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Research Article

### PREVALENCE OF TOXOPLASMOSIS AMONG PREGNANT WOMEN AND RISK FACTORS IN AL-KAEDA PROVINCE, IBB, YEMEN

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**Abstract:**

**Aim:** To determine the seroprevalence of toxoplasmosis and its associated risks factors among pregnant women and to asses the relation of some abnormalities and infection with Toxoplasmosis in Alkaeda province ibb city. **Methodology:** This pr prospective study was conducted at Alkaeda Hospital, over a 6 months period (March' 2016 to August' 2016). The study was a pproved by the Alrahma Medical collage and written informed consents were obtained from the patients. The study group co mprised pregnant women. Samples were tested for anti-Toxoplasma IgG and IgM antipodies by using OnSite Toxo IgG/IgM Rapid Test-Cassette. The OnSite Toxo IgG/IgM Rapid Test is a lateral flow chromatographic immunoassay for the simultane ous detection and differentiation of IgG and IgM anti-Toxoplasma Gondii (T. gondii) in human serum or plasma. This kit is i ntended to be used as a screening test and as an aid in the diagnosis of infection with T. gondii. Any reactive specimen with t he OnSite Toxo IgG/IgM Rapid Test must be confirmed with alternative testing method(s) and clinical findings.

**Results:** In the present study found that 13 sample (13%) were seropositive and 87 cases (87%) were seronegative for Toxo plasma specific IgG antibody and 4 samples (4%) were seropositive and 96 samples (96%) were seronegative for toxoplasm a specific IgM antibody. The distribution of positive serum samples among the different age groups for anti-Toxoplasma gon dii IgG and IgM showed that pregnant woman of the age group 23-30 years had the highest percentage (17.78 % and 6.68% ) of positive results respectively. In present study of all cases, 71 living in village which 4 (13.8%) cases of them were detecte d as IgG and 3(3.5) cases of them were detected as IgM. Of all cases 68 had history of contact with cat which 10(14.7) cases of them were detected as IgG positive and 4(5.9) cases of them were detected as IgM. In the present study showed that the s eropositivity of Toxoplasma in relation to the number of times the antenatal woman experienced BOH revealed that the high est percentages (13.20%) of positivity was noted among women with a history of one BOH and seropositive cases were distri buted in relation to the type of BOH revealed that Abortion (66.67%) was the commonest form of pregnancy wastage..

**Keywords:** Prevalence Of Toxoplasmosis Among Pregnant Women And Risk Factors.

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## INTRODUCTION:

Toxoplasmosis is an infection of vertebrates caused by the obligate intracellular protozoan parasite, *Toxoplasma gondii* [1]. *Toxoplasma gondii* is one of the most common parasites of humans worldwide, infecting approximately one third of the world's population [1]. It is a facultative heteroxenous parasite whose definitive hosts are members of the family Felidae, including domestic cat but is capable of infecting mammals, birds and reptiles as intermediate hosts. Its broad host range, high infection rate, worldwide distribution and the ability to maintain a benign coexistence with its host, are features of *Toxoplasma gondii* which allow it to be widely regarded as one of the most successful parasites on Earth [2].

*Toxoplasma gondii* is causative agent for abortions, stillbirths, eye problems, and mental retardation in the children of women who acquire primary infection during pregnancy [3]. Cats and other members of the Felidae are the definitive hosts of the parasite and shed the oocysts after they are infected [4,5]. These oocysts contain infective sporozoites that can then cause human infection by fecal-oral transmission. Humans can also be exposed to bradyzoites, contained in tissue cysts of the intermediate hosts particularly food animals through consumption of improperly cooked meat and meat products or water [6-8].

Infection in pregnant women with *Toxoplasma gondii* may be transmitted to the fetus where it may cause permanent damage of the fetus including retinochoroiditis and hydrocephalus. The infection may reactivate after birth with new attacks of retinochoroiditis and reduced eye sight as the result.

Infection of the woman before pregnancy causes immunity and the infection is transmitted to the fetus, and therefore it is essential to estimate the time of infection as precisely as possible to properly estimate the risk of infection for the fetus.

Congenital infection of the fetus in women infected just before conception is extremely rare and even during the first few weeks of pregnancy the maternal-fetal transmission rate is only a few percent [9]. Primary infection with *T. gondii* during the third trimester of pregnancy carries a higher risk of congenital transmission than that acquired during the first trimester [10,11].

