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Research Article

Retrospective Evaluation of the Toxoplasmosis Seroepidemiology among Women of Productive Age and Infants in Jeddah, Saudi Arabia

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ABSTRACT

Introduction: Toxoplasmosis in women in productive age and infant can be life-threatening. The information needed for proper control and management strategies in Saudi Arabia is lacking; hence our retrospective study was achieved.

Aim: This study aimed to determine the seroprevalence of *Toxoplasma gondii* amongst women of productive age, baby boys, baby girls, baby boy twins and baby girl twins in Jeddah city, Saudi Arabia. This study aimed to determine the seroprevalence of *Toxoplasma gondii* amongst women of productive age, baby boys, baby girls, baby boy twins and baby girl twins in Jeddah city, Saudi Arabia.

Materials and methods: We retrospectively analyzed the medical records among women of productive age, baby boys and baby girlslooking for health care in King Fahad Hospital, King Abdulaziz Hospital and East Jeddah Hospital. The study was directed between January 2019 and March 2021. Data on anti-Toxoplasma IgG and IgM antibodies were composed *via* a structured pre-design questioner and verified using Excel spreadsheets, then exported and analyzed using the SPSS Statistics.

Results: These studies considered 2955 cases and an overall seroprevalence of anti-*T. gondii* IgG antibodies were 16.3% (483/2955) and 15.50% (378/2433) in women of reproductive age looking for healthcare in Jeddah city hospitals. Belong to anti-*T. gondii* IgM 1.5% (44/2955), anti-*T. gondii* IgG+IgM-15.2% (448/2955), anti-*T. gondii* IgG-IgM+ 0.9% (28/2955) and anti-*T. gondii* IgG-IgM-82.8% (2448/2955) in the study area. The seroprevalence of anti-*T. gondii* IgG among baby boys was 20.60% (59/286), baby girls 18.80% (40/213), baby boy twins 42.90% (3/7), baby girl twins 18.80% (3/16).

Conclusion: Seroprevalence of Toxoplasma IgG antibodies in productive age women was little in Jeddah if equated with Asian, African, American nations as well as with other portions of the Arabian Peninsula. The large proportion of Toxoplasma seronegative, non-immune women in the current study, 83.60% (2033/2433), is quite alarming due to the potential risk of Toxoplasmosis in productive age women.

Keywords: Toxoplasmosis; Retrospective; Seroprevalence; Statistics

INTRODUCTION

Toxoplasmosis is caused by *T. gondii* can infect all warm-blooded mammals, including humans. Ingestion of undercooked or raw meat harboring tissue cysts or oocyst contaminated food or water or unwashed vegetables causing the Toxoplasma infection to human [1]. Transmission may also occur through tachyzoites in transfused blood, tissue transplants, or raw milk. Oocytes excreted in the feces of infected cats or contact with cat litter or soil. Severe complications of toxoplasmosis, such as encephalitis, can occur in immunocompromised patient. Moreover, ocular toxoplasmosis, particularly retinochoroiditis [2]. Maternal infection toxoplasmosis was reported low: 3.7% in Korea [3] while prevalence is as high as 53.1% in Kuwait [4]. In the American continent, the seroprevalence

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of toxoplasmosis was 77.5% in Brazil [5] and 63.5% in Colombia [6]. More recently, it has been recommended that total fertility rates be shown by age 15-49 years; consequently, women of reproductive age refer to all women aged 15-49 years [7].

The valuation of the immunologicgrade of the mothers is always not simple. It may necessitate additional-level assessments such as IgG avidity. Usually, for toxoplasma, a first assessment is achieved as soon as probable after the pregnancy analysis and then monthly repeated, in all negative women. Women with IgG and absence of IgM antibodies at first assessment don't usually undertake any other tests, demonstrating toxoplasma infection for more than one year (Immune women) while nonimmune women: Absence of specific IgG and IgM antibodies. If IgG and IgM antibodies are both presents at the first test, second level assessments are usually achieved (IgG avidity) to evaluate, the timing of infection. Women with the presence of IgM and absence of IgG antibodies, possible acute infection or false positive IgM reaction thus need retest after two weeks, and the same result designates false positive but positive IgG in the second response indicate acute infection [8].

