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**TOXOPLASMA GONDII INFECTION AMONG PREGNANT WOMEN ATTENDING MATERNITY CLINICS; MULTI CENTER EXPERIENCE FROM RIYADH REGION, SAUDI ARABIA**

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**ABSTRACT**

***Introduction:* Toxoplasma gondii infection in pregnant women is linked with higher risk of spontaneous abortion or premature infants. This study aims to investigate the seroprevalence of T. gondii infection in pregnant women in Riyadh, Saudi Arabia.**

**Material and Methods:** 1000 blood samples were collected from women visiting various regional laboratories of Riyadh. Serum was tested for toxoplasmosis using ELISA technique.

**Results:** The result revealed that 93% pregnant women were serologically negative and only 7% were positive. The study concludes that young and aged women who have *T. gondii* infection should have more awareness about this infection and its complications.

**Conclusion:** The study would be valuable in improving pregnancy care by encouraging the health workers to implement clinical and protective care plans side by side.

## INTRODUCTION

*Toxoplasma gondii* (*T. gondii*) is an intracellular protozoan, causing toxoplasmosis; it is transferred to humans via drinking water and/or ingesting raw vegetables as they may be contaminated with oocysts transferred through cat feces. This protozoan is also transmitted by eating raw/undercooked meat containing *T. gondii* tissue cysts (1-3). The toxoplasmosis infection is a worldwide endemic and nearly 15-85% of human infection is asymptomatic. In most cases, this infection is mild, but it can be dangerous in infected fetus (transplacental infection) (4-5), and in individuals with compromised immune system (6-7). The disease development and severity vary from patient to patient depending on a variety of factors such as effectiveness of immune system and the genetics of parasite (8-9).

Additionally, a great variation with respect to seroprevalence of *T. gondii* infection is reported in different ethnic groups even if they live in the same area. Regional variations may be due to climatic alteration, and also due to cultural variances in the type and amount of raw meat consumed and the variable sources of the meat (1-2). Pregnant women with toxoplasmosis infection are at risk of spontaneous abortion, premature birth, or defected births. Toxoplasmosis is more likely to transfer congenitally via the placenta to the fetus. Therefore, it is recommended to all pregnant women (particularly women in the first trimester) to

perform serological screening test conducted to detect IgG and IgM antibodies against *T. gondii* infection; it is one of the way to avoid or minimize any possible complications regarding child birth (4,5,9). This study aims to investigate the seroprevalence of *T. gondii* infection in Saudi pregnant women living in Riyadh by detecting serum IgG and IgM antibodies against *T. gondii*.

## MATERIAL AND METHODS

**Study design:** A cross-sectional study was designed to assess the prevalence of toxoplasmosis in Saudi pregnant women living in different parts of Riyadh. All the information was collected on a predesigned questionnaire from each woman. 1000 retrospective files were randomly selected in this cross-sectional study that continued from Dec 2017 to Jan 2020 (age of the selected women ranged between 25 and 55 years; mean age:  $37.13 \pm 7.45$  years). Serum was tested for toxoplasmosis by using enzyme-linked immunosorbent assay (ELISA) technique to prospectively monitor serological levels of IgG and IgM antibodies. For this purpose, Blood samples were screened for the seroprevalence of IgM and IgG antibodies using a commercially available ELISA kit (Würzburg, Germany). Serum samples were diluted and the test was performed according to the manufacturer's instruction. The results were interpreted as positive and negative as the aim of the study

was to detect the prevalence rate. Data analysis was conducted using SPSS. Written informed consent from all patients were obtained. Ethical approval is obtained from the Health and Applied Committee at the PSAU, Al-Kharj, Saudi Arabia.

## RESULTS

Total 1000 samples of pregnant women were investigated for toxoplasma antibodies from Dec 2017 to Dec 2019. The result of the current study reveals that 93% of the pregnant women were serologically negative and only (7%) were positive. Six percentage of them were IgG positive and only 1% of pregnant women were IgM positive (Figure 1)

