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Study of Risk Factors for *Toxoplasma gondii* infection in Tripoli

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ABSTRACT

Background and Objective: *Toxoplasmosis is caused by Toxoplasma gondii is an obligate intracellular parasite which infects both humans and animals as a zoonotic pathogen wide spread in nature. This study was aimed at comparing the prevalence of toxoplasmosis in human at random population and hemodialysis patients as immunocompromised individuals, and identify risk factors that affect infection rate in different areas from Tripoli by using questionnaire.* ***Methods****: Serum samples of 2170 were collected from human population, out of it 50 serum samples from hemodialysis patients during the period from February 2016 to November 2016, were examined for the presence of antibodies of Toxoplasma gondii (Immunoglobulin G) by immunoassay system. The seroprevalence in hemodialysis patients of Toxoplasmosis was (52%).* ***Results****: Age, study level, occupation, blood transfusion, marital status, problems during pregnancy, congenital disorder, and hemodialysis disease were statistically significantly associated with infection rates. The gender, contact with cats and dogs, source of drinking water and barbecue eating were not associated with infection.* ***Conclussion****: To conclude, with the publication of health education and disease definition will be recorded infection reduced, hemodialysis patients who are susceptible to Toxoplasma infection. Therefore, patients undergoing hemodialysis should be screened for Toxoplasma.*

Keywords: ***Toxoplasmosis, Toxoplasma gondii, obligate intracellular parasite, zoonotic pathogen.***

INTRODUCTION

Toxoplasmosis is a contagious and a zoonotic disease caused by an obligate intracellular protozoan parasite *Toxoplasma gondii* [1]. *Toxoplasma* was first discovered in gondii, North Africa rodent [2]. *T. gondii* is one of the most common parasitic infection of human and other warm-blooded domesticated and wild animals [3]. It has been found worldwide in nearly one-third of the human population. The incidence of infection may vary in different parts of a world. The causes for this variation are environmental condition, cultural habits, and animal species [4].

T. gondii is transmitted to human by ingestion raw contaminated meat, ingestion sporulated oocystes in unwashed vegetables or untreated water, contact with cats, and drinking unpasteurized milk. Also it can transmitted by organ transplantation and blood transfusion [5]. *T. gondii* cause serious or even fatal effects on a fetus whose mother first contracts the disease during pregnancy or on an immunocompromised human. When *T. gondii* occurs for the first time during pregnancy, the parasite can cross the placenta, possibly leading to hydrocephalus, intracranial calcification, and chorioretinitis [6]. The organism of Toxoplasmosis has two life cycle, the sexual part of the life cycle in cats (definitive host), and the asexual part of the life cycle can take place in any warm- blooded animal (intermediate host) [7].

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METHODOLOGY

A Total of 2170 blood samples collected from human population and hemodialysis patient (Total 50 blood sample) as immunocompromised individuals during the period from February 2016 to November 2016. All blood samples and an information (a questionnaire) collected together.

Approximately 5ml venous blood collected in sterile conditions, these samples were left to clotted for 15-30 minutes to avoid hemolysis, then the sera were separated into microtubes after centrifugation at 4000 rpm for 5 minutes, then the microtubes were stored at -20 C° until analysis for presence of antibody of *Toxoplasma gondii* (IgG) by immunoassay system (Beckman coulter).

Data analysis was performed with computer software SPSS (statistical package for social sciences, version 16 – 2007), statistical significance was taken at p of ≤0.05.

RESULTS

Table 1: The prevalence of *T. gondii* - specific IgG among total tested samples

Total of Tested Samples	No. of IgG Positive Samples (%)	No. of IgG Negative Samples (%)
2170	514 (23.7%)	1656 (76.3%)

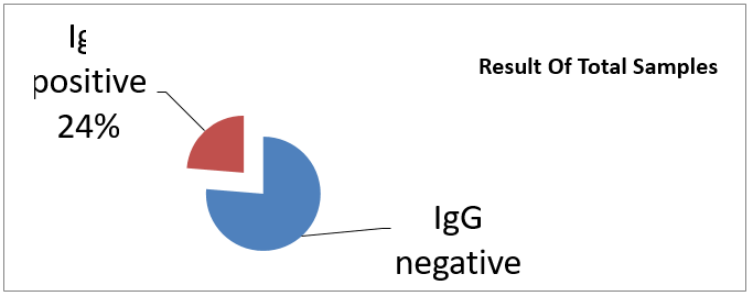

Figure 1: The prevalence of *T.gondii*- specific IgG among total tested samples

Table 2: The relation between *T. gondii* - specific IgG and the age of tested samples

