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Prevalence and correlates of *Trichomonas vaginalis* infection in women attending antenatal clinic in Jos, Plateau State, Nigeria

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Abstract

Background: *Trichomonas vaginalis* is the most common, treatable or curable non-viral sexually transmitted infection (STI) with an annual incidence of more than 170 million cases worldwide.

Objectives: The study was carried out to determine the prevalence of *Trichomonas vaginalis* infection and the associated risk factors associated among pregnant women attending antenatal clinic in Plateau State Specialist Hospital Jos.

Methods: This cross-sectional study was carried out with a total of 300pregnant women who consented to participate in the study. Urine samples were collected from the consenting pregnant women and analysed microscopically. Information on sociodemographic and risk factors were collected via structured questionnaire and analysed statistically.

Results: Prevalence of *T. vaginalis* infection was found to be 22.0% in this study. The studied population had a mean age of 28.49 years with the infection most prevalent among women in the 3rd trimester of their pregnancy (24.1%). Women who admitted to having had stillbirths/miscarriages had the highest prevalence of the infection (33.3%). *Trichomonas vaginalis* was found (32.1%) among women with vaginal discharge.

Conclusion: *Trichomonas vaginalis* infection is prevalent in Jos with 22.0% prevalence among women attending antenatal clinic in plateau State Specialist Hospital. Enlightenment on good personal hygiene as well as education on safe sexual practices are recommended.

Keywords: *Trichomonas vaginalis*, pregnant women, pregnancy, jos

1. Introduction

Trichomonas vaginalis is an anaerobic flagellated protozoan parasite that infects the human urogenital tract and the causative agent of trichomoniasis (Mahmoud *et al*., 2015) [15]. It is the most common, treatable or curable non-viral sexually transmitted infection (STI) with an annual incidence of more than 170 million cases worldwide (Muzny *et al*., 2013, Okojokwu *et al*., 2015) [19, 20]. According to the World Health Organisation (WHO) an estimated 276.4 million new cases of trichomoniasis occurred globally in 2008 making it more prevalent than gonorrhea and Chlamydia, however, this is predominantly in developing countries (WHO, 2012) [27]. Humans are the only known host, with the trophozoite transmitted via direct, skin-to-skin contact with an infected individual, primarily through vaginal sexual intercourse (Wilkerson, 2011, Mosab, 2018) [11, 18]. Transmission via formites is rarely established.

The infection is more common in women than in men and older women are more likely to be infected than younger women (Johnson and Mabey, 2008) [10]. Trichomoniasis is often asymptomatic in men, however more than half of the infected women manifests symptoms such as; vaginal discharge (which can be white, gray, yellow, or green, and usually frothy with an unpleasant smell), vaginal spotting or bleeding, genital burning or itching, genital redness or swelling, frequent urge to urinate and pain during urination or sexual intercourse.

Adverse effects of this infection are significant during pregnancy leading to pre-labour rupture of membranes, preterm delivery, and low birth weight. Infections can also occur after abortion and caesarean delivery (pneumonia and conjunctivitis). In addition, infants with *Trichomonas vaginalis* cultured from nasopharyngeal secretions have been reported to present with significant respiratory distress (David *et al.*, 2003) [4]. *Trichomonas vaginalis* infection has been associated with an increased risk of transmission of other STIs, including human immunodeficiency virus (HIV) (Buvé *et al*., 2001, McClelland *et al*., 2007; Kissinger and Adamski, 2013) [17, 13].

