International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

# Prevalence Rate of Toxoplasmosis and its Effects on Some Liver Functions in Blood Samples of Volunteers' Students

**Amenah A. Ibrahim[1], Ahlam J. Taher[1], Aisha S. Obaid[1], Hazima M. Al-Abassi[1]**

[1]College of Education for Pure Science Ibn Al-Haitham / University of Baghdad

**Abstract:** ***Recently, young people have shown a desire to keep cats as pets, despite being threatened with health problems including toxoplasmosis. Therefore, the current study was aimed to detect toxoplasmosis infections among of volunteers students as well as spreading health awareness among students and knowledge about the importance of this disease. Prevalence rate and effects of liver functions were tested by measured levels of Aspartate aminotransferase( AST) and Alanine aminotransferase (ALT) enzymes while the OnSiteToxo IgG/IgM combo rapid test was used in the diagnosis of the disease. The blood samples were collected from 76 volunteers (35 male and 41 female). The results showed that, the total percentage of infections was 27.6% and all infections as a chronic type. According to the gender, the percentage was 47.6% (males) and 52.4% (females) of the 21 infection. In the infected group, the level of ALT enzyme was increased significantly, but there's no significant impact elevation in the AST enzyme with the control groups.***

**Keywords:** Toxoplasma gondii, Toxoplasmosis, Liver enzymes, The OnSiteToxo IgG/IgM Combo Rapid test, Rapid chromatographic test

## 1. Introduction

*Toxoplasma gondii* is a complex eukaryotic parasite that appears to have all the cellular machinery required for independent life, but that has adopted an obligate intracellular existence [1]. It is a coccidian parasite of felids with humans and other warm-blooded animals serving as intermediate hosts, It belongs to the subphylum Apicomplexa, class Sporozoa and exists in nature in many forms: macro- and microgametes, the oocyst (which releases sporozoites), the tissue cyst (which contains and may release bradyzoites), and the tachyzoite [2]. Toxoplasmosis is an important zoonosis with medical and veterinary importance worldwide, therefor it is one of the most well studied parasites [3, 4].

The disease can be due to congenital infection or acquired infection after birth [5]. It is mainly contracted by ingesting undercooked or raw meat containing viable tissue cysts, or by ingesting food or water contaminated with oocysts [3]. Rarely, infection may be transmitted through blood or leucocyte transfusion or organ transplantation; it may also be acquired by laboratory [6]. Cats usually become infected with *T. gondii* when they initially begin to hunt and ingest an infected bird or small mammal [7].

Laboratory diagnosis may be made by microscopic demonstration of the parasite by its isolation, or by serological tests, but the most common method of laboratory diagnosis is by serology. Several serological tests are available; these include the Sabin-Feldman dye test, indirect immunofluorescence, indirect haemagglutination, complement fixation and ELISA [6]. Rapid chromatographic test considered as a good test for detection of IgG and IgM anti *Toxoplasma gondii* antibodies in both acute and chronic Toxoplasmosis [8].

## 2. Materials and Methods

Infection with the *Toxoplasma gondii* may cause liver disease [9]. Laboratory liver tests are broadly defined as tests useful in the evaluation and treatment of patients with hepatic dysfunction, some of the enzymes and the end products of the metabolic pathway which are very sensitive for the abnormality occurred may be considered as a biochemical marker of liver dysfunction[10]. Alanine aminotransferase (ALT), Aspartate aminotransferase (AST) and Alkaline phosphatase (ALP) enzymes tests are widely applied for detected of liver function, but in this article ALT and AST were used as an indicators for infected of toxoplasmosis groups.

**A- The collection of samples**

Blood samples (5ml) were collected from 76 volunteers students (males and females) at the biology department's in the College of Education for Pure Science Ibn Al-Haitham/University of Baghdad. Sera were collected and divided into two groups, one for the diagnosis of toxoplasmosis, and another for the studying liver functions, and stored at -20°C until use.

**B-Diagnosis of toxoplasmosis**

The OnSiteToxo IgG/IgM combo rapid test was used to diagnose toxoplasmosis according to the kit instructions supported by the CTK biotech company/USA.

**C- Liver functions tests**

The levels of ALT and AST enzymes into the blood samples were measured according to the kit instructions supported by the Randox company, UK.

**D-Statistical analysis**

The data were analyzed by using statistical software package IBM SPSS (version 24). The normality of quantitative variables was tested by the Kolmogorov-Smirnov test. The differences between levels of ALT, AST in the infected and control groups tested by using Mann-Whitney U test.

## 3. Results

The sample study for infected and uninfected students by toxoplasmosis are summarized and shown in the Table (1).

