

Socioeconomic Status and Prevalence of Toxoplasmosis in Pregnant Women with Bad Obstetric History

Review Article

Naushaba Siddiqui*, Fatima Shujatullah, Haris M. Khan, Tamkin Rabbani and Parvez A. Khan

Department of Microbiology, J. N. Medical College and Hospital, Aligarh Muslim University, Aligarh - 202002 U.P, India

*Corresponding author: Naushaba Siddiqui, Department of Microbiology, J. N. Medical College and Hospital, Aligarh Muslim University, Aligarh - 202002 U.P, India, E-mail: naushsid@gmail.com

Article Information: Submission: 11/03/2014; Accepted: 08/05/2014; Published: 12/05/2014

Abstract

Introduction: Toxoplasmosis is a cosmopolitan disease arising from infection with the cat borne Apicomplexan, coccidian protozoan *Toxoplasma gondii*. Lower levels of education and socioeconomic status were associated with an increased risk for toxoplasmosis and may be related to employment in jobs with greater soil exposure and unhygienic living habits.

Materials and methods: The study was conducted in the Department of Microbiology, Antenatal clinic and Outpatient Department of Gynaecology and Obstetrics, J. N. Medical College Hospital, Aligarh, over a period of one and a half years from February, 2011 to September, 2012. A total of 96 pregnant females attending Antenatal Clinic with complaints of spontaneous abortions were included in the study. Quantitative determination of IgG and IgM antibodies to *Toxoplasma gondii* infection was done using Toxoplasma IgG ELISA and Toxoplasma IgM ELISA kit (Calbiotech Inc.).

Results: Maximum numbers of patients were present in 21-30 years age group followed by 11-20 years age group, 31-40 years age group, 41-50 years age group and 51-60 years age group had least number of patients. Maximum number of positive patients that is 48% for IgG ELISA and 50% for IgM ELISA were in socio-economic class IV (low socioeconomic strata) while no patients were in socio-economic Class I.

Conclusions: The present study suggests that social and economic differences have a major impact on transmission of the parasite. Pregnant women who adopted appropriate hygienic measures regarding food and cooking habits have less chances of contracting T.gondii infection.

Keywords: Toxoplasma; Pregnant females; Socioeconomic status

Introduction

Toxoplasmosis is a cosmopolitan disease arising from infection with the cat borne Apicomplexan, coccidian protozoan *Toxoplasma gondii*, an obligate intracellular parasite that forms cyst in mammalian tissues throughout the body [1]. *T. gondii* infects upto one-third of global population and a wide range of other mammalian and avian species [2,3]. It is a well known parasitic zoonosis that is a causative agent for abortions, stillbirths, eye problems and mental retardation in children of women who acquire primary infection during pregnancy [4]. Acute *Toxoplasma* infection in pregnancy is usually subclinical and the diagnosis is by serology. *Toxoplasmosis* is transmitted through oocysts shed in infected cats' faeces, consumption of contaminated

unwashed/unpeeled vegetables, fruits, unpasteurised milk and raw or undercooked infected meat [5]. Vertical transmission to the foetus occurs by transplacental transfer of organisms from the mother usually following acute maternal infection. Lower levels of education and socioeconomic status were associated with an increased risk for toxoplasmosis and may be related to employment in jobs with greater soil exposure and unhygienic living habits. There is some preliminary evidence from a population-based survey done in seven states which found that persons with less education may be less likely to wash cutting boards with soap or bleach after cutting raw meat [6]. In the present paper, we report the association of socioeconomic status and seropositivity to *Toxoplasma* in women with bad obstetric history belonging to different socioeconomic group.

