

# Trichomonas Vaginalis Infection Among Pregnant Women In South-Eastern Nigeria: The Public Health Significance

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## Abstract

There is paucity of scientific information on the epidemiology, diagnosis and prevention of trichomoniasis among pregnant women in Nigeria. Using the spun urinalysis, a cross-sectional survey of *Trichomonas vaginalis* infection was conducted among married pregnant women attending antenatal clinics, for the first time in pregnancy. Of the 502 pregnant women studied, 14 (2.8%, 95% CI 1.4-4.2%) were infected with *T. vaginalis*. Individuals aged 20-25 years were most infected (3.7%, 95% CI 1.0-6.4%). Women in their third trimester of pregnancy were significantly more infected (8.2%, 95% CI 2.7-13.7%) ( $\chi^2 = 14.46$ ,  $df=2$ ,  $P<0.05$ ), than those in their second trimester (2.3%, 95% CI 0.3-4.3%) and first trimester (0.5%, 95% CI 0.5-1.5%). The primiparae were more infected than the multiparae (6.4%, 95% CI 2.3-10.5% vs 1.4%, 95% CI 0.2-2.6%) and the difference was statistically significant ( $\chi^2 = 9.51$ ,  $df=1$ ,  $P<0.05$ ). Routine surveillance of trichomoniasis among women of child bearing age and prompt treatment of infected individuals are advocated.

## INTRODUCTION

*Trichomonas vaginalis*, a protozoan parasite which can be transmitted sexually, is known to be responsible for an estimated 180 million new infections per year, making it the most prevalent non-viral sexually transmitted pathogen worldwide (1). Transmission to neonates during passage through an infected birth canal is also possible (2). Although infection with *T. vaginalis* is frequently asymptomatic and self limited, it can however, cause urethritis in men and vaginitis in women. Vaginal discharge, vulvovaginal soreness, dysuria, dyspareunia, and/or irritation are usually experienced by symptomatic women with trichomoniasis (1). Several studies have suggested that pregnant women infected with *T. vaginalis* may be at increased risk of an adverse outcome. Premature rupture of membranes, premature labour, low birth weight, and post-abortion or post-hysterectomy infection are complications of trichomonal vaginitis that have been reported (3,4).

In the sub-Saharan Africa, including Nigeria, trichomoniasis has neither been the focus of intensive study nor of active control programs, and this neglect is likely a function of the relatively mild nature of the disease (5). However, in addition to the association of *T. vaginalis* with adverse pregnancy outcomes, increasing evidence suggests that the pathogen may serve as a cofactor in human immunodeficiency virus

(HIV) transmission (6,7). Hence, the need for improved understanding of the natural history, pathology, diagnosis, treatment and prevention of this common protozoan parasite cannot be overstated.

There is paucity of information on the association of socio-demographic parameters and obstetric history with *T. vaginalis* infection among pregnant women in Nigeria. In this report we present the findings of a hospital-based study of the prevalence of *T. vaginalis* infection among pregnant women attending antenatal clinics (ANCs). The objective of the study was to provide scientific information that would improve understanding of the epidemiology of trichomoniasis among women of child-bearing age. The public health significance of results is discussed as it affects maternal health care delivery system and the prevention of *T. vaginalis* infection in Nigeria and other similar settings of the sub-Saharan Africa.

## METHODS

### STUDY AREA

The study location was Abakaliki the capital city of Ebonyi State, South-eastern Nigeria, with a population size of about 255,752. The study was conducted at the five major hospitals in the city with facility for antenatal care. The hospitals include: Ebonyi State University Teaching Hospital (EBSUTH), Holy Child Hospital and Maternity

(HCHM), Felly-Sussy Memorial Hospital (FSMH), St. Theresa's Hospital and Maternity (STHM), and Mgbodo Specialist Hospital and Maternity (MSHM). Heterosexual intercourse is the predominant sexual behaviour in the area and the prevalence rates of HIV infection and syphilis among women attending ante-natal clinics (ANCs) in the area were 4.6% and 1.0% respectively (8).

