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Seroprevalence of *Toxoplasma gondii* in Schizophrenia Patients Referred to Abdelaal Alidrisi Psychiatric Hospital

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Abstract

Introduction: Schizophrenia is a severe neuropsychiatric disorder of unknown etiology. Toxoplasma has emerged as an interesting candidate as a possible cause of some cases of schizophrenia. Studies have found a high seroprevalence of *T. gondii* in schizophrenia patients Methods: In the present study 82 patients suffering from schizophrenia (68 were male and 14 were female) were examined for the presence of IgM antibodies against *T. gondii* by enzyme-linked immunosorbent assay (ELISA). **Results:** The positivity rate of anti-Toxoplasma gondii IgM antibodies among individuals with schizophrenia (4.5%), there were associations between *T. gondii* seropositivity and gender. **Conclusion:** Toxoplasma gondii infection was not significantly associated with schizophrenia. Schizophrenia medication, low cat existence in our study area and rare consumption of undercooked meat reasons of our low seropositivity.

Keywords: *Toxoplasma gondii*, Schizophrenia, Seroprevalence

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Introduction

Until recent years, the idea that an infectious parasite might be a cause of schizophrenia would have met with two major conceptual barriers. The first was the idea that schizophrenia is an actual disease of the brain while the second barrier was the idea that a parasite might cause a chronic brain disease. Research on *Toxoplasma gondii* as a possible cause of schizophrenia has become prominent in the past decade [(1)].

T. gondii is a protozoan parasite found worldwide; it is an obligate intracellular protozoan parasite belongs to phylum Apicomplexa. [(2)]. *Toxoplasma* infects varieties of intermediate hosts, including livestock, and humans, but the cat remain final host [(3)].

Humans may become Infection with *T. gondii* occurs pre- natal or post-natally. infected with *T. gondii* by eating food or drinking water contaminated with oocysts shed by cats or by ingesting undercooked or raw meat containing tissue cysts from sheep, goats, or other animals that have acquire infection from cats [(4) (5)]. Congenital infection also occurs and can be very fatal to the fetus [(6)].

The clinical spectrum of infection with *T. gondii* in humans varies from asymptomatic latent infection to severe disease affecting eyes, lymph nodes and central nervous system, it can cause abortion and still births after primary infection in pregnant women, the parasite forms cysts preferentially in the brain and establish chronic infection, [(7)] .

Most of *Toxoplasma* infections are asymptomatic to mild and in some infected persons cervical lymphadenopathy, ocular disease

[2] [8]; central nervous system manifestation [9] and brain abscess may occur [10]. In congenital toxoplasmosis the organisms may cross the placenta and infect the fetus. The symptoms of congenital toxoplasmosis include hydrocephaly, microcephaly, intracranial calcifications, damage to the retina, and mental retardation [11].

In humans, acute infection with *T. gondii* can produce psychotic symptoms similar to those displayed by persons with schizophrenia [12]. Consequently, *T. gondii* may be a candidate infectious agent related to schizophrenia.

Similar psychiatric complications and meningoencephalitis can also occur in *T. gondii*-infected immunocompetent human hosts [13] [14], and human studies revealed that latent toxoplasmosis may cause personality changes [15] and decreased IQ [16]. Although a potential link between *T. gondii* and neuropsychiatric disorders, particularly schizophrenia, has been proposed [17], controversial results have also been reported.

A review of 114 cases acquired toxoplasmosis noted the psychiatric disturbances were very frequent in 24 of the case patient [18] additional studies have documented that persons with serologic evidence of toxoplasmosis have evidence of psychiatric changes in the absence of a history of clinically apparent *Toxoplasma* infection.

Materials and methods

Total numbers of eighty two patients diagnosed clinically by psychiatrics in Abdelaal Alidrisi Psychiatric Hospital Khartoum Sudan were enrolling in this study during the period from December 2012 to July 2013.

Our patients age range between (20 - 70), 20.7% of our patients had family history of psychiatrics while other had not.
Blood was obtained from eighty two schizophrenia patient; Serum was separated from whole blood by centrifugation at 1000 r.p.m. and the sera were stored at -20 C until; the analysis. Serum was examined with enzyme-linked immunoassays for the presence of anti-Toxoplasma IgM antibodies.

The levels of specific IgM antibodies to *T. gondii* in the serum samples were measured using enzyme linked immunosorbent assay (ELISA) technique according to the manufacturer's instructions(SERION ELISA *classic* immunoassays)

This study was approved by the Research Ethical Committee of west Nile College, department of medical laboratory, Sudan. All participants were provided written informed consent after the study purpose and procedures were explained.

Results

Four (4.88%) of 82 schizophrenia patients were positive for anti *T. gondii* IgM antibodies indicating prevalence of *T. gondii*. Total number of 82 sample collected from patients in Abdelaal Aldressy were enrolled in our study, of this patients 68 were male and 14 were female. (Table 1).