Maternal-fetal transmission occurs between 1 and 4 months following placental colonization by tachyzoites. The placenta remains infected for the duration of the pregnancy, and therefore may act as a reservoir supplying viable organisms to the fetus throughout pregnancy [12, 13]. Historical studies (before the availability and use of anti-toxoplasma medication in pregnancy) have shown that the risk of vertical transmission increases with gestational age, with the highest rates (60% to 81%) in the third trimester compared with 6% in the first trimester [14, 15]. Disease severity, however, decreases with gestational age, with first trimester infection resulting in fetal l

oss or major sequelae [16]. The overall risk of congenital infection from acute *T. gondii* infection during pregnancy ranges from 20% to 50% without treatment [17].

Acute and latent *T. gondii* infections during pregnancy are mostly diagnosed by serological tests including detection of anti-*T. gondii*- specific IgM and IgG antibodies [18,19]. Maternal toxoplasmosis is usually asymptomatic and if the diagnosis was delayed, unavoidable and irreversible fetal damage might take place. A serological survey during pregnancy represents a valuable tool for the diagnosis of infection in the neonate and may bring a rapid and effective treatment of an affected child. Thus, all pregnant women should be examined at spot and seronegative women followed at intervals for evidence of seroconversion.

The aim of this study to determine the seroprevalence of *Toxoplasma gondii* infection and its associated risks factors among pregnant women and assess the relation of some abnormalities and infection with Toxoplasmosis at the Al-kaida province in Ibb city of Yemen.

## MATERIAL AND METHODS:

### 1-Study population:

This prospective study was conducted with 100 pregnant women at Alkaeda Hospital, over a 6 months period (March' 2016 to August' 2016). The study was approved by the Alrahma Medical collage and written informed consents were obtained from the patients. The study group comprised pregnant women. The samples were pregnant women referring to the reference laboratory of Alrahma for routine pregnancy tests. Inclusion criteria for the study subjects were pregnant women, of all ages and at any stage of pregnancy, residing in Alrahma laboratory.

### 2-Sample collection:

Blood samples were obtained from subjects referred for examination in out-patients clinics by medical trained staff, record number, and information on age and sex. The subjects were referred to the phlebotomy unit for whole blood collection (5 ml) by venipuncture in plain tubes. The blood samples were then transported to the parasitology laboratory at department of biology of college of science of Alrahma laboratory. The blood samples collected into a tube without anticoagulant and refrigerated overnight at 4oC. It was then centrifuged, serum harvested into eppendorf tubes, and stored at -20oC until tested.

### 3- Questionnaire:

Epidemiological data, including socio-demographic and behavioral characteristics, were obtained from all pregnant women. Socio-demographic characteristics included age, place of residency, and educational and socio-economic levels. Behavioral characteristics included cat contacts, consumption of raw or undercooked meat, contaminated water, and unwhashed raw vegetable or fruit consumption.

**4-Serological testing for toxoplasmosis:**

Samples were tested for anti-Toxoplasma IgG and IgM antibodies by using OnSite Toxo IgG/IgM Rapid Test-Cassette. The OnSite Toxo IgG/IgM Rapid Test is a lateral flow chromatographic immunoassay for the simultaneous detection and differentiation of IgG and IgM anti-Toxoplasma Gondii (*T. gondii*) in human serum or plasma. This kit is intended to be used as a screening test and as an aid in the diagnosis of infection with *T. gondii*. Any reactive specimen with the OnSite Toxo IgG/IgM Rapid Test must be confirmed with alternative testing method(s) and clinical findings.

**RESULTS:**

A total of 100 pregnant women were enrolled and the blood samples for this study were collected from them at department of laboratory, Alrahama college, and they were screened for the presence of anti-Toxoplasma IgG and IgM antibodies.

The age ranged from 15 to 46 years old; where all of them were coming from Alkaeda province Abba city (Table 2). In the present study found that 13 sample (13%) were seropositive and 87 cases (87%) were seronegative for Toxoplasma specific IgG antibody and 4 samples (4%) were seropositive and 96 samples (96%) were seronegative for toxoplasma specific IgM antibody (Table 1 Fuger1 and 2).

