



RESEARCH PAPER

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Prevalence of *Toxoplasma gondii* antibodies among pregnant women in District Bannu, Khyber Pakhtunkhwa (KP), Pakistan

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Abstract

Toxoplasmosis is a common zoonotic disease and caused by parasite, *Toxoplasma gondii*. It also causes of high morbidity and mortality in all animals and human beings. The present study was conducted during February to November 2015, for the detection of *Toxoplasma gondii* infection in pregnant women. Total of 150 blood samples were collected from pregnant women randomly. Among these 98.68% (148/150) blood samples were negative and 1.32% (02/150) were positive with IgM and IgG antibodies. Similarly the ages (20-30) and (31-40) years were more susceptible to the toxoplasmosis. Uneducated pregnant women were only susceptible to the *Toxoplasma gondii* infection. The rural area patients were more screened for *Toxoplasma gondii* infection as compared to the urban communities.

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Introduction

Toxoplasma gondii is a common parasitic protozoan, member of phylum Apicomplexa, subclass Coccidiasina and family Sarcocystidae (Hill *et al.*, 2007; Pereira *et al.*, 2010). It is worldwide distributed and 6 billion peoples have been suffered in all over the world (Furtado *et al.*, 2011). High prevalence of *T. gondii* has been recorded in warm and humid areas (Coelho *et al.*, 2003). In Pakistan approximately 29.5% of human population of different districts like Punjab and Dera Ghazi Khan has serological disease of toxoplasmosis (Tasawar *et al.*, 2011).

Toxoplasma gondii is an obligate intracellular zoonotic protozoan present in humans and animals population globally. The infection is transmitted by using raw meat and deeply contact with catfeces obtaining oocytes. It can also cause inborn disease and abortion in livestock and humans population (Krick and Remington, 1978; Dubey, 1988). Initially the *Toxoplasma gondii* infection is without any symptoms in pregnant women but produce severe neonatal problems (Linguissi, 2012). In pregnancy the toxoplasmosis has been related with many complications in newborn babies like cerebral calcification and hydrocephalus etc (Flatt and Shetty, 2013). In some developed countries, approximately 0.01% - 0.1% of babies were infected with congenital toxoplasmosis (Montoya and Remington, 2008). When healthy pregnant women are infected with *T. gondii* parasite, this infection can also causes in fetus through placenta, therefore it is considered congenitally. The prevalence of fetal transmission is various, for example in first trimester the infection is 10%–25%, while in second and third trimesters are 30%–54% and 60%–65% respectively (Montoya and Remington, 2000). A high prevalence of *T. gondii* has been recorded in many developed countries. For example in France, where the peoples are use improperly cooked meat (Baril *et al.*, 1999), and in tropical areas where cats are present abundantly and environment suitable for oocytes growth (Arias *et al.*, 1996). Human sere prevalence of toxoplasmosis is stopped by washing the hands as well as kitchen instruments like knife and cotton board etc with soap after handling the contaminated meat.

Meat obtaining oocytes can also be killed by boiling in water with range of (67°C) for 4 minutes (Dubey *et al.*, 1990), and also freeze with range of (-13°C) for 3 days (Dubey and Thayer, 1994). For the treatment of toxoplasmosis, different medicines like Sulfadiazine and Pyrimethamine (Daraprim) are prescribed. Someother medicines like at ovaquone, clindamycin, diaminodiphenylsulfone and spiramycin are also approved in severe infection (Dolores and Dubey, 2014). Keeping in view the purpose of current study was to investigate the prevalence of *Toxoplasma gondii* antibodies in pregnant women of district Bannu.

Materials and methods

Study area

District Bannu is situated in between the 31.28° North latitude and 73.25° East longitudes. It is present with adjacent districts Lakki Marwat, Karak and agencies of North South Waziristan. In 1998 census the total population was 677350 and annual growth rate is 2.8% respectively. The total region of district Bannu is 1,227 square kilometers contain total area and 74196 Hectors area is under cultivated. In summer season the temperature range is 48°C, while 6°C in winter season. Total 45% area is irrigated through canal systems, while remaining depend upon rainfall.

