

### Toxoplasmosis Among Selected Groups Of Children

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#### Abstract:

Blood samples were collected from 30 children with mental retardation, 30 children with epilepsy, 40 leukemic children and 100 apparently healthy children in Basrah province. Sera were tested for *Toxoplasma gondii* IgG by enzyme immuno-assay method.

The rate of infection in the studied patients was 7% in comparing to the control group (2%). There were 10%, 3.3% and 7.5% infected children with either mental retardation, epilepsy or leukemia successively. Toxoplasmosis may play an important role in causing mental retardation, epilepsy and leukemia.

#### Introduction:

Toxoplasmosis is a zoonotic disease of all warm-blooded animals and man. Congenital type lead to a most serious effects in human beings. Positive serological tests indicate past exposure to *Toxoplasma gondii* and may or may not be related to the existing clinical situation.<sup>(1)</sup>

When a mother acquires infection during gestation, the organism may be disseminated hematogenously to the placenta and then to the fetus transplacentally.<sup>(2,3)</sup> If the mother acquires the infection in the first trimester and the infection is not treated, approximately 17% of fetuses suffer from a severe disease. But when the mother acquires the infection in the third trimester, approximately 65% of fetuses are infected with either mild or inapparent form of the disease.<sup>(3,4)</sup> Congenital toxoplasmosis may result in significant problems in infected infants include hydrocephalus, microcephaly, psychomotor retardation, vision and hearing impairment.<sup>(4)</sup> On the hand, toxoplasmosis and tumors provoke substantial changes accompanied with the disbalance of many neuroendocrine factors which in their summarizing effects influence the life span of the infected laboratory mice <sup>5,6</sup>. Thus, toxoplasmosis has been considered as an important opportunistic infections in immunosuppressed patients and/or malignancies.<sup>(7,11)</sup>

Therefore, this study was designed to investigate the toxoplasma antibody titers among children with selective disorders in the region.

#### Patients & Methods:

1) Patients: There were 3 groups namely:

A. Mentally retarded group: It composed of 30 children. They were attending the outpatients psychiatric clinic of Basrah General Hospital. Their ages ranged from 1 to 14 years. There were 16 males and 14 females.

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Table (1): Toxoplasma antibody as detected by ELIZA in different clinical subjects and control group.

Group	No. Examined			No. (%) infected		
	Male	Female	Total	Male	Female	Total
Mental retardation	16	14	30	1	2	3(10.0)
Epilepsy	13	17	30	1	0	1(3.3)
Leukemia	25	15	40	2	1	3(7.5)
Total			100	4	3	7(7.0)
Control	33	67	100	2	0	2(2.0)
Total	87	113	200	6	3	9(4.5)

### Discussion:

The results obtained in this study and the previous one which involved women with recurrent miscarriage<sup>(13)</sup>, suggest an endemic nature of the disease in Iraq especially in Basrah. Other areas in the Middle East such as Lebanon<sup>(14)</sup>, Jordan<sup>(15)</sup> are also considered endemic for the disease. The relatively warm weather and high humidity combined with the presence of domestic and stray cats are presumably the most important factors associated with high prevalence of toxoplasmosis.<sup>(16)</sup> Similarly, Wallas and Kagan<sup>(17)</sup> and Ghorobani *et al*<sup>(18)</sup> have found a higher levels of antibody in Brazil and Iran respectively where the climate is humid.

The relation between toxoplasmosis and mental disorders has been studied by many workers. High rates of toxoplasmosis in association with mental retardation or epilepsy have been reported in Vienna, Iraq, Moldavia, Egypt and Brazil.<sup>(19-23)</sup> Others, in contrast, have stated that toxoplasmosis did not appear to be a significant cause of mental retardation.<sup>(24,25)</sup>

Epileptic patients has demonstrated a significant higher level of antibody when compared with control children. These results are consistent with those of Thalhammer<sup>(19)</sup> and Betin<sup>(26)</sup> but disagree with those of Al-Saffar and Hamdi<sup>(27)</sup> and Stern *et al*.<sup>(24)</sup>

