International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

*Original Research Article*

# Seropositivity Rates of Toxoplasmosis and Syphilis in Pregnant Women Visiting Western Regional Hospital, Nepal

Suresh Jaiswal[1], Tripti Pokhrel[1], Subham Sharma[1], Surya Rana Bhat[1], Dipendra Kumar Yadav[2], Bashudev Koirala[3]

[1]Department of Medical Lab Science, [2]Department of Public Health, School of Health and Allied Sciences, Pokhara University, Kaski, Nepal.
[3]Western Regional Hospital Laboratory, Pokhara, Kaski, Nepal.

Corresponding Author: Suresh Jaiswal

*Received: 06/08//2014* *Revised: 27/08/2014* *Accepted: 27/08/2014*

## ABSTRACT

Toxoplasmosis and syphilis are infections which pose greater risk in pregnant women resulting maternal and fetal infection. Toxoplasma gondii, the causal agent of toxoplasmosis is an important water and food borne parasite ubiquitous worldwide having toxoplasmosis rate 30%-75% with intrauterine infection rate 3-8 infants/1000 live births. Syphilis has highest prevalence in Asia(44.3%) and 1-4% in pregnant women in Nepal. Both can cause serious congenital infections including perinatal death. This study was conducted in pregnant women visiting Western Regional Hospital from 16/11/2013 to 14/03/2014 with an objective of finding the seropositivity rates of Toxoplasma gondii immunoglobulin(Ig) IgG, IgM and syphilis. These variables were measured for all subjects, along with their history and socio-demographic information. Out of 176 participants, 89 (50.6%) were IgG seropositive, 10 (5.7%) IgM positive and seven (4.0%) rapid plasma regain (RPR) reactive. Seven participants showed both IgG and IgM seropositivity and six showed both IgG and RPR seropositivity while none showed all three positive. Among independent variables analyzed, dwelling place, present complications and bad obstetrics history showed significant correlation with toxoplasmosis ($p < 0.05$) but neither of the independent variables showed significant correlation with syphilis. Since toxoplasmosis is still considered as one of the risk factor for foetal loss, screening of Toxoplasma gondii infections during antenatal care should be done on regional hospital as the main strategy to prevent and minimize congenital toxoplasmosis. Awareness programmes about sex hygiene must be carried out focusing the newly married group as RPR positivity target is found to be primigravid in the study.

***Key words:*** Toxoplasmosis, syphilis, IgG, IgM, RPR

## INTRODUCTION

Toxoplasma gondii, the causal agent of toxoplasmosis, is an important water and food borne protozoan parasite ubiquitous throughout the world. [(1,2)] It belongs to the phylum Apicomplexa. The apicomplexa is an extremely large and diverse group of parasites comprising of ~5000 members and cause a variety of life-threatening diseases in humans and animals. [(1)] Toxoplasma gondiiis the only known species in the genus Toxoplasma and is considered one of the

most successful eukaryotic pathogen in the world in terms of the number of host species and percentage of animals infected worldwide. [1,3] T. gondii research is a significant area of study because of its medical and veterinary importance. [1] In humans, T. gondiiis transmitted by ingestion of tissue cyst, by ingestion of oocyst in contaminated vegetables and water or by congenital transmission. [1,4] Toxoplasma infection is a serious threat to immune-compromised individuals such as AIDS patients and organ transplant recipients. It can cause severe and life-threatening disease (e.g. encephalitis, retinitis, and myocarditis) in developing fetuses and in immune-compromised patients. [4,5] Up to onethird of the human population in the world is chronically infected and more than 60 million people in United States itself are believed to be infected. [1,6] Toxoplasma infection is also implicated in etiologies of neuro developmental and neuro-cognitive disorders like-schizophrenia. [7] Although current available drugs like pyrimethamine and sulphadiazine, can control the proliferative form of the parasite and treat Toxoplasma infections, they are poorly tolerated, have severe side effects like allergic reactions and are ineffective against chronic Toxoplasma infections. In addition, resistance to some of these drugs has recently been noted. [8-10] The immense success of Toxoplasma gondiiis due to its spread in different environment through resistant oocysts shed by felids and by transmission between intermediate hosts through carnivorous or omnivorous feeding. [1,11] It is also due to the ability of asexual forms to penetrate and grow in virtually all types of animal cells and its long-term survival as tissue cysts. [1,4]

Syphilis- a sexually transmitted bacterial infection caused by an actively motile, spirochete, Treponema pallidum - can pass from a mother who is infected to her unborn child. [12] Screening pregnant women for syphilis during routine antenatal care by looking for a reaction to T. pallidum in the blood (seropositivity) and then treating any detected infections with penicillin injections has been feasible for many years. However, because coverage of testing and treatment of syphilis remains low in many countries, mother-to-child transmission of syphilis—"congenital syphilis"—is still a global public health problem. In general, an estimated one-third of untreated pregnancies end in fetal loss, another one-third in the birth of a child with congenital syphilis, and the remaining one-third in the birth of a healthy child. [13] Untreated maternal syphilis limits the potential of pregnancies in utero, causing spontaneous abortion, stillbirth, low birth-weight, preterm labor, and perinatal death. [14] According to the Centers for Disease Control and Prevention (CDC), people with syphilis are two to five times more likely to get HIV, the virus that causes AIDS. In general, someone who has one STD is at greater risk for infection with other STDs, including HIV. [15] Syphilis is contagious during its primary and secondary stages, and sometimes in the early latent period. [16] Transmission of an STD, including syphilis, cannot be prevented by washing the genitals, urinating, and/or douching after sex. [17] In Nepal 1-4% of pregnant women attending the ANCs are seropositive for syphilis [18] and immigrants are one or the major sources of infection immigration. [19] In 2007, the World Health Organization (WHO) estimated that there were 2 million syphilis infections among pregnant women annually, 65% of which resulted in adverse pregnancy outcomes. [20] Detection of syphilis varies depending upon stage of disease and screening method which can be diagnosed by direct microscopic examination (dark field illumination), non-treponemal tests, treponemal tests and direct antigen detection