Even though toxoplasmosis is one of the dangerous diseases distributed worldwide, there is scarce information on the prevalence and epidemiology of the disease in the Arabian Gulf countries. Only a few studies have been conducted to determine the prevalence of *T. gondii* in Saudi Arabia, including studies carried out in Riyadh, the Eastern region, Jeddah and Jazan, South Western region [9-14].

Our study aims to analyze the immunological status in women of productive age, baby boys, baby girls, baby boy twins and baby girl twins for Toxoplasma, assessing the risk for congenital infection in Jeddah city, Saudi Arabia for three years.

MATERIALS AND METHODS

Study area

This study was conducted in Jeddah, which is the largest city in Makkah Province. With a population of about 4,697,000 people as of 2021, situated on the Red Sea coast. Like most coastal towns, it is highly populated with cats.

Study design and participants

This study is a hospital-based retrospective study conducted among women of productive age, baby boys, baby girls, baby boy twins and baby girl twins and looking for health care in King Fahad Hospital, King Abdulaziz Hospital, and East Jeddah Hospital in Jeddah city during the period between January 2019 and March 2021.

Ethical approval

Ethical approval was obtained from the Institutional Review Board at Ministry of Heath, Directory of heath affairs, Jeddah (1462).

Sample size calculation and data gathering

Information was composed *via* pre-design questionnaire collected of 25 requests linking to demographic and medical information. Information on anti-Toxoplasma IgG and IgM antibodies were also collected from each study subject.

A total of 2955 hosts were considered in this analysis. They comprised (2433) women of productive age, (286) baby boys, (213) baby girls, (7) baby boy twins, and (13) baby girl twins.

Information managing and analysis

Information collected through this study was arrived at the Faculty of Applied Medical Sciences, Umm Al Qura University. Data were verified using Excel spreadsheets and analyzed using the SPSS software (version 26.0). Variables include Location (King Fahad hospital, King Abdulaziz hospital and East Jeddah hospital in Jeddah city), date (2019-2021G), Cases (women of productive age, baby boys, baby girls, baby boy twins, and baby girl twins), baby boys 0-2 years, baby girls 0-2 years, baby boy twins and baby girl twins), anti-Toxoplasma IgG (latent toxoplasmosis), anti-Toxoplasma IgM (active toxoplasmosis), anti-Toxoplasma IgG+IgM-, anti-Toxoplasma IgG-IgM+, anti-Toxoplasma IgG+IgM+, and anti-Toxoplasma IgG-IgM-. P Value <0.05 was used to designate statistical consequence.

RESULTS

Characteristics of the study cases

All women were in the age group of 15-49 years belong to productive age and fertility.

Prevalence of IgG and IgM antibody responses

These studies considered 2955 hosts. Out of the 2955 cases examined for seroprevalence of *T. gondii* IgG, 483 (16.3%) and 44 (1.5% %) were positive for Toxoplasma IgM. anti-*T. gondii* IgG+IgM-15.2% (448/2955), anti-*T. gondii* IgG-IgM+ 0.9% (28/2955) (Table 1).

Tables 2 and 3 show the absence of specific IgG and IgM antibodies among the majority of cases, 82.8% (2448/2955); consequently, they had been exposed to infection with *T. gondii*.

Heterogeneity and seroprevalence of anti-*T. gondii* antibodies in infants

The seroprevalence of infants with anti-*T. gondii* IgG among baby boys was 20.60% (59/286), baby girls 18.80% (40/213), baby boy twins 42.90% (3/7), baby girl twins 18.80% (3/16). Only one baby boy was 0.30% (1/286) anti-*T. gondii* IgM (Table 2).

