

Seroprevalence of *Toxoplasma gondii* among pregnant women in AL-Najaf governorate

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Abstract

Background: *Toxoplasma gondii* infection is the primary infection during pregnancy that may result in congenital toxoplasmosis, abortion and still birth. Many studies tried to explain the relationship between ABO blood groups and anti-toxoplasmosis, but the results were conflicting. Therefore, the aim of this study was to investigate the relationship between the type of blood groups and *anti toxoplasma gondii*.

Methods: The study was conducted on 76 women infected with toxoplasmosis to determine the positive or negative IgM and IgG for *Toxoplasma gondii* and relation with blood group type and age.

Results: The study showed toxoplasmosis was more prevalent among women 26-30 years and the prevalence of infection among women with blood type O, A, B and AB was 44.7%, 23.7%, 21.0% and 10.6% , respectively. In addition, the rate of positive results for IgG were more than the positive results for IgM (81.6% and 23.2%), respectively while the negative results were (18.4% and 76.3%), respectively. As a consequence, the age and blood group phenotype of a pregnant women could be determinant of the likelihood of her infection with *Toxoplasma gondii*.

Key words: Toxoplasmosis, ABO blood groups, Anti-toxoplasmosis, Congenital malformations, IgG, IgM.

INTRODUCTION

Toxoplasma gondii infection is very common; it is an obligate intracellular apicomplexan ^[1]. It is the primary infection during pregnancy that may result in congenital toxoplasmosis, abortion and still birth ^[2]. *Toxoplasma gondii* is transmitted to human through consumption of raw meat having viable tissue cysts or fruits and water contaminated with oocysts from feces of infected cats ^[2, 3, 4].

Toxoplasmosis is important due to the possibility of transplacental transmission and adversely affecting the fetus ^[5]. If the mother is infected in the first trimester, it may lead to abortion, still birth or severe disease of the fetus ^[6]. The parasite is globally distributed and can be found in different species of mammals and birds. It is estimated that up to $5 * 10^8$

people worldwide are infected with *T. gondii* ^[7]. Toxoplasmosis mainly spreads through direct contact with domestic animals like cattle, cats and dogs. The primary infection of *T. gondii* is generally non-symptomatic ^[8]. Toxoplasmosis is one of the most common parasitic infections between humans and animals ^[9,10]. The main symptoms of this disease include severe neurological symptoms, ocular complications and abortion ^[10].

The molecules that define ABO blood group phenotypes consist of carbohydrates that are present in the structures of glycolipids and glycoproteins expressed in red blood cells ^[11]. The binding of microorganism on the mucous membranes of host cell is not clear like glyco-conjugates of the ABO group system ^[12]. Many studies tried to explain the relationship between ABO blood groups and anti-toxoplasmosis, but the results were conflicting. For example, one of the studies concluded that the blood group B could act as potential receptor for *Toxoplasma gondii*, however, other studies did not confirm it. Gastrointestinal tract is one of the important routes for infection, so that, glyco-conjugates possible play role in infection. Therefore, there might be a relation between ABO blood group and anti- *Toxoplasma gondii* ^[13].

Therefore, the aim of this study was to investigate the relationship between the type of blood groups and *anti-toxoplasma gondii*.

METHOD

A total of 76 samples were collected from pregnant women attending Al-Sddaer Medical City, Al-Hakeem Hospital and AL-Hayate Center for Fertility in Al-Najaf province during the period from March to December 2017. A 5-ml blood sample was drawn from each participant by vein-puncture, placed in a tube and left for 30 minutes at room temperature. After that, the samples were centrifuged at 3000 rpm for 5 minutes (Back man/counter, Germany) to separate the serum. The latter was collected in another sterile tube for measurement of IgM and IgG.

ABO Phenotyping

The ABO phenotypes were identified by the standard test tube haemagglutination using commercial monoclonal anti-sera anti-A, anti-B and anti-AB for direct typing and standard red blood cells A₁ and B for reverse typing (Fresenius Kabi, Brazil).

Measurement of IgG, IgM in the serum

Single radial diffusion method in the gel was used (normally processed from the company LTA; Italy) in accordance with manufacturer's instructions by the principle of falck; 2002.

RESULT

Results of current study showed that 34% of participants infected with *Toxoplasma gondii* were women aged 26-30 years (Figure 1). The results also revealed that 18 (28.2%) of participants were positive for IgM antibodies and 58 (76.8%) of them were negative. On the other hand, for IgG antibodies, 62 (89.5%) were positive and 14 (11.5%) were negative (Figure 2).

Moreover, current study showed most infected women were carriers of blood groups O, A, B and AB, respectively, and the corresponding proportions of infection were 44.7%, 23.7%, 21.0% and 10.6% respectively (Figure 3).