tests. [12] There are no home remedies or over-the-counter drugs that will cure syphilis, but syphilis is easy to cure in its early stages. [21] Once tested and diagnosed with syphilis, it can be easily and effectively treated and cured with antibiotics – most commonly, with an injection of penicillin. [22] A single injection of penicillin can stop the disease from progressing if the patient had been infected for less than a year. If the patients have had syphilis for longer than a year, they may need additional doses. [23] Use of contraceptive is an easy way to be safe from syphilis.

## MATERIALS AND METHODS

This is a cross-sectional study. The samples were collected from Western Regional Hospital, Pokhara, which cover the patients of Kaski, Tanahu, Syanja, Parbat, Lamjung, and Gorkha districts. Selected pregnant women visiting neonatal care unit (ANCU), gynaecology ward and laboratory of WRH. The study was conducted from 16/11/2013 to 14/03/2014. Pregnant women of random pregnancy, random trimester with or without bad obstetrics history and with or without clinical symptoms were included in the study. Pregnant women who denied to fill up consent form and not interested were excluded.

A total of 176 samples were collected and processed. Then blood samples were collected which were labeled with unique code number. The serum was separated by centrifuging the blood samples at 3000 rpm for 5 minutes. The separated sample was transferred into the well labeled eppendroff tube and was stored at -20°C.

Sample processing for toxoplasmosis antibody were based on solid phase enzyme-linked immunosorbent assay (ELISA) based on the sandwich principle by IBL international kit. The wells were coated with antigen. Specific antibodies of the sample binding to the antigen coated wells are detected by a secondary enzyme conjugated antibody (E-Ab) specific for human IgG/IgM. After the substrate reaction the intensity of the colour developed is proportional to the amount of IgG/IgM-specific antibodies detected. Results of samples can be determined directly using the standard curve.

### *Interpretation of Results:*

| Method | Range IgG | Range IgM | Interpretation |
|---|---|---|---|
| Quantitative (Standard Curve) | <8 IU/mL | <8 IU/mL | Negative |
| | 8-12 IU/mL | 8-12 IU/mL | Equivocal |
| | >12 IU/mL | >12 IU/mL | Positive |
| Qualitative (Cut-off index, COI) | <0.8 | <0.8 | Negative |
| | 0.8-1.2 | 0.8-1.2 | Equivocal |
| | >1.2 | >1.2 | Positive |

Sample processing for syphilis was done by non-treponemal testing procedure for the serologic detection of syphilis. The RPR card antigen suspension is a carbon-particle cardiolipin antigen that detects reagin, an antibody like substance present in the sera from syphilis persons and occasionally in sera of persons with other acute or chronic conditions. When a specimen contains antibody, flocculation occurs with a co-agglutination of the carbon particles of the RPR card antigen, which appears black clumps against the white background of the plastic-coated card. Nonreactive specimens appear to have an even light-gray color. Result interpretation was done by qualitatively as non reactive for a negative result and reactive for a positive result. All the data were analyzed by using SPSS version 21.

## RESULTS

The present study was conducted on 176 pregnant women visiting Western Regional Hospital for routine antenatal check-up. Three variables were measured for all participants, along with their history

and socio-demographic information. Out of 176 participants, 89 were IgG seropositive, 10 were IgM positive and seven were RPR reactive. Seven participants showed both IgG and IgM seropositivity and six showed both IgG and RPR seropositivity while none showed all three positive.

In our study, out of 176 participants 31(17.6%) were of age group <20 years, 131(74.4%) were of 21-30 years and 14(8%) were above 31 years of age. Similarly, as per the ethinicity of the participants there were 53(30.1%) Brahmin, 28(15.9%) Chhetri, 56(31.8%) Janajati and 39(22.2%) Dalit. 33(18.8%) illiterate, 91(51.7%) school level educated and 52(29.5%) higher education attended were included in this study. 64(36.4%) were VDC dwellers whereas 112(63.6%) were municipality dwellers. Our study included 158(89.8%) housewife and 18(10.2%) employed women. The participants' husband occupations were also inquired in our study so that it could give idea about the transmission of syphilis. Out of 176 women's husband, 14(8.0%) were unemployed, 112(63.6%) were employed and 50(28.4%) were in abroad.

Similarly, history and status of participants were also observed during the study. Here 56(31.8%) pregnant women were primigravid, 105(59.7%) were multigravid and 15(8.5%) were grand multigravid. 43(24.4%) were in their first trimester, 98(55.7%) were in their second trimester and 35(19.9%) were in their last trimester. Complications if any present were also inquired with the participants. Those having sex- related complication and other complications were 56(31.8%) in number whereas rest 120(68.2%) stated their pregnancy as complication less. Previous delivery history was also taken from the participants. Among 176, 98(55.7%) had normal delivery at home or health centre whereas 22(12.5%) did not have their normal delivery (caesarean/other). Likewise, bad obstetrics history of patient were also taken which showed 30(17%) had bad obstetrics history of either spontaneous or induced abortion and 146(83%) had no bad obstetrics history.

Independent factors imposing risk for toxoplasmosis were also analyzed as per the information given by the participants. According to them, 96(54.5%) had cat or other pets at home during study and 80(45.5%) had no any pet at home. 4(2.3%) were vegetarian while 172(97.7%) were non-vegetarian. Drinking water habit was also asked to the participants. Among them 79(44.9%) used to drink water without purification while 97(55.1%) used to drink purified water (filtered/boiled).

Result of Toxoplasma IgG test

Out of 176 participants tested for IgG 68(38.6%) were negative, 19(10.8%) were equivocal and 89(50.6%) were positive. Association of Toxoplasma IgG level with sociodemographic characteristics of participants were observed as shown in Table 1.

Out of 89 IgG positive, age wise seroprevalence was highest in 21-30 years age group (51.9%) than <20 years age group (48.4%) and lowest in age group >31(42.9%). Seroprevalence was highest in Brahmin (54.7%) whereas lowest in Janajati (44.6%). Seroprevalence was higher in illiterate than the literates. Seroprevalence as per age group, ethnicity and education status showed no significance. Similarly, seroprevalence was highest in VDC (67.2%) than in municipality (41.1%) (p-value: 0.001) (Odds ratio: 2.94). This showed highly significant relationship and also showed that the people living in VDC are at around three times more risk than that of those living in municipality. Seroprevalence rate of toxoplasma IgG was more in employed women than in housewives.

Table 1: Association of toxoplasma IgG level with sociodemographic characteristics of participants

| Variables (n=176) | Toxoplasma IgG | | $\chi^2$ | p-value | Odds ratio |
|---|---|---|---|---|---|
| | Positive | Negative | | | |
| Age of participants(years) | | | | | |
| <20 | 15 (48.4%) | 16 (51.6%) | | | |
| 21-30 | 68 (51.9%) | 63 (48.1%) | 0.486 | 0.784 | |
| >31 | 6 (42.9%) | 8 (57.1%) | | | |
| Ethnicity | | | | | |
| Brahmin | 29 (54.7%) | 24 (45.3%) | | | |
| Chhetri | 15 (53.6%) | 13 (46.4%) | 1.26 | 0.739 | |
| Janajati | 25 (44.6%) | 31 (55.4%) | | | |
| Dalit | 20 (51.3%) | 19 (48.7%) | | | |
| Education | | | | | |
| Illiterate | 20 (60.6%) | 13 (39.4%) | | | |
| School level | 45 (49.5%) | 46 (50.5%) | 1.781 | 0.41 | |
| Higher level | 24 (46.2%) | 28 (53.8%) | | | |
| Address | | | | | |
| VDC | 43 (67.2%) | 21 (32.2%) | 11.11 | 0.001 | 2.94 |
| Municipality | 46 (41.1%) | 66 (58.9%) | | | |
| Participant's occupation | | | | | |
| Housewife | 79 (50.0%) | 79 (50.0%) | 0.2 | 0.655 | |
| Employed | 10 (55.6%) | 8 (44.4%) | | | |

Table 2: Association of toxoplasma IgG level with history and status of participant

| Variables (n=176) | Toxoplasma IgG | | $\chi^2$ | p-value | Odds ratio |
|---|---|---|---|---|---|
| | Positive | Negative | | | |
| Pregnancy | | | | | |
| 1st | 27 (48.2%) | 29 (51.8%) | | | |
| 2nd | 53 (50.5%) | 52 (49.5%) | 0.658 | 0.72 | |
| 3rd and more | 9 (60.6%) | 6 (40.0%) | | | |
| Trimester | | | | | |
| 1st | 24 (55.8%) | 19 (44.2%) | | | |
| 2nd | 48 (49.0%) | 50 (51.0%) | 0.628 | 0.73 | |
| 3rd | 17 (48.6%) | 18 (51.4%) | | | |
| Complication | | | | | |
| Yes | 34 (60.7%) | 22 (39.3%) | 3.382 | 0.046 | 1.82 |
| No | 55 (45.8%) | 65 (54.2%) | | | |
| Condition in previousdelivery | | | | | |
| Normal | 48 (49.0%) | 50 (51.0%) | | | |
| Abnormal | 14 (63.6%) | 8 (36.4%) | 1.726 | 0.422 | |
| No | 27 (48.2%) | 29 (51.8%) | | | |
| Bad Obstetric History of participants | | | | | |
| Yes | 20 (66.7%) | 10 (33.3%) | 3.749 | 0.041 | 2.23 |
| No | 69 (47.3%) | 77 (52.7%) | | | |
| Pets at home of participants | | | | | |
| Yes | 51 (53.1%) | 45 (46.9%) | 0.552 | 0.457 | |
| No | 38 (47.5%) | 42 (52.5%) | | | |
| Food habit of participants | | | | | |
| Vegetarian | 2 (50%) | 2 (50%) | 0.001 | 0.982 | |
| Non-vegetarian | 87 (50.6%) | 85 (49.4%) | | | |
| Water habit of participants | | | | | |
| Direct | 43 (54.4%) | 36 (45.6%) | 0.855 | 0.355 | |
| Purified | 46 (47.4%) | 51 (52.6%) | | | |

Result of toxoplasma IgM test

Association of toxoplasma IgM level with sociodemographic characteristics of participants is shown in Table 5. Out of 176 participants, 10 (5.7%) were toxoplasma IgM positive. Unlikely the seroprevalence of IgG, toxoplasma IgM is more prevalent in age group of <20years (6.5%) than in the age group 21-30years (6.1%); higher level educated are more infected (7.7%) than those are illiterate (3.0%) and school level educated (5.5%). Likely to the

seroprevalence of IgG, toxoplasma IgM is more prevalent in VDC dwellers (7.8%) than municipality dwellers (4.5%); employed are more infected (11.1%) than unemployed women (5.1%). Above all parameters have no significant relation with toxoplasma IgM. Chhetri women have highest IgM seroprevalence (21.4%) while brahmin have lowest (1.9%) (p-value:0.001).