Heterogeneity and seroprevalence of anti-*T. gondii* antibodies in various years

The seroprevalence anti-*T. gondii* IgG 24.20% (191/790) among cases in Jeddah city in 2019, 15.10% 9220/1458) in 2020 while in 2021, 10.20% (72/707) (Table 2). The seroprevalence anti-*T. gondii* IgM 2.20% (17/790) among cases in Jeddah city in 2019, 1.50% 22/1458) in 2020 while in 2021, 0.70% (5/707) (Table 3). There is a significant difference when the seropositivity was compared within the case groups ($p<0.05$) among cases looking for healthcare in Jeddah city hospitals for three years showed a relationship with anti-*T. gondii* antibodies IgG.

The presence of IgG and absence of IgM antibodies documented in 15.2% (448/2955) among cases looking for healthcare in Jeddah city hospitals (Tables 2-4). The presence of IgM and absence of IgG antibodies were 0.9% (28/2955).

Table 5 showed that IgG and IgM antibodies are both present among 0.4% (13/2955) cases looking for healthcare in Jeddah city hospitals. Absence of specific IgG and IgM antibodies showed in Table 6 among 82.8% (2448/2955) cases looking for healthcare in Jeddah city hospitals.

Table 1: Seroprevalence of *T. gondii* IgG among cases looking for healthcare in Jeddah city hospitals.

Results	*T. gondii* IgG		*T. gondii* IgM		*T. gondii* IgG+IgM-		*T. gondii* IgG-IgM+		*T. gondii* IgG+IgM+		*T. gondii* IgG-IgM-	
	Seroprevalence	%	Seroprevalence	%	Seroprevalence	%	Seroprevalence	%	Seroprevalence	%	Seroprevalence	%
Positive	483	16.3	44	1.5	448	15.2	28	0.9	13	0.4	2448	82.8
Negative	2472	83.7	2911	98.5	2507	84.8	2927	99.1	2942	99.6	507	17.2
Total	2955	100	2955	100	2955	100	2955	100	2955	100	2955	100

Table 2: Seroprevalence of *T. gondii* IgG among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgG		Total
			Positive	Negative	
2019	Cases	Women	158 (24.90%)	476 (75.10%)	634
		Baby boy	22 (26.80%)	60 (73.20%)	82
		Baby girl	9 (12.70%)	62 (87.30%)	71
		Baby girl (Twin)	2 (66.70%	1 (33.30%)	3
	Total		191 (24.20%)	599 (75.80%)	790
2020	Cases	Women	164 (13.90%)	1015 (86.10%)	1179
		Baby boys	32 (19.20%)	135 (80.80%)	167
		Baby girls	20 (21.70%)	72 (78.30%)	92
		Baby boys (Twin)	3 (42.90%)	4 (57.10%)	7
		Baby girls (Twin)	1 (7.70%)	12 (92.30%)	13
	Total		220 (15.10%)	1238 (84.90%)	1458
2021	Cases	Women	56 (9.00%)	564 (91.00%)	620
		Baby boys	5 (13.50%)	32 (86.50%)	37
		Baby girls	11 (22.00%)	39 (78.00%)	50
	Total		72 (10.20%)	635 (89.80%)	707
Total	Cases	Women	378 (15.50%)	2055 (84.50%)	2433
	2955	Baby boys	59 (20.60%)	227 (79.40%)	286
	2955	Baby girls	40 (18.80%)	173 (81.20%)	213
	2955	Baby boy (Twins)	3 (42.90%)	4 (57.10%)	7
	2955	Baby girl (Twins)	3 (18.80%)	13 (81.30%)	16
	Total		483 (16.30%)	2472 (83.70%)	2955

Table 3: Seroprevalence of *T. gondii* IgG among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgM		Total
			Positive	Negative	
2019	Cases	Women	16 (2.50%)	618 (97.50%)	634
		Baby boy	1 (1.20%)	81 (98.80%)	82
		Baby girl	0 (0.00%)	71 (100.00%)	71
		Baby girl (Twin)	0 (0.00%)	3 (100.00%)	3
	Total		17 (2.20%)	773 (97.80%)	790
2020	Cases	Women	22 (1.90%)	1157 (98.10%)	1179
		Baby boys	0 (0.00%)	167 (100.00%)	167
		Baby girls	0 (0.00%)	92 (100.00%)	92
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%)	13 (100.00%)	13
	Total		22 (1.50%)	1436 (98.50%)	1458
2021	Cases	Women	5 (0.80%)	615 (99.20%)	620
		Baby boys	0 (0.00%)	37 (100.00%)	37
		Baby girls	0 (0.00%)	50 (100.00%)	50
	Total		5 (0.70%)	702 (99.30%)	707

