

# IMMUNOGLOBULINS AND SERUM PROTEINS IN TOXOPLASMOSIS

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## ABSTRACT

Immunoglobulin levels in 47 children (age 13-20 years) with toxoplasmosis were compared with 46 age and sex matched controls. No significant difference was observed in mean serum immunoglobulin (IgG, IgA, IgM) levels between patients and controls but mean IgM levels were significantly (P) higher in children with acute toxoplasma infection. Total proteins were higher in patients while mean albumin and globulin levels were similar between the two groups. Estimation of serum immunoglobulins in young children with toxoplasmosis has no significance and should not be considered as an immunodiagnostic tool (JPMA 42: 42, 1992).

## INTRODUCTION

Human toxoplasmosis, caused by intracellular protozoan parasite *Toxoplasma gondii*, is world wide. Immuno compromised patients are particularly at risk. In Pakistan few studies have been done on the prevalence of toxoplasmosis<sup>1-3</sup>, but the immune status of patients with toxoplasmosis has not yet been studied. The present study was undertaken to estimate the immunoglobulin levels and serum proteins in patients with toxoplasmosis and to compare the results with age and sex matched healthy controls.

## PATIENTS AND METHODS

Forty-seven patients with toxoplasmosis were included in this study. The *Toxoplasma gondii* IgG antibodies were detected using enzyme linked immunosorbent assay (lab system *Toxoplasma* IgG, ETA). They were further tested for the presence of *Toxoplasma* IgM antibodies by the same technique. An acute infection was indicated in 12.7% (6/47) IgG positive children. Their sera were assayed for immunoglobulins (IgG, IgA, IgM), total proteins and albumin. The reference values for controls were derived from 46 healthy children matched for age, sex and socio-economic status. The quantitative estimation of immunoglobulins (IgG, IgA, IgM) was carried out by radial immunodiffusion technique of Mancini<sup>4</sup> (Kallsted Laboratories, USA). Serum total proteins was estimated by Biuret method using bio Merieux kit and serum albumin by bromocresol green, BCG (bio Merieux). Statistical analysis was done using Chi square and Students 't' test.

## RESULTS

Forty-seven patients with toxoplasmosis were included in this study, their mean age was 15.1 SE±0.11 years with a range of 13 to 20 years. Of the total, 28 were boys (mean age 15.5±SE 0.15, range 13-20 years) and 19 were girls (mean age 14.6± SE 0.13, range 13-18 years). Forty-six healthy subjects who served as controls were in the same age group. Of 46 controls, 21 were boys and 25 were girls. The mean serum immunoglobulins in patients and controls are shown in Table I.

**TABLE I. Serum immunoglobulins in toxoplasmosis and controls.**

Group	No.	IgG (mg/dl)	IgA (mg/dl)	IgM (mg/dl)
		Mean $\pm$ SE (range)	Mean $\pm$ SE (range)	Mean $\pm$ SE (range)
Patients	47	1519 $\pm$ 79 (94-2948)	196 $\pm$ 13 (58-627)	160 $\pm$ 11 (46-348)
Controls	46	1373 $\pm$ 54 (431-2681)	176 $\pm$ 12 (38-452)	164 $\pm$ 12 (21-384)

All differences were non-significant.

Though the mean serum IgG and IgA levels were higher in patients than controls but the difference was statistically insignificant.

**TABLE II. Serum immunoglobulins in acute toxoplasma infection (T. gondii IgG antibody positive cases who showed presence of T. gondii IgM antibody).**

Immunoglobulins (mg/dl)	Acute toxoplasma infection (n=6)	Controls (n=46)
	Mean $\pm$ SE (range)	Mean $\pm$ SE (range)
IgG	1306 $\pm$ 97 (852-1509)	1373 $\pm$ 54 (431-2681)
IgA	232 $\pm$ 37 (113-325)	176 $\pm$ 12 (38-452)
IgM	*244 $\pm$ 35 (136-348)	164 $\pm$ 12 (21-384)

\*P < 0.05

Table II shows mean serum immunoglobulin levels in patients with acute toxoplasma infection. Out of 47 cases positive for toxoplasma IgG antibody, 6 (12.7%) showed presence of toxoplasma IgM antibody, which indicated current infection. A significant (P) increase in mean serum IgM levels was found in patients with acute toxoplasma infection.

