

CO-RELATION OF *TOXOPLASMA GONDII* INFECTION
AND COUSIN MARRIAGES

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ABSTRACT

Sera from 735 women of child-bearing age (15-45) years) were tested for the presence of IgG antibodies to *Toxoplasma gondii* by Enzyme-Linked Immunosorbent Assay (ELISA) technique. Along with other information's, the respondents were also asked about the relationship of their parents to each other before marriage. 263 (35.78%) women were seropositive for *Toxoplasma* antibodies. Seropositivity was much higher (48.63%) in the group whose parents were first cousins and the rate declined progressively in second cousins (41.46%) distant blood relations (26.82%), same caste (26.63%) and different caste (23.73%). This difference is statistically highly significant ($P < 0.005$). The reason for high prevalence of *Toxoplasma gondii* infection among women whose parents are first cousins is not clear. Further study in this regard is suggested.

INTRODUCTION

For purpose of definition, toxoplasmosis refers to a clinical disease caused by sporozoan, *Toxoplasma gondii*, whereas *Toxoplasma gondii* infection refers to the presence of either the tachyzoite form or the cyst form in tissues irrespective of clinical disease.¹

Toxoplasma gondii is an obligate intracellular coccidian protozoan. Members of the cat family are definite hosts; while humans, all orders of mammals, birds and reptiles as well are the intermediate hosts. Immunity is associated with chronic infection, which may recrudescence when a patient is immuno-suppressed.²

The prevalence of *Toxoplasma* infections in various parts of the world ranges from zero to over 97%.³ Kean (1972) stated that *Toxoplasma* infection involved one-half billion humans. *Toxoplasma* infection is a significant public health problem, as stated by the fact that incidence of congenital toxoplasmosis ranges from 1.0 in Montreal to 7.0 cases per 1000 live births in Vienna.^{4,5} Patients with AIDS have a particular predilection for the development of encephalitis caused by *Toxoplasma gondii* 'As stated by Vieira et al. up to 50 percent patients with AIDS suffer from fulminating toxoplasmosis.⁷

All the conditions (hot and humid climate, poor socio-economic conditions, abundance of stray cats, unhygienic habits and habit of taking undercooked meat) conducive for *Toxoplasma* infection exist in Pakistan. Being a global public health problem and particularly due to its grave

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consequences in congenital toxoplasmosis and in immune compromised patients, less attention has been focused on the subject in Pakistan. This study was cross-sectional and sero-epidemiological to fill the gap in knowledge regarding local epidemiology of the disease. This article is a part of different articles published elsewhere.

MATERIALS AND METHODS

Study Area.

This study was carried out in Lahore, the Capital of Punjab Province and the second largest city of Pakistan, having semi-tropical climate. The annual rainfall is about 490mm and the relative humidity varies between 22 and 90%.

Study Population.

The women of child bearing age i.e. from 15 to 45 years (as on last birthday), irrespective of their marital status were included in study. The sampling frame consisted of the lists prepared on the basis of annual survey conducted by two Maternal and Child Health (M.C.H.) Centres of the College of Community Medicine, Lahore. 735 women of child bearing age were selected by simple random sampling. In case of non-availability of a respondent, next women on the sampling frame was included.

Collection, Handling, Transportation and Storage of Specimen.

The data was collected by administering the questionnaire by direct interview. 5ml of blood was taken aseptically avoiding stasis from a superficial vein by a disposable syringe. Blood was transferred to a sterile centrifuge tube, which was then plugged and labelled.

The specimens thus collected were transported to the laboratory in an ice-box. Blood was allowed to clot at room temperature and serum was then separated by centrifugation at 1000xg for 10 minutes. The serum was transferred in the polystyrene bottles, labelled and stored at -20°C in a deep freezer.