Higher prevalence is observed among persons with multiple sexual partners, poor sexual activity hygiene, poor personal hygiene, low socio-economic status and presence of other venereal diseases (Iwueze *et al.*, 2014).This high prevalence has been reported in many states of Nigeria including Lagos (Adeoye and Akande, 2007) [2], Plateau (Okojokwu *et al.*, 2015) [20], Maiduguri (Mairiga *et al.*, 2011) [16], Anambra

(Iwueze *et al.*, 2014) and Abia States (Kanu *et al.*, 2015) [12].
Several methods including microscopy, culture, antigen detection tests and nucleic acid amplification tests have been used for diagnosis of trichomoniasis. The organism can be detected in vaginal, urethral and prostatic secretions as well as in semen and urine (Hobbs *et al*., 2013) [7].
This study is geared toward identifying the prevalence of *Trichomonas vaginalis* among women attending antenatal clinic in Plateau State Specialist Hospital Jos, Nigeria and to examine the risk factor associated with the infection, hence providing useful information for the need to include its screening as a routine in antenatal care clinic.

2. Materials and Methods

2.1 Study Area

The study was conducted in Jos North Local Government Area of Plateau State, Nigeria located between latitude 9°55'42.56" N and longitude 8°53'31.63" E, among women attending antenatal care at Plateau State Specialist Hospital, Jos.

2.2 Study Population

A total of three hundred (300) pregnant women attending antenatal care in Plateau Specialist Hospital, Jos, within the period of the study were enrolled for this study.

2.3 Ethical Clearance

Ethical clearance was obtained from the ethical committee of Plateau State Specialist Hospital, Jos.

2.4 Collection of Sample and Processing

Prior to sampling, informed consent was obtained before collection and questionnaire was administered alongside to obtain relevant information from the patients. Five millimeters (5 ml) of urine sample was obtained from each participant into sterile universal sample bottles.
The urine sample was put in a centrifuge and spun at 3,500 rpm for 5 minutes. The urine deposits were examined microscopically by wet mount preparations. A drop of the urine deposit was placed on a clean grease-free glass slide and gently covered with a cover slip avoiding air bubble and over-floating. The preparation was then examined under the microscope using low power (10x) and high power (40x) objectives for the presence of *Trichomonas vaginalis*, identified with its characteristic pear-shaped morphology and quick jerky motility.

2.5 Statistical Analysis

Data obtained from the study were analyzed using Statistical Package for the Social Sciences (SPSS) version 23 (IBM SPSS Inc, USA). Proportions were compared using Chi-square with p-value of <0.05 considered significant.

3. Results

Out of the 300 urine samples examined, 66 (22.0%) samples showed positivity for *Trichomonas vaginalis* infection (Table 1).
The prevalence of *T. vaginalis* infection across different age groups showed that those who did not indicate their age group were found to have the highest prevalence rate of 50.0%, followed by the age groups 16 – 20 and 31 – 35, who had the same prevalence rate of 27.3% and 27.3 respectively. Those within the age groups 26 – 30 had prevalence rate of 20.0%, 36 – 40 had 15.4% and 21 – 25 had 11.1%. The difference in age was found to be statistically insignificant (χ^2 = 4.94; p = 0.426).
Data obtained from the study shows that most of the women involved in this study are within the age of 28 and had mean age of 28.49±5.66 (Table 2).
Table 3 shows the prevalence of *T. vaginalis* in relation to marital status and pregnancy trimester. Out of the 300 pregnant women examined, 297were married of which 63(21.2%) were found to be positive for *T. vaginalis* infection while the one patient left is widow and was found to be positive for the infection with prevalence of 3(100%). There was no relationship between prevalence and marital status(χ^2 = 3.581; p = 0.058).
Women in their third trimester were found to have the highest prevalence of 24.1% out of 174, followed by those in their second trimester with prevalence of 19.2% out of 78 and those in the first trimester had the least prevalence of 18.8% out of 48 examined. There was no statistically significant association (χ^2 = 0.37; p = 0.831) between pregnancy trimesters and trichomoniasis (Table 3).
Table 4 shows the prevalence of *T. vaginalis* infection in relation to other risk factors associated with the infection. With respect to urine appearance, 252(19.7%) samples were clear and pale amber while 45 (40.0%) samples were cloudy and pale amber. No statistical association was established between urine appearance and *T. vaginalis* infection (χ^2 = 3.734; P-value = 0.053).
When association between stillbirths/miscarriage was examined, the highest prevalence was recorded in women who had 3 stillbirths/miscarriage representing a prevalence of 33.3% out of 9study subjects examined. This was followed by those who never had stillbirth with prevalence of 57(23.2%) out of 246 samples followed by those who have had 2 stillbirths with a prevalence 3(16.7%) out of 15. The lowest prevalence of 11.1%was recorded in those with 1 recorded case of still birth. There was no relationship between number of stillbirths/miscarriages and prevalence rate (χ^2 = 1.011; p-value = 0.799).
Prevalence of *T. vaginalis* infection was more in those who answered 'Yes' to virginal discharge (yellowish fluid with purulent foul odour) with 27(32.1%) out of 84 while those who answered 'No' had 39(18.1%) out of 216, tested positive. There was no statistically significant association (χ^2 = 2.331; p = 0.127) between vaginal discharge and *T. vaginalis* infection (Table 4).