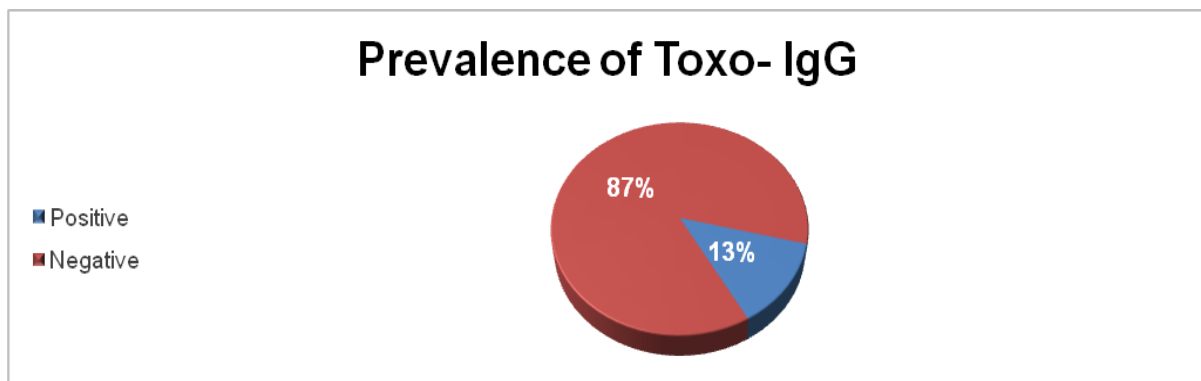


Fig 1: Showed the Prevalence of Toxo- IgG

Table 1: Prevalence of Toxo- IgG and Prevalence of Toxo- IgM

Antibody types	No. Tested	Positive		Negative	
		No.	(%)	No.	(%)
Prevalence of Toxo- IgG	100	13	(13)	87	(87)
Prevalence of Toxo- IgM	100	4	(4)	96	(96)

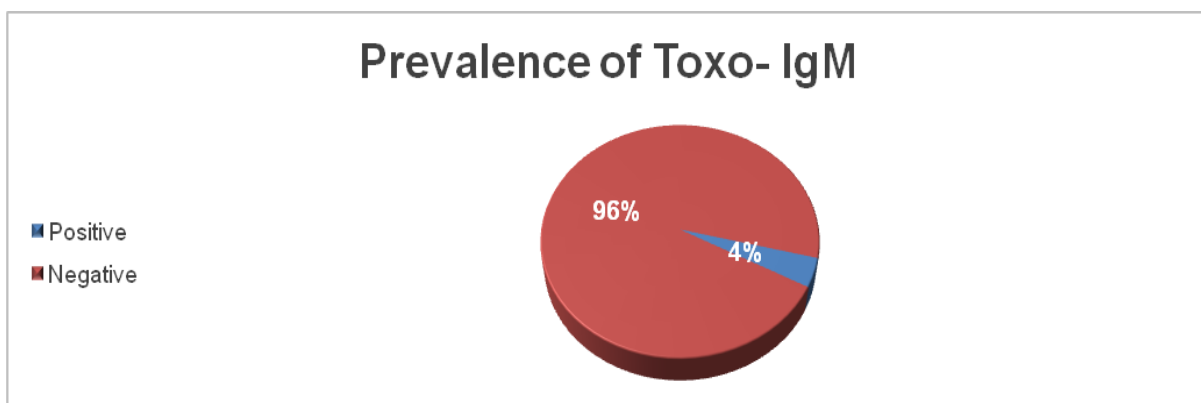
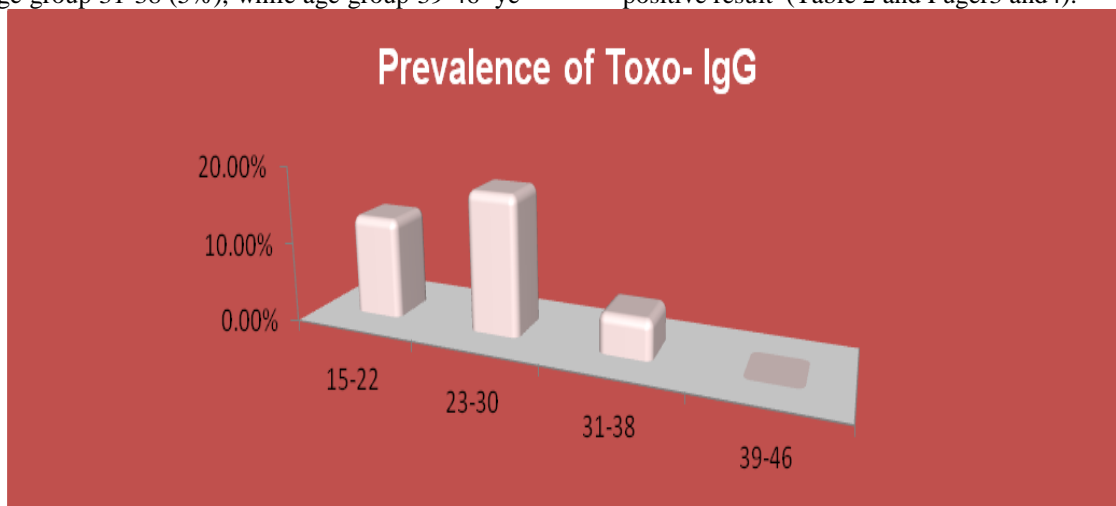


