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Trichomoniasis Spread amongst Pregnant Women attending a Tertiary Institution Teaching Hospital for Antenatal Routine in Kwara State, Nigeria

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ABSTRACT: The objective of this paper was to present the spread of *Trichomoniasis* amongst pregnant women attending a tertiary institution teaching hospital for antenatal routine in Kwara State, Nigeria using appropriate standard structured questionnaire and standardized methods were deployed for data collection and analysis. Three hundred and fifty samples were collected based on their age group, marital status and their level of Education. From the results obtained, the respondents between the ages 15-25 (66.6%) were shown to be positive, followed by those within the age of 26-35 (23.2%), and those between 35-45 years (10.2%) respectively. With respect to the marital status, the prevalence rate of *T.vaginalis* was recorded to be highest in single (51.4%); married (40%) and divorced pregnant mothers (8.6%) respectively. On the accK of the level of Education, the prevalence rate of *T.vaginalis* was reportedly higher in those with primary education (44.3%) followed by those with secondary school education (30%) and post-secondary school education (25.7%) respectively. There was however no statistically significant difference between the groups (p=0.559). The immunological status as indicated by CD 4 counts caused by *Trichomonasvaginalis* infection (p=0.560) show no significant differences in the sampled groups. Therefore, to prevent the impact of *Trichomonasvaginalis* infection, health sanitization awareness is recommended to be carried out time to time by the community health service providers.

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Keyword*:* *T.vaginalis;*painful urination;infectious discharge;Trichomoniasis spread

*Trichomonasvaginalis*is a unicellular, flagellated protozoan that is the causative agent of *Trichomoniasis*, the most common non-viral sexually transmitted infection in the world Hirt*et al*. (2011). The World Health Organization estimates that there were 276.4 million new cases of *T. vaginalis*infection in 2008, which surpasses the total number of *Chlamydia trachomatis* (105.7 million), *Neisseria gonorrhea* (106.1), and syphilis (10.6) infections combined (Hirt*et al*., 2011). Moreover, in the United States *T. vaginalis*is one of the most common parasitic infections Moodley*et al.* (2015), It was reported that an estimated 3.7 million people currently infected and 1.1 million people predicted to be newly infected each year. Just as many parasitic diseases affect the world's poorest populations De Waaij*et al*. (2017), *T.vaginalis*has also been found to disproportionally affect minorities and people from low socioeconomic backgrounds in the U.S. Morikawa*et al*. (2018). The public health threat posed by this parasite and its understudied nature has caused it to be recently recognized as one of the U.S.'s own neglected parasitic infections Schneider *et al*. (2011). *T. vaginalis*colonizes the genitourinary tract of men and women, with the lower genital tract being the major sites of infection in women and the urethra in males

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Workowski*et al*. (2015). Although, infection is usually asymptomatic, clinical manifestations include inflammation of the vagina, urethra, and the prostate, discharge, pruritus (itching), dysuria (painful urination), and hemorrhagic lesions Ramjee*et al*. (2015). Graver complications associated with *T. vaginalis*infections include adverse pregnancy outcomes such as giving birth prematurely and giving birth to low birth weight infants. Around 2000, a study of U.S. HIV+ women found that co-infection with *T. vaginalis*was associated with 4.07-fold higher HIV-RNA3vaginal shedding Kusdian*et al*. (2014).

Although the general processes that contribute to *T. vaginalis*parasitism have been deduced to include degradation of mucin and ECM, adherence to and lysis of host cells, degradation of immune factors, and interactions with multiple host cell types, we have only began to decipher the molecular that might mediate these processes. Mouse models of infection have been established Winograd-Katz *et al*. (2014), however, their limited use and issues of reproducibility have contributed to a lack of their widespread implementation in the field. Therefore, *in vitro* studies using vaginal endo-cervical and ecto-cervical cells Schönfeld*et al*. (2018) serve as the main models to study pathogenesis-associated factors. Since *T. vaginalis*remains extracellular, attachment to host cells and cytolysis of host cells are considered two of the more important phases of infection.