Total	Cases	Women	43 (1.80%)	2390 (98.20%)	2433
		Baby boys	1 (0.30%)	285 (99.70%)	286
		Baby girls	0 (0.00%)	213 (100.00%)	213
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%)	16 (100.00%)	16
	Total		44 (1.50%)	2911 (98.50%)	2955

Table 4: Seroprevalence of *T. gondii* IgG+IgM- among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgG+IgM-		Total
			Positive	Negative	
2019	Cases	Women	140 (22.10%)	494 (77.90%)	634
		Baby boy	22 (26.80%)	60 (73.20%)	82
		Baby girl	8 (11.30%)	63 (88.70%)	71
		Baby girl (Twins)	2 (66.70%)	1 (33.30%)	3
	Total		172 (21.80%)	618 (78.20%)	790
2020	Cases	Women	150 (12.70%)	1029 (87.30%)	1179
		Baby boys	32 (19.20%)	135 (80.80%)	167
		Baby girls	20 (21.70%)	72 (78.30%)	92
		Baby boy (Twins)	3 (42.90%)	4 (57.10%)	7
		Baby girl (Twins)	1 (7.70%)	12 (92.30%)	13
	Total		206 (14.10%)	1252 (85.90%)	1458
2021	Cases	Women	54 (8.70%)	566 (91.30%)	620
		Baby boys	5 (13.50%)	32 (86.50%)	37
		Baby girls	11 (22.00%)	39 (78.00%)	50
	Total		70 (9.90%)	637 (990.10%)	707
Total	Cases	Women	344 (14.10%)	2089 (85.90%)	2433
		Baby boys	59 (20.60%)	227 (79.40%)	286
		Baby girls	39 (18.30%)	174 (81.70%)	213
		Baby boy (Twins)	3 (42.90%)	4 (57.10%)	7
		Baby girl (Twins)	3 (18.80%)	13 (981.30%)	16
	Total		448 (15.20%)	2507 (84.80%)	2955

Table 5: Seroprevalence of *T. gondii* IgG-IgM+ among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgG-IgM+		Total
			Positive	Negative	
2019	Cases	Women	13 (2.10%)	621 (97.90%)	634
		Baby boys	1 (1.20%)	81 (98.80%)	82
		Baby girls	0 (0.00%)	71 (100.00%)	71
		Baby girl (Twins)	0 (0.00%)	3 (100.00%)	3
	Total		14 (1.80%)	776 (98.20%)	790
2020	Cases	Women	10 (0.80%)	1169 (99.20%)	1179
		Baby boys	0 (0.00%)	167 (100.00%)	167
		Baby girls	0 (0.00%)	92 (100.00%)	92
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%)	13 (100.00%)	13
	Total		10 (0.70%)	1448 (99.30%)	1458
2021	Cases	Women	4 (0.60%)	616 (99.40%)	620
		Baby boys	0 (0.00%)	37 (100.00%)	37
		Baby girls	0 (0.00%)	50 (100.00%)	50
	Total		4 (0.60%)	703 (99.40%)	707
Total	Cases	Women	27 (1.10%)	2406 (98.90%)	2433
		Baby boys	1 (0.30%)	285 (99.70%)	286
		Baby girls	0 (0.00%)	213 (100.00%)	213
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%)	16 (100.00%)	16
	Total		28 (0.90%)	2927 (99.10%)	2955