## STUDY POPULATION /SAMPLING TECHNIQUE

The study was conducted from January 2005 - June 2005 among pregnant women attending routine antenatal clinic at the selected hospitals. Approval for the study was obtained from the Research/Ethical Committees of the five hospitals. Approval for this study was also obtained from the Infectious Disease Research Unit of the Faculty of Clinical Medicine, College of Health Sciences, Ebonyi State University Abakaliki. The approval was on the agreement that patient anonymity must be maintained, good laboratory practice/quality control ensured, and that every finding would be treated with utmost confidentiality and for the purpose of this research only.

The study was thus, an anonymous, unlinked, cross-sectional survey and following informed consent, 502 pregnant women were enrolled into the study. All the women were married and were attending the clinics for the first time in pregnancy. Socio-demographic information and obstetric history were obtained from participants by interview. Thereafter, each subject was given a wide mouthed, leak-proof universal specimen container and was instructed on how to collect her own urine sample. About 20mls of urine sample was obtained from each participant. For the purpose of the research, no personal identifiers (names, ID number, address, etc) were used on the urine sample of the participant. Instead bar-coded numbers were used to ensure anonymity of subjects, to facilitate laboratory procedures and minimize the chances of errors during the handling of the urine specimens.

## LABORATORY ANALYSIS

Microscopic examination of wet mount preparations of the urine samples was done to detect *T. vaginalis* using the spun urinalysis as described previously (9). Diagnosis of trichomoniasis was predicted on visualization of the organism through direct microscopy. Individuals with *T. vaginalis* infection were referred for medical attention.

## STATISTICAL ANALYSIS

Differences in proportion were evaluated using the chi-square test. Statistical significant was achieved if  $P < 0.05$ .

## RESULTS

Of the total of 502 pregnant women studied, aged 20-40 years old (mean age 28.1 years), laboratory analysis confirmed *T. vaginalis* infection through direct microscopy in 14 (2.8%, 95% CI 1.4-4.2%) of the urine specimens. Of the five hospitals used in this study which provided the antepartum services to the subjects, the highest prevalence of *T. vaginalis* infection (6.9%, 95% CI 2.0-11.8%) was recorded among pregnant women at the MSHM and the least prevalence (0.9%, 95% CI 0.9-2.7%) among subjects at the STHM, although no statistically significant difference was observed ( $\chi^2 = 9.11$ ,  $df=4$ ,  $P<0.05$ ) (Table 1). When age was associated with *T. vaginalis* infection, no significant difference was observed ( $\chi^2 = 1.37$ ,  $df=3$ ,  $P<0.05$ ), although the highest prevalence of the infection was noted among individuals of age category 20-25 years (3.7%, 95% CI 1.0-6.4%) and the lowest among those aged 26-30 years old (1.9%, 95% CI 0.2-4.0%) (Table 1).

**Figure 1**

Table 1: Analysis of socio-demographic and obstetric history with infection among pregnant women in Abakaliki, Nigeria.

Parameter investigated	Number examined	Number positive	Percentage positive	95% Confidence interval
<b>Hospital</b>				
EBSUTH	99	3	3.0	0.4-6.4
HCHM	99	1	1.0	1.0-3.0
FSHM	102	2	1.9	0.7-4.5
STHM	101	1	0.9	0.9-2.7
MSHM	101	7	6.9	2.0-11.8
<b>Age</b>				
20-25	188	7	3.7	1.0-6.4
26-30	162	3	1.9	0.2-4.0
31-35	112	3	2.7	0.3-5.7
36-40	40	1	2.5	1.4-4.2
<b>Pregnancy trimester</b>				
First	190	1	0.5	0.5-1.5
Second	215	5	2.3	0.3-4.3
Third	97	8	8.2	2.7-13.7
<b>Parity</b>				
Primigravidae	140	9	6.4	2.3-10.5
Multigravidae	362	5	1.4	0.2-2.6
<b>Occupation</b>				
Business	54	8	14.8	5.3-24.3
Civil servant	38	1	2.6	2.5-7.7
Student	87	3	3.4	0.4-7.2
Housewife	223	2	0.9	0.3-2.1
<b>Educational status</b>				
Non	120	8	6.6	2.2-11.0
Primary	200	3	1.5	0.2-3.2
Secondary	162	3	3.4	0.4-7.7
Tertiary	20	0	0.0	-