Table 1: Prevalence of Trichomonas vaginalis infection in relation to Age Group

Age (years)	No of samples	No positive (%)	χ2	P-value
16 – 20	33	9 (27.3)	4.94	0.426
21 – 25	54	6 (11.1)		
26 – 30	90	18 (20.0)		
31 – 35	66	18 (27.3)		
36 – 40	39	6 (15.4)		
No response	18	9 (50.0)		
Total	300	66 (22.0)		

Table 2: Mean Age of Participants

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Age	282	18	38	28.49	5.658
Valid Number	282				

Table 3: Prevalence of *Trichomonas vaginalis* infection in relation to Marital Status and Pregnancy Trimester

Marital status	No of samples	No positive (%)	χ2	P-value
Married	297	63 (21.2)	3.581	0.058
Widow	3	3 (100)		
Total	300	66 (22.0)		
Trimester				
First	48	9 (18.8)	0.37	0.831
Second	78	15 (19.2)		
Third	174	42 (24.1)		
Total	300	66 (22.0)		

Table 4: Prevalence of *Trichomonas vaginalis* infection in relation to other risk factors

Macroscopy	No of samples	No positive (%)	χ2	P-value
Clear & pale amber	252	45(17.9)	3.734	0.053
Cloudy & pale amber	45	18 (40.0)		
Total	297	63 (21.2)		
Stillbirth/miscarriage				
None	246	57 (23.2)	1.011	0.799
One	27	3 (11.1)		
Two	18	3 (16.7)		
Three	9	3 (33.3)		
Total	300	66 (100.0)		
Vaginal discharge				
Yes	84	27 (32.1)	2.331	0.127
No	216	39 (18.1)		
Total	300	66 (22.0)		

4. Discussion

Trichomonas vaginalis was detected with an overall prevalence of 22.0% from the urine samples collected from women attending antenatal care in Plateau State Specialist Hospital, Jos North Local Government Area of Plateau State. Reasons for this prevalence may be associated with most of these women are carriers of the *Trichomonas vaginalis* but never show symptoms (asymptomatic) and since the infection is not routinely checked during antenatal care, they are never diagnosed of it. Another reason may be that vaginal discharges were taken for normal discharge among women during pregnancy. This observed prevalence of 22.0% is slightly lower than those reported in literatures: 24.1% in Jos by Jombo *et al.* (2006) [11], 24.4% by Uneke *et al.* (2007) [27], 35.7% by Jatau (2006) [9], 46.9% in New York by Shuter (1998) [22], 36.1% in Nebraska by Franklin and Monif (2000) [6] 25% in Turkey by Tanyuksel *et al.* (1996) and 28.1% in Saudi Arabia by Madani (2006)and much higher prevalence than that previously reported as 4.0% in Jos by Okojokwu *et al.* (2015) [20], 17.5% in Onitsha by Iwueze *et al.*(2014), 10.99% in Maiduguri by Mairiga *et al.*(2011) [16] and 17.7% in Uyo (Opara *et al.*,2009) [21]. These differences in prevalence reported in the various could be associated with social, cultural and environmental factors, the sample size, the test method used, degree of infection and level of hygiene of the infected women.