Table 6: Seroprevalence of *T. gondii* IgG+IgM+ among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgG+IgM+		Total
			Positive	Negative	
2019	Cases	Women	3 (0.30%)	631 (99.50%)	634
		Baby boys	0 (0.00%)	82 (100.00%)	82
		Baby girls	0 (0.00%)	71 (100.00%)	71
		Baby girl (Twins)	0 (0.00%)	3 (100.00%)	3
	Total		3 (0.30%)	787 (99.60%)	790
2020	Cases	Women	9 (0.80%)	1170 (99.20%)	1179
		Baby boys	0 (0.00%)	167 (100.00%)	167
		Baby girls	0 (0.00%)	92 (100.00%)	92
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%	13 (100.00%	13
	Total		9 (0.60%)	1449 (99.40%)	1458
2021	Cases	Women	1 (0.20%)	619 (99.80%)	620
		Baby boys	0 (0.00%)	37 (100.00%)	37
		Baby girls	0 (0.00%)	50 (100.00%0	50
	Total		1 (0.10%)	706 (99.90%)	707
Total	Cases	Women	13 (0.50%)	2420 (999.50%)	2433
		Baby boys	0 (0.00%)	286 (100.00%)	286
		Baby girls	0 (0.00%)	213 (100.00%)	213
		Baby boy (Twins)	0 (0.00%)	7 (100.00%)	7
		Baby girl (Twins)	0 (0.00%)	16 (100.00%)	16
	Total		13 (0.40%)	2942 (99.60%)	2955

Anti-Toxoplasma IgG seropositivity was 15.50% (378/2433) among women of productive age, 20.60% (59/286) in baby boys, 18.80% (40/213) in baby girls, 42.90% (3/7) in baby boy twins, 18.80% (3/18) in baby girl twins seeking healthcare in Jeddah hospitals, Jeddah city, Saudi Arabia (Table 3).

Cases seeking healthcare in Jeddah city hospitals for three years showed an association with anti-*T. gondii* antibodies IgG, there is an important difference when the seropositivity was equated inside the case clusters ($p< 0.05$).

Anti-Toxoplasma IgM seropositivity was 1.80% (43/2433) among women of productive age and 0.30% (1/286) in baby boys looking for healthcare in Jeddah hospitals, Jeddah city, Saudi Arabia (Table 4).

Presence of IgG and absence of IgM antibodies documented among 14.10% (344/2433) women of reproductive age, 20.60% (59/286) in baby boys, 18.30% (39/213) in baby girls, 42.90% (3/7) in baby boy twins, 18.80% (3/16) baby girl twins (Table 4).

Cases seeking healthcare in Jeddah city hospitals showed an association with anti-*T. gondii* antibodies IgG+IgM-, here is a significant difference when the seropositivity was equated inside the case clusters ($p< 0.005$).

1.10% (27/2433) women of productive age tested positive IgM and negative IgG as well as 0.30% (1/286) baby boys (Table 5).

Table 6 showed that IgG and IgM antibodies are both present among 0.50% (13/2433) women of reproductive age. Absence of specific IgG and IgM antibodies showed in Table 7 among 83.60% (2033/2433) women of productive age, 78.70% (225/286) in baby boys, 81.20% (173/213) in baby girls, 57.10% (4/7) in baby boy twins, 81.30% (13/16) in baby girl twins. Cases seeking healthcare in Jeddah city hospitals for three years showed an association with anti-*T. gondii* antibodies IgG-IgM-, here is a significant difference when the seropositivity was likened inside the case clusters ($p< 0.05$).

Table 7: Seroprevalence of *T. gondii* IgG-IgM- among various cases looking for healthcare in Jeddah city hospitals.

Date			*T. gondii* IgG-IgM-		Total
			Positive	Negative	
2019	Cases	Women	469 (74.00%)	165 (26.00%)	634
		Baby boys	61 (74.40%)	21 (25.60%)	82
		Baby girls	63 (88.70%)	8 (11.30%)	71
		Baby girl (Twins)	1 (33.30%)	2 (66.70%)	3
	Total		594 (75.20%)	196 (24.80%)	790

