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Review Article

Detection of Toxoplasmosis in Pregnant Women Using Polymerase Chain Reaction in Gulf Countries: A Review

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ABSTRACT

Introduction: *Toxoplasma gondii* is an obligate intracellular parasite which causes Toxoplasmosis infection. Polymerase chain reaction is rapid test which can be used to confirm the infection by this parasite in pregnant women to avoid the complications may be happened to the fetus. According to literature review, the disease is wild spread in Gulf countries depend on serological studies. The aim of this article is to explore the situation of the disease by using PCR in Gulf countries and this is will open the door for this type of the study.

Methodology: A search of published data was done electronically using Um Al-Qura University academic digital library which consists of many global data base for nine journals.

Results: Total studies reported in Gulf countries are 5 studies, 3 reported in Saudi Arabia, 1 reported in Kuwait and 1 in Iraq.

Conclusion: These are a few studies, we recommended more studies consist of all cities in every country to detect the disease by PCR.

Key words: Detection, *Toxoplasma gondii*, Pregnant Women, PCR, Gulf Countries.

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INTRODUCTION

Toxoplasma gondii is an obligate intracellular parasite cause Toxoplasmosis infection.[1] Congenital toxoplasmosis is subclinical infection to intrauterine death by acute infection of Toxoplasmosis in pregnant women.[2]

Among immunodeficient individuals, if the patient has defects of T-cell–mediated immunity often occur toxoplasmosis such as those with bone marrow, solid organ transplants, and hematologic malignancies, or acquired immunodeficiency syndrome (AIDS).[3]

Unborn baby can infect by transmit the infection from women infected with toxoplasmosis across the placenta. Infection is less likely to be transmitted to the baby in early of the pregnancy than infection later in the pregnancy. More severe symptoms in the baby in early infection than a later one. Most babies infected during pregnancy show no sign of toxoplasmosis when they are born, but they may develop learning, visual, and hearing disabilities later in life.[4]

PCR is a fast and inexpensive technique used to "amplify" - copy - small segments of DNA. Because significant amounts of a sample of DNA are necessary for molecular and genetic analyses, studies of isolated pieces of DNA are nearly impossible without PCR amplification.[5]

METHODOLOGY

A search of published data was done electronically using Um Al-Qura University academic digital library which consists of many global data base for journals including Springer Online Journal, Web of Science, Wiley Online Library, EBSCO, ProQuest, Medline, Elsevier, in addition to Google scholar and Pubmed.

In the seven countries of Arabian Gulf region, only six studies were found, the majority of studies were done in Saudi Arabia (5 studies), and one study in each Kuwait and Iraq (Table 1). The search was done using the following keywords: Detection, *Toxoplasma gondii*, Pregnant Women, PCR, and Gulf Countries.

RESULTS

Detection of Toxoplasmosis in Pregnant By PCR in Saudi Arabia

Three studies were done on Saudi Arabia in the past 4 years, in 2012 a study targeting B1 gene of *T. gondii* to test it with PCR and compare the result with ELISA was conducted in Aseer, Saudi Arabia. About 137 Sera were obtained from peripheral blood and then the DNA was extracted and amplified by PCR, ELISA was also performed on sera for anti-*T gondii* IgG and IgM, 41% of

cases have B1 gene that can be amplified by PCR, the results were confirmed by DNA sequencing, 6.5% of cases were detected by IgM-ELISA assay, 38.6% of cases had a positive result of immunoglobulin G detection.[6] In 2015 two studies were done, one was published in 17th of May, 203 samples were tested using PCR on two stages; in the first stage the PCR was applied to identify an area by the amplification of gene B1. With one sample used as a negative control and other one as a positive control, the primers used were (B1F1 50-GGAACTGCATCCGTTCATGAG-30),
(BIR1 50-TCTTTAAAGCGTTCGTGGTC-30),
(B1F2 50-TGCATAGGTTGCAGTCACTG-30),
(B1R2 50-GGCGACCAATCTGCGAATACACC-30) a cycle of three steps: 1. Denaturation for 30 seconds at 95 C, 2. Annealing for 30 s at the same temperature, 3. Extension for 30 s at 72 C) were repeated 39 times, the steps were also done in the second stage with a nested PCR with other dimers
(SAG2F4 50-GACCTCGAACAGGAACAC-30).
(SAG2R450-GCATCAACAGTCTTCGTTGC-30),
(SAG2F 50-GAAATGTTTCAGGTTGCTGC-30),
(SAG2R250-GCAAGAGCGAACTTGAACAC-30).[7]
In December, a comparison between ELIZA and GRA6-coding fragment PCR was done in Jazan, the ELIZA were positive in 27.9% positive, and PCR was positive in 13.3%[8]

Detection of Toxoplasmosis in Pregnant By PCR in Kuwait

Iqbal and Khalid in Kuwait were collected 41 samples from peripheral blood and analyzed by Nested PCR and found about 6 of 41 (14.6%)were positive to *Toxoplasma* DNA. They used two types of primers, Inner primers were
(5-GGAACTGCATCCGTTCATGAG-3)
(5-TCTTTAAAGCGTTCGTGGTC-3), outer primers were
(5-TGCATAGGTTGCAGTCACTG-3)
(5-GGCGACCAATGTGCGAATAGACC-3).[9]

Detection of Toxoplasmosis in Pregnant By PCR in Iraq

In Iraq, another comparison was done, 130 high risk samples and 25 control samples were taken, 50 samples were IgM positive or IgG positive or both, 15 of them were low IgG avidity antibodies, 25 selected samples underwent PCR, 15 IgM positive with low IgG avidity samples out of 15 were positive for toxoplasmosis, only 1 IgM positive with high IgG avidity sample out of 3 was positive for toxoplasmosis, none of the 7 IgM negative samples was positive for toxoplasmosis.

The specific primers for used for amplification of the sequence of T. gondii DNA were: (forward primer) 5'-AAG-GCG-AGG-GTG-AGGAT--3', MW 5693, melting temperature 65.3 °C; (reverse primer)5'-GCG-TCG-TCT-CGT-CTGGAT--3', MW 5786, melting temperature 66.2 °C.[10]

Table 1: The Results of Search with Different Categories in Different Countries

Methods	Countries						
	Saudi Arabia	United Arab Emirates	Kuwait	Iraq	Oman	Bahrain	Qatar
Medline	0	0	1	0	0	0	0
Elsevier	1	0	0	0	0	0	0
PubMed	2	0	1	1	0	0	0
EBSCO	0	0	1	0	0	0	0
Google Scholar	1	0	1	0	0	0	0
Springer Online Journal	0	0	0	0	0	0	0
Science Direct	1	0	1	0	0	0	0
Web of Science	2	0	1	0	0	0	0
Wiley Online Library	0	0	0	0	0	0	0
ProQuest	0	0	1	0	0	0	0
Total	**7**	**0**	**7**	**1**	**0**	**0**	**0**

Table 2: The specific primers for used for amplification of the sequence of T. gondii DNA in different studies.

References	Type of samples	Prevalence of Rate	Country	Primers	Gene	Type of PCR	No. of Samples
Jamshaid Iqbal and Nabila Khalid 2009	Peripheral blood	6 of 41 (14.6%)	Kuwait	(5-GGAACTGCATCCGTTCATGAG3) (5-TCTTTAAAGCGTTCGTGGTC-3) (5-TGCATAGGTTGCAGTCACTG-3) (5-GGCGACCAATGTGCGAATAGACC-3)	B1	Nested	41
		50 OF 155 (32.3%)	Iraq	(5'-AAG-GCG-AGG-GTG-AGGAT--3') 5'-GCG-TCG-TCT-CGT-CTGGAT--3'			155
Bin D SM, Almushait MA 2012	Peripheral blood		Saudi Arabia	5'-GGAACTGCATCCGTTCATGAG-3` 5'-TCTTTAAAGCGTTCGTGGTC-3' 5'-TGCATAGGTTGCAGTCACTG-3' 5'-GGCGACCAATCTGCGAATACACC-3'	B1		137
Alghamdi J, Elamin MH, Alhabib S			Saudi Arabia	50-GGAACTGCATCCGTTCATGAG-30 50-TCTTTAAAGCGTTCGTGGTC-30 50-GGCGACCAATCTGCGAATACACC-30 50-GACCTCGAACAGGAACAC-30	B1	nested	203
Eidi AM 2015		13.3%.	Saudi Arabia				

CONCLUSION

From this comprehensive systematic review about Detection of toxoplasmosis in pregnant women using polymerase chain reaction we found a few studies in Saudi Arabia, Kuwait and Iraq. The big issue here is the limited number of geographical areas covered and we recommended more studies consist of all cities in every country to detect the disease by PCR.

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