



Is *Toxoplasma gondii* IgG seropositivity a predisposing factor for infertility?

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Abstract: Toxoplasmosis is a disease caused by an obligate intracellular protozoan parasite *Toxoplasma gondii*. Approximately one third of the world population is infected with this parasite. Several studies have examined the causes of human infertility in the Middle East. A high proportion of secondary infertility and a great contribution of the female factor was the major finding in most of these studies. In this study, we aim to explore the relation between *Toxoplasma gondii* seropositivity and female infertile patients. Serum samples from 83 female patients visiting the infertility clinic and 57 normal prim gravid females attending the ANC clinic were collected during the year 2014. Serum samples were analyzed for anti-*Toxoplasma* IgG by chemiluminescent micro particle immunoassay (CMIA) technology. Patients visiting the infertility clinic, aged from 18-40 years ($x=29.7$) while normal prim gravid females attending the ANC clinic aged from 18-38 ($x=26.1$). Of the 83 samples collected from patients visiting the infertility clinic, 15 samples were positive for anti-*Toxoplasma* IgG while only 2 samples (out of 57) collected from normal prim gravid females attending the ANC clinic were positive. There was a statistically significant correlation between positive anti-*Toxoplasma* IgG and infertility ($p<0.01$). We suggest considering the presence of anti-*Toxoplasma* antibodies in serum of young females as an indicator for possible future infertility.

Keywords: *Toxoplasma gondii*, infertility, anti-toxoplasma, IgG.

1. Introduction

Toxoplasmosis is a disease caused by an obligate intracellular protozoan parasite *Toxoplasma gondii* [1,2]. Approximately one third of the world population is infected with this parasite [3]. Infection with *Toxoplasma gondii* is very common. Postnatal acquired toxoplasmosis is usually asymptomatic. However, clinical disease is greatly confined to risk groups, including infants and immunocompromised individuals. Congenital toxoplasmosis is seen in cases of the mother acquiring the infection for the first time during pregnancy. The incident of prenatal toxoplasmosis is estimated to vary from 1 to 100 per 10,000 births. Toxoplasmic encephalitis and disseminated toxoplasmosis have been reported in immunocompromised patients [2].

Level of seroprevalence for toxoplasmosis ranged from 8-77% worldwide. High seroprevalence for toxoplasmosis has been reported among pregnant women and women of childbearing age from different parts of the world, including the Middle East [2,3]. The prevalence of infection in Saudi Arabia showed wide variations as revealed from previous studies. The highest positivity rate was reported in Jeddah 61.4% [4], Al Hassa of 51.4% [5,6], 41% in Aseer [9], 38% in Riyadh [8], and 35.6% in Makkah [7]. Moreover, studies showed a relation between positivity for toxoplasmosis and female sterility. Furthermore, visual impairment, hearing loss and malignant neoplasms were major coincidental diseases in *Toxoplasma gondii* seropositive cases [10-13].

Several studies have examined the causes of infertility in the Middle East. A high proportion of secondary infertility and a great contribution of the

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female factor was the major finding in most of these studies [14-19]. Review of the literature since 1995 did not reveal any data regarding the relation between female infertility and infections.

In this study, we aim to explore the relation between *Toxoplasma gondii* seropositivity and female infertility patients.

2. Materials and Methods

Serum samples from 83 female patients visiting the infertility clinic at King Faisal Specialist Hospital & Research Center in Jeddah, Saudi Arabia was collected during the year 2014. Inclusion criteria included female, aged 18-40, married for more than one year, with no children, and unable to conceive. Fifty seven control samples were collected from normal prim gravid females attending the ANC clinic with no history of infertility. Patient demographics including age, nationality, medical history, height and weight were also collected. Serum samples were analyzed for anti-*Toxoplasma* IgG by chemiluminescent micro particle immunoassay (CMIA) technology in ARCHITECT *i2000 System* using commercial kits (Abbott Diagnostics) with appropriate positive and negative controls provided by the manufacturer. Data were analyzed using SPSS (Ver. 16). The research was approved by the research ethics committee at the Faculty of Applied Medical Sciences, King Abdulaziz University.

3. Results

One hundred and forty serum samples were collected from female patients visiting the infertility clinic and normal prim gravid females attending the ANC clinic as described above. Patients visiting the infertility clinic, aged from 18-40 years ($x=29.7$) while normal prim gravid females attending the ANC clinic aged from 18-38 ($x=26.1$). Of the 83 serum samples collected from patients visiting the infertility clinic, 15 samples were positive for anti-*Toxoplasma* IgG while only 2 serum samples (out of 57) collected from normal prim gravid females attending the ANC clinic were positive.

Statistical analysis revealed a statistically significant correlation between having a positive anti-*Toxoplasma* IgG antibody in serum and infertility ($p<0.01$). There was no statistically significant correlation between infertility and other demographic data.

4. Discussion

Toxoplasmosis has gained tremendous interest among researchers since the emergence of AIDS. However, many aspects of this parasitic infection are still unveiled to date. Several studies discussed the role of *Toxoplasma gondii*, as a causative agent of congenital disease. There is a controversy about the

issue of recurrent abortion being caused by toxoplasmosis [20]. However, congenital toxoplasmosis is considered a severe disease that can result in abortion and/or severe handicap [2,21]. Latent toxoplasmosis in immunocompetent individuals is usually overlooked from the health point of view. Nowadays, several studies have explored the effect of toxoplasmosis on personality profile. It has been shown that latent toxoplasmosis can affect the personality profile in a negative manner [22-24]. Furthermore, changes in hormones have been known to also affect the personality profile [25].

In this study, we investigate the relation between seroprevalence to toxoplasmosis and infertility. There was a significant positive correlation between the presence of IgG antibodies to *Toxoplasma gondii* and having problems in conceiving a child normally. However, the mechanism and how this effect takes place is still open to wide speculations. This is in agreement with other findings which investigated the effect of toxoplasmosis on infertility/sterility in animals and humans [10]. Dvorakova-Hortova [13] found low levels of luteinizing hormone in urine of mice infected with toxoplasmosis. Moreover, infected mice had also lower sperm count compared to non-infected mice [13]. Although, the host parasite relationship in the case of toxoplasmosis has been substantially researched, we still lack valuable information about the effect of such relationship on many health aspects. We speculate that toxoplasmosis may affect the level of different hormones in the body. This may have a secondary effect resulting in infertility. We suggest considering the presence of anti-*Toxoplasma* antibodies in serum of young females as an indicator for possible future infertility. Furthermore, more research should be conducted to deeply study the mechanism that controls this relation between positive anti-*Toxoplasma* antibodies and infertility and to investigate the role of personality and its effect on hormones in this matter. The Results of this study call for the urge in setting virtuous applicable control programs to control toxoplasmosis.

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