**Table 1:** The total percentage of infection of toxoplasmosis

| *No. of students* | | *Per. %* |
|---|---|---|
| Infected | 21 | 27.6 |
| Uninfected | 55 | 72.4 |
| Sum. | 76 | 100 |

Table 2 has shown the percentage of the infected group depending on the gender.

**Table 2:** The percentage of infection according to gender

| *Gender* | *No.* | *Per.%* |
|---|---|---|
| Male | 10 | 47.6 |
| Female | 11 | 52.4 |
| Sum. | 21 | 100 |

The levels of ALT and AST enzymes in the infected group compared with the control, have illustrated in Figure 1.

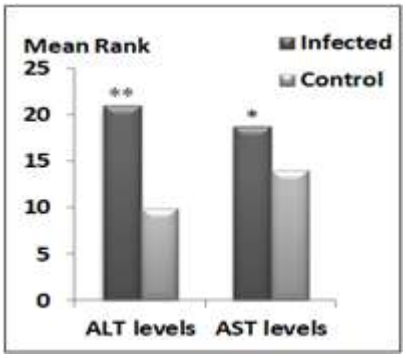


**Figure 1:** ALT and AST levels in the Infected and control groups

** Significant elevation.
***** Not significant elevation.
*P* value < 0.05.

## 4. Discussion

In the current study, the onsite toxo IgG/IgM combo rapid test is used, the seroprevalence of infection is 27.6% from 76 students (Table 1). This result almost agrees with Khalil *et al*. [11], where the percentage of infection is 27.13%. while the percentage of infection is 41-52%, 14.72%, 32.4%, 68.57% and 5.87% in the study of Yacoub*et al*. [12], Saleh [13], Tawfeeq*et al*. [14], Al-Khamesi*et al*. [15] and Frimpong*et al*. [16] respectively. This variation may be due to differences in the volume of the samples tested, the method used in the diagnosis, heterogeneity of cultural levels as well as the health awareness of the study area.

All infections in this study are of the chronic type and agree with the result of Frimpong*et al.* [16].

According to the gender, there are little differences in the percentage of infection between males (47.6%) and females (52.4%) (Table 2). These results agree with Khalil *et al.* [11]. In contrast Salman [17], who pointed to a higher rate of infection in females compared to males. Goñi*et al.* [18] mentioned to the important role of rapid immunochromatographic (IC) tests in the future diagnosis of parasitic disease because these tests are easy to implement and does not require sophisticated equipment or experienced staff to conduct them. In the other side, Wang *et al.* [19] have been compared IC with ELISA for detecting infection by *T. gondii* and concluded that IC could be an effective methodto detect infection by*T. gondii*.

Concerning to liver enzymes, there is a significant elevation of the ALT levels in the infected group compared to the control group, while the elevations of AST levels are not significant compared to the control group (Figure 1). Burtis*et al.* [20] was mentioned that in most types of liver disease, the activity of ALT enzyme was higher than AST. Whilst the increasing of ALT and AST levels were significant in the study samples which carried out by Al-Kaysi *et al.* [21], Mahmood & Dawood [22], Al-Jowari& Hussein [23], Mahmood [24] and Al-Khamesi*et al.* [15].

## 5. Conclusion

Despite the many studies conducted on toxoplasmosis, the infection is still widespread until today. The toxoplasmosis infections may be a cause of liver disorders as shown in the evidenced by the current study as well as supported by several other studies. As can be said, the high level of liver enzymes in some patients may give an indicator for infection by several diseases including toxoplasmosis.

## References

[1] Schwartzman, J.D. (2001). Toxoplasmosis. In: Gillespie, S.H. & Person, R.D. (Eds.). Principal and practice of clinical parasitology. John Wiley & Sons, Chichester: 113-138.
[2] Montoya, J.G.; Boothroyd, J.C. & Kovacs, J.A. (2017). *Toxoplasma gondii.* In: Bennett, J.E.; Dolin, R. &Blaser, M.J. Infectious disease essentials., Elsevier, USA: 424-425.
[3] Liu, Q.; Wang, Z.D.; Huang, S.Y.& Zhu, X.Q. (2015). Diagnosis of toxoplasmosis and typing of Toxoplasma gondii. Parasite & vectors,8(292): 1-4.
[4] Dubey, J.P. (2010). Toxoplasmosis of animals and humans 2nd edn. CRC Press, USA: 338.
[5] Jones, J.L. & Dubey, J.P. (2012). Foodborne toxoplasmosis.Clin. Infect. Dis., 55(6):845-851.
[6] Paniker, C.K.J. (2007). Text book of medical parasitology. 6thedn., Jaypee Bros. Med. Pub., New Delhi: 235pp.
[7] Torrey, E.F. &Yolken, R.H. (2013). *Toxoplasma* oocysts as a public health problem. Trends Parasitol., 29(8): 380-384.
[8] Hassan, J.S.; Ghazi, H.F. & Ahmed, A.A.H. (2010). Evaluation of rapid chromatographic immunoassay with latex agglutination test and ELISA for diagnosis of human toxoplasmosis. J. Fac. Med. Baghdad, 52(4):468-70.
[9] Alvarado-Esquivel, C.; Torres-Berumen, J.L.; Estrada-Martínez, S.; Liesenfeld, O. & Mercado-Suarez, M.F. (2011).Toxoplasma gondii infection and liver disease: a case-control study in a Northern Mexican population. Parasit Vectors, 4: 1-7.