Table 3: Association of toxoplasma IgM level with sociodemographic characteristics of participants

| Variables (n=176) | Toxoplasma IgM | | $\chi^2$ | p-value | Odds ratio |
|---|---|---|---|---|---|
| | Positive | Negative | | | |
| Age of participants(years) | | | | | |
| <20 | 2(6.5%) | 29(93.5%) | | | |
| 21-30 | 8(6.1%) | 123(93.9%) | 0.922 | 0.631 | |
| >31 | 0(0.0%) | 14(100.0%) | | | |
| Ethinicity | | | | | |
| Brahmin | 1(1.9%) | 52(98.1%) | | | |
| Chhetri | 6(21.4%) | 22(78.6%) | 15.553 | 0.001 | |
| Janajati | 2(3.6%) | 54(96.4%) | | | |
| Dalit | 1(2.6%) | 38(97.4%) | | | |
| Education | | | | | |
| Illiterate | 1(3.0%) | 32(97.0%) | | | |
| School level | 5(5.5%) | 86(94.5%) | 0.831 | 0.660 | |
| Higher level | 4(7.7%) | 48(92.3%) | | | |
| Address | | | | | |
| VDC | 5(7.8%) | 59(92.2%) | 0.852 | 0.356 | |
| Municipality | 5(4.5%) | 107(95.5%) | | | |
| Participant occupation | | | | | |
| Housewife | 8(5.1%) | 150(94.9%) | 1.103 | 0.294 | |
| Employed | 2(11.1%) | 16(88.9%) | | | |

Table 4: Association of toxoplasma IgM with History and status of participant

| Variables (n=176) | Toxo plasma IgM | | $\chi^2$ | p-value | |
|---|---|---|---|---|---|
| | Positive | Negative | | | |
| Pregnancy | | | | | |
| 1st | 3 (5.4%) | 53 (94.6%) | | | |
| 2nd | 7 (6.7%) | 98 (93.3%) | 1.103 | 0.576 | |
| 3rd and more | 0 (0.00%) | 15 (100.0%) | | | |
| Trimester | | | | | |
| 1st | 6 (14.0%) | 37 (86.0%) | | | |
| 2nd | 3 (3.1%) | 95 (96.9%) | | | |
| 3rd | 1 (2.9%) | 34 (97.1%) | | | |
| Complication | | | | | |
| Yes | 3(5.4%) | 53(94.6%) | 0.016 | 0.899 | |
| No | 7(5.8%) | 113(94.2%) | | | |
| Condition in previous delivery | | | | | |
| Normal | 4(4.1%) | 94(95.9%) | | | |
| Abnormal | 3(13.6%) | 19(86.4%) | 3.077 | 0.215 | |
| No | 3(5.4%) | 53(94.6%) | | | |
| Bad Obstetric History of participants | | | | | |
| Yes | 5(16.7%) | 25(83.3%) | 8.143 | 0.004 | 5.68 |
| No | 5(3.4%) | 141(96.6%) | | | |
| Pets at home of participants | | | | | |
| Yes | 4(4.2%) | 92(95.8%) | 0.903 | 0.342 | |
| No | 6(7.5%) | 74(92.5%) | | | |
| Food habit of participants | | | | | |
| Vegetarian | 0(0.0%) | 4(100.0%) | 0.247 | 0.620 | |
| Non-vegetarian | 10(5.8%) | 162(94.2%) | | | |
| Water habit of participants | | | | | |
| Direct | 4(5.1%) | 75(94.9%) | 0.102 | 0.749 | |
| Purified | 6(6.2%) | 91(93.8%) | | | |

Association of toxoplasma IgM level with history and status of participant is shown in the Table 6. Bad obstetric history of the participant has highly significant association (p-value: 0.004) with toxoplasma IgM along with around six times more chances of infection in those with BOH. IgM seroprevalence is found high in multigravid women(6.7%) than primigravid (5.4%); in first trimester (14%) than second (3.1%) and third (2.9%); in abnormal previous delivery cases (13.6%) than normal cases (4.1%); in participants drinking purified water (6.2%) than those who drink direct water (5.1%). in case of pregnancy with present complication, seroprevalence is almost same (5.4%, complicated), (5.8%, uncomplicated).

Result of RPR test

Out of 176 participants, only seven were RPR reactive and rest 169 were RPR non-reactive. All those RPR reactive participants are of age group 21-30years. Seroprevalence was found to be 3.8% Brahmin, 3.6% Chhetri, 3.6% Janajati and 5.1% Dalit; highest in illiterate (6.1%) than literate; in municipality dwellers (4.5%) than VDC dwellers (3.1%); higher in employed (11.11%) than housewives (3.2%); higher in wives of husband who are abroad (6.0%) than those employed in country (3.6%).

Table 5: Association of Syphilis with sociodemographic characteristics of participants

| Variables (n=176) | Syphilis | | $\chi^2$ | p-value |
|---|---|---|---|---|
| | Positive | Negative | | |
| Age of participants | | | | |
| <20 | 0(0.0%) | 31(100.0%) | | |
| 21-30 | 7(5.3%) | 124(94.7%) | 2.504 | 0.286 |
| >31 | 0(0.0%) | 14(100.0%) | | |
| Ethnicity | | | | |
| Brahmin | 2(3.8%) | 51(96.2%) | | |
| Chhetri | 1(3.6%) | 27(96.4%) | 0.177 | 0.981 |
| Janajati | 2(3.6%) | 54(94.4%) | | |
| Dalit | 2(5.1%) | 37(94.9%) | | |
| Education | | | | |
| Illitrate | 2(6.1%) | 31(93.9%) | | |
| School level | 2(2.2%) | 89(97.5%) | 1.567 | 0.457 |
| Higher level | 3(5.8%) | 49(94.2%) | | |
| Address | | | | |
| VDC | 2(3.1%) | 62(96.9%) | 0.191 | 0.662 |
| Municipality | 5(4.5%) | 107(95.5%) | | |
| Participant occupation | | | | |
| Housewife | 5(3.2%) | 153(96.8%) | 2.672 | 0.102 |
| Employed | 2(11.1%) | 16(88.9%) | | |
| Husband occupation | | | | |
| Unemployed | 0(0.0%) | 14(100.0%) | | |
| Employed | 4(3.6%) | 108(96.4%) | 1.164 | 0.559 |
| Foreign | 3(6.0%) | 47(94.0%) | | |

Association of Syphilis with history and status of participant is shown in Table 9. RPR reactivity was found highest in primigravid (7.1%)than multigravid (1.9%) and grand multigravid (6.7%); higher in first trimester (9.3%)than second trimester (3.1%); higher in cases without complication.(4.2%) than cases with complication (3.6%); 3.1% in participants who had normal previous delivery.

Because of the low positivity cases the independent variables were not significantly associated with RPR reactivity.

Table 6: Association of Syphilis with History and status of participant

| Variables (n=176) | Syphilis | | $x^2$ | p-value |
|---|---|---|---|---|
| | Positive | Negative | | |
| Pregnancy | | | | |
| 1st | 4(7.1%) | 52(92.9%) | | |
| 2nd | 2(1.9%) | 103(98.1%) | 2.934 | 0.231 |
| 3rd and more | 1(6.7%) | 14(93.3%) | | |
| Trimester | | | | |
| 1st | 4(9.3%) | 39(90.7%) | | |
| 2nd | 3(3.1%) | 95(96.9%) | 4.858 | 0.088 |
| 3rd | 0(0.0%) | 35(100.0%) | | |
| Complication | | | | |
| Yes | 2(3.6%) | 54(96.4%) | 0.033 | 0.851 |
| No | 5(4.2%) | 115(95.8%) | | |
| Condition in previous delivery | | | | |
| Normal | 3(3.1%) | 95(96.9%) | | |
| Abnormal | 0(0.0%) | 22(100.0%) | 2.596 | 0.273 |
| No | 4(7.1%) | 52(92.9%) | | |
| Bad Obstetric History of participants | | | | |
| Yes | 1(3.3%) | 29(96.7%) | 0.039 | 0.843 |
| No | 6(4.1%) | 140(95.9%) | | |

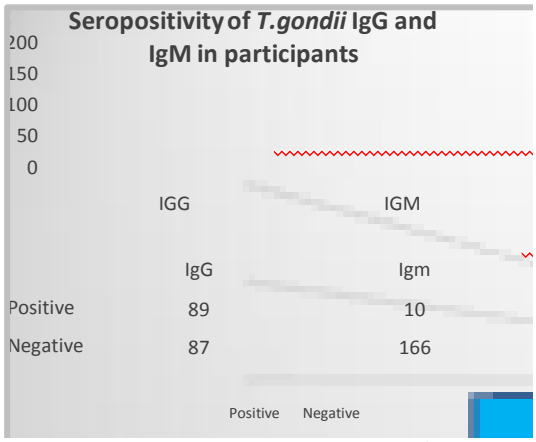


Figure1: Bar diagram represting seropositivity of Toxoplasma gondii IgG and IgM in participants.

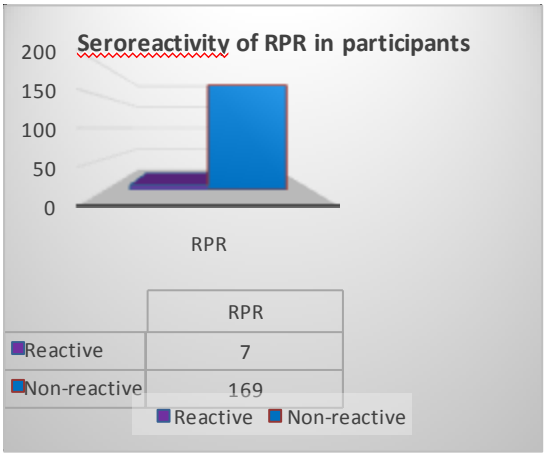


Figure 2:Bar diagram representing seroreactivity of RPR in participants

## DISCUSSION

### *Toxoplasmosis*

In present study, we screened 176 pregnant women for toxoplasmosis antibodies and RPR reactivity. Most interestingly, we observed a high IgG seroprevalence of 50.6%. In contrast, few pregnant women (5.7%) had IgM against T. gondii; all of these women were <30 years of age. The seroprevalence of IgG by our study was more than in Mwanza(30.9%)., [24] in Iran (33.5%), [25] Stockholm, Sweden (14%) [26] whereas less than in Belgrade, Yugoslavia(77%). [27] The seroprevalence of IgM by our study is more than different studies in Brazil (3.6%) [28] by Spalding SM and o.5% in a study by Sroka S, et al. [29]

Age wise seroprevalence showed the highest prevalence in 21-30 years age group as like other studies by Remington JS, [30] Anteson RK, [31] Bobi B [32] which is the most active childbearing age of women, though the age wise seroprevalence of toxoplasmosis does not agree with other studies which have shown the increment in seroprevalence of toxoplasmosis with the increasing age of mother that is higher in age group above 30 years than those of 21-30 years by Sakikawa M, et al(above 35

years of age), [33] by Kravetz JD, et al [34] and by Rosso F(25-34,40.1% and 35-44, 41.7%). [35]

Ethnic variation in toxoplasmosis is almost similar but Brahmin/ Chhetri being slightly more infected group than dalit and janjati groups.