Serological Examination:

In this sero-epidemiological study Enzyme-Linked Immuno-Sorbent Assay (ELISA) technique⁸ was used to detect IgG-specific antibodies to *Toxoplasma gondii* from the sera of the sampled population. The kit used for ELISA tests was "Enzygnost Toxoplasmosis/IgG" (Behring, W. Germany) batch/lot No. 17984. Out of 96 reacting wells in a kit, three were used for negative control sera and one for positive control serum supplied along with the kit and remaining 92 wells were used for sera of study population. If the control sera, positive and negative, exhibit and actively given on the respective labels, then the test is valid for evaluation. Visual evaluation was done with the help of plate reading mirror. Results were read by comparing the colour of test wells with the colour of negative control wells. More intense colour of the test wells than of the wells with negative control were considered positive for *Toxoplasma* antibody. For the sake of quality control,

photometric evaluation was done by reading absorbance in a Titertek Multiskan Photometer (Flow Laboratories) at 405 nanometer (nm).

The results were printed out in absorbance mode through inbuilt facility of the instrument.

Statistical analysis was performed with the help of Department of Biostatistics, College of Community Medicine, Lahore.

RESULTS

Seven hundred and thirty-five sera belonging to women of child bearing age were tested for *Toxoplasma* antibodies. The age of the respondents ranged from 15 to 45 years, the mean age being 27.81 ± 8.15 (Mean \pm S.D.) years. The antibody positivity rate in the population studied was 35.78% (263 out of 735). Strikingly seropositivity was very high (48.63%) among women whose parents were first cousins at the time of marriage. The percentage of Toxo-Positive women decreased among group whose parents were second cousins, distant blood relations, same caste and different caste respectively. The results are elicited in Table-I. The statistical comparison of different group is highly significant $P < 0.005$.

TABLE-I COMPARASION OF PREVALENCE OF *TOXOPLASMA* INFECTION AMONG WOMEN HAVING COUSIN MARRIAGE PARENTS AND OTHER GROUPS.

Relationship of Respondents' Parents before marriage	No. Tested	Toxo-Positive	% Positive
First Cousins	292	142	48.63
2nd Cousins	41	17	41.46
Distant Blood Relation	41	11	26.82
Same caste	244	65	26.63
Different Caste	117	28	23.73
Total	735	263	35.78

X² Statistics = 23.426

Degree of freedom = 4

P < 0.005 (Highly significant)

DISCUSSION

Toxoplasma gondii is one of the most successful of parasites. It respects neither the boundaries of geography nor of zoology and causes infection, usually life long, in all species of mammals and birds, as far as is known, throughout the world except Antarctica.⁹ Frequency of infection varies considerable from one country to another and within a given country. The present study furnishes only some idea with regard to prevalence of infection and its few correlates. The prevalence of 35.78% of Toxo infection among women of child bearing age in quite substantial. Judging from global point of view, the prevalence is rather intermediate, being higher when

compared to prevalence of 5% in pregnant Navajo Indians, 22% in a London study, 25% in Egypt and 31.2% in Saudi Arabia.^{10,11,12,13} However, the prevalence tends to be low when compared to prevalence of 40% in Montreal, 51.5% in Morocco and 58% in Kuwait.^{4,14,15} The prevalence found in this study is similar to the one reported by Mehta (1987) from Bombay. The regional experience in Pakistan is however a bit different, and it varies from 7.74% to 15%.^{16,17} This difference might be due to geographic distribution of disease and difference in attitude, humidity and temperature or due to different techniques used in different studies.

Strikingly high prevalence of *Toxoplasma* infection among women born to parents who were and are first cousins is amazing. This sero positivity decreases significantly among the groups whose parents are second cousins, distant blood relations, or are from the same and different caste. Statistically this comparison is highly significant. We could not find any literature regarding relationship of Toxo infection and close marriages. This might be the first epidemiological study finding significant correlation of Toxo infection with cousin marriages. The reasons for this high prevalence could be due to identical socio-economic conditions, similar eating and cooking habits or living in the localities having plenty of stray cats. Another reason which needs further probe is the possible inherited or genetic predisposition.

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