

SEROLOGICAL PREVALENCE OF ANTI-TOXOPLASMA ANTIBODIES AMONG IMMUNOCOMPETENT POPULATION -COMPARATIVE STUDY OF ELISA AND LATEX AGGLUTINATION TEST

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ABSTRACT:-Toxoplasma gondii (T gondii) causing toxoplasmosis is highly prevalent throughout the world. Transfusion or organ transplantation from an infected person can transmit the infection. Studies performed in different geographic areas and populations have shown need for regional studies to determine epidemiologic and socio-demographic characteristics for each population in order to improve control and prevention strategies. Seroprevalence can be associated with environmental and cultural factors. Different methods like Latex Agglutination Test (LAT) and Enzyme Linked Immuno Sorbent Assay (ELISA) are available for the detection of antitoxoplasma antibody.

The study was planned to conduct a comparative evaluation of ELISA and LAT techniques for the serological prevalence of anti-toxoplasma antibodies among immunocompetent population, in the department of Neuromicrobiology, National Institute of Mental Health and Neurosciences (NIMHANS) Bengaluru.

As a prospective study it comprised a total of ninety serum samples collected from the healthy voluntary blood donors attending Transfusion medicine centre. Serum was tested for T. gondii antibodies by LAT and ELISA.

The age group ranged from 18 to 45 years. All the serum samples were seronegative for Human Immunodeficiency Virus (HIV) and clinically there was no other evidence of

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immunosuppression. LAT was positive in 4% and ELISA was positive in 23.33% of cases for anti-toxoplasma antibodies. Comparatively, ELISA was found to be a more sensitive test.

Strategies are required to prevent risk of spread of toxoplasmosis at institutional level. Public health education should be implemented regarding the disease, prevention, risk factors, and its negative influence.

INTRODUCTION: Toxoplasmosis, a zoonotic disease of worldwide distribution, is an infection caused by a single-celled, obligate intracellular protozoan parasite *T. gondii*.¹ The parasite can be transmitted to humans through various modes, like contact with soil, ingestion of raw or undercooked meat, consumption of contaminated raw fruits and vegetables by the oocysts.² It is also suggested that *T. gondii* could also be waterborne.³ Around one third of human population is estimated to carry toxoplasma infection, and the incidence of toxoplasmosis varies world wide, with highest rates in Europe up to 55% in France.⁴ The seroprevalence ranges between 30% and 60% in most countries and the prevalence changes according to social and cultural habits, geographic factors, climate, transmission route, and increases with age and is higher in warm and humid areas.⁵

It would be a valuable approach to study immunocompetent adult blood donor population and determine the epidemiological characteristics of a community which might represent the general adult population of the same community for the reason that the transmission of *T. gondii* infection by transfusion of blood from asymptomatic, apparently healthy individuals exposed to the infection could be dangerous.

Screening for *Toxoplasma* in blood and blood product is not mandatory in India. This poses great risk to the recipients of blood and blood products, especially large volumes at multiple sittings.

A pilot study was therefore carried out to assess the validity and compare LAT and ELISA to determine the seroprevalence of *T. gondii* in the blood collected from healthy voluntary donors at blood donation camps conducted around Bengaluru, Karnataka, India.

MATERIALS AND METHODS: Blood sample was collected from 90 voluntary blood donors at the blood donation camps organized by the division of transfusion medicine centre, Department of Neuropathology, NIMHANS Bengaluru, South India, a specialty hospital for neurological and psychiatric disorders. A seroprevalence study for anti-toxoplasma antibodies was conducted at the department of Neuromicrobiology, NIMHANS.

The techniques used were ELISA (IgG) and latex agglutination test LAT (IgM and IgG). All serum samples were analyzed using the Latex agglutination kit (Tulip) and Platelia Toxo-G immunoglobulin G enzyme immunoassay test (Sanofi Diagnostics Pasteur, BioRad, Hercules, California), according to the manufacturer's instructions.

RESULTS: There were 79 males and 11 females in the study. LAT was positive in 4% and ELISA was positive in 23.33% of cases for anti-toxoplasma antibodies. All the samples positive by LAT were also positive by assay method. 19.33% of samples negative by LAT were positive by ELISA.

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DISCUSSION: The prevalence of toxoplasmosis in the human population is associated with exposure to risk factors. Serological surveys indicate that about 80% of the primary infections are asymptomatic, due to the effective immune system.⁵ Serological tests are used to diagnose toxoplasmosis, and these tests are often helpful for the diagnosis of active infection, as well as indicating previous exposure.⁶ The seroprevalence of toxoplasmosis is persistently evolving globally, with respect to regional socioeconomic status and habits.⁷ Seropositivity levels vary widely among different regions of the globe⁸ from as low as 4.1% in Thailand to 75% in Brazil.⁹ In Kenya, a dye test found antibodies in 42% and a positivity of 54% and 37.5% by indirect hemagglutination test in Kenya and Saudi Arabia respectively. Overall seroprevalence of 20.3% *T. gondii* IgG by ELISA, was recorded in blood donors.⁵

The current study showed an overall seroprevalence of 23.3% in healthy voluntary donors either by LAT or ELISA. In comparison, ELISA was found to be a more sensitive technique than LAT (Fig1) though the latter is an efficient method for routine serologic screening for anti-toxoplasma antibodies. This variation between the two techniques could be due to the fact that the antibody levels in healthy individuals could be low hence not detected by LAT.

There are certain advantages of LAT over ELISA, including a low individual test cost, ability to obtain semiquantitative results, and a relatively short time to obtain results. Semiquantitative results can be obtained by performing 2 to 10-fold dilutions. At the same time; the disadvantages include the need to carefully interpret marginal results and problems with specificity due to interfering substances. These disadvantages are overcome by ELISA technique since its specificity is better than LAT, as in our study where 19.33% samples negative by LAT were positive by ELISA. In a Korean study, LAT and IgG ELISA, were used to increase the accuracy of diagnosis, and the seropositive rates from each assay were 6.5% and 6.8%, respectively.⁶ The difference in ELISA seropositivity may be due to recognition of different antigenic epitopes, and also different limits of sensitivity for each test.¹⁰ The data on the prevalence of toxoplasmosis either in the donors or the recipients who had multiple transfusion, is limited from India.⁹

The donor population may constitute a significant risk of transfusion transmitted toxoplasmosis which may result in significant clinical consequences in immunocompromised, immunocompetent multiply transfused patients, pregnant women, fetus etc. To ensure availability of seronegative blood, a national policy of screening of blood and blood products for toxoplasmosis along with other mandatory screening tests, needs to be implemented.⁹

Hence, routine screening of blood using a sensitive method for *T. gondii* antibodies may be recommended in the panel of serological screening tests to detect endemic infectious diseases in our country. Effective strategies should be implemented to prevent transfusion transmitted toxoplasmosis or any possible spread of toxoplasmosis through blood transfusion.

A health program should provide the public with information regarding this disease, its risk factors, prevention in risk groups and the negative influence. This could have significant contribution in the improvement of general public health.

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GRAPHICAL COMPARISON OF ELISA AND LAT(%)