Fig 2: Showed the Prevalence of Toxo- IgM

All positive study subjects were in the 15 to 38 year age group (Table 2). The distribution of positive serum samples among the different age groups for anti-Toxoplasma gondii IgG showed that pregnant woman of the age group 23-30 years had the highest percentage (17.78 %) of positive results followed by the age group 15-22 year (12.9 %), and then by the age group 31-38 (5%), while age group 39-46 years

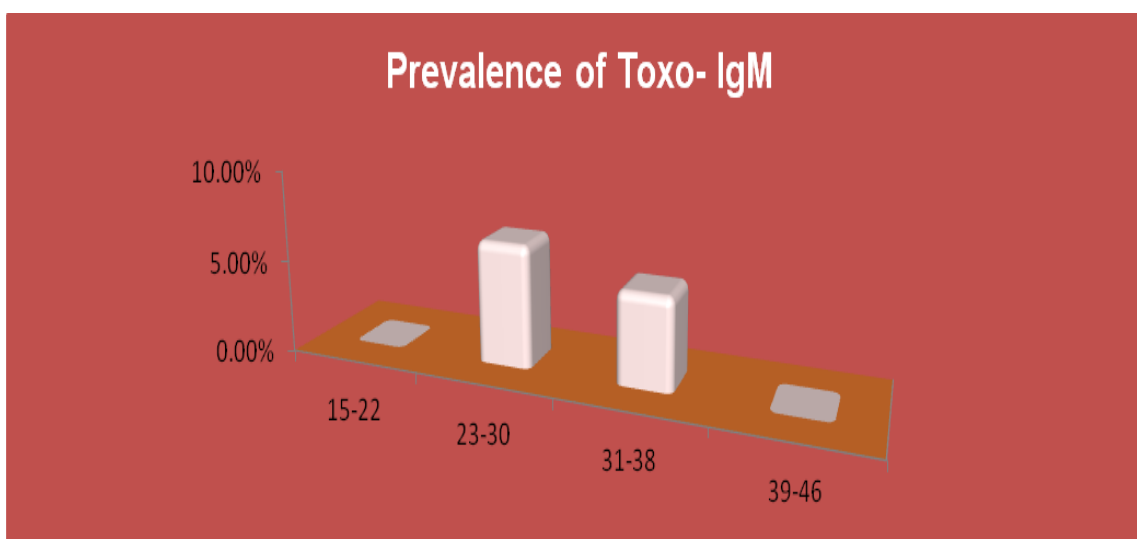
showed no positive result (Table 2). While distribution of positive serum samples among the different age groups for anti-Toxoplasma gondii IgM showed that pregnant women of the age group 23-30 year had the highest percentage (6.67%) of positive results, followed by the age group 31-38 year (5 %), while age groups 15-22 and 39-46 years showed no positive result (Table 2 and Figs 3 and 4).



**Fig 3: Percentage of Toxo- IgG with different age groups**

**Table 2: Prevalence of Toxo- IgG and Prevalence of Toxo- IgM in different age groups**

Age	Total	Prevalence of IgG		Prevalence of Toxo- IgM	
		No.	%	No.	%
15-22	31	4	12.9%	0	0%
23-30	45	8	17.78%	3	6.67%
31-38	20	1	5%	1	5%
39-46	4	0	0%	0	0%



**Fig 4: Percentage of Toxo- IgM with different age groups**

In present study of all cases, 71 living in village which 4 (13.8%) cases of them were detected as IgG and 3 (3.5) cases of them were detected as IgM (Table-3). Of all cases 68 had history of contact with cat which 10 (14.7) cases of them were detected as IgG positive and 4 (5.9) cases of them were detected as IgM (Table-3).

