

COMPARATIVE EVALUATION OF ELISA AND IHA IN THE SERO-DIAGNOSIS OF HUMAN TOXOPLASMOSIS

AGRAWAL N. R., KAR S., SEN M.R., GANGOPADHYAN A. N., SEN P. C.

SUMMARY

Two techniques for the detection of toxoplasma antibodies, viz the enzyme linked immunosorbent assay (ELISA) and the indirect haemagglutination test (IHA) were evaluated through testing of 110 sera. The sera were from 70 patients with clinically suspected toxoplasmosis and 40 control subjects. There was 94.3 percent correlation between ELISA and IHA. It was found to be slightly more sensitive than IHA in detecting toxoplasmosis.

INTRODUCTION

Wide variation of clinical manifestation including ophthalmic involvements, neurological manifestations, mental retardation and obstetric manifestations alongwith difficulties in direct demonstration of the organism make the diagnosis of toxoplasmosis impossible in most situations. To overcome these difficulties some indirect methods of serological diagnosis were introduced. Most commonly used serological tests are indirect fluorescent antibody test (IFA), indirect haemagglutination test (IHA) and enzyme linked immunosorbent assay test (ELISA). In this study, a comparative evaluation of the two most

specific and sensitive tests namely ELISA and IHA in toxoplasmosis has been done.

MATERIAL AND METHODS

Twenty two obstetrical cases and 48 neonates, mainly with neurological or ophthalmic involvement were included in the study. Obstetrical group consisted of mothers with history of repeated abortions, still births or previous deliveries of congenitally malformed babies. Forty samples taken from healthy subjects served as control. From each subject 5 ml of blood was collected and serum was separated and preserved at -7 C until assayed. Each sample was analysed by ELISA and IHA for toxoplasmosis. ELISA was done by the method of Voller et al (1976) as modified by Mohapatra et al (1983). IHA

was done by the method of Chordi et al (1964). In IHA a titre of 1:18 or more and in ELISA 1:100 or more were taken as positive. (24.2%) were found to be positive for toxoplasmosis. In control group only two samples gave positive reaction by ELISA and these samples also showed agglutination with IHA (table 1).

OBSERVATIONS

The four sera which were negative for IHA showed positivity with ELISA, though gave positive reactions, whereas by IHA 17 in low titres (3 in 1:200 and 1 in 1:400

TABLE 1
SEROPOSITIVITY BY ELISA AND IHA IN VARIOUS CLINICAL CONDITIONS

CLINICAL DIAGNOSIS	No (%)	ELISA No (%)	IHA No (%)
Mothers with history of still births/abortions	18(25.7)	2(2.9)	1(1.4)
Mothers with congenitally malformed babies	4(5.7)	1(1.4)	1(1.4)
Neonates with meningomyelocele/Encephalocele	3(4.3)	3(4.3)	3(4.3)
Hydrocephalous	9(12.9)	2(2.9)	2(2.9)
Hepatosplenomegaly/lymphadenopathy	3(4.3)	0	0
Congenital cataract	7(10.0)	4(5.7)	4(5.7)
Uveitis	11(15.7)	3(4.3)	1(1.4)
Chorioretinitis	11(15.7)	4(5.7)	4(5.7)
Endophthalmitis	1(1.4)	1(1.4)	1(1.4)
Multiple congenital anomalies	1(1.4)	0	0
Others (rashes all over body)	2(2.9)	1(1.4)	0

TABLE 2
COMPARISON OF TITRES IN ELISA AND IHA

Titres in IHA test	TITRES IN ELISA							Total
	100	200	400	800	1600	3200	6400	
18 or less	-	3	1	-	-	-	-	4
18	-	-	-	-	-	-	-	-
54	-	2	3	6	1	1	-	13
162	-	-	-	1	-	-	-	1
486	-	-	-	3	1	-	1	5
1458	-	-	-	-	-	-	-	-
Total	0	5	4	10	2	1	1	23

dilution). Both control sera were positive in 1:54 dilution by IHA and with ELISA, the titres were 1:200 and 1:800 (Table 2). There was no correlation of seropositivity with history of cat contact, age and diet.

DISCUSSION

The seropositivity in the present series is more or less similar to the observations of the previous workers, Panigrahi et al (1978) reported 27% seropositivity by IHA in congenital and obstetrical groups of suspected cases of toxoplasmosis. Prakash and Chowdhary (1969) demonstrated antitoxoplasma antibody in 20.3% of suspected cases of toxoplasmosis and 3.3% of normal persons. Singh et al (1980) has also shown similar results with positivity of 19.6% by IHA. They also suggested that the positive tests in neonates may sometimes be misleading due to passive transfer of IgG from mothers to the fetus. Presence of IgM in neonates is diagnostic of the infection and can be detected by direct ELISA (Naot et al, 1981). However, this could not be done in the present study due to non-availability of monospecific IgM antibodies.

The group with neurological manifestations showed maximum seropositivity because *Toxoplasma gondii* has got an affinity for the nervous tissues more than other tissues like reticulo-endothelial, cardiac and other muscles.

In a comparative study Voller et al (1976) have reflected an overall positive correlation between IHA and ELISA titres. Milatovic and Baraveny (1980) evaluated quantitative agreement within +1 dilution between ELISA and IHA and found 89% agreement. In our study we found 94.3% qualitative agreement between ELISA and

IHA.

Thus, in conclusion, though both ELISA and IHA showed high sensitivity and specificity, former has got an advantage being much more sensitive, suitable and economical for larger scale studies.

REFERENCES

- 1 Chordí, A., Walls, K.W., Kagan, I.G. : *J Immunology*, 93:1024, 1964
- 2 Mohapatra, T.M. and Sen, P.C. : *Ann. Trop. Med. & Parasitol*, 77:101, 1983
- 3 Milatovic, D. and Braveny, I. : *J Clin. Path.*, 33:841, 1980
- 4 Naot, Y., Desmonts, G. and Remington, J.S. : *J Paed.*, 98:32, 1981
- 5 Panigrahi, H., Mithal, S., Mohapatra, L.N. and Shyamsunder, K. : *Ind. J Med. Res.*, 67:918, 1978
- 6 Prakash, O. and Chaudhuri, P. : *Ind. J Med. Res.*, 57:13, 1969
- 7 Singh, p., Chugh, T.D. and Garg, P.: *Ind.*, 17:350, 1980
- 8 Voller, A., Bidwell, D.E., Bantlett, A., Fleck, D.G. and Perkins, M. : *J Clin. Path.*, 29:150, 1976