# SEROPREVALENCE OF TOXOPLASMOSIS IN PREGNANT WOMEN OF DISTRICT ABBOTTABAD

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**Authors' Contribution**

A. Haseeb, B. Ahmed, R. Ullah and F. Jan conducted the research; while A.Hayyat, M.Rehman, proceed the data analysis. Mr. Abdul Haseeb and Syed Ehtasham Amin also wrote the manuscript.

## ABSTRACT

The amoebic parasite *toxoplasma gondii* causes toxoplasmosis, which is frequently linked to eating raw or undercooked meat, dirt, or food contaminated by cat faeces. More than 6 billion people are T. gondii carriers. Toxoplasmosis is a disease that can cause a variety of complications, including ocular toxoplasmosis, neonatal toxoplasmosis, and cerebral toxoplasmosis. The goal of this research was to determine how commonplace toxoplasmosis is among Abbottabad's pregnant women. Immuno-chromatography was used to examine toxo-IgG and IgM levels in the blood of 500 pregnant women. From a total of 500 samples analysed, only 44 (8.8%) were found to have toxoplasmosis when employing the ICT method. We now know that 15 (64%) of the 44 confirmed cases are chronic and 29 (36%) are acute (36 percent). In-depth analysis by the research team revealed that a sizable proportion of chronic patients show no deterioration over time. There is an extreme demand for high-quality, large-scale research in this area. Fetal damage or loss of pregnancy may occur if the mother contracts toxoplasmosis during pregnancy. Understanding the symptoms of a T.gondii infection is essential for preventing the spread of the parasite to pregnant women.

Keywords: Toxoplasmosis: Immunoglobulin G: ICT

## INTRODUCTION

Parasites that are able to enter and live within a host cell are protected from the host's immune system, have easy access to food, and are hard to find if therapy is attempted. Because of the risk of starvation and other stresses, parasites must abandon their present host and begin searching for a new one at some point. The reproduction of apicomplexan protozoa is strictly dependent on the presence of a eukaryotic host cell. Toxoplasma gondii, an intracellular parasite that may infect nearly every species of warm-blooded animal, is an example of an obligatory parasite (Hill et al., 2005).

When Charles Nicolle and his student Manceaux were studying leishmaniasis at the Pasteur Institute in Tunis, they found a protozoan in the tissues of a rodent called a gundi, which is similar in appearance to a hamster (Ctenodactylus gundi). The parasite was first misidentified by Nicolle, who thought it was a piroplasm (Ajioka and Soldati, 2007). After moving on to Leishmania, he realised he had actually found a new species and dubbed it Toxoplasma gondii after its host. This microorganism is known by its scientific name, toxoplasma gondii (Nicolle and Manceaux, 1909). The correct name for this parasite is T. gondi, not Ctenodactylus gondi (Dubey, 2007). Splendore (1908), like many other researchers before him, mistook a parasite he identified in a rabbit in Brazil for Leishmania. The existence of T. gondii-like organisms in many hosts, especially birds, was not known until after 30 years (Dubey, 2002). Results from cross-protection tests showed that the human T. gondii isolate was genetically identical to the wild-type strain found in animals (Sabin and Olitsky, 1937). This study demonstrates the efficacy of both innate and acquired defences against T. gondii. In the 1940s, researchers observed that human immunoglobulin (Ig) G antibodies were effective against extracellular tachyzoites but not intracellular ones (Sabin, and Feldman, 1948; Sabin, and Olitsky 1937). *Toxoplasma gondii*, a protozoan parasite, was discovered in the tissues of the gondii (Ctenodactylus gondii) a century ago by Pasteur Institute researchers Nicolle and Manceaux (Ferguson, 2009). Parasites of the protozoan form, *Toxoplasma gondii*, are responsible for the disease toxoplasmosis (Blader and Saeij, 2009; Aldebret et al., 2011; Shah et al., 2014). Malaria and cryptosporidium are two examples of parasites of the phylum Apicomplexa, which also contains the obligate intracellular parasite Toxoplasma gondii. This parasite causes widespread infection, however because of the lack of severe symptoms in hosts, most people are unaware they are infected. In the early trimester of pregnancy, acute toxoplasmosis, which can be fatal in immunocompromised persons, might cause major birth defects or perhaps lead to pregnancy termination (Black, and Boothroyd, 2000). (Black, and Boothroyd, 2000). Serious complications, including as spontaneous miscarriages and congenital abnormalities, can result after an acute infection with Toxoplasma, and people with compromised immune systems are at a higher risk. It has been observed that toxoplasmosis can result in terrible clinical symptoms and even death (Black & Boothroyd, 2000). Inflammation of the retina, myocardium, and meninges are only a few examples (Furtado, et al 2011). However, the vast majority of afflicted people show no outward signs of sickness. Latent T. gondii infection is not taken seriously as a public health issue because most people with the infection have no symptoms. Recent research, however, suggests that T. gondii infection in humans may have far-reaching effects that have not been fully appreciated until now. Reducing parasite transmission and reproduction may be facilitated by modifying usual interactions between the intermediate host and the ultimate host. Because the parasite's life cycle concludes in the cat, the parasite would gain from the rodent developing a taste for cats when it normally dislikes them (Flegr, 2013). Memory loss and loss of aversion to the scent of cat urine have both been linked to *Toxoplasma gondii* infection in mice (Ingram et al., 2013). It was determined that (Kannan et al., 2010). (Kannan et al., 2010). Because of these observations, it's been theorised that other sorts of host species might potentially undergo transformation. There has been a growth in interest in using these discoveries to forecast human conduct. Psychiatric disorders, impulsivity, and aberrant neurocognitive processes have all been studied as potential human manifestations of the T. gondii infection-induced behavioural changes seen in rodents. The fact that hallucinations, a hallmark of schizophrenia, can be brought on by an acute T. gondii infection is intriguing. T. gondii positivity rates in samples from psychiatric inpatients have also been reported to be inflated as far back as the 1950s (Torrey, Yolken, 2003).