Materials and Methods

The study was conducted in the Department of Microbiology, Antenatal clinic and Outpatient Department of Gynaecology and Obstetrics, J. N. Medical College Hospital, Aligarh, over a period of one and a half years from February, 2011 to September, 2012. A total of 96 pregnant females attending Antenatal Clinic at Jawaharlal Nehru Medical College and Hospital with complaints of spontaneous abortions were included in the study. All the cases were subjected to a detailed history and clinical examination. Subjects with known causes of foetal wastage were excluded from the study. Subjects were also tested for anti HBsAg, anti HCV, anti HIV antibodies and anti-treponemal antibodies. This study was approved by Institutional Ethics Committee of the Faculty of Medicine, Aligarh Muslim University, Aligarh. An informed consent was obtained from the patients. For serological analysis, 2 mL of venous blood was collected in a sterile container with strict aseptic precautions from each study subject. The serum was separated and stored in numbered aliquots at -20 °C till assayed.

Quantitative determination of IgG and IgM antibodies to *Toxoplasma gondii* infection was done using Toxoplasma IgG ELISA and Toxoplasma IgM ELISA kit (Calbiotech Inc.). The test was performed according to the manufacturer’s instructions. The interpretation was based on cut off calculated as per the instruction provided in the manual. If the index was < 0.9, the test was considered negative, 0.9 to 1.1 equivocal and an index of >1.1 was considered positive.

Results

Figure 1 shows the distribution of patients according to their age group. Maximum numbers of patients were present in 21-30 years age group followed by 11-20 years age group, 31-40 years age group, 41-50 years age group and 51-60 years age group had least number of patients. Mean age of the patients was 25.78±5.78 years. Table 1 and

Table 2 shows distribution of patients in the study group according to their socio-economic status (Modified Prasad’s classification). According to Modified Prasad’s classification, the population is divided into six social classes according to the per capita social income in rupees [7]. Class I (10,000 and above), Class II (5000-9999), Class III (3000-4999), Class IV (1500-2999), Class V (500-1499), Class VI (<500). Maximum number of patients were present in socio-economic class IV (38.5%), followed by Class III (35.4%), Class II (15.6%), Class V (6.3%) and Class I having least number of patients (4.2%). Table 3 shows distribution of patients in the study group according to the seropositive rate in various socioeconomic group. Maximum number of positive patients that is 48% for IgG ELISA and 50% for IgM ELISA were in socio-economic class IV while no patients were in socio-economic Class I. Prevalence of toxoplasmosis as indicated by IgG seropositivity, was higher (62.7%) in low socioeconomic group as compared to high (43.3%) socioeconomic group (p value<05). 2 patients had antibodies against Hepatitis B while no patients had antibodies for HIV, Hepatitis C and Syphilis .

Discussion

Toxoplasma gondii may cause some repeated abortions, stillbirth and fetal loss in infected pregnant women. Since, during pregnancy the clinical implications of these infections are tremendously dangerous which necessitates the importance of evaluating the immunological status of the pregnant women regarding toxoplasmosis [8]. In our study, the minimum age of the patient was 18 years and the maximum age was 55 years. Mean age of the patients was 25.78±5.78 years. Toxoplasmosis was most prevalent in the age group of 21-30 years. Spalding *et al.* also observed a higher prevalence among people aged 20-30 years [9]. It was similar to the studies done by Hung *et al.* and Malarvizhi *et al.* in which the seropositivity was more in the age group of 20-40 years whereas it was lower for those below 20 years and above 40 years [8,10]. But in few studies it was found that prevalence increases as the age increases, the reason might be increasing risk of exposure with age [11]. This may be due to the fact that the frequency