Women in their third trimester of pregnancy were significantly more infected with *T. vaginalis* (8.2%, 95% CI

2.7-13.7%) ( $\chi^2=14.46$ ,  $df=2$ ,  $P<0.05$ ), than those in their second trimester (2.3%, 95% CI 0.3-4.3%) and first trimester (0.5%, 95% CI 0.5-1.5%) (Table 1). The primiparous women were more infected than the multiparous women (6.4%, 95% CI 2.3-10.5% vs 1.4%, 95% CI 0.2-2.6%) and the difference was statistically significant ( $\chi^2=9.51$ ,  $df=1$ ,  $P<0.05$ ).

T. vaginalis infection was associated with occupation and result showed that the business women were the most infected (14.8%, 95% CI 5.3-24.3%) while the housewives were the least infected (0.9%, 95% CI 0.3-2.1%). Chi-square test indicated a significant difference in the association between occupation and infection ( $\chi^2=32.06$ ,  $df=3$ ,  $P<0.05$ ) (Table 1). No case of T. vaginalis infection was observed among individuals with tertiary education, but women with no formal education had the highest prevalence of 6.6% (95% CI 2.2-11.0%) with a statistically significant difference ( $\chi^2=8.77$ ,  $df=3$ ,  $P<0.05$ ).

## DISCUSSION

Antenatal screening and treatment for sexually transmitted infections (STIs) have proved beneficial in countries where the practice is adopted. However there are indications that treatment of T. vaginalis infection during pregnancy may be deleterious, probably due to metronidazole (10). This is consistent with a National Institute for Child Health and Human Development trial that found an excess of preterm births in children of women with T. vaginalis infection who were treated with metronidazole (11). Consequently the need for the prevention of T. vaginalis infection among pregnant women cannot be overstated even if the infection has not assumed epidemiological proportion in an area. The T. vaginalis infection prevalence of 2.8% observed in this study was comparatively higher than those recorded among pregnant women in Dhaka, Bangladesh (1.4%) (12) and in Bulgaria (0.9%) (13). However, in a number of other studies, the prevalence rates of T. vaginalis infection noted among pregnant women attending antenatal clinic were higher than what we observed in this study. These include the 4.7% prevalence noted in Ilorin, Nigeria (14), 16% in Mwanza, Tanzania (15), and in the USA; 12.6% in Maryland (3), 46.9% in New York (16), and 36.1% in Nebraska (17).

The prevalence of T. vaginalis infection observed in this study appeared to suggest the existence of low rate of the infection among married pregnant women. This is in conformity with a large, multicenter study of pregnant women in Maryland, USA (18), and at a primary health care

ANC in Dar es Salaam, Tanzania (19), where the unmarried were significantly more infected than the married. Marital status has thus been found to be significantly associated with the level of STD preventive practices (20). However our data must be interpreted cautiously as the possibility of underestimation of the prevalence may not be completely ruled out due to our diagnostic technique. Although performing the wet mount microscopy of spun urinalysis to detect T. vaginalis is reported to be reasonably sensitive and diagnostic (9), a negative wet mount does not necessarily exclude T. vaginalis infection (21).

The wet mount microscopy is used routinely in most settings in Nigeria for T. vaginalis diagnosis, and this has an average sensitivity of 60 to 80 percent for detection of the motile T. vaginalis organisms (22). Culture of T. vaginalis using a Diamond medium, which has a sensitivity of 91 to 100 percent, is considered to be far superior to wet mount examination, however, the culture technique is more expensive than wet mount examination and requires two to seven days to obtain results (23). The sensitivity of culture when compared with polymerase chain reaction (PCR) has been estimated to be 70% (24). Such highly sensitive PCