1986:165.
2. Golledge CL, Beaman MH. Toxoplasmosis and pregnancy. *Australian and New Zealand journal of obstetrics and gynaecology*, 1990, 30:32–3.
3. Kimball AC Kean BH, Fuchs F. The role of toxoplasmosis in abortion. *American journal of obstetrics and gynecology*, 1971, 111:219–26.
4. Kean BH. Clinical toxoplasmosis—50 years. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1972, 66(4):549–71.
5. Mahajan RC et al. Toxoplasmosis—its role in abortion. *Indian journal of medical research*, 1976, 64(6):797–800.
6. Jacobs L, Lunde MN. A haemagglutination test for toxoplasmosis. *Journal of parasitology*, 1957, 43:308–14.
7. Karim KA, Ludlam GB. The relationship and significance of antibody titres as determined by various serological methods in glandular and ocular toxoplasmosis. *Journal of clinical pathology*, 1975, 28:42–9.
8. Anderson SE, Remington JS. The diagnosis of toxoplasmosis. *South medical journal*, 1975, 68(11):1433–43.
9. Lester J. Detection of antibodies to *Toxoplasma gondii*: a comparison of three

test kits. *Medical laboratory science*, 1983, 40(4):387–9.

10. Langer H. Repeated congenital infection with *T. gondii*. *Obstetrics and gynecology*, 1963, 21:318–29.
11. Hingorani V et al. Toxoplasmosis: abortions and stillbirths. *Indian journal of medical research*, 1970, 58:967–74.
12. Southern PM. Habitual abortion and toxoplasmosis. Is there a relationship? *Obstetrics and gynecology*, 1972, 39:45–7.
13. Stray-Pedersen B, Lorentzen-Styr AM. Uterine toxoplasma infections and repeated abortions. *American journal of obstetrics and gynecology*, 1977, 128(7):716–21.
14. Jones MH et al. Toxoplasmosis and abortion. *American journal of obstetrics and gynecology*, 1969, 104(6):919–20.
15. Frenkel JK, Ruitz A. Human toxoplasmosis and cat contact in Costa Rica. *American journal of tropical medicine and hygiene*, 1980, 29:1167–80.
16. Barbier D, Ancelle T, Martin-Bouyer G. Seroepidemiological survey of toxoplasmosis in La Guadeloupe, French West Indies. *American Journal of tropical medicine and hygiene*, 1983, 32(5):935–42.
17. Al-Omar OM, Tabbara KF. Prevalence of *Toxoplasma* antibodies among Saudi eye patients. *Saudi medical journal*, 1993, 14(3):244–6.