Samples	>1-<10	≥10 -<20	≥20 -<30	≥30-<40	≥40-<50	≥ 50-<60	≥60-<70	≥70-<80	≥ 80-<90	Total
Positive No.	12	180	85	106	65	40	12	11	3	514
%	6.2	16	32.3	37.6	39.6	47.6	42.9	47.8	60	23.7
Negative No.	181	948	178	176	99	44	16	12	2	1656
%	93.8	84	67.7	62.4	60.4	52.4	57.1	52.2	40	76.3
Total	193	1128	263	282	164	84	28	23	5	2170

The results showed that there was a significant relation between the positivity and the age of tested samples ($p < 0.05$).

Table 3: The relation between *T. gondii* - specific IgG and the gender of tested samples

Samples	Male	Female	Total
Positive No.	211	303	514
%	23.7	23.7	23.7
Negative No.	678	978	1656
%	76.3	76.3	76.3
Total	889	1281	2170

The results showed that there was an insignificant relation between the positivity and the gender of tested samples ($p > 0.05$).

Table 4: The relation between *T. gondii* - specific IgG and study level of tested samples

Study level	Below school age	Basic	Middle	Graduate	Postgraduate	Illiterate	Total
Positive No.	4	168	203	86	1	52	514
%	9.3	16.2	28.5	33.2	33.3	45.2	23.7
Negative No.	39	869	510	173	2	63	1656
%	90.7	83.8	71.5	66.8	66.7	54.8	76.3
Total	43	1037	713	259	3	115	2170

The results showed that there was a significant correlation between the positivity and the study level of tested samples ($p < 0.05$).

Table 5: The relation between *T. gondii* - specific IgG and the occupation of tested samples

Occupation	Business man	Administrative	Educational	Medical staff	Security	Student	Jobless	Total
Positive No.	27	53	103	41	3	194	93	514
%	38.6	45.7	35.9	31.5	60	15	34.3	23.7
Negative No.	43	63	184	89	2	1097	178	1656
%	61.4	54.3	64.1	68.5	40	85	65.7	76.3
Total	70	116	287	130	5	1291	271	2170

The results showed that there was a significant correlation between the positivity and the occupation of tested samples ($p < 0.05$).

Table 6: The relation between *T. gondii* - specific IgG and contact with cats

Samples	Contact with cats; Yes	Contact with cats; NO	Total
Positive No.	120	394	514
%	27.1	22.8	23.7
Negative No.	322	1334	1656
%	72.9	77.2	76.3
Total	442	1728	2170

The results showed that there was insignificant correlation between the positivity and contact with cats ($p > 0.05$)

Table 7: The relation between *T. gondii* - specific IgG and contact with dogs

Samples	Contact with Dogs; Yes	Contact with Dogs; No	Total
Positive No.	107	407	514
%	19.9	25	23.7
Negative No.	432	1224	1656
%	80.1	75	76.3
Total	539	1631	2170

The results showed that there was insignificant correlation between the positivity and contact with dogs ($p > 0.05$).

Table 8: The relation between *T. gondii* - specific IgG and barbecue eating

Samples	Barbecue eating; Yes	Barbecue eating; No	Total
Positive No.	401	113	514
%	23.7	23.7	23.7
Negative No.	1292	364	1656
%	76.3	76.3	76.3
Total	1693	477	2170

The results showed that there was insignificant correlation between the positivity and barbecue eating ($p > 0.05$).

Table 9: The relation between *T. gondii* - specific IgG and source of drinking water

Samples	Mineral Water	Tap water	Wells	Total
Positive No.	50	419	45	514
%	26.3	23.2	25.7	23.7
Negative No.	140	1386	130	1656
%	73.7	76.8	74.3	76.3
Total	190	1805	175	2170

The results showed that there was insignificant correlation between the positivity and the source of drinking water ($p > 0.05$).