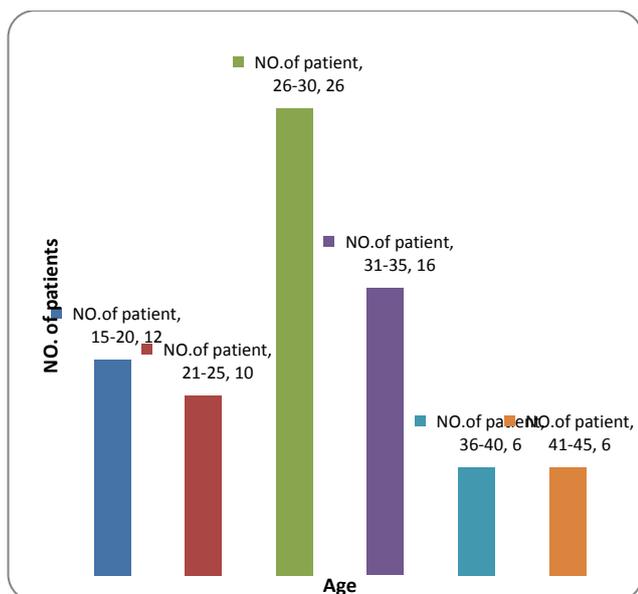


Figure 1 The relation between patients' age and infection with toxoplasmosis

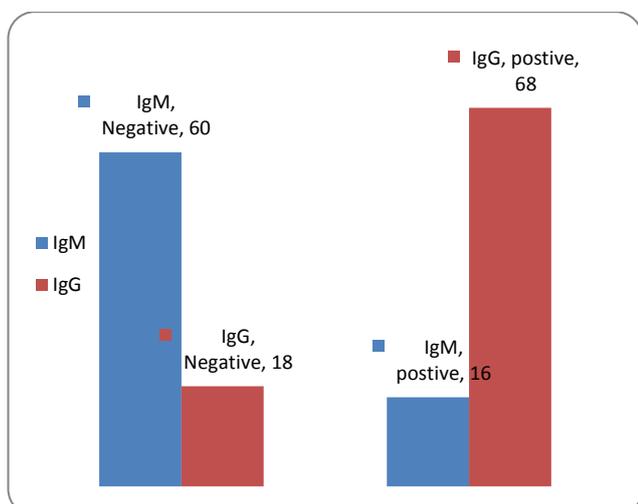


Figure 2 The relation between antibody level and infection with toxoplasmosis.

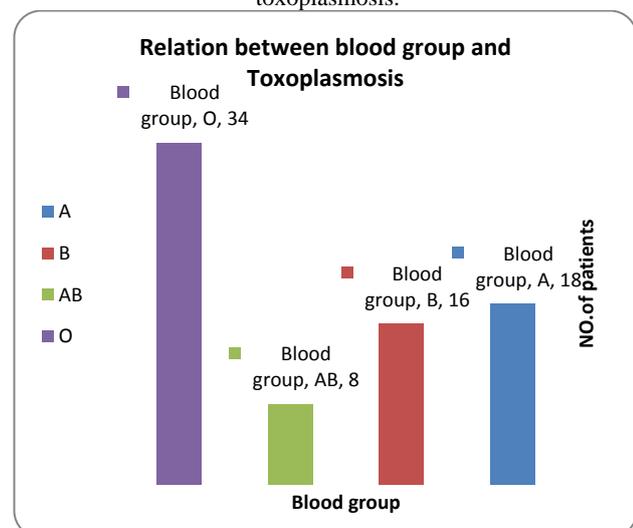


Figure 3 The relation between blood groups and infection with toxoplasmosis

DISCUSSION

Previous studies tried to explain the relationship between ABO blood groups and anti-toxoplasmosis, but the result was conflicting. For example, one of the studies concluded that the blood group B could act as potential receptor for *Toxoplasma gondii*, however, other studies did not confirm it. Gastrointestinal tract is one of the important routes for infection, so that, glyco-conjugates may play a role in infection. Therefore, there might be a relation between ABO blood group and anti- *Toxoplasma gondii* [13,14].

This study showed that the incidence of toxoplasmosis was higher among women who are carriers of blood group O. However, these findings disagree with those reported by [15,16] who did not report any association between ABO system and infection with *Toxoplasma gondii*. In contrast, our results agreed with those reported by [17,18].

Also, *Toxoplasma gondii* can stimulate the immune system to produce antibodies such as IgM, IgA, IgE and IgG. These antibodies can be isolated from women patients and used for diagnosis of infection [19]. The presence of high level of IgG indicates that the person has had toxoplasmosis at some time in his life, because IgG can persist for many decades and is, therefore, not an indicator of recent infection. Also raised IgM may indicate a current or recent infection, because this immunoglobulin typically persists for 6–9 months after infection and is helpful in the diagnosis of acute infection [20]. Also *T. gondii* stimulates the development of immune memory so people tend to produce high avidity IgG anti- *T. gondii* antibodies [21]. There are many factors that can affect the immune response to *Toxoplasma gondii* infection. For example, age of patient. In present study the results revealed that there is direct relationship between the increase in age and positive serology for IgG anti-*T. gondii* antibodies [22].

Therefore, current study showed that toxoplasmosis more prevalent among pregnant women aged 26-30 years and those who carry blood group O.

Ethical Clearance: It was obtained from Ethics Committee at Al-Sddaer Medical City, Al-Hakeem Hospital and AL-Hayate Center for Fertility in Al-Najaf province

Financial Disclosure: There is no financial disclosure.

Conflict of Interest: None to declare.

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