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Seroepidemiological Study of *Toxoplasma gondii* Infection of Mentally Retarded Patients (Chahrmahal Va Bakhtiari Province, Iran)

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Toxoplasmosis is a widespread zoonosis disease in the world. Although the infection by *Toxoplasmo gondii* is widely prevalent, the disease is not common and the most of acquired infections are asymptomatic. Whereas congenital Toxoplasmosis can occur with passing the trophozoite of the parasite from mother to child and the important aspect of this parasitic infection are the probable danger of congenital transmission and its severe effects of the fetus. In this case- control study, a total of 108 mentally-retarded cases inhabited in 3 rehabilitation centers and 50 apparently healthy donors as a control were screened to detect Toxoplasmosis antibodies. In this study serum of all participants (including mental retard & voluntary blood donors) were kept at - 20°C until laboratory examination. Samples were tested by commercial kit to detect anti Toxoplasma IgG and IgM antibodies. The survey showed that 35.2% of the mental retard group and 30% of control group had anti Toxoplasma IgG and IgM antibodies. From 31 cases in the group of mental retard who were positive for IgG antibody of Toxoplasmosis, 22 cases were male and 9 cases were female that indicated a positive relationship between presence of anti Toxoplasma IgG antibody and being male ($P<0.05$). Out of 50 volunteer blood donors 15 cases (30%) had IgG and IgM antibodies of *Toxoplasma gondii* and statistic tests showed that there was no significant difference between cases and controls for IgG and IgM antibodies of *Toxoplasma gondii*. The rate of Toxoplasma infection in the mentally retarded group was approximately the same as in the normal control group that indicated Toxoplasmosis is not a serious problem in this individual group and played little or no role as a predisposing factor in the occurrence of congenital mental deficiency in this setting.

Key words: Toxoplasma infection, Mental retardation, Blood donor, Shahrekord.

Since 1908 which Nicolle and Manceaux have isolated the *Toxoplasma gondii* from the North African rodent *Ctenoductylus gondii*, it has been shown that the parasite is widespread and can infect mammals, birds and a large proportion of the world's population. Until now the organism has been isolated at least from 50 animal species[1,2,3]. The prevalence of Toxoplasmosis among the human population especially focused on mental retardation individuals however has not yet been precisely determined. The diagnosis of infection exclusively based on serological data rather than on isolation of the organism[2,3]. In the life cycle of the parasite, cats are the final hosts and varieties of mammals are intermediate host[3,4]. The infection

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is acquired by ingestion of tissue cyst containing trophozoite in raw or undercooked meat or ingestion of oocyst extracted in cats or felines feces via consumption of contaminated vegetables or fruits and even contaminated water or drinking sources[5]. The prevalence of Toxoplasmosis among normal populations in different geographical areas ranged from 8 to more than 70%. Toxoplasmosis is usually asymptomatic in adults, but the infection acquired during the pregnancy and in this case the parasite has great affinity for the central nervous system as well as for other tissues. In some cases abortion is unavoidable and in some cases the infection may lead to severe form. Up to 50% of the babies infected with Toxoplasmosis during the pregnancy, will be born early as a premature baby[1,2,3]. Congenital Toxoplasmosis can damage the baby's eyes, nervous system, skin, and ears. Often, there are signs of infection in the baby at birth. However, newborns with milder infections may not have symptoms or problems for months or even years. If they are not treated, almost all problems develop, especially in the eyes, in later years of life[1,2,3,6]. It was considered of interest to determine the role of Toxoplasmosis in mental retardations cases that were in rehabilitation centers in Shahrekord and Farsan from Chaharmahal Va Bakhtiari province.

MATERIALS AND METHODS

In this case-control study, a total of 108 mentally retarded cases were inhabited in 3 rehabilitation centers (two centers from Shahrekord and a center from Farsan). Township with 50 apparently healthy blood donors as a control was recruited for purpose of study. Blood samples were taken from all participants and were screened for anti Toxoplasmosis antibodies. Sera were kept at -20°C until laboratory examination. Samples were tested by commercial kit (DIA.PRO. Diagnostic Bioprobes Srl. Via Columella n° 31. 20128 Milano - Italy) to detect anti Toxoplasma IgG and IgM antibodies[7].