A significant higher incidence of toxoplasmosis antibodies was found in patients with leukemia suspected of having toxoplasma lymphadenopathy. Such situation has been recorded in India, Turkey, Nepal and Egypt.<sup>(9-11,28)</sup> In Adana, Turkey, workers have found that neoplasm was detected in 12(13.7%) patients with toxoplasmosis.<sup>(29)</sup> Further more, 346 serum samples from urban stray cats in the city of Ghent, Belgium were tested for antibodies to *T.gondii* and feline immunodeficiency virus, and antigen of feline leukemia virus. Of these 346 samples, 243(70.2%) were seropositive for toxoplasmosis.<sup>(6)</sup> Therefore, results of this study in Basrah in addition to that in Baghdad, Iraq<sup>(30)</sup> and other works mentioned earlier may suggest that toxoplasmosis must be considered in the differential diagnosis of leukemia.

*Toxoplasma gondii* is an important opportunistic species in patients whose resistance to infection is compromised by underlying diseases, such as tumors, Hodgkin's disease, non-Hodgkin's lymphoma and other malignancies of the blood. Drugs employed to treat these diseases also affect immune functions. Thus, such patients appear to be strongly predisposed not only to initial infection with toxoplasma but to reactivation of the latent

B. The epileptic group: Thirty children were attending the psychiatric clinic of Basrah General Hospital for receiving the treatment were included. Their ages ranged from 1 to 14 years. There were 13 males and 17 females.

C. The leukemic group: This group is composed of 40 patients were admitted to Oncology Ward in Basrah Maternity and Child Hospital for receiving anti-leukemic treatment and follow up. Their ages ranged from 1 to 14 years. There were 25 males and 15 females.

2) Control group: One hundred apparently healthy children were included in the study as a control group. They were chosen randomly from Basrah population. Their ages ranged from 1 to 14 years. There were 33 males and 67 females.

Blood samples: Three ml of blood were collected from each patient as well as the control group. Serum was separated by centrifugation at 3000 rpm for 5 minutes. Sera were stored at -20°C until needed.

Serological test: ELIZA test was used for the detection of anti-*Toxoplasma gondii* antibodies of both patients and control children. A kit of *Toxoplasma gondii* IgG enzyme immuno-assay test (Biocheck Inc., USA)<sup>12</sup> was used. Purified *T. gondii* antigen is coated on the surface of microwells. Diluted patient serum is added to the wells and the *T. gondii* IgG antibody, if present, binds to the antigen. All unbound materials are washed away. HRP-conjugate is added, which binds to the antibody-antigen complex. Excess HRP-conjugate is washed off and a solution of TMB reagent is added. The enzyme conjugate catalytic reaction is stopped at a specific time. The intensity of the color generated is proportional to the amount of IgG-specific antibody in the sample. The results are determined by a microwell reader compared in a parallel manner with calibrator and controls. Toxo G Index of 1.0 or greater, WHO iu/ml value greater than 32 iu/ml is seropositive.

Statistical analysis: Chi-square (X<sup>2</sup>) test was used for statistical analysis. The significance level was set at P<0.05.

### Results:

The rate of infection in the studied patient children was 7% in comparing to the control group (2%). The percentage of positive reaction in males was 4% as compared with females (3%). Although the infection in females apparently higher than males but the difference was statistically insignificant.

Out of 30 mentally retarded children, 3 (10%) were positive for toxoplasmosis in comparing to the control group (2%) (Table 1). The difference statistically is significant. Even children with epilepsy showed a higher antibody titer (3.3%) than control children (2%) but statistically, the difference is insignificant (Table 1).

Likewise, children with leukemia showed a positive antibody titer for toxoplasmosis at a rate of 7.5% (Table 1). The statistical difference between the leukemic patients and the control children is significant.



infection.<sup>(31)</sup> Central nervous system involvement and toxoplasma encephalitis have been observed in patients receiving immunosuppressive treatment.<sup>(7,8,32)</sup>

In conclusion, these observations indicate that toxoplasmosis may play an important role in causing mental retardation, epilepsy and leukemia. Therefore, large scale prospective studies of toxoplasmosis during the course of pregnancy coupled with long term follow up of infants may supply accurate figures for their contribution to mental disorders and malignancies in this country.

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