The natural hosts for *Trichomonasvaginalis*are human beings, the parasite lives in the female lower genital tract and the male urethra and prostate, when it replicates asexually by mitotic division and binary fission. No sexual reproduction of *T. vaginalis*has been documented. *T. vaginalis*is a facultative anaerobe which exists only in a trophozoite phase with no cystic phase. Since *T. vaginalis*lacks a cyst, and the flagellate dies outside the human body unless protected against drying and extreme temperature, a moist environment is critical for transmission to occur. *T.vaginalis*may survive for at least an hour in urine Mabaso*et al*. (2020) or for several hours on swimming pool water Masha*et al*. (2017). Sexual transmission is the main mode of transmission, although non-sexual transmission has been reported Crucitti*et al*. (2011). Newborn infants of mothers infected with *T. vaginalis*may become infected by *T. vaginalis*when the parasites are transferred into the neonates urinary or vaginal tract during passage through the infected birth canal Ton Nu *et al*. (2015).Hence, the objective of this paper was to present the spread of *Trichomoniasis* amongst pregnant women attending a tertiary institution teaching hospital for antenatal routine in Kwara State, Nigeria

MATERIALS AND METHODS

*Study Population:*The target group was 350 pregnant women attending Antenatal unit of the clinic. Their socio-demographic profiles were obtained accordingly. The clustered type of sampling where all pregnant women on antenatal visit from November 2021 to May, 2022 were enrolled for the study. It includes both pregnant women that attend the antenatal clinic for routine examination and those that come due to pregnant-related illnesses.

A pre-tested questionnaire was used to collect information on socio-demographic characteristics, gynecological and obstetric history, age, marital status education level previous history of antenatal care attendance, age of pregnancy at initial antenatal care attendance, number of antenatal care attended in the entire gestation period and whether or not the woman was ever screened for *T. vaginalis*. Any pregnancy related complication(s) was also enquired and recorded. Antenatal cards were reviewed to obtain information on other investigations such as HIV or syphilis screening done during the antenatal care visits (Bochner, 2017).During sample collection, High Vaginal Swab was collected from the consenting subject. Vaginal exudates were collected using a sterile swab stick with the aid of sterile speculum Bolumburu*et al*. (2017). Wet preparation of the vaginal exudates collected were made using a drop of normal saline on microscope slide covered with a cover slip and immediately examined microscopically using ×10 and ×40 objective lenses Daluz Becker, (2018). The parasite *T.vaginalis*was identified morphologically by it shape, size, characteristic jerking and twisting movement (Klute, 2011). HVS samples were collected with the help of speculum, which was inserted and focused on the cervix where the sample was collected using sterile swab stick. 2.0 ml of urine sample would be put in a test tube and centrifuged at the rate of 1800 rpm for 3 minutes. It was then removed and the supernatant was decanted. The sediment was kept ready for microscopy Imam *et al*. (2021).

The urine sediment was smeared on a clean grease-free glass slide, which was covered with cover slips, which was then viewed under ×10 and ×40 objectives of the light binocular Olympus microscope to identify motile parasite of *T. vaginalis*. Smear of HVS was done after a 0.5ml of normal saline (physiological saline 0.9%) which was placed on a clean grease-free glass slide. The smear were covered with a cover slip and observed under ×10 and ×40objectives of the light binocular Olympus microscope to identify motile parasite of *T. vaginalis*Imam *et al*. (2021).

In the laboratory, a wet preparation using microscopic glass slides were prepared using a 0.85% normal saline and examined microscopically for the presence of *T. vaginalis* .Conversely, a thick smears would be prepared from vaginal swabs, allowed to dry at room temperature (for 15-20 minutes), stained with 3% Giemsa stains and examined microscopically for the presence of trophozoites by two independent medical laboratory technicians (Kreisel, 2014). For quality assurance, 10% of the positive and negative Giemsa stained thick smears were re-examined by a third medical laboratory technician.

Using convenience sampling method, consecutive infected pregnant women presenting to the ante natal clinic of UITH who satisfied the inclusion criteria were recruited. Matched pregnant women who satisfied the inclusion criteria were also recruited around the same period (November 2021 to May, 2022).

Sample Size Determination:The minimum sample size (N) for each of the comparative group were obtained from the formula in equation 1 (provide a reference for this equation:

$$N = \frac{P_1(100 - P_2) + P_2(100 - P_2) * (Z_{crit} + Z_{pwr})^2}{(P_1 - P_2)^2}$$

Where Z crit = 1.96 (2S.D) at 95% confidence level; Z pwr = at 0 .80 desired statistical power, P_1 = Prevalence of *TrichomonasVaginalis*infection among Pregnant women from a previous study=9.4%[40]; P_2 = Prevalence of *TrichomonasVaginalis* infection among Pregnant women from a previous study = 1.9 %[40]
N = 136

To allow for attrition and uncompleted follow-ups, the sample size was increased by 20%. Therefore a sample size of 160 was used in each group, with pregnant women serving as matched controls. A total of 350 women were recruited into the study.