Blood samples collection

The present study was arranged during February to November 2015 in district Bannu for the assessment of *Toxoplasma gondii* in pregnant women. Total of 150 blood samples were collected randomly. The samples contained 2mL of venous blood, was taken in a sterile syringe from each patient and brought to the Women & Children Teaching Hospital (WCTH) district Bannu laboratory for *Toxoplasma gondii* detection.

Toxoplasma gondii detection

The blood sample of each patient was centrifuged for 5 minutes for serum extraction. 2-3 drops of separated serum were kept on rapid diagnostic kit for the detection of IgG and IgM antibodies. The kit obtained different values like 'C' (negative value), 'T1' and 'T2' represented IgM and IgG antibodies respectively. The site 'S' is used for serum falling, if the serum was stopped on 'C' value it represented

negative sample, if stopped on 'T1' and 'T2' values it represented the positive samples for IgM and IgG antibodies respectively.

Results

The present study was conducted during February to November 2015, for the detection of *Toxoplasma gondii* infection in pregnant women. Total of 150 blood samples were collected from pregnant women randomly. Among these 148 blood samples were negative and 02 were positive. Among positive one was infected with IgM, while other was with IgG antibodies. For the prevalence of *Toxoplasma gondii*, the age of pregnant women were divided in to four groups with ten years gap. The age (31-40) years have more patients, while the age (>50) years have least patients. Similarly the ages (20-30) and (31-40) years were infected with *Toxoplasma gondii* (Table 1).

Table 1. Age wise prevalence of *Toxoplasma gondii* antibodies in pregnant women during February to November 2015.

Age (Years)	Negative	Positive	
		IgM Antibodies	IgG Antibodies
20-30	48	01	00
31-40	56	00	01
41-50	41	00	00
>50	03	00	00
Total	148	01	01, (Total Positive= 02)

The overall percentage wise prevalence of *Toxoplasma gondii* infection in pregnant women was recorded as 1.32% positive and 98.68% was recorded negative (Fig. 1).

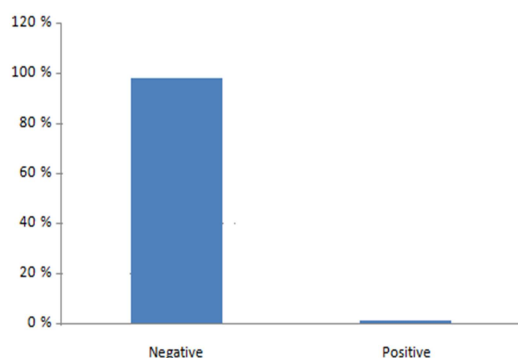


Fig. 1. Percentage wise prevalence of *Toxoplasma gondii* antibodies in pregnant women.

Most of the patients were belonged to the rural area, among the infected patients one was belonged to urban area, while the other was rural area patient (Table 2).

Table 2. Prevalence of *Toxoplasma gondii* antibodies in pregnant women on the basis of locality.

Locality	Negative	Positive	
		IgM Antibodies	IgG Antibodies
Urban	63	00	01
Rural	87	01	00

Uneducated pregnant women were only susceptible to the *Toxoplasma gondii* infection and most of the patients were also screened of this category (Table 3).

Table 3. Prevalence of *Toxoplasma gondii* antibodies in educated and uneducated pregnant women.

Education	Negative	Positive	
		IgM Antibodies	IgG Antibodies
Literate	69	00	00
Illiterate	81	01	01

Discussion

Toxoplasmosis is a common zoonotic disease and caused by parasite *Toxoplasma gondii*. It also causes of high morbidity and mortality in all animals and human beings. The present study was conducted during February to November 2015, for the detection of *Toxoplasma gondii* infection in pregnant women. Total of 150 blood samples were collected from pregnant women randomly. Among these 148 (98.68%) blood samples were negative and 02 (1.32%) were positive. Among positive one was infected with IgM, while other was with IgG antibodies. Similarly the ages (20-30) and (31-40) years were only susceptible to the infection.