Contact with cat may pose another risk for T. gondii infection. However, in this study no significant association between T. gondii infection and a history of cat/ other animals contact was found. The findings are consistent with studies done in Palestine by Nijem KA-AS, et al, [38] Turkey by Ghoneim NSS, et al, [39] Nigeria by Ishaku BAI, et al [37] and MwambeB, et al which showed 32.6% positivity in those without cat contact whereas 29.2% in those who had cat contact. [37] Nevertheless, studies from Taiwan by Lin YL, et al [40] and Ethiopia by Zemene E, et al [36] showed a significant association between contact with cats and sero-prevalence of T. gondii.

Women who had bad obesterics history like spontaneous or induced abortions, stillbirth or death of baby after birth have the higher prevalence of toxoplasmosis supporting the finding of IgM prevalence by Abbas M.M.(21.5%), [41] Al-Sorchee S.M.(30.7%) [42] and Al-Khafajy(43.8%) [43] and of IgG (26.1%)by Addory A.Z.R. [44] Toxoplasmosis and BOH are significantly related ($p<0.05$) whith the risk of toxoplasmosis 2.23 times more in case of BOH (OR: 2.23)

Women who may get infection during pregnancy may show a variety of clinical signs and symptom depending on many factors, such as the number of parasites, virulence of strain, and the time period the mother acquires infection. [45] We also inquired about the presence of any complication in participants. The cases in our study with the minor or major complications have shown the higher prevalence of toxoplasmosis than those who had no current complications with significant relation. (p-value: 0.04, OR=1.82).

In this study, a large proportion of pregnant women (47.7%) were susceptible to primary infection (IgG −/IgM−). Also,the rate of probable acute Toxoplasma infection(IgG+/IgM+) in this study was 4.0%. Therefore, 48.3%of pregnant women were immune to Toxoplasma infection (IgG+/IgM−), as prevalence of chronic infection. This was in agreement with finding of Lindsay et al [46] who explained that increased levels of IgG and IgM antibodies in acute Toxoplasma infections usually appear within the first or second week of infection. High levels of specificIgG antibodies indicate that the individual has been previously infected. However, these antibodies do not distinguish a recent infection from one acquired a long time before. Detection of specific IgM antibodies can help to determine if infection was recent [47]]; although, these antibodies can persist for months or even years after acute infection. [48]

Similary, participants were also screened for syphilis by using RPR test. Out of 176 participants only seven(4.0%) participants were RPR reactive, all of whom were of age group 21-30.The seropositivity rate is higher than that present in Pakistan by Laghari AH,et al (1.9%)Bolivia, [49] Mexico,2006(0.3%); Bolivia,2006(3.9%) and Brazil,2010(2.2%) by Roehl KM but lower than in al. Tanzania(7.7%) by Watson-Jones D, [50] et al; than in China,2006(18.7%) and than in Bangladesh,2008(20.8%). by Roehl KM, et. Because of very few seropositivity numbers and un-uniform distribution of the reactive cases, independent variables showed no significant correlation with the RPR reactivity.

In this study all RPR reactive women were of age group 21-30 years which is also

shown highest in study by Zhou H,et al(50.0%) [51] compared to other age group; In contrary, the incidence was very high in women aged 15–19 (6.8% over 2 years), falling to lower levels from age 20 by J Todd et al. [52]

In this study, reactivity was found more in Dalit women with the titre of 1:8 in all Dalits. Besides it was found that all Dalits who were RPR reactive had their husbands in abroad. This could be the imported syphilis may be due to the sex habit of husband with multiple persons. This is supported by a study in Western Nepal. {Mumbai disease} which showed higher prevalence of syphilis in migrants entering Nepal from India.

Syphilis was found higher in women who were pregnant for the first time and women in first trimester. The reason behind this could be due to lack of proper knowledge about the sex health and hygiene in first pregnancy. Since, RPR is a routine checkup for pregnant women in Nepal, so most of those women of second or third trimester could have visited hospital in their first trimester and had taken medication for syphilis as well as were aware about syphilis in early hospital visit, which could be the reason behind this seropositive status in first trimester.

## CONCLUSION

Sero-prevalence of T. gondii-specific antibodies is high among pregnant women visiting WRH with a significant proportion of women at risk of contracting T. gondii infections. Presence of complications, women with bad obstetrics history and village dwellers were the independent risk factors associated with the presence of T. gondii infections. Screening of T. gondii infections during antenatal care should be considered in regional hospital as the main strategy to prevent and minimize congenital toxoplasmosis. Despite of syphilis screening as a routine checkup in pregnant women, syphilis is prevalent in pregnant women visiting WRH, though small in number. Public awareness programmes about sex hygiene habit and proper use of contraceptives must be carried focusing the newly married group as RPR positivity target is found to be primigravid in the study.

***Recommendations***

Toxoplasma gondii test should be carried out as routine test in regional hospital in every pregnant woman if possible and compulsorily in at least those with complications. Since not a single woman during our study had knowledge about toxoplasmosis so public awareness and health education programmes should be arranged focusing about the risk association and prevention of toxoplasmosis and congenital transmission. Syphilis is still found in around four pregnant women out of hundred, though being small number. Further studies are needed to be done that could cover larger number of participants to give more accurate result.