*Identification of Trichomonasvaginalis:*Wet mounts of all swab samples were made in sterile normal saline on clean slides, covered with a cover slide and examined under the low power (10x) and high power (40x) magnifications for presence of motile trichomonas. A smear of the secretion was also made on a slide, air-dried and fixed in absolute methanol for 1 minute. Diluted Giemsa stain was poured on the smear and allowed to stain for 10 minutes after which it was washed, air dried and examined under microscope with oil immersion (X100) magnification for presence of trichomonas. This was done by a trained medical laboratory scientist from the department of pathology, microbiology division, Iorin university teaching hospital. Those diagnosed with *Trichomonasvaginalis*infection were treated free of charge with tabs metronidazole 500mg twice daily for seven days. They were advised to abstain from sexual intercourse for seven days. Same prescriptions were written for their partners.

Statistical Analysis: Microsoft Excel Version 2010 was employed for the statistical analysis of the data. Descriptive analysis include sum, percentage, mean and standard deviation, while analysis Null hypothesis were carried out using Chi-square test in order to check whether there is significance difference between age groups, trimester and frequency of pregnancy to *T.vaginalis*infection.

RESULTS AND DISCUSSION

*Prevalence Of T. Vaginalis in Relation to Age Group:*From the research carried out on the prevalence of *T.vaginalis*in pregnant mothers attending UITH for their Antenatal routine revealed that, 350 samples were collected base on their age group; between 15-25, 100 samples out of 150 (66.6%) were positive. 120 samples within the age of 20-35, 70 (58.3%), and between 35-45 years 80 samples tested 35 (43.7%) were positive respectively. The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 1shows that age group from 15- 25 have highest percentage % of infection rate by 66.6%.

The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 1the results shows that age group from 25-35 have high percentage% of infection rate by 58.3%.The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 1shows that age group from 35-45 have the lowest percentage% of infection rate by 43.7%.

Table:1 Prevalence of *T.vaginalis* in relation to age group with a total sample of 350

Age Group	No of samples tested	No of positive samples	Positive %
15-25	150	100	66.6%
20-35	120	70	58.3%
35-45	80	35	43.7%

From table 2 the prevalence of *T.vaginalis*in relation tomarital status, (single) 180 (51.4%); married 130 (37.1%) and divorced 40(11.4%). The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 2showing that in relation to marital status single have the highest infection rates by 51.4%.The prevalence of *T.*

*vaginalis*among pregnant women at the study center is presented in Table 2showed that in relation to marital status (married) have low rate of infection by 37.1%.The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study centre is presented in Table 2shows that in relation to marital status of (divorced) group have the lowest infection rate by 11.4%.

Table 2: Prevalence of *T.vaginalis* in relation to marital status with a total sample of 350.

Marital Status	No of sample tested	positive %
Single	180	51.4%
Married	130	37.1%
Divorced	40	11.4%

From table 3 the prevalence of *T.vaginalis* in relation to their level of Education, (primary) 165 (44.3%) were positive, (secondary) school, 155 (42.8%) and (post secondary) 35 (10%) were positive respectively. The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 3shows that in relation to their level of education primary group have the highest infection rate by 44.3%.The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 3shows that in relation to education level secondary have the high infection rate by 42.8%.The prevalence of *T. vaginalis*among pregnant women coming for antenatal at the study center is presented in Table 3shows that in relation to education level post secondary group have the lowest infection rate by 8.6%.There is no much significant difference between the primary group and secondary in relation to education level. Relationship between CD4 count and *Trichomonasvaginalis* infection among positive pregnant women. 8% of pregnant women were negative to the infection rate.

Table 3: Prevalence of *T.Vaginalis* in relation to Education level with a total sample of 350.

Education level	No of samples	Positive %
Primary	165	44.3%
Secondary	155	42.8%
post-secondary	35	10%

Table 4. Relationship between life time number of sex partners and *Trichomonasvaginalis*infection positive in pregnant women

	T. vaginalis		**Total**
Sex partners	**Positive N (%)**	**Negative N (%)**	**Total N (%)**
1	1(6.3)	51(35.4)	52(32.5)
>1	15(93.7)	93(64.5)	108(67.5)
Total	**16(100.0)**	**144(100.0)**	**160(100.0)**

Test statistic: OR =1.914; Fisher's exact test = 0.6406; P= 0.342

Table 5. Relationship between viral load and *Trichomonasvaginalis* infection among positive pregnant women.