## PATHOGENESIS

There are several diseases whose transmission is restricted by the fact that they can only infect certain tissues or areas. While some populations may function just fine without the ability to invade new environments, others rely on it heavily. Protozoan and helminthic parasites, for example, need to move to different parts of the host body in order to reproduce. Multiple stages of Plasmodium's life cycle require movement of the parasite between the skin, the liver, and the blood. Slowly migrating from the epidermis to other tissues including the lungs, adult worms of *Schistosoma mansoni* first mate in the mesenteric venules before releasing their eggs into the stomach. Clinical signs and tissue damage have their origins in a parasitic infection. The protozoan parasite *Entamoeba histolytica*, for instance, can infect the liver and lead to an abscess if it survives the journey through the digestive tract. The harmful migration of many helminthes and nematodes through the brain and other vital organs can go on indefinitely, unlike the maturation of many viruses when exposed to unsuitable hosts. The pathology brought on by parasitic infections is mostly due to the parasites' innate capacity to elude host defences, which is crucial to the

parasites' reproductive success. One-third of the world's population is chronically infected with *Toxoplasma gondii*, making it a major danger to global public health (Dubey, and Jones, 2008).
Infected cats can spread the parasite to other animals by their faeces, which contain the oocyst stage of the parasite, and through the water and food they contaminate (Schlundt et al., 2004; Webster, 2007; Robert Gangneuxa and Darde, 2012). Transmission through breast milk is more likely to occur during pregnancy (Sibley et al., 2009; Hajsoleimani et al., 2012).
The ability of T.gondii to modify its metabolic strategy in response to the host tissue it invades contributes to the pathogen's versatility. Muscle, brain, eyes, liver, placenta, and lungs are only some of the organs and tissues that might get infected after ingesting an oocyst or tissue cyst. There is a plenty of proof that (Lieberman & Hunter, 2002). The parasite reaches a chronic, asymptomatic stage in response to immunological stress, where it persists as cystic bradyzoites in different organs such the brain, eye, and muscle. This change has been linked to multiple symptom clusters in the clinic. When T. gondii was first discovered in a human foetus, it gained widespread media attention. To wit: (Wolf, Cowen, Paige, 2004). *Toxoplasma gondii* completes its life cycle in the intestines of cats, and the ensuing tissue cysts can infect humans in two ways: through the bradyzoites they contain or by the sporozoites they carry in their oocysts. There is a well-established relationship between the transmission of toxoplasmosis and the consumption of undercooked meat, particularly pig and lamb. Toxoplasmosis cases have decreased, perhaps due to better animal husbandry practises and increased public knowledge of the risks of consuming raw or undercooked meat (Tenter et al., 2000). Finding human toxoplasmosis in water systems increases our understanding of the disease's distribution (Bowie et al., 1997; Bahia Oliveira et al., 2003; Moura et al., 2006; Belfort-Neto et al., 2007).

**OBJECTIVES**

Specifically, the research intends to do the following: As a first step, we must determine how many pregnant women in Abbottabad have been diagnosed with toxoplasmosis. How common is Toxoplasmosis among Women of Childbearing Age?

**METERIALS AND METHODS**

**Place of study:** Study Scientists toiled away at the Hamdard Laboratory in Abbottabad's zarbat medical Centre from April to August of '22.

**Sample Collection:** Blood samples (3 mL) were taken from 500 female patients at Al-Rehman hospital with their agreement. The microbiology department of Hamdard Laboratory will receive the serum. We employed the Immuno-chromatographic Technique to evaluate the serum samples we collected (ICT). In traditional labs, the ICT approach is typically only utilized for preliminary tests.

**Test description:** Test while using a cutting-edge piece of consumer electronics for data and communication during Immunochromatography, sample molecules and reagents are separated based on their migration on a solid substrate, with the use of capillary flow (also known as lateral flow testing). Every form of detection and identification relies on the antigen-antibody immunological reaction. Liquid sample is moved from an application pad to a conjugate release pad (such as lyophilized labeled antibodies) along a strip of nitrocellulose or filter paper membrane in a lateral flow test. In the case of colloidal gold or latex particles as the conjugate, an immunocomplex is formed between the conjugate and the immobilised detecting antibody, resulting in a line of colour somewhere between red and purple. Given that samples may be pumped over the membrane in 5-15 minutes, rapid antigen detection is feasible. All serum samples were analyzed with a fresh disposable device. Before testing, it's best to let samples at room temperature (from the fridge or freezer) and mix them thoroughly. Taking the gadget out of its case and setting it down on a level, dust-free surface is all that's required for the test. The specimen's ID number was displayed prominently on the gadget. A vertically held disposable plastic dropper was used to deposit a single drop (30-45 l) of specimen into the designated well. Drop one of the sample diluents into the machine right away. Everyone could tell the difference within minutes. Internally, there were three distinct markings: a single "1" for the control group, a single "+" for the test group, and a single "-" for the negative control group. It could take as little as one to five minutes for the benefits to kick in. When evaluating the performance of a gadget, the absence of a control line is fatal.

**RESULTS AND DISCUSSIONS**

During the trial, researchers examined 500 samples from pregnant women for signs of toxoplasmosis. A mere 44 of these cases (8.8%) tested positive, while 456 (91.2% of the total) tested negative (see tables 3.1 and 3.1 for details). Based on the data presented in Table 3.2 and Figure 3.2, 15 of the 44 positive cases are in the acute phase, while the remaining 29 are in the chronic phase.

Anyone can get toxoplasmosis, but pregnant women and those with compromised immune systems are especially at risk. Birth abnormalities such as cerebral calcification, hydrocephalus, chorioretinitis, and miscarriage are possible outcomes for pregnant women who are exposed to the pathogenic parasite. Humans can catch this parasite via swallowing raw or undercooked meat, milk, or eggs, or from coming into touch with contaminated water, plants, or soil that contain cat faeces.

Seroprevalence of toxoplasmosis Gondi was 8.8% among pregnant women in this study from Abbottabad, Pakistan. Cases that persisted for an extended period of time outnumbered those that were only mildly affected. While 7.7% of pregnant women were found to be infected with *Taxoplasma gondii* in a different study (Allain et al., 1998), no evidence of infection was found in this investigation.

Pregnant women in the western part of Turkey had a 48.3% frequency of Toxoplasma antibodies, with only 0.4% testing positive for the IgM subtype (Tamer et al., 2009). Rosso et al. found that among pregnant women in Cali, Colombia, South America, IgG levels averaged 45.8% while IgM levels averaged 2.8%. (2008).

Anti-Toxoplasma IgG antibody was present in 52.1% of pregnant women and anti-Toxoplasma IgM antibody was present in just 0.54% of participants in a study of Toxoplasma gondii, rubella, and Cytomegalovirus seroprevalence in southern Turkey (Ocak et al., 2009). IgG was more common than IgM in a study of pregnant women in Denmark who were tested for antibodies to toxoplasmosis (9). (Lebech et al., 1993) A 27.4 and a 0.65 percentage point difference. 6.1% of 343 pregnant women tested positive for IgG anti-T. gondii antibodies in a study of the sero-epidemiology of Toxoplasma gondii infection (Alvarado-Esquivel et al., 2006). There was no positive IgM anti-T. gondii antibody test result among the 343 female participants.

A total IgG seroprevalence rate of 45% was discovered in a study investigating the incidence and prevalence of toxoplasmosis in pregnant women in India (Singh, and Pundit, 2004). Anti-IgM antibodies were found in 3.7% of patients. Among pregnant women in Bangladesh, 38.5% tested positive for toxoplasma IgG antibodies and 1.1% tested positive for toxoplasma IgM antibodies, according to a separate study (Ashrafunesa et al., 1998).

In a study conducted on 235 pregnant women in Changchun, China, 10.6% obtained positive ELISA results for IgG, while none did for IgM. Liu et al. (2009)..

**CONCLUSIONS**

Based on our findings, toxoplasmosis appears to play an important role in ectopic pregnancies. Also demonstrated to be vulnerable are the infants of moms who tested positive for toxoplasmosis. Toxoplasmosis infection rates in pregnant women have been estimated at between 8% and 20%. There were more persistent cases than transient ones discovered. Sixty-six percent of people test positive for IgG, whereas only 44% do so for IgM.

Wearing gloves when interacting with potentially infected people is one precaution that can help prevent the spread of Toxoplasmosis. Following the removal of cat or pet faeces, chemicals are used to eliminate any leftover parasites. Contact with dogs during pregnancy should be limited or avoided. To guarantee the prevention and eradication of Toxoplasmosis, further research is needed, ideally with huge sample sizes and cutting-edge technologies.

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