## REFERENCES


1. Beattie CP & Dubey JP. Toxoplasmosis of animals and man,(CRC Press, Boca Raton,
   Fla., 1988.
2. Frenkel, J.K. Pursuing toxoplasma. J Infect Dis 1970; 122: 553-9.
3. Grigg ME & Suzuki Y. Sexual recombination and clonal evolution of virulence in Toxoplasma. Microbes Infect. 2003; 5: 685-90.
4. Howe DK & Sibley LD. Toxoplasma gondii comprises three clonal lineages: correlation of parasite genotype with human disease. J Infect Dis.1995; 172: 1561-6.
5. Blader IJ & Saeij JP. Communication between Toxoplasma gondii and its host: impacton parasite growth,

development, immune evasion, and virulence. Apmis. 2009;117: 458-76.
6. Tenter AM, Heckeroth AR & Weiss LM. Toxoplasma gondii: from animals to humans. Int J Parasitol.2000; 30: 1217-58.
7. Torrey EF & Yolken RH. Toxoplasma gondii and schizophrenia. Emerg Infect Dis.2003; 9: 1375-80.
8. Aspinall TV, Joynson DH, Guy E, Hyde JE & Sims PF. The molecular basis ofsulfonamide resistance in Toxoplasma gondii and implications for the clinical management of toxoplasmosis. J Infect Dis 2002; 185, 1637-43.
9. Baatz H, Mirshahi A, Puchta J, Gumbel H & Hattenbach LO. Reactivation oftoxoplasma retinochoroiditis under atovaquone therapy in an immunocompetent patient.Ocul Immunol Inflamm.2006; 14: 185-7.
10. Dannemann, B. et al. Treatment of toxoplasmic encephalitis in patients with AIDS. Arandomized trial comparing pyrimethamine plus clindamycin to pyrimethamine plussulfadiazine. The California Collaborative Treatment Group. Ann Intern Med.1992; 116: 33-43.
11. Frenkel J.K. Pathophysiology of toxoplasmosis. Parasitol Today.1988; 4: 273-8.
12. Chakraborty P. A textbook of Microbiology. 2nd edition. Kolkota: New Central Book Agency (P) Ltd; February 27, 1995.
13. Valderrama J, Zacarías F, and Mazin R, Sífilis materna y sífilis congénita en América Latina: un problema grave de solución sencilla. Rev Panam Salud Publica/Pan Am J Public Health, 2004. 16(3): p. 211-217.
14. Mullick S, et al. Sexually transmitted infections in pregnancy: prevalence,impact on pregnancy outcomes, and approach to treatment in developing countries. Sex TransmInfect, 2005; 81: p.294-302.
15. Laghari AH, Sultana V, Samoo AH, Makhija P, Ara J, Hira. Prevalence and associated risk factors for syphilis in women with recurrent miscarriages. Pak J Med Sci. 2014; 30(2): 295-298. doi:http://dx.doi.org/10.12669/pjms.302.4382
16. URL: http://www.mayoclinic.org/diseases-conditions/syphilis/basics/causes/con-20021862 (Accessed on January 14, 2014)
17. Syphilis-CDC Fact Sheet. URL:http://www.cdc.gov/std/syphilis/STDFact-Syphilis-detailed.htm(Accessed on February 18, 2014) Centers for Disease Control and Prevention
18. Ministry of Health and Population Nepal. UNGASS Country Progress Report Nepal 2010; Available from: http://www.unaids.org/en/KnowledgeCentre/HIVData/CountryProgress/2010CountryProgressAllCountries.asp. (cited July 19, 2010) (Accessed on February 20, 2014)
19. Poudel KC, Okumura J, Sherchand JB, Jimba M, Murakami I, Wakai S. Mumbai disease in far western Nepal: HIV infection and syphilis among male migrant-returnees and non-migrants.Trop Med Int Health. 2003 Oct; 8(10): 933-9.
20. Global Estimates of Syphilis in Pregnancy and Associated Adverse Outcomes: Analysis of Multinational Antenatal Surveillance Data Lori Newman mail,Mary Kamb,Sarah Hawkes,Gabriela Gomez,Lale Say,Armando Seuc,Nathalie Broutet Published: February 26, 2013 DOI: 10.1371/journal.pmed.1001396
21. Workowski K.A and Berman S.M. *Centers for Disease Control and Prevention Sexually Transmitted Disease Treatment Guidelines.* Clin Infect Dis. 2011; 53(3): p.S59-63.
22. LisaOldson. http://www.sexualhealth.com/syphilistreatment/related:BIEaVyIsm3wJ:scholar.google.com/(Last reviewed: January 2011) (Accessed on february 15, 2014)