2020	Cases	Women	1003 (85.10%)	176 (14.90%)	1179
		Baby boys	133 (79.60%)	34 (20.40%)	167
		Baby girls	71 (77.20%)	21 (22.80%)	92
		Baby boy (Twins)	4 (57.10%)	3 (42.90%)	7
		Baby girl (Twins)	12 (92.30%)	1 (7.70%)	13
	Total		1223 (83.90%)	235 (16.10%)	1458
2021	Cases	Women	561 (90.50%)	59 (9.50%)	620
		Baby boys	31 (83.80%)	6 (16.20%)	37
		Baby girls	39 (78.00%)	11 (22.00%)	50
	Total		631 (89.30%)	76 (10.70%)	707
Total	Cases	Women	2033 (83.60%)	400 (16.40%)	2433
		Baby boys	225 (78.70%)	61 (21.30%)	286
		Baby girls	173 (81.20%)	40 (18.80%)	213
		Baby boy (Twins)	4 (57.10%)	3 (42.90%)	7
		Baby girl (Twins)	13 (81.30%)	3 (18.80%)	16
	Total		2448 (82.80%)	507 (17.20%)	2955

DISCUSSION

Toxoplasmosis is a global zoonotic intracellular parasite. In the current study, we report the seroprevalence of *T. gondii* among Jeddah city, Saudi Arabia, among women of productive age, baby boys and baby girls. It considered 2955 hosts and an overall seroprevalence of anti-*T. gondii* IgG antibodies were 16.3% (483/2955) while the global IgG seroprevalence was 32.9%, the Americas had the highest prevalence (45.2%), and Western Pacific the lowest (11.2%) [15].

The present study revealed that the seroprevalence rate of anti-Toxoplasma IgG among women of reproductive age looking for healthcare in Jeddah city was 15.50 %. This rate is nearly consistent with those reported among pregnant women in Italy (17.97%) [8] but lower than those reported among pregnant women looking for healthcare in different regions of Saudi Arabia including Riyadh, 22.4% (81/362) [9], Jeddah, 61.4% (43/70) [12], and Jazan Province 20.0% (39/195) [13]. At the regional level, Egypt (30.2%-67.5%) [15,16], Iraq (31.5%) [17], Morocco (50.6%) [18] and Kuwait (53.1%) [4]. Variations in *T. gondii* seroprevalence between different countries could be attributed to climate environments among diverse parts as the accomplishment of oocysts sporulation improved in warmer and wetting areas, differences in cultural and socioeconomic factors as well as hygienic and feeding habits, adopting different serological detection methods in the variations in the seroprevalence rates [19].

The seroprevalence anti-*T. gondii* IgG 24.20% (191/790) among cases in Jeddah city in 2019, 15.10% 9220/1458) in 2020 while in 2021, 10.20% (72/707) while seroprevalence anti-*T. gondii* IgM 2.20% (17/790) among cases in Jeddah city in 2019, 1.50% 22/1458) in 2020 while in 2021, 0.70% (5/707). The current results lower than the seroprevalence of anti-*T. gondii* IgG reported from Yemen (41.9%-43.7%) in studies conducted between the years 2007 and 2011 [20, 21]. Belong to 2021, our data collected only for three months from January to Marsh while whole years for 2019 and 2020.

Cases with IgG and absence of IgM antibodies at first evaluation don't usually undergo any other tests, indicating toxoplasma infection for more than one year [8]. In the current study, the presence of IgG and absence of IgM antibodies documented among 15.2% (448/2955) among cases seeking healthcare in Jeddah city hospitals and expressed as immune population.

In the present study, the overall seroprevalence of anti-*T. gondii* IgM antibodies were 1.5% (44/2955) while the seroprevalence of anti-*T. gondii* IgM in productive age women 1.80% (43/2433). It is nearly consistent with the global IgM seroprevalence was 1.9%. On the other hand, Aqeely et al., reported that IgM seropositivity was 6.2% (12/195) in pregnant women in Jazan province. At the regional level, Eastern Mediterranean had the highest IgM seroprevalence (4.1%), and The Americas, the lowest (1.1%) [13,15].