RESULTS

Totally 158 participants including 108 mentally retarded cases and 50 healthy blood donor controls were studied. Out of 108 cases 86 cases were male and 22 were female. In the group of mental retard 61 individuals (56%) and 47 cases (44%) lived in urban and rural area, respectively. There was no statistically significant difference between existence of anti Toxoplasma antibodies and place of living. Forty two (39%) of mentally retard subjects were born in familial wedding and 66 (61%) had no history of familial wedding. Among 108 cases, 83 cases (77%) had no other mental retard brother or sister and 25 (23%) had one or more other mental retard sister or brother. All cases were divided in 4 groups according to their IQ's and 61 (56.5%), 36 (33.3%), 11 (10.2%) had severe mental retardation, moderate mental retardation and mild mental retardation, respectively. The relationship between mental retardation status and having anti Toxoplamsa antibodies was not significant.

Table 1. Comparison of IgG and IgM titre in mentally retarded

		Positive		Negative		Total		P-Value
		No	%	No	%	No	%	
Sex	Male	20	23.2	66	76.8	86	100	0.01
	Female	11	50	11	50	22	100	
Place of	Urban	17	27.9	44	72.1	61	100	0.82
living	Rural	14	29.8	33	70.2	47	100	
Marital	Familial	12	28.6	30	71.4	42	100	0.98
Status	Non-Familial	19	28.8	47	71.2	66	100	
Disabled	Yes	10	40	15	60	25	100	0.15
person in	No	21	25.3	62	74.7	83	100	
the family								
The severity of	Mild	4	36.4	7	63.6	11	100	
Retarded	Moderate	10	27.8	26	72.2	36	100	0.69
	Severe	17	27.9	44	72.1	61	100	

Out of 108 cases 38 cases (35.2%) had anti Toxoplasma IgG and IgM antibodies in which 31 (28.7%) had anti IgG antibody and 7 (6.5%) had anti Toxoplasma IgM antibody. Among participants who were positive for IgG, 20 (23.2%) were male and 11 (50%) were female that indicated more IgG for male. There was a statistically significant association between existence of IgG and gender ($p<0.05$) (Table 1). Among positive cases for IgM, 6 cases were male and only one case was female and no statistically significant association between IgM and sex was observed. While among 42 subjects who were born in a familial wedding 12 cases (28.6%) were positive for anti Toxoplasma IgG and two case positive for anti Toxoplasma IgM. Among 66 cases with no history of familial wedding 19 cases (28.8%) and 5 cases (7.5%) were positive for anti Toxoplasma IgG and IgM antibodies, respectively. Statistical test showed that there was no significant association between presence of IgM and IgG and close family relationship between parents of mental retard subjects. Among 11 mild mental retardation cases 4 cases had anti Toxoplasma IgG and no one had anti Toxoplasma IgM antibody. From inhabitants with moderate mental retardation (36 cases), 10 cases and 4 cases were positive for IgG and IgM, respectively. Forty-eight percent (61 cases) of the participants had severe mental retardation in which 17 cases had anti IgG Toxoplasma antibody and 3 cases had IgM anti Toxoplasma antibody. There was no statistically significant relationship between anti Toxoplasma antibodies and degree of mental retardation (IQ's) (Table 2 and 3).

From first 50 apparently healthy blood donors as controls were studied in which 14 sera (28%) and 1 (2%) were positive for IgG and IgM respectively (Table 3). The survey showed that 35.2% of mental retard group and 30% of controls had anti Toxoplasma IgG and IgM antibodies, although the percentage of existence of anti Toxoplasma IgM and IgG antibodies was higher in mental retarded cases compared to healthy individuals, however statistic test showed that there was no statistically significant association between existence of anti Toxoplasma antibodies in cases and controls.