A study was conducted by Faisal *et al.*, 2013, total of 805 blood samples were screened from district Swabi Pakistan for *Toxoplasma gondii* infection. Among these 155 (19.25%) were positive and 650 (80.75%) were negative. The age groups 25-34 years were more susceptible to the infection. Another study was put forwarded by the Khan *et al.*, 2011 in district Kohat Pakistan. Total of 180 blood samples were collected randomly, among these 26 (14.4%) blood samples were positive.

Another study was conducted by Pal *et al.*, 1996 who documented 17% seroprevalence of *Toxoplasma gondii* from Rawalpindi and Islamabad, Pakistan. The above findings were greater as compared to the present work because the females were in great care, they used washed vegetables and properly cooked meat.

A study was arranged in Karaj to township Iran by Akhlaghi *et al.*, 2014, total of 400 pregnant women were screened. Among these 1% and 29% were positive with IgM and IgG antibodies. The age group >30 years were more susceptible to the infection. A study was conducted by Mwambe *et al.*, 2013 in Tanzania, total of 350 pregnant women were screened and 108 (30.9%) were sero-positive. This infection was recorded higher in urban as compared to rural area (41.5% versus 22.0%). A study was conducted by Hashemi and Saraei 2010, total of 400 pregnant women were screened for *Toxoplasma gondii* infection in Islamic Republic of Iran. The overall seropositivity was recorded as 34% respectively. In Iran 30%-35% peoples have been contained found *Toxoplasma gondii* infection in most areas (Hashemi and Saraei, 2010). Low level of education was greatly concerned associated with high seroprevalence of toxoplasmosis (Nash *et al.*, 2005). Malarvizhi *et al.*, 2012 reported total of 232 pregnant women were checked for *T. gondii* infection, among these 23 (9.9%) were positive for IgG, while 9 (3.9%) were positive for IgM antibodies. The overall seroprevalence of present findings were smaller as compared to mentioned citations because the pregnant women have high hygienic conditions and consumption of unpasteurized milk. These females have also no contact with domestic animals because the literature indicates that toxoplasmosis is a zoonotic disease.

Conclusion

Toxoplasmosis is a common zoonotic disease and caused by parasite, *Toxoplasma gondii*. It also causes of high morbidity and mortality in all animals and human beings. Overall prevalence was recorded 1.32% (02/150) with IgM and IgG antibodies. Among the age groups (20-30) and (31-40) years were only susceptible to the infection.

Uneducated pregnant women were only susceptible to the *Toxoplasma gondii* infection. The rural area patients were more screened for *Toxoplasma gondii* infection as compared to the urban communities.

References

Akhlaghi L, Ghasemi A, Hadighi R, Tabatabaie F. 2014. Study of seroprevalence and risk factors for *Toxoplasma gondii* among pregnant women in Karaj township of Alborz province; Journal of Entomology and Zoology Studies **2(6)**, 217-219.

Arias ML, 1996. Seroepidemiology of toxoplasmosis in humans: possible transmission routes in Costa Rica. Revista de biología tropical **44(2A)**, 377-81.

Baril L, 1999. Risk factors for Toxoplasma infection in pregnancy: a case-control study in France. Scandinavian Journal of Infectious Diseases **31(3)**, 305-9.

Coelho RA, Kobayashi M, Carvalho B. 2003. Prevalence of IgG antibodies specific to *Toxoplasma gondii* among blood donors in Recife, Northeast Brazil. Revista do Instituto de Medicina Tropical de Sao Paulo **45**, 229-231.

Dolores EH, Dubey JP. 2014. "Toxoplasmosis." USGS Science for changing world (National Wildlife Health Center), no. **1389**, 56, 57.

Dubey JP, Beattie CP. 1988. Boca Raton, FL: CRC Press; Toxoplasmosis of animal and man 1-220.

Dubey JP, Kotula AW, Sharar AK, Andrews CD, Lindsay DS. 1990. "Effect of high temperature on infectivity of *Toxoplasma gondii* tissue cysts in pork." Parasitology **76**, 201-204.

Dubey JP, Thayer DW. 1994. "Killing of different strains of *Toxoplasma gondii* tissue cysts by irradiation under defined conditions." Parasitology **80**, 764-767.