Table 1: showing personal data of our patients

		Frequency	Percent
Age(years)	< 30 years	20	24.4%
	30 – 39 years	25	30.5%
	40 – 49 years	11	13.4%
	50 – 59 years	15	18.3%
	60 – 69 years	9	11.0%
	>69 years	2	2.4%
Total		82	100.0%
Gender	Male	68	82.9%
	Female	14	17.1%
Total		82	100.0%
Origin	Central Sudan	32	39%
	Western Sudan	20	24.4%
	Northern Sudan	24	29.3%
	Eastern Sudan	6	7.3%
Total		82	100.0%

Age distribution of our study group include (less than 30 years) 20 patients (24.4%) ,(30 –39years) 25patients (30.5%), (40 – 49 years)11 patients (13.4%), (50 – 59 years) 15patients (18.3%) ,(60–69years) 9 patients (11.0%) , (70-79yeasrs) 2 patients (2.4%) (Table1). There was no significant difference between age and *T. gondii* antibody seropositivity

Patients resident distribute as, Central Sudan 32 (39%), Western Sudan 20 (24.4%), Northern Sudan 24 (29.3%), Eastern Sudan 6 (7.3%) as show in (table 1).

Table 2: Socioeconomic characteristics of the respondent

		Frequency	Percent
Education	Nil	20	24.4%
	Primary	27	32.9%
	Secondary	19	23.2%
	University	16	19.5%
Group Total		82	100.0%
Occupation	Unemployed	14	17.1%
	Laborer	21	25.6%
	Employed	34	41.5%
	Professional	4	4.9%
	Farmer	9	11.0%
Group Total		82	100.0%
Marital status	Single	45	54.9%
	Married	29	35.4
	Divorced	8	9.8
Group Total		82	100.0%

Socioeconomic characteristics of the respondent was, Nil (20) percent (24.4%) , Primary (27) percent (32.9%), Secondary (19) percent (23.2%) and University(16) percent(19.5%) (Table 2).
Occupation characteristics of our respondent, Unemployed 14 (17.1%), Laborer 21 (25.6%), Employed 34 (41.5%) Professional 4(4.9%), Farmer (9) (11, 0%) (Table2).

No significant difference in antibody titer between the two group concerning their residence, occupation and socioeconomic status.

Marital status of patients was as follows. Single (45) (54.9%), married (29) (35.4%) and divorced (8) (9.8%) (Table2).

The data in this study showed significant difference in the Seroprevalence of anti-*Toxoplasma* antibodies between males 75%and females 25%.

History of psychiatric illnesses in the family, number of patients who already receive the same situation within families (17) their percent (20.7%) , while The number of patients who never receive the same situation within their families(65) percent(79.3%) (Table3).

Table 3: History of psychiatric illnesses in the family

		Frequency	Percent
Family history of psychotic problems	Yes	17	20.7%
	No	65	79.3%
Total		82	100.0%

Table 4: Family problems no desribition for table 4

		Frequency	Percent
Died mother	Yes	18	22.0%
	No	64	78.0%
Total		82	100.0%
Died father	Yes	33	40.2%
	No	49	59.8%
Total		82	100.0%
Divorced	Yes	8	9.8%
	No	74	90.2%
Total		82	100.0%
Homeless	Yes	5	6.1%
	No	77	93.9%
Total		82	100.0%

Discussion

Our study results showed that (4.9%) of our patients showed ELISA IgM positive for occurrence of *T. gondii*.

Association between *T. gondii* seropositivity and gender was found in studies, Male showed highly prevalence (75%) while female (25%). Prevalence of *T. gondii* in association to age group was not observe , our founding in agree with results by Alvarado *et al*. [19]; Alipour *et al*. [20] and Hamidinejat *et al*. [21]. Low seroprevalence of anti *T.gondii* IgM antibodies in our schizophrenia patients can be explain by schizophrenia medication; (Resperidone, Aripiprazole, Quetiapine and Olanzapine) some study suggests that anti-schizophrenia medication may have decreased the antibody levels. Antipsychotics have been shown to inhabit *T. gondii* in cell culture [22]. Other explanation low cat's existence in our study area, which agrees with studies in China, showed that the keeping of cats was uncommon and prevalence of *T. gondii* antibodies was low [23]

In contrast, Stanford and his colleagues in Ireland [24] showed that the keeping of cats as pets was common and where the prevalence of *T. gondii* antibodies in the general population was high.

Toxoplasma transmission throw consumption of oocysts shed in cat's faeces and eating tissue cysts in undercooked meat which is rare in our country. Therefore, it may have less risk for us to development of schizophrenia due to *Toxoplasma* infection.

Conclusion

In this study we described seropositivity of *T. gondii* and their associated to schizophrenia in Sudan, our results findings that *T. gondii* infection was not significantly associated with schizophrenia.

Schizophrenia medication, low cat existence in our study area and rare consumption of undercooked meat can explain our low seropositivity.

Our limitation included a relatively lower sample size, which was as a result of limited logistics. Nonetheless, this finding is essential as a preliminary data in Sudan in establishing an association between *T. gondii* and schizophrenia. Further studies with a larger sample size and advanced techniques should be done.

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