[10] Gowda, S.; Desai, P.B.; Hull, V.V.; Math, A.K.;Vernekar, S.N. & Kulkarni, S.S. (2009). A review on laboratory liver function tests. Pan Afr. Med. J., 3(17): 1-11.
[11] Khalil, H.I.; Merdaw, M.A.; Abdullah, A.M.; El-Hashimi, W.K.; Al-Bashier, N.M. &Mohemmad, H.J. (2016). Estimation of *Toxoplasma gondii* infection by Serological and Immunohistochemical methods in Baghdad City-Iraq. Int. J. Adv. Res., 4(4): 272-278.
[12] Yacoub, A.A-H.: Bake, S.; Hameed, A-M.; Al-thamery, A.A- A.&Fartoci, M.J. (2006). Seroepidemiology of selected zoonotic infections in Basra region of Iraq. Eest. Mediterr. Health J., 12(1/2): 112-118.
[13] Saleh, M.A. (2011). Determination of antibodies (IgG, IgM). Against *Toxoplasma gondii* in some Iraqi individuals by usingELISA technique. Baghdad Sci. J.,8(4): 940-946.
[14] Tawfeeq, W.F.; Saeed, A. R. KH. & Muslim, T.M. (2012). Seroprevalence and Associated Factors of Toxoplasma Infection among Sample of Pregnant Women in Wassit Governorate- Iraq. Med. J. Babylon, 9(4): 873- 882.
[15] Al-Khamesi, M.B.; Al-Sibahi, Z.N.; Al-obaidy, L.H.A. & Hilal, Z.H. (2016). Studying of kidney, liver functions and some blood ions in toxoplasmosis patients. 27(1): 43-46.
[16] Frimpong, G.; Mahasa, M.; Sitali, L. &Michelo, C. (2017). Seroprevelence and determinants of toxoplasmosis in pregnant women attending antenatal clinical at the university teaching hospital, Lusaka, Zambia. BMC. Infect. Dis., 17(10): 1-8.
[17] Salman, Y.J. (2014). Watching of *Toxoplasma gondii* antibodies among peoples in Kirkuk Province from 1993 to 2012 by using different serological tests. Int. J. Curr. Microbiol. App. Sci., 3(9): 923-932.
[18] Goñi, P.; Martín, B.; Villacampa, M.; García, A.; Seral, C.; Castillo, F.J. &Clavel, A. (2012). Evaluationof an immunochromatographic dip strip test forsimultaneous detection of Cryptosporidium*spp*,*Giardia duodenalis*, and *Entamoeba histolytica*antigensin human faecal samples. Eur. J. Clin. Microbiol.,31:2077–2082.
[19] Wang, Y-H.; Li, X-R.; Wang, G-X.;Yin, H.; Cai, X-P.; Fu, B-Q &Zhang, D-L. (2011). Development of an immunochromatographic strip for the rapid detectionof Toxoplasma gondii circulating antigens. Parasitol.Int., 60:105-107.
[20] Burtis, C.A.; Ashwood, E.R. &Bruns, E.R. (2008). Enzymes. In: Panteghini, M. &Bais, R. (Eds.). Tietz fundamentals of clinical chemistry. Saunedrs Elsevier, USA: 17-33.
[21] Al- Kaysi, A.M.; Eid, R.A.A. &Fahmy, BGA (2010). Biochemical studies on the effect of Toxoplasmainfection on liver and kidney functions in mice. EgyptJ. Path. Clinic. Path., 23(1): 174-185.
[22] Mahmood, N.A.J & Dawood, M.N. (2012). Liver function tests in toxoplasmosis. Ann. Coll. Med. Mosul, 38(2): 68-72.
[23] Al-Jowari, S.A-K. & Hussein, D.K. (2014). Effect of toxoplasmosis Infection on Liver and Kidney Functions among Pregnant Women in Abo-Gharib District-Iraq. Iraqi J.Sci., 55(1): 101-105.
[24] Mahmood, O.I. (2016). Effect of toxoplasmosis on hematological, biochemical and immunological parameters in pregnant women in Tikrit city, Iraq. Tikrit J. Pure Sci., 21(3):24-27.