- Faisal Alvi I, Khan AU, Waqar M, Ahmad T, Shah T, Khan MI, Ali N, Faisal S, Saif I, Ahmad W, Javid U.** 2014. Distribution of *Toxoplasma gondii* in the Pregnant Women of District Swabi Khyber Pakhtunkhwa Pakistan World Applied Sciences Journal **29(1)**, 77-79.
- Flatt A, Shetty N.** 2013. Seroprevalence and risk factors for toxoplasmosis among antenatal women in London: a re-examination of risk in an ethnically diverse population. Eur J Public Health **23(4)**, 648-52.
- Furtado JM, Smith JR, Belfort R, Gattey D, Winthrop KL.** 2011. Toxoplasmosis: a global threat. J Global Infect Dis **3**, 281-284.
- Hashemi HJ, Saraei M.** 2010. Seroprevalence of *Toxoplasma gondii* in unmarried women in Qazvin, Islamic Republic of Iran. EMHJ Vol. **16(1)**.
- Hashemi HJ, Saraei M.** 2010. Seroprevalence of *Toxoplasma gondii* in unmarried women in Qazvin Islamic Republic of Iran. East Mediterr Health J **16(1)**, 24-8.
- Hill DE, Sreekumar C, Jones J, Dubey JP.** 2007. *Toxoplasma gondii*. Ch 12 In: Simjee S (Ed) Foodborne diseases. Humana Press, Totowa p. 337-353.
- Khan SN, Khan S, Ayaz S, Jan AH, Jehangir S, Attaullah S, Ali I, Shams S.** 2011. Seroprevalence and Risk Factors of *Toxoplasma gondii* among Pregnant Women in District Kohat, Khyber Pakhtunkhwa Pakistan. World Appl. Sci. J **14**, 1032-1036.
- Krick JA, Remington JS.** 1978. Toxoplasmosis in the adult: an overview. N Engl J Med **298**, 550-3.
- Linguissi L.** 2012. Seroprevalence of toxoplasmosis and rubella in pregnant women attending antenatal private clinic at Ouagadougou, Burkina Faso. Asian Pac J Trop Med **5(10)**, 810-813.
- Malarvizhi AI, Viswanathan T, Lavanya V, Malar SSA, Moorthy K.** 2012. Seroprevalence of *Toxoplasma gondii* in pregnant Women. Journal of Public Health and Epidemiology **4(6)**, 170-177.
- Montoya JC, Remington JS.** 2000. *Toxoplasma gondii*. In: Mandel GL, Bennett JE, Dolin R. Mandell, Douglas and Bennett's principles and practice of infectious diseases, 5th ed. Philadelphia, Churchill Livings to N.
- Montoya JG, Remington JS.** 2008. Management of *Toxoplasma gondii* infection during pregnancy. Clin Infect Dis **47**, 554-566.
- Mwambe B, Mshana SE, Kidenya BR, Massinde NA, Mazigo HD, Michael D, Majinge C, Groß U.** 2013. Sero-prevalence and factors associated with *Toxoplasma gondii* infection among pregnant women attending antenatal care in Mwanza, Tanzania. Parasites & Vectors **6**, 222.
- Nash JQ, Chissel S, Jones J, Warburton F, Verlander NQ.** (2005). Risk factors for toxoplasmosis in pregnant women in Kent, United Kingdom. Epidemiol Infect **133(3)**, 475-83.
- Pal RA, Qayyum M, Yaseen M.** 1996. Seroprevalence of antibodies to *Toxoplasma gondii*, with a particular reference to obstetric history of patients in Rawalpindi-Islamabad, Pakistan. J. Pak. Med. Assoc **46**, 56-58.
- Pereira KS, Franco RM, Leal DA.** 2010. Transmission of toxoplasmosis (*Toxoplasma gondii*) by foods. Advances in Food and Nutrition Research **60**, 1-19.
- Tasawar ZS, Nawaz MH, Lashari F, Aziz, Hayat CS.** 2011. Seroprevalence of Human Toxoplasmosis in Dera Ghazi Khan, Punjab. Gomal Journal of Medical Sciences **9**, 82-85.