	T. vaginalis		**Total**
Viral load	**Positive N (%)**	**Negative N (%)**	**Total N (%)**
<1000	13(81.3)	110(76.4)	123(76.8)
>1000	2(12.5)	13(9.0)	15(9.4)
Missing	1(6.2)	21(14.6)	22(13.8)
Total	**16(100.0)**	**144(100.0)**	**160(100.0)**

Test statistic: OR = 0.7681; Fisher's exact test = 0.1054; P= 0.667

Table 6. Relationship between CD4 count and *Trichomonasvaginalis* infection among positive pregnant women.

	T. vaginalis		**Total**
CD4 count	**Positive N (%)**	**Negative N (%)**	**Total N (%)**
<500	12(75.0)	97(67.4)	109(68.1)
>500	3(18.7)	39(27.1)	42(9.3)
Missing	1(6.3)	8(5.6)	9(5.6)
Total	**16(100.0)**	**144(100.0)**	**160(100.0)**

Test statistic: OR= 1.61; Fisher's exact test = 0.5065; P =0.560

The experimental results showed that the prevalence of *T.vaginalis*is common within the younger age group from 15-24 years. The younger age group respond more positive to the infection by 66.6%, age group from 25-34 respond to the infection by 58.3% and age group from 35-44 years have the lowest rate of infection by 43.7%.

Prevalence of *T.vaginalis* in relation to Educational level the primary group have the highest rate of infection by 44.3%, the secondary group infection rate 42.8% and the post secondary have the lowest rate of infection 8.6%. Prevalence of *T.vaginalis* in relation to marital status the singles pregnant mothers have the highest incidences of *T.vaginalis*by 51.4%, married pregnant mothers have 37.1% and the divorced pregnant mothers have the lowest infection rate by 11.4%.

Trichomoniasisis consider as inconsequential infection but lately, it has attracted more attention because of its co-factor role in spread of Human Immunodeficiency Virus (HIV) and other sexually transmitted infections (STIs), adverse pregnancy outcomes, predisposition to cervical and prostate cancer, premature rupture of the placental membrane, in the study, the prevalence of *T. vaginalis*was found to be 12.5%.it is a public health concern (Maina, 2020). The experimental results showed that the prevalence of *T.vaginalis*is common among pregnant women attending antennal routine. In this study 350 samples were collected and divided in to various groups, the first one is base on their age difference, marital status and their level of education. *T.vaginalis*causes Trichomoniasis which is one of the most prevalent non-viral sexually transmitted disease in the world (Lazenby, 2014). Prevalence rate of the infection is reported high in developing countries and

also among high-risk groups in developed countries (Maina, 2016). In this study *T.vagnalis* is associated significantly with the younger age. The association with younger women has been the experience of other authors Fiori*et al*. (2013). *T.vagnalis* is associated with younger age group; it is a reflection of higher sexual activity in younger women. The increased prevalence of thrush in illiterate women may be associated with personal habits that encourage Candida growth.

Out of the total number (350) of subjects, 150 samples (100) were found positive for *T. vaginalis*which accounted for 66.6% of the subjects. Prevalence of *T. vaginalis*among pregnant women showed that higher incidence found among the subjects is between the age categories of 15-24 years.120 samples (70) were found positive for *T. vaginalis* which accounted for 58.3% of the subjects. Prevalence of *T. vaginalis*among pregnant women showed that high incidence found among the subjects age category from 25-35 years.80 samples (35) were found positive for *T. vaginalis*which accounted for 43.7% of the subjects. Prevalence of *T. vaginalis*among pregnant women showed that there is low infection rate among the subject 35-45 years.Base on the result obtained from the study, under age group from 15-25years respond more positive with highest percentage due to multiple partners, toilet infections and lack of educational background. 150 subjects were tested positive by 66.6%, they responded more to the infection. The age group from 25-35 years, 120 samples respond positive by 58.3%. The age group 80 samples from 35-45years have lowest infection rate by 43.7%. Base on educational level there is significant difference between primary (44.3%) post secondary (8.6%), post secondary have the lowest rate of infection by 8.6% because they have no multiple partner. In this study pregnant mothers and non pregnant mothers were observed, non pregnant women have the lowest rate of infection of *T. vaginalis* infection.

*Conclusion:*Further studies needed to be carried out, some of these women are not even aware of the prevalence of the infection they have been living with it and if *T. vaginalis*is left untreated it can spread to other organs like reproductive organ, in women *T. vaginalis* cause low birth weight in infant, itching of the vagina, premature birth and infertility. In men it causes itching, painful urination and discharge from the penis. Health sensitisation awareness needed to be carried out time to time by community health service. Risk factors associated with *T. vaginalis* includes sharing of bathroom, multiple sex partners, unprotected sex. Personal hygiene is very important and necessary.

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