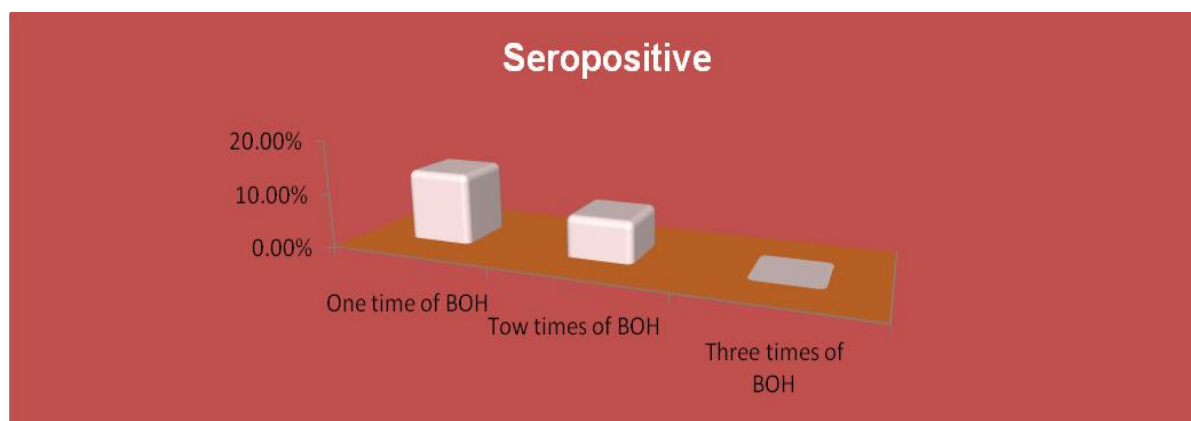
In the present study showed that the seropositivity of Toxoplasma in relation to the number of times the antenatal woman experienced BOH revealed that the highest percentages (13.20%) of positivity was noted among women with a history of one BOH, followed by 7.69% positivity among women with two BOH (Table 4 and Figure 5).

**Table 3: The Frequency Distribution of Specific anti-Toxoplasma IgG and IgM Positive among Pregnant Women according to Examined Variables**

Patient's Characteristic	Seroprevalence for IgG test				Seroprevalence for IgM test			
	Negative		Positive		Negative		Positive	
	NO.	%	NO.	%	NO.	%	NO.	%
<b>Residence</b>								
<b>City</b>	62	87.3	9	12.7	68	95.8	3	4.2
<b>Village</b>	25	86.2	4	13.8	28	96.5	1	3.5
<b>Education</b>								
<b>Primary level</b>	43	86	7	14	47	94	3	6
<b>Secondary level</b>	26	86.7	4	13.3	29	96.7	1	3.3
<b>University level</b>	18	90	2	10	20	100	0	0
<b>Cat breeding</b>								
<b>Yes</b>	58	85.3	10	14.7	64	94.1	4	5.9
<b>No</b>	29	90.6	3	9.4	32	100	0	0

**Table 4: Seropositivity in relation to number of bad obstetric outcomes**

The number of BOH	No. of sera tested		Seropositive		Seronegative	
			No.	%	No.	%
1	15	7	13.20%	53	86.8%	
2	11	2	7.69%	26	92.31%	
3	6	0	0.00%	14	100%	



**Fig 5: Seropositivity in relation to number of BOH**

**Table 5: Seropositivity in relation to type of bad obstetric outcomes**

Type of BOH	Seropositive	%
Abortion	6	66.67%
Abortion and congenital defects	2	22.22%
Premature delivery	1	11.11%

The seropositivity played an important role in determining the foetal outcome. In current study the seropositive cases were distributed in relation to the type of BOH revealed that Abortion (66.67%) was the commonest form of pregnancy wastage, followed by Abortion and congenital defects (22.22%) and premature deliveries (11.11 %) (Table5).

### DISCUSSION:

Since its discovery 100 years ago, *T. gondii* has become established as one of the most versatile and successful of all parasites. Its worldwide distribution, broad host range and ability to maintain a benign co-existence with its hosts have enabled its success. The ability of *T. gondii* to be cultured, the fact that it is amenable to genetic manipulation and has excellent animal models, has made studying this organism fairly uncomplicated [2].

