Detection and Prevalence of *Trichomonas vaginalis* among Pregnant Women in Ibadan, Southwestern Nigeria

1E. Donbraye, 2O.O.B. Donbraye-Emmanuel, 3I.O. Okonko, 4I.O. Okedeji, 5J.A. Alli and 6J.C. Nwanze

1Department of Medical Microbiology and Parasitology, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria  
2Department of Medical Microbiology and Parasitology, University College Hospital (UCH), Ibadan, Nigeria  
3Medical Microbiology & Virology Unit, Department of Biochemistry & Microbiology, Lead City University, Ibadan, Nigeria  
4Department of Pharmacology and Therapeutics, Igbinedion University, Okada, Edo State, Nigeria

Abstract: This study aimed at detecting and determining the prevalence of *Trichomonas vaginalis* infection among pregnant women in Ibadan, Nigeria. One hundred antenatal clinic attendees at Adeoyo Maternity Hospital, Ibadan, were recruited for this study. Samples of high vaginal swab (HVS) were collected per participant and processed using standard parasitological methods. *T. vaginalis* were detected in 6 of the 100 HVS from pregnant women (6.0%) and the infected women were asymptomatic. It shows that a high percentage of the parasites were detected in pregnant women within less than 20 years of age (11.8%). This was followed by 30 years and above (5.0%) while age groups 20-29 years had the least percentage (4.8%). However, vaginal colonization by *T. vaginalis* was not age-dependent (P>0.05). Sexual contact seems to be the principal way of transmitting *T. vaginalis*. Women in their 2nd trimester (10.0%) and 3rd trimester (5.5%) were more often colonized by *T. vaginalis*. None of the pregnant women were in their first trimester. The vaginal colonization by *T. vaginalis* among the pregnant women was 6.0% emphasizing the importance of routine screening of pregnant women thereby assisting in prevention of neonatal *T. vaginalis* infection. However, a thorough medical examination and culture of HVS is highly recommended for pregnant women to ensure detection of vaginal infection by *T. vaginalis* among these immunosuppressed persons. The infected women were asymptomatic. Therefore, the identification of this common treatable sexually transmitted infection offers a precious and much needed additional strategy for AIDS prevention.

Key words: Pathogens colonization · HVS · Pregnant women · STI/STD · *T. vaginalis* · Wet mount · Nigeria

INTRODUCTION

Trichomoniasis is a common sexually transmitted disease (STD) that affects both women and men, although symptoms are more common in women. Trichomoniasis is the most common curable STD in young, sexually active women. An estimated 7.4 million new cases occur each year in women and men [1-4]. Trichomonal infection has been encountered in every continent and climate and has no seasonal variability. It has a cosmopolitan distribution and has been identified in all racial groups and socioeconomic strata [5]. Recent data have shown that the annual worldwide incidence of trichomoniasis is more than 170 million cases [6]. In fact, the World Health Organization [6] has estimated that this infection accounts for almost half of all curable sexually transmitted infections [5, 7]. The incidence of trichomoniasis is as high as 56% among patients attending STD clinics [5, 8].

Trichomoniasis is caused by the single-celled protozoan parasite, *Trichomonas vaginalis*. *Trichomonas vaginalis* is a flagellated protozoan parasite, 10-30 µm in diameter, that infects 170-200 million individuals worldwide and it is one of the most frequent and widespread sexual transmitted infections/diseases.
worldwide, trichomoniasis or "trich" [5, 9]. The main signs of a Trichomonas infection in women are abdominal pain, itching and presence of a foul-smelling discharge with abundant leukocytes. Infection with this organism is also associated with severe complications, such as infertility and enhanced predisposition to neoplastic transformation in cervical tissues. Asymptomatic infection rates are as high as 50% in women [5]. Nearly half of all women with T. vaginalis are asymptomatic. Signs of infections in symptomatic women include vaginal discharge (42%), odor (50%), edema or erythema (22-37%) and colpitis macularis, i.e. strawberry cervix (a clinical sign) which is characterized by punctate hemorrhagic lesions. Other complaints may include dysuria, a yellowish-green frothy discharge, pruritis, dyspareunia and lower abdominal pain [5, 10].

The vagina is the most common site of infection in women and the urethra (urine canal) is the most common site of infection in men. The parasite is sexually transmitted through penis-to-vagina intercourse or vulva-to-vulva (the genital area outside the vagina) contact with an infected partner. Women can acquire the disease from infected men or women, but men usually contract it only from infected women [1-4]. Pregnant women with trichomoniasis may have babies who are born early or with low birth weight (low birth weight is less than 5.5 pounds) [3-4].

T. vaginalis is an obligate parasite in that it lacks the ability to synthesize many macromolecules de novo, particularly purines, pyrimidines and many lipids. These nutrients are acquired from the vaginal secretions or through phagocytosis of host and bacterial cells [11]. Culture media for T. vaginalis therefore need to include all the essential macromolecules, vitamins and minerals [12]. In particular, serum is essential for the growth of trichomonads, since it provides lipids, fatty acids, amino acids and trace metals [13]. In vitro, it grows optimally at a pH of 6.0-6.3 [13], although it can also grow through a wide range of pHs, especially in the changing environment of the vagina [5].

The presence of T. vaginalis in the vagina increases predispositions to HIV seroconversion [15]. The genital inflammation caused by trichomoniasis can increase a woman’s susceptibility to HIV infection if exposed to the virus. Having trichomoniasis may increase the chance that an HIV-infected woman passes HIV to her sex partner(s) [4].

Recent literature documents that women infected during pregnancy are predisposed to premature rupture of membranes, premature labor and low-birth-weight infants. Further, it may amplify HIV transmission [5]. The organism typically elicits an aggressive local cellular immune response, with heavy infiltration of leukocytes, even in symptom-free patients. In addition, in about 50% of infected women, punctate hemorrhages can be observed. In an HIV-negative person, there are target cells available, as also access to blood stream. In an HIV-positive person, all this may expand the portal of exit for the virus and increase shedding of HIV-1 in the genital area. Thus, trichomoniasis may amplify HIV-1 transmission by increasing susceptibility in an HIV-1-negative person and the infectiousness of an HIV-1-positive patient [5]. Few studies have been published on T. vaginalis. Buve et al. [15] confirmed that the risk of T. vaginalis is higher in women reporting a greater lifetime number of sexual partners in those with poorer education levels and in women with alcohol dependency while McClelland et al. [16] reported that the infection was also more common in women with concomitant cervicitis or bacterial vaginosis. On the other hand, the use of condoms and progesterone-only contraceptive methods (depot-medroxyprogestrone acetate or Norplant) was found to be associated with a lower risk of infection in a multivariate analysis model [9].

Prevention of trichomoniasis has not been a priority due to lack of understanding of its public health implications and lack of resources [10]. For long it has been considered a ‘minor’ STD [5]. It has been seen that women infected during pregnancy are predisposed to premature rupture of membranes, premature labor and low-birth-weight infants [5, 17-18]. Further, it may amplify HIV transmission [19-21]. The natural history of this organism, including its often symptomless nature and protracted carriage, play an important role in HIV transmission dynamics, especially where heterosexual behaviour and a high prevalence of HIV obtain [5, 22].

Therefore, the laboratory plays a key role in the diagnosis of this infection. Accurate diagnosis is essential, since it will lead to appropriate treatment and will facilitate the control of the spread of T. vaginalis infection. To determine whether routine testing/screening for vaginal pathogen is necessary in our setting, there is need to determine the vaginal carriage rate of pathogens amongst Nigerian women. The aim of this study therefore was to detect and determine the vaginal carriage rate/ prevalence of T. vaginalis infection among pregnant women in Ibadan, Southwestern, Nigeria.
MATERIALS AND METHODS

Study Area: The study was carried out in the municipal area of Ibadan, which is made up of five local government areas. Ibadan city lies 3°5' E and 7°23' N. The city is characterized by low level of environmental sanitation, poor housing and lack of potable water and improper management of wastes especially in the indigenous core areas characterized by high density and low income populations.