23. http://www.mayoclinic.org/diseases-conditions/syphilis/basics/treatment/con-20021862 (Accessed on Jan. 08, 2014)
24. Mwambe B, Mshana SE, Benson R, et al. Sero-prevalence and factors associated with Toxoplasma gondii infection among pregnant women attending antenatal care in Mwanza, Tanzania. Parasites & Vectors. 2013; 6: 222.
25. Fallah M, Rabiee S, Matini M and Taherkhani H. Seroepidemiology of toxoplasmosis in primigravida women in Hamadan, Islamic Republic of Iran, Eastern Mediterranean Health Journal. 2008; 14(1): 163-168.
26. Petersen K et al. Seroprevalence of Toxoplasma gondii among pregnant women in Sweden. Acta obstetricia et gynecologica Scandinavica. 2000; 79(10): 824–9.
27. Bobic B et al. Risk factors of Toxoplasma infection in a reproductive age female population in the area of Belgrade, Yugoslavia. European journal of epidemiology. 1998; 14(6): 605–10.
28. Spalding SM, Amendoeira MRR, Klein CH and Ribeiro LC. Serological screening and toxoplasmosis exposure factors among pregnant women in South of Brazil. Revista da Sociedade Brasileira de Medicina Tropical. 2005; 38(2):173-177.
29. Sroka S, Bartelheimer N, Winter A, et al. Prevalence and Risk Factors of Toxoplasmosis among Pregnant Women in Fortaleza, Northeastern Brazil. Am. J. Trop. Med. Hyg. 2010; 83(3): pp.528–533.
30. Remington J.S. Toxoplamosis in the adult. Bull N Y Acad Med. 1974; 50: 211-227.
31. Anteson RK, Sekimoto S, Furukawa S, Quakyi IA. Studies on Toxoplasmosis in Ghana II. The Prevalence of Toxoplasmosis in a group of pregnant women and their neonates. A preliminary report. Gh Med J. 1978; 17: 203-206.
32. Bobi B, Jevremovi I, Marinkovi J, Ibali D and Djakovi OD. Risk factors for Toxoplasma infection in a reproductive age female population in the area of Belgrade, Yugoslavia. European Journal of Epidemiology. 1998; 14: 605-610.
33. Sakikawa M, Noda S, Hanaoka M, et al. Anti-Toxoplasma Antibody Prevalence, Primary Infection Rate, and Risk Factors in a Study of Toxoplasmosis in 4,466 Pregnant Women in Japan. Clin. Vaccine Immunol. 2012; 19(3): 365.
34. Kravetz JD, Federman DG. Toxoplasmosis in pregnancy. The American Journal of Medicine. 2005; 118: 212–216.
35. Rosso F. Prevalence of infection with Toxoplasma gondii among pregnant women in Cali, Columbia, South America. Am J Trop Med Hyg. 2008; 78: 504–508.
36. Zemene E, Yewhalaw D, Abera S, Belay T, Samuel A, Zeynudin A. Seroprevalence of Toxoplasma gondii and associated risk factors among pregnant women in Jimma town, Southwestern Ethiopia. BMC Infect Dis. 2012; 12: 337.
37. Ishaku BAI, Umoh J, Lawal I, Randawa A. Seroprevalence and risk factors for Toxoplasma gondii infection among antenatal women in Zaria, Nigeria. Res J Medicine & Med Sc. 2009; 4: 483–488.
38. Nijem KA-AS. Seroprevalence and associated risk factors of toxoplasmosis in pregnant women in Hebron district, Palestine. East Mediterr Health J. 2009; 15: 1279–1284.
39. Ghoneim NSS, Hassanain N, Zeedan G, Soliman Y, Abdalhamed A. Detection of genomic Toxoplasma gondii DNA and anti-Toxoplasma antibodies in high risk women and contact animals. Global Veterinaria. 2009; 3: 395–400.
40. Lin YL, Liao YS, Liao LR, Chen FN, Kuo HM, He S Seroprevalence and sources of Toxoplasma infection among indigenous and immigrant pregnant women in Taiwan. Parasitol Res. 2008; 103(1): 67–74.

41. Abbas M.M. Seroepidemiological study in toxoplasmosis among women with history of abortion. M. Sc. Thesis. College of Medicine, Al-Nahrain University, Baghdad, Iraq. 2002.
42. Al-Sorchee S.M. Immunological study on toxoplasmosis women with a history of abortion. M. Sc. Thesis, College of Education (Ibn Al-Haitham), Baghdad University, Iraq. 2005.
43. Al-Khafajy A.H. Cytogenic, Immunological and Biochemicalstudies on women infected with Toxoplasma gondii with a history of abortion M. Sc. Thesis, College of Medicine, Al-Nahrain University. Baghdad, Iraq. 2004.
44. ADdoryAZR. Seroepidemeological study of Toxoplasmosis among pregnant women in Salah-Adden government. Tikrit Medical Journal. 2011; 17(1): 64-73.
45. Tenter AM, Heckeroth AR, Weiss LM. Toxoplasma gondii: from animal to human. Int. J. Parasitol. 2000; 30: 1217-58.
46. Lindsay DS, Blagburn BL, Dubey JP. Feline toxoplasmosis and the importance of the T.gondii oocyst. Compend Contin Education Pract. 1997; 19: 448-61.
47. Leser P. Teste de Avidez de IgG para. 2004;Toxoplasmose.http://www.fleury.com.br/htmls/med news/0300/mdcontfcb0304.htm (Accessed on February 18, 2014)
48. Liesenfeld O, Montoya JG, Kinney S, et al. Effect of testing for IgG Avidity in the diagnosis of Toxoplasma gondii infection in pregnant women: Experience in a US Reference Laboratory. J. Infec. Dis. 2001; 183: 1248-53.
49. Laghari AH, Sultana V, Samoo AH, Makhija P, Ara J, Hira. Prevalence and associated risk factors for syphilis in women with recurrent miscarriages. Pak J Med Sci 2014;30(2):295-298. doi: http://dx.doi.org/10.12669/pjms.302.4382 Syphilis thesis 2
50. Watson-Jones D, Gumodoka B, Weiss H, et al. Syphilis in pregnancy in Tanzania. II. The effectiveness of antenatal syphilis screening and single-dose Benzathine penicillin treatment for the prevention of adverse pregnancy outcomes. J. Infect. Dis. 2002; 186: 948-57.
51. Zhou H, Chen XS, Hong FCRisk factors for syphilis infection among pregnant women: results of a case-control study in Shenzhen, China. Sex transm Infect. Oct 2007; 83(6): 476–480.
52. Todd J, Munguti K, Grosskurth H, et al. Risk factors for active syphilis and TPHA seroconversion in a rural African population. *Sex Transm Infect.* 2001; 77: 37-45

How to cite this article: Jaiswal S, Pokhrel T, Sharma S et. al. Seropositivity rates of toxoplasmosis and syphilis in pregnant women visiting western regional hospital, nepal. Int J Health Sci Res. 2014;4(9):230-242.

**********