Despite numerous reports on toxoplasma antibody determinations in the general population of Yemen, few sero-epidemiological studies have been performed in pregnant women. The seroprevalence of *T. gondii* in pregnant women, on worldwide scale, varies from 7% to 52.3% and in women with abnormal pregnancies and abortions the seroprevalence varies from 17.5% to 53.3 % [20].

In the present study, the seropositivity of IgG, indicating remote infection, was 13%, and it was 4% IgM, indicating recent infection. The result partially matched with the observations of Sandhu et al. who detected 8% IgG seropositivity among antenatal women without BOH, and none of them was positive for IgM [21] and near to that found by Musa Abdel et al, in sudan found that Among 163 pregnant women, 33 (20.2%) were positive for (IgG) antitoxoplasma antibodies, while 130(79.8%) seronegative. None of the examined women had IgM antitoxoplasma antibodies [22].

Borkakoty et al. also observed IgM seroprevalence was 5.9% among the same group [23]. In contrast our findings lower than that reported by Nijem and Al-Amleh, 2009 among pregnant women in Hebron district was (27.9%) for anti-IgG and (17.6%) for anti-IgM [24]. It is also lower than that reported by Al-Harhi, et al., 2006 among pregnant women in Makkah, was (29.4%) for anti-Toxoplasma IgG, (5.6%) for anti-Toxoplasma IgM [25]. The different in prevalence might be explained by the fact that, these people were exposed to animal and soil environment hence more chance to contact infection as compared to pregnant women from different professionals [26]. The different could partly be explained by the behavioral variation and differences in climatic conditions, where higher sero-prevalence is associated with hotter and wetter areas, which is favorable for sporulation of oocysts compared to less humid areas[27].

The high seronegative rate (87.%) anti-toxoplasma IgG and (96%) anti-toxoplasma IgM reflects the large number of pregnant women at high potential risk of seroconversion during pregnancy and consequently could transmit the infection to the fetus. In our study found that the highest prevalence rate of IgG and IgM antibodies (17.78% and 6.67%) were detected in the age group of 23-28. This might be explained by the facts that younger people prefer eating compared to elderly, this eating expose them to grilled meat (which might be undercooked), fruits and salads which may be contaminated with the parasites hence increased risks of infection [28-30]. This result is in accordance with the results of some studies such as Adel Ebrahimzadeh who found that the highest seropositivity rate in 25-29 age group. Same result found by other studies [31-33].

In contrast the different studies reported an increase in seropositivity of anti-*T. gondii* antibodies with increasing age[34,35]. Nevertheless, this association does not mean that older age is a risk factor predisposing to infection but might be explained by the older the person the longer time being exposed to the causing agent and may retain a constant level of anti-toxoplasma IgG in serum for years.

In the present study, the percentage of seropositivity was also assessed in relation to the number of BOH clearly shows that there was not relationship between the number of pregnancy wastages and seropositivity. The result matched with Borkakoty et al According to their study, the increase in the number of pregnancy wastages had no significant association with infection due to *T. gondii*. [36]

Although, some studies have indicated the association between seropositivity of toxoplasma and contact with cat, yet in this study this association was not established. Moreover present study did not show a association between seropositivity of Toxoplasma residency and educational status.

Among the seropositive cases, Abortion (66.67%) was the commonest form of pregnancy wastage, followed by Abortion and congenital defects (22.22%) and premature deliveries (11.11 %). The seropositivity played an important role in determining the foetal outcome. Surpam *et al.* observed abortions in 27.27%, intrauterine growth restriction in 9.37%, intrauterine foetal death in 17.64%, and preterm labour in 18.18% of cases [37]. Kandle *et al.* reported similar results in their study; 42(50%) abortion cases were positive for anti-Toxoplasma antibodies [38]. The result also partially matched with the observations of Bachhiwal *et al.* who reported that abortion was the commonest (85.45%) form of pregnancy wastage, followed by congenital anomalies, stillbirths, and premature deliveries [39].

To conclude the results of this study have shown that *Toxoplasma gondii* infection is present in Alkaida province, but its prevalence is much lower than in other parts of the world. This low prevalence means that previously unexposed people are at risk of acquiring an acute infection, which may be passed on congenitally in pregnant women, or which could be life-threatening. The implementation of regular serological testing during pregnancy is important to reduce the effects of the disease on mothers as well as on newborn babies.

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