Table 2. Comparison of IgG and IgM titre in mentally retarded

		Positive		Negative		Total		P-Value
		No	%	No	%	No	%	
Sex	Male	6	7	80	93	86	100	0.67
	Female	1	4.5	21	95.5	22	100	
Place of	Urban	3	5	58	95	61	100	0.45
living	Rural	4	8.5	43	91.5	47	100	
Marital	Familial	2	4.8	40	95.2	42	100	0.56
Status	Non-Familial	5	7.5	61	92.5	66	100	
Disabled	Yes	2	8	23	92	25	100	0.72
person in	No	5	6	78	94	83	100	
the family								
The severity of	Mild	0	0.0	11	100	11	100	
Retarded	Moderate	4	11.1	32	98.9	36	100	0.30
	Severe	3	4.9	58	95.1	61	100	

Table 3. Comparison of IgG and IgM titre in case and control groups

		Positive		Negative		Total		P-value
		No	%	No	%	No	%	
IgG	Case	31	28.7	77	71.3	108	100	0.92
	Control	14	28	36	72	50	100	
IgM	Case	7	6.5	101	93.5	108	100	0.23
	Control	1	2	49	98	50	100	

DISCUSSION

Toxoplasmosis is usually asymptomatic but congenital Toxoplasmosis can damage the baby's eyes, nervous system, skin, and ears. Often, there are signs of infection in the baby at birth. However, newborns with milder infections may not have symptoms or problems for months or even years. If they are not treated, problems might appear during early years of life or later in adolescents[8]. Whereas there was no local study to investigate if there is any association between mental retardation and Toxoplasmosis in subjects with mental retardation problems in rehabilitation centers, this case-control study was carried out. Out of 108 mental retardation individuals 38 cases (35.2%) had anti Toxoplasma IgG and IgM antibodies including 31 subjects had anti Toxoplasma IgG antibody and 7 (6.5%) had anti Toxoplasma IgM antibody. The prevalence of Toxoplasma infection in the group of mental retard was more likely similar to other studies in this specific group around Iran[9] even thought the rate of infection was higher in case-group than healthy group, but it was not statistically significant. There are no ample studies about the Toxoplasma infection rate in mental retardation cases; however the rate of infection in the current study was less than the rate of infection in Gharavi and Sharif studies from Iran[9,10], and also Caiaffa study's from Brazil[11]. The lower rate in current study is possibly due to un-favorite environment and geographical condition for spuralation of the *Toxoplasma gondii* tachyzoite. Among participants were positive for IgG, 22 (25.6%) cases were male and 9 (40.9%) were female which showed more IgG for male and there was a statistically significant association between presence of anti Toxoplasma IgG antibody and gender. Among positive cases for IgM, 6 cases were male and only one case was female and no significant relationship between presence of anti Toxoplasma IgM antibody and gender was seen. This study found an association between anti Toxoplasma antibody and gender, but other studies have not reported this association and usually there is no sex dependency for Toxoplasma infection[1,2,3]. In agreement with this finding Sharif has reported higher rate of Toxoplasma infection in men than women, however due to small sample size and a few positive cases it is too difficult to claim being male is a risk factor for Toxoplasmosis in mental retard cases and further studies are needed to confirm this finding. The study showed 7 cases had anti Toxoplasma IgM antibody that indicated current Toxoplasma infection. This finding is in disagreement with Gharavi study from Iran[10] which has reported no presence of IgM antibody in their study, but other studies from Iran have reported similar infection rate and presence of anti Toxoplasma IgM antibody in normal population[11,12,13,14]. The controversy between our finding and Gharavi study it might be due to lower hygienic facilities in Sharekord and Farsan rehabilitation centers and more contact by contaminated soil with cat feces during outward cares, however this result is in agreement with Sharif study from north of Iran[9,10]. Current study has not found significant association between rate of Toxoplasma infection and age of participant, or parent's family wedding and place of born in both groups.

CONCLUSION

The results of this study showed that the rate of Toxoplasma infection in the mentally retarded group was approximately the same as in the normal control group that indicated and Toxoplasmosis is not a serious problem and this disease played little or no role as a predisposing factor in the occurrence of congenital mental deficiency in this setting.

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