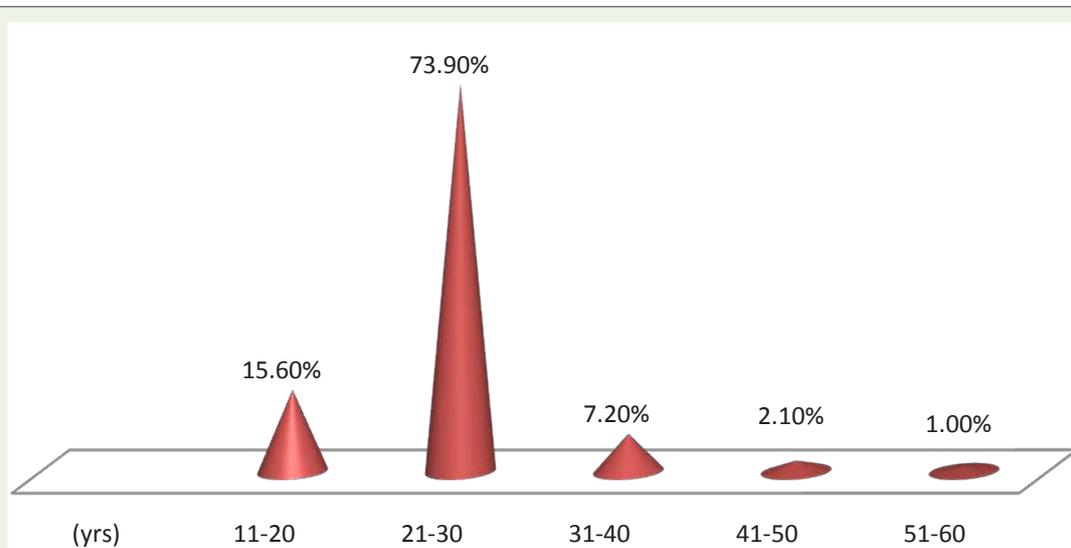


Figure 1: Distribution of patients according to their age group.

Table 1: Distribution of patients according to their socio-economic status.

Socio-economic class	Number of patients
Class I	4(4.2)
Class II	15(15.6)
Class III	34(35.4)
Class IV	37(38.5)
Class V	6(6.3)
Total number of patients	96(100.0)

Figure within parentheses indicates percentage.

Table 2: Distribution of patients according to their socio-economic status and positive results observed in various serological tests.

Socio-economic Class	Total number of patients	IgG ELISA (n=50)	IgM ELISA (n=40)
Class I	4	0(0)	0(0)
Class II	15	7(14)	5(12.5)
Class III	34	16(32)	13(32.5)
Class IV	37	24(48)	20(50)
Class V	6	3(6)	2(5)
Total	96	50	40

Figure within parentheses indicates percentage.

of infection increases with older age groups as the probability of an individual coming into contact with the transmission routes increases as his or her age increases.

In our study, maximum number of patients seropositive for toxoplasmosis belonged to low socioeconomic strata that is socioeconomic class IV (48%) followed by socioeconomic class III (32%), class II (14%), class V (6%) and class I (0%). Maximum number of patients having acute infection were in is socioeconomic class IV (50%) followed by socioeconomic class III (32.5%), class II (12.5%), class V (5%) and class I (0%). It was similar to a study done in Hyderabad, India which showed a higher percentage of seropositivity in women of low socio-economic group (33%) compared to those of high socio-economic group(22%) [12]. A multivariate analysis done in United States showed that risk of *T.gondii* infection was higher in persons with a lower educational level and those who lived in crowded places [6]. In another study done in Cali, Columbia there was a significant trend towards a higher seroprevalence in the lower socio-economic strata (low: 49%, high: 29%) [13]. In a study conducted in 112 pregnant women with history of pregnancy wastage in Assam it was observed that higher prevalence of *T. gondii* infection was associated with low socioeconomic status [14]. The present study suggests that social and economic differences have a major impact on transmission of the parasite. Seroprevalence tends to be lower in pregnant women who adopted appropriate hygienic measures regarding food and cooking habits such as washing chopping boards with soap or bleach, using different chopping board for meats and vegetables, the frequent washing of knives and hands while cooking and avoiding contamination of food by protecting it from flies and dust compared to the uneducated group belonging to lower socio economic strata [15].

Thus to prevent infection by *T. gondii*, the hands of people handling meat should be washed thoroughly with soap and water before they go to other tasks. All cutting boards, sink tops, knives, and other materials coming in contact with uncooked meat should also be washed with soap and water. Pregnant women, especially, should avoid contact with cats, soil, and raw meat. Untreated water has been shown to be an effective vehicle for the transmission of the parasite, and drinking water sources potentially contaminated with oocysts should be avoided. Above all, expectant mothers should be aware of the dangers of toxoplasmosis [16].

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