Low IgM seropositivity rate (1.80%) among women of productive age in the current study is nearly consistent with the low rate of 3.3% among pregnant women in countryside areas of Taiz [22] and lower than those reported among 9.1% of pregnant women in Sana'a city, the capital of Yemen [20].

In the current study, cases with the presence of IgM and absence of IgG antibodies detected in 0.9% (28/2955). Puccio et al., reported that possible acute infection or false positive IgM reaction thus need retest after two weeks; the same result indicates false positive but positive IgG in the second reaction indicates acute infection in the mentioned case [8].

If IgG and IgM antibodies are together presenting at the first evaluation, additional assessments are usually achieved (IgG avidity) to evaluate, the timing of infection [11]. In the current study, IgG and IgM antibodies are both present at 13/2955 (0.4%) among cases looking for healthcare in Jeddah city hospitals, while the absence of specific IgG and IgM antibodies as nonimmune cases detected among 82.8% (2448/2955).

The absence of specific IgG and IgM antibodies in the current study among 82.8% (2448/2955) cases looking for healthcare in

Jeddah city hospitals. In addition, 83.60% (2033/2433) women of productive age. In detail, the huge amount of Toxoplasma seronegative, nonimmune women in the current study is relatively shocking because of the probable hazard of Toxoplasmosis in productive age women, which can prime to congenital toxoplasmosis [23]. In the current study, the prevalence of infants with anti-*T. gondii* IgG among baby boys was 20.60% (59/286), baby girl 18.80% (40/213), and only one baby boys were 0.30% (1/286) anti-*T. gondii* IgM (active toxoplasmosis).

In the current study, the baby boys were observed with a slightly higher prevalence of anti-*T. gondii* IgG 20.60% (59/286) compared to baby girls 18.80% (40/213), and only one baby boy was 0.30% (1/286) anti-*T. gondii* IgM. As IgM is considered an indicator for recent/active infection [13], our information respect that vigorous cases are rare and lower than inactive infections.

Serologic diagnosis of toxoplasmosis providing high sensitivity, but specificity wide-ranging liable on the examination used and false-positive IgM anti-Toxoplasma outcomes. The organ transplantation, leukemia and T-cell deficiency affected immunity led to false-serodiagnosis [24]. But even true positive results must be cautiously understood as IgM antibodies might persevere for one year after toxoplasmosis treatment. Initial diagnosis of *T. gondii* in pregnancy must be upgraded by resolve of anti-Toxoplasma IgG avidity to discriminate former and current toxoplasmosis [12].

PCR of amniotic fluid was valuable to verify or invalidate fetal toxoplasmosis or distinguish infection in lymphadenopathy. B1 the 35-fold repetitive gene evidenced valued PCR goal for *T. gondii* recognition [25]. Quick and reliable judgment of toxoplasmosis is an essential. Grouping of PCR-positive outcome and ELISA-IgG-positive outcome verified the current infection [12]. However, this study provides insight into the seroprevalence of *T. gondii* and may serve as a reference paper to implement control measures among the individuals in Saudi Arabia.

CONCLUSION

Only 15.50% of productive age women looking for healthcare in Jeddah are seropositive for anti-Toxoplasma IgG. This designates that most productive age women are non-immune and had been exposed to infection with *T. gondii*, as evidenced by their seronegative status where anti-Toxoplasma IgG-IgM-antibodies 83.60% (2033/2433). In addition, IgM seropositivity rate (1.80%) of productive age women indicates the possibility of active toxoplasmosis.

The high seronegative anti-Toxoplasma IgG-IgM-antibodies demands the application of health education agendas and prenatal screening as preventive strategies against toxoplasmosis in productive age women, which may pose a probable hazard for congenital toxoplasmosis.

The assessment of the immunological status of the mothers may necessitate second level examinations such as IgG avidity, Immunoblotting, PCR, particularly when the situation is not pure at first assessment.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures followed were in accordance with the ethical standards of on human research from the National Institute on Drug Abuse, National Institutes of Health, Department of Health and Human Services. Ethical approval was obtained from the Institutional Review Board at Ministry of Heath, Directory of heath affairs, Jeddah (1462).

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