Study Population: A total of one hundred pregnant women of different ages and socioeconomic status attending antenatal clinic at Adeoyo maternity hospital, Ibadan, were enrolled in this study. The study was conducted over a period of six months starting from March to August, 2000 by recruiting consecutive consenting women resenting at Adeoyo Maternity Hospital, Ibadan, Oyo State, Southwestern Nigeria until a total of 100 participants was attained. Other relevant information of all participants was obtained a proforma specially designed for this purpose. The study was approved by the ethical review committee of the hospital.

Specimen Collection: Duplicate samples of High Vaginal Swabs were collected under aseptic condition using a speculum with the help of a gynaecologist. The specimens were transported in a commercially available collection and transport system for pathogens, BBL Culture Swab Plus (Becton Dickinson, Heidelberg, Germany) to medical microbiology and parasitology laboratory for analysis.

Wet Preparation and Identification: This was carried according to the methods of Cheesbrough [23]. A sample of the exudate was transferred to a microscope slide. A drop of sterile physiological saline is added and mix. It is covered with a cover glass and examined under the microscope at ×10 and ×40. The results were analyzed using the ×2-test, with the level of significance set at p<0.05.

RESULTS

Table 1: Detection and prevalence of T. vaginalis in relation to age of the subjects

<table>
<thead>
<tr>
<th>Age Group (years)</th>
<th>No. Tested</th>
<th>No. Positive for T. vaginalis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>17</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>20-29</td>
<td>63</td>
<td>3 (04.8)</td>
</tr>
<tr>
<td>30 and above</td>
<td>20</td>
<td>1 (05.0)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>6 (06.0)</td>
</tr>
</tbody>
</table>

Table 2: Detection and prevalence of T. vaginalis in relation to occupational group of the subjects

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No. Tested</th>
<th>No. Positive for T. vaginalis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artisan</td>
<td>15</td>
<td>1 (06.7)</td>
</tr>
<tr>
<td>Civil servant</td>
<td>10</td>
<td>0 (00.0)</td>
</tr>
<tr>
<td>House wife</td>
<td>03</td>
<td>0 (00.0)</td>
</tr>
<tr>
<td>Student</td>
<td>07</td>
<td>0 (00.0)</td>
</tr>
<tr>
<td>Teacher</td>
<td>20</td>
<td>1 (05.0)</td>
</tr>
<tr>
<td>Trader</td>
<td>45</td>
<td>4 (08.9)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>6 (06.0)</td>
</tr>
</tbody>
</table>

Table 3: Detection and prevalence of T. vaginalis in relation to trimester (period of three-months of pregnancy)

<table>
<thead>
<tr>
<th>Trimester (period of three-three-months)</th>
<th>No. Tested</th>
<th>No. Positive for T. vaginalis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First trimester (1st 3- months)</td>
<td>00</td>
<td>00(00.0)</td>
</tr>
<tr>
<td>Second trimester (2nd 3- months)</td>
<td>10</td>
<td>01(10.0)</td>
</tr>
<tr>
<td>Third trimester (3rd 3- months)</td>
<td>90</td>
<td>05(05.5)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>06 (06.0)</td>
</tr>
</tbody>
</table>

It shows that a high percentage of the parasite were detected in pregnant women within less than 20 years of age (11.8%). This was followed by 30 years and above (5.0%) while age groups 20-29 years had the least percentage (4.8%) as shown in Table 1. However, this difference was not significant (P>0.05).

Table 2 shows the detection and prevalence of T. vaginalis colonization in relation to occupational groups of the subjects. T. vaginalis colonization were more prevalent among traders, this constituted 8.9% of the pregnant women with T. vaginalis infection, followed by artisans (6.7%) and teachers (5.0%) while other occupational group had zero prevalence as shown in Table 2.

Table 3 shows the detection and prevalence of T. vaginalis colonization in relation to trimester (a period of three months, especially one of the three-three-month periods into which human pregnancy is divided for medical purposes) as at the time of this study. This also shows that women in their 2nd and 3rd trimester had T. vaginalis colonization having a prevalence of 10.0% and 5.5% respectively. However, none of the pregnant women were in their first trimester (Table 3).
DISCUSSION

Trichomonas vaginalis was detected in 6.0% of the high vaginal smears of collected from pregnant women in this study and the infected women were asymptomatic. This lower compared to what was reported by other investigators. de Lemos and Garcia-Zapata [9] detected T. vaginalis in 23.0% of the HVS from 39 pregnant women in their study. Some other investigators [24-25] have also reported a high rate in this type of population. Uneke et al. [22] reported 24.4% prevalence of T. vaginalis among HIV-seropositive Nigerian women using the wet mount preparations from high vaginal swab (HVS). In India, as per the published literature, the prevalence of T. vaginalis ranges from 0.4-27.4% in women [5]. The 6.0% prevalence reported in this study is comparably higher than the 4.6% prevalence reported by Piperaki et al. [26] among women attending a Greek gynaecological hospital in Athens, Greece. It is already established that a minimal concentration of 10³ organisms per milliliter of vaginal fluid appears to be necessary for identification of the protozoan by wet mount [1]. The study by Sood et al. [5] has demonstrated that the sensitivity of wet mount is 55%.

The 6.0% prevalence value reported for T. vaginalis infection in this study was higher among pregnant women within ages less than 20 years (11.8%). This was followed by 30 years and above (5.0%) while age groups 20-29 years had the least percentage (4.8%). This contrary to what was reported by Uneke et al. [22], who recorded highest prevalence of T. vaginalis infection among individuals in the 26-30 years age category and slightly comparable in that they recorded [22] lowest prevalence among the age categories 20-25 years and above 40 years. However, our study showed that T. vaginalis colonization was not age dependent. Some researchers reported that the distribution of parasites detection in asymptptomatically colonized pregnant was even irrespective of age. However, irrespective of the source, T. vaginalis colonization rate of the vagina appears to decrease with age. The poor socio-economic status of women is usually implicated as one of the risk factors for T. vaginalis colonization but in this study one marker of socio-economic status i.e. occupation level was not significantly related to T. vaginalis colonization (P > 0.05).

Vertical transmission of T. vaginalis may lead to severe respiratory problems in newborn infants [27-28]. Premature rupture of the membranes is a direct consequence of the activation of neutrophils by T. vaginalis provoking an increase in defensins, principally IL-8 in amniotic fluid [25].

In this study, all the women were married or had a steady sexual partner; thus promiscuity could not be directly related to the presence of the parasite; however, according to de Lemos and Garcia-Zapata [9], early sexual initiation (defined as referring to women under 18 years of age at the time of initiation of sexual activities) was associated with the presence of the infection. Sexual contact seems to be the principal way of transmitting T. vaginalis and in our study women in their 2nd and 3rd trimester were more often colonized than those in their 1st trimester. However, none of the pregnant women were in their first trimester. This shows that the prevalence of T. vaginalis colonization among pregnant women could also be contributed by trimester. Neonatal infections can be prevented by identifying and treating pregnant women who carry T. vaginalis and have a risk of transmitting the parasite to their newborns.

Contrary to McCalland et al. [16] and de Lemos and Garcia-Zapata [9], occupational levels or poorer educational levels were not associated with the presence of T. vaginalis. Though, T. vaginalis colonization was more prevalent among traders, artisans and teachers than other occupational groups.

In conclusion, the presence of T. vaginalis among 6.0% pregnant women in Ibadan has public health implications for HIV prevention as it confirms the practice of unprotected sex, educational efforts must be aimed at sexually active persons and high risk groups and are best focused upon the use of barrier precautions, particularly condom use. Nevertheless, considering that pregnancy is a period in which immunity is low, pregnant women run a greater risk of acquiring sexual transmitted infections and the diagnosis and treatment of T. vaginalis is indispensable since the parasite acts as a carrier of the human immunodeficiency virus (HIV) into the organisms [9, 27]. Therefore, the identification of this common treatable sexually transmitted infection offers a precious and much needed additional strategy for AIDS prevention. However, the surest way to avoid transmission of sexually transmitted diseases is to abstain from sexual contact, or to be in a long-term mutually monogamous relationship with a partner who has been tested and is known to be uninfected.

ACKNOWLEDGMENTS

We thank the management and staff of Adeoyo Maternity Hospital, Ibadan, for permitting this study and the management and staff of Department of Medical Microbiology and Parasitology for permitting the use of the laboratory for bacteriological analysis.
REFERENCES