**TABLE III. Hemoglobin and serum proteins in patients and controls.**

Parameters studied	Toxoplasmosis (n=47)	Control (n=46)
	Mean $\pm$ SE (range)	Mean $\pm$ SE (range)
Hemoglobin g/dl	13.91 $\pm$ 0.51 (9.2-18.7)	13.63 $\pm$ 0.03 (8.4-15.8)
Total protein g/dl	*7.86 $\pm$ 0.12 (6.2-9.4)	7.44 $\pm$ 0.10 (5.8-8.8)
Albumin g/dl	4.92 $\pm$ 0.10 (3.3-5.9)	4.78 $\pm$ 0.08 (3.4-5.7)
Globulin g/dl	2.80 $\pm$ 0.16 (2.2-4.7)	2.65 $\pm$ 0.09 (1.8-3.7)
A/G ratio	1.74 $\pm$ 0.06 (1.0-2.5)	1.85 $\pm$ 0.09 (1.1-2.7)

\*P < 0.01

Table III shows mean hemoglobin level and serum proteins in patients and controls. Hemoglobin levels

in patients were slightly higher than controls. Mean serum total protein was significantly higher (P) in patients but albumin and globulin levels were only slightly elevated in patients than in controls.

## DISCUSSION

Protozoal infections caused by unicellular organisms that multiply intra or extra-cellularly in the host, provide a large antigenic stimulus, as in leishmaniasis, trypanosomiasis, malaria, amoebiasis and toxoplasmosis<sup>5</sup>. *Toxoplasma gondii* is one of the obligate intra-cellular parasites whose infection is usually mild or inapparent<sup>6</sup>. The type and degree of the immune response to infection are complex and influence the course of infection, clinical manifestations and its diagnosis. In adolescence and adulthood, most infections are subclinical or run a very mild clinical course<sup>7</sup>. *Toxoplasma gondii* causes serious illness or death in congenitally infected fetus<sup>8-10</sup> and induce a major complication in immune compromised individuals<sup>11</sup>. Toxoplasmosis is a systemic infection, always accompanied by the production of serum antibodies at high titre. After the acute stage antibodies persist in lower titres throughout life. Detection of IgM antibodies establishes the diagnosis of recently acquired or reactivated infection, but these antibodies soon disappear or decrease to very low levels followed by the appearance of IgG which stays longer. Humoral immunity can be reflected by the levels of plasma proteins, especially the levels of immunoglobulins. In the present study, patients positive for *Toxoplasma gondii* IgG antibodies showed no significant change in serum immunoglobulin levels when compared to controls. No comparable data on serum immunoglobulins in young patients with toxoplasmosis is available. However, in acute or subclinical congenital toxoplasmosis, neonates may exhibit variations in their serologic response to diagnostic antigens as well as alterations in immunoglobulin development<sup>12</sup>. Some neonates may have an elevation in IgM and IgM *Toxoplasma* antibody. A similar elevation in IgM levels was seen in this study in cases with acute *Toxoplasma* infection (patients showing both IgG and IgM antibodies). It is suggested that the increase in IgM levels in these cases might be due to an intensification of antibody response by the immunogenic effects of parasite. However, no symptoms were elicited that could reasonably be linked to primary infection in these patients. The raised serum total protein levels could be due to the disease itself or due to some previous infections as some of the cases gave history of hepatitis, typhoid and fever. This study suggests that estimation of immunoglobulins in toxoplasmosis has no significance and it may not be considered as an immunodiagnostic tool.

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