Amongst the age groups investigated, *Trichomonas vaginalis* infection prevalence was higher in women of 16 – 20 years (27.3%) and 31 – 35 years (27.3%). The result is in agreement with generally observed epidemiology that incidence of sexually transmitted diseases (STDs) including trichomoniasis is of high prevalence among the 15 – 30 years age group (Donbraye, 2010), this may also be due to the fact that women in these age groups are sexually active (Okojokwu *et al.*, 2015) [20].

Contrary to the report by Usanga *et al.* (2009) [25], who documented that pregnant women admitted decrease in the frequency of sexual intercourse during second and third trimesters. Which could be the reason for low incidence of infection at these stages, the infection recorded highest prevalence of (24.1%) among women in the third trimester followed the second trimester (19.2%) and the lowest among women in the first trimester (18.8%). This study is in agreement with the findings of Mairiga *et al.* (2011) [16] and Donbraye *et al.* (2010), who reported that pregnant women were significantly infected with *Trichomonas vaginalis* infection in their 2nd and 3rd trimester. This is of a concern because it could lead to increased adverse birth outcomes and vertical transmission from mother to neonate if not treated on time. However, it is important to screen pregnant women during all the trimesters (Mairiga *et al.*, 2011) [16].

Marital status did not also affect the prevalence of the infection which agrees with the worksof Usanga *et al.* (2009) [25] and Okojokwu *et al.* (2013).

With regards to macroscopy, that is, the physical appearance of the urine, women with cloudy, pale amber urine had the highest prevalence of *T. vaginalis* infection with (40.0%) followed by those with clear, pale amber urine (17.9%). Only one of the women had bloody urine and was found to be positive for the infection.

Women who have had 3 stillbirths/miscarriage were found to have the highest prevalence for *T. vaginalis* infection (33.3%), followed by those who have had none then those who have had 2 with prevalence of (23.2%) and (16.7%) respectively. Those who have had 1 had the lowest prevalence of (11.1%). But results obtained were no significantly different.

The prevalence rate was found to be higher among women who have vaginal discharge of a yellowish purulence foul odour with a prevalence rate of (32.1%) while those who did not have vaginal discharge had a prevalence rate of (18.1%). This report is in agreement with the works of Abdurehman *et al.* (2013) who carried out a study among pregnant women in Ethiopia and reported a higher prevalence of *T. vaginalis* infection among women with vaginal discharge.

5. Conclusion

The prevalence of *Trichomonas vaginalis* infection is 22.0% among women attending antenatal care in Plateau State Specialist Hospital, Jos North LGA of Plateau State. This infection is a big public health risk considering the fact that it increases the risks of acquiring other sexually transmitted diseases and can also causes complications to the mother and her neonate. It is also possible that many women are carriers and do not exhibit symptoms but transfer from person-to-person.

Routine screening for trichomoniasis for all women attending antenatal care and appropriate treatment should be given to them since the infection has been associated with complications during pregnancy. Education on good personal hygiene and safe sexual practices should also be given a top priority.

6. Acknowledgements
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7. Conflict of Interest
The authors declare no conflict of interest.

8. Authors' Contribution
Ocheme Julius Okojokwu, Entonu Elijah Entonu and Bashiru Shafa Abubakar conceived and designed the study; I.A. Onaji, Ocheme Julius Okojokwu, Nanlop Ladul Mwankat, Bashiru Shafa Abubakar and Ibrahim Abubakar Yusuf performed the experiments; Ocheme Julius Okojokwu, I.A. Onajii and Ibrahim Abubakar Yusuf analyzed the data. Manuscript draft, reading, corrections and editing were done by Ocheme Julius Okojokwu, Nanlop Ladul Mwankat, Bashiru Shafa Abubakar, Ibrahim Abubakar Yusuf, Entonu Elijah Entonu. All the authors consensually agreed to the final manuscript.

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