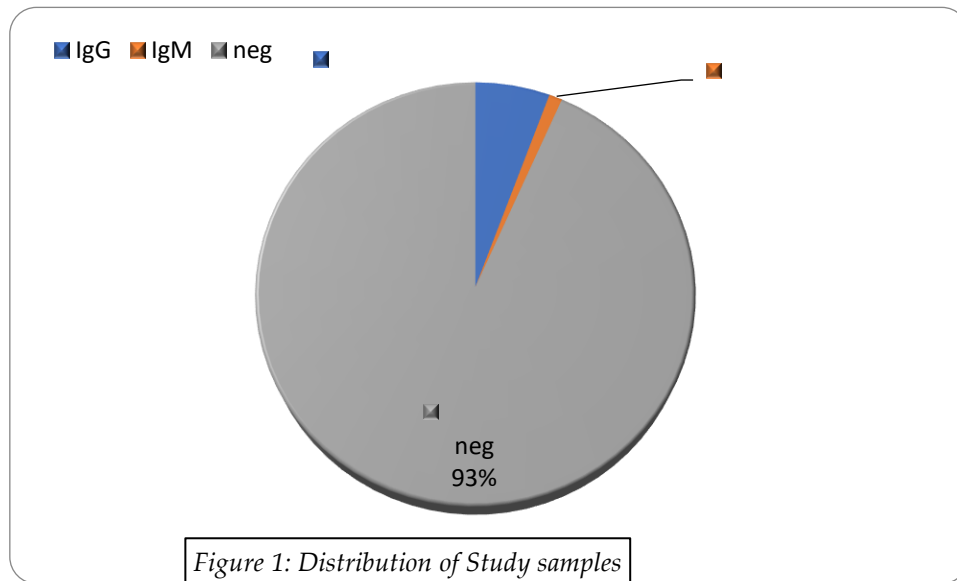


Figure 1: Distribution of Study samples

### Differential White Cell Count

There was no significant difference between IgM positive and negative regarding the neutrophils, lymphocytes, monocytes or eosinophils counts, P value > 0.05. There was a significant increase in basophile count in the IgM positive samples (P value 0.02), while other remained unchanged in both groups.

Table-1 shows that 21 of women who are less than 30 years old were IgG positive as compared to the 9 women who were more than 30 years old. However, the seropositivity of IgM were the same in both groups.

**Table 1**  
Distribution of Toxoplasma by Age

Age	Total	Sero-ve	IgG +ve	IgM +ve
≥40	39	36	2	2
35-39	100	96	3	1
30-34	121	116	4	1
25-29	106	98	6	2
20-24	133	123	8	2
≤20	98	91	7	0

## DISCUSSION

Toxoplasmosis is linked with long-term morbidity and mortality and is the cause of huge burden on health care system around the world including KSA. The eradication of the infected animal and contaminated products are strict precautionary measures to be taken to prevent the exposure of humans to this zoonotic agent. During the first few days of acute infection, IgM is the only antibody detected and its level continues to elevate; however, its level decreases after 8-12 wks. IgG titer, on the other hand, is the parameter used for the detection of chronic infection. In this study, a higher percentage of chronic cases was detected as compared to the acute cases and these findings are in line with the previous local studies. The high prevalence rate in some other countries could be attributed to domestic animals or eating animals and their products such as milk or meat. From a diagnostic standpoint, there are different laboratory approaches that can be used to detect the acute stages of infection: application of polymerase chain reaction (PCR), and capture ELISA. Taken together, sero-detection of Toxo antigen may be a very useful, easy, rapid, feasible, and cost-effective diagnostic tool for early diagnosis of asymptomatic patients and could be used as an alternative to RT-PCR, particularly in developing countries.

The current study results indicate that the seroprevalence of *T.gondii* IgG antibodies and IgM is 6% and 1% among pregnant women, respectively, which in turn makes it mandatory to establish a routine blood screening. This seroprevalence rate is low in comparison with the worldwide rate as reported in previous studies (10-13). For example, 29% seroprevalence of IgG antibodies against *T.gondii* was found in pregnant women in Nigeria (14); similarly, the seroprevalence rate of IgG was highly reported in Brazil which was 53% while the IgM was 3.20% (13). Noticeably, the

seropositivity, lifelong immunity is mediated by IgG neutralizing antibodies against the infecting Toxo serotype, and these antibodies do not mediate long cross protective immunity against other serotypes.

Additionally, the seroprevalence rate of this study is still much lower than those reported in other regions of Saudi Arabia including Makkah (30% of IgG and 6% of IgM) (15) while in Alhasa (52% of IgG and 9% of IgM) (16). Based on the age of the precipitants, the current study demonstrated that seropositivity of anti-*T.gondii* IgG was higher in pregnant women aged less than 30 year than in the older group (more than 30 years old). In percentage, 6% of pregnant women in young, aged group was IgG positive while ~3% of older women was IgG positive. This might indicate that the risk of getting infection in younger women in Riyadh is almost twice as older women. However, this finding disagree with other studies (17-18).The reason of this dissimilarity is likely to be due to food habits and life style.

## CONCLUSION

The results of the current study inform the medical field workers to increase the awareness level of younger pregnant women about this infection and inform them how to avoid, follow-up and reduce toxoplasmosis-associated complications. Future studies are still required to include more samples with wider regional scope.

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