Table 10: The relation between *T. gondii* - specific IgG and blood transfusion

Samples	Blood Transfusion; Yes	Blood Transfusion; No	Total
Positive No.	61	453	514
%	40.7	22.4	23.7
Negative No.	89	1567	1656
%	59.3	77.6	76.3
Total	150	2020	2170

The results showed that there was a significant correlation between the positivity and blood transfusion ($p < 0.05$).

Table 11: The relation between *T. gondii* - specific IgG and the marital status of females the studies samples

Samples	Married; Yes	Married; No	Total
Positive No.	125	178	303
%	37	18.9	23.7
Negative No.	213	765	978
%	63	81.1	76.3
Total	338	943	1281

The results showed that there was a significant correlation between the positivity and the marital status of females the studies samples ($p < 0.05$).

Table 12: The relation between *T. gondii* - specific IgG and the problems during pregnancy

Samples	Problems During Pregnancy; Yes	Problems During Pregnancy; No	Other Samples	Total
Positive No.	70	41	403	514
%	40	30.1	21.7	23.7
Negative No.	105	95	1456	1656
%	60	69.9	78.3	76.3
Total	175	136	1859	2170

The results showed that there was a significant correlation between the positivity and the problems during pregnancy ($p < 0.05$).

Table 13: The relation between *T. gondii* - specific IgG and the congenital disorders

Samples	Congenital Disorders; Yes	Congenital Disorders; NO	Other Samples	Total
Positive No.	8	103	403	514
%	42.1	35.6	21.6	23.7
Negative No.	11	186	1459	1656
%	57.9	64.4	78.4	76.3
Total	19	289	1862	2170

The results showed that there was a significant correlation between the positivity and the congenital disorders ($p < 0.05$).

Table 14: The relation between *T. gondii* - specific IgG and hemodialysis

Samples	Hemodialysis	Normal	Total
Positive No.	26	488	514
%	52	23	23.7
Negative No.	24	1632	1656
%	48	77	76.3
Total	50	2120	2170

The results showed that there was a significant correlation between the positivity and hemodialysis ($p < 0.05$).

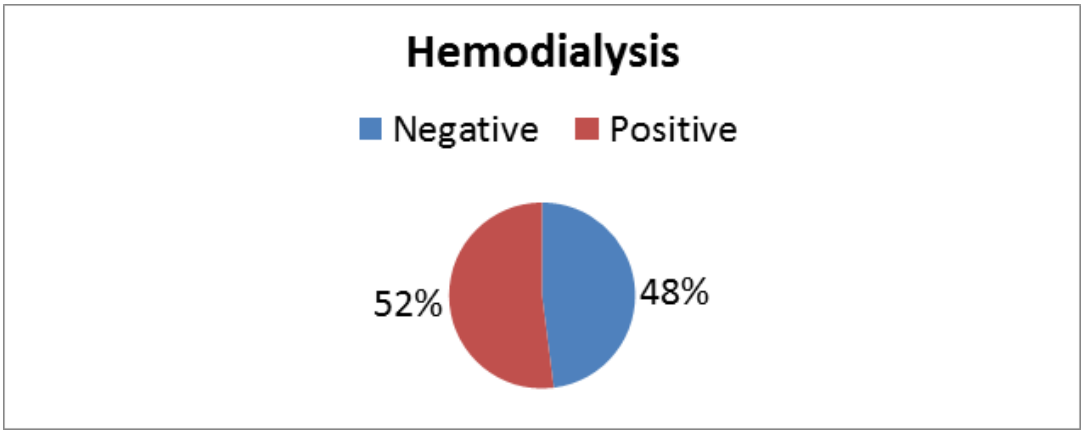

Figure 2: The relation between *T. gondii* - specific IgG and hemodialysis

DISCUSSION

In this study the significant correlation showed between seropositivity and age ($p < 0.05$). The infection increased with age, older group are more susceptible to the parasite than other groups. Similar result in Libya was obtained by Al-zaaiydi (2007), who mentioned that the infection increased with age highest rate of infection was (69.3%) in 46-50 age group [8]. Analogous results reported in Italy (Valcavi et al, 1995) [9], United States (Jones et al, 2001) [10], and Saudi Arabia (Al-Harthi et al, 2006) [11]. This study also revealed insignificant correlation between the prevalence of *T. gondii* specific IgG and gender, that means in males and females are equally exposed to the risk of *Toxoplasma* infection similar results were observed in several studies done.

In Libya by Al-Jhbali (2008), who mentioned that (65.7%) in males and (68.1%) in females [12], while Al-Qurashi et al, (2001) indicated in Saudi Arabia, (12.0 %) in males and (13.0 %) in females [13]. On thr other hand, these results are not similar to another study done by Gashout et al, (1992) where the infection in females (41.13%) higher than males (17.87%) [14].

There was significant correlation between seropositivity found in this study and study level of tested samples higher infection reported in illiterate (45.2%). The results were similar to another result by Fallah et al, (2008) in Iran the highest prevalence rate observed in illiterate (61.5%) [15]. The infection decrease in cases with educational background than non educated cases.

This study showed there is statistical significant between occupation and rate of infection, security reported (60%) but this group was very small, this rate in infection was high, student samples reported lowest infection (15%), these results are consistence with results by Al-Qurashi et al, (2001) in Saudi Arabia [13]. This difference may be due to life style and exposure to infection. In this study, insignificant relation between seropositivity and contact with cats, in the previous studies reveled similar results by (Al-Harthi et al, 2006) in Saudi Arabia [11]. On contrary, results of Al-Jhbali, (2009) in Libya, reported significant relationship between positivity and contact with cats [12]. Also in my study insignificant relation between seropositivity and contact with dogs, similar results reported by (Sharif at el, 2010) [16], but in study by (Azbedah 2009) reported statistical significant between seropositivity and samples that had a contact with dogs [17], the fur of dogs that come in and contact with cat faces may be a vector for mechanical transmission of oocystes to humans. The absence of a statistical significant relationship between the prevalence of *T. gondii* specific IgG and source of drinking water in this study, these results were similar to that obtained by (Azbedah, 2009) in Tripoli [17], while not similar with documented by Nijem and Al-Amleh (2009) in Palestine [18].

Drinking of unclean water e.g: rain, river, and mountain supplies these collected water is often used for drinking without boiling or addition of chloride for sterilization such water is expected to be highly contaminated with different organisms, including *Toxoplasma* oocystes (Nijem and Al-Amleh, 2009) [18].

In this study the prevalence of *T. gondii* was not significantly among individual samples who were consumed barbecued meat and individual samples that never consumed it, I found similar report from Saudi Arabia, (Al-Harthi et al, 2006) [11], while not similar with studies showed that consumption of under cooked meat was statistically significantly associated with higher infection rates in Darna, Libya (56%) El-khgkhag (2010) [19], Iran (61.9%) Fallah et al, (2008) [15]. The answers to the questions enlisted in questionnaire showed significant relation between the prevalence of Toxoplasmosis and women who had problems during pregnancy.

This finding is similar to that found in Libya (Al-Jhbali, 2009) [12], and differs from that found in Saudi Arabia (Al-Harthi et al, 2006) and there was significant relation between seropositivity and samples that had delivered with congenital disorders [11], this results not similar to that obtained by (Al-Jhbali, 2009) in Libya [12]. Also the seropositivity found in this study significant higher in married status samples than not married. This may be attributed to the local facts that married statue of females are responsible for houses and contacts with vegetables and meat during meal preparation. This results were not similar to another results in Libya (Al-Jhbali, 2009) who showed that (68.1%) but not statistically significant [12]. This study also showed a significantly higher between the seropositivity and blood transfusion, this result is not similar to studies done before in Malaysia (Nissapatorn et al, 2011) [20].

In this study seroprevalence of Toxoplasmosis in hemodialysis patient was (52%) with statistical significance, this results was found to be lower than those found in Turkey (56.06%) (Yazar et al, 2003) [21], and (76.5%) (Ocak et al, 2005) [22], in Iran (59.1%) (Solhjor et al, 2010) [23], all these studies reported statistical significance. This finding may be due to the hemodialysis patient having immunocompromised and susceptible to infection.

CONCLUSION

The results confirmed hemodialysis patients are risk group for infection. According to marital status for women, prevalence reported in married higher than single women. The population blood transfusion more affected than none. The publication of health education and disease definition will be recorded infection reduced in the coming years.

DISCLOSURE STATEMENT

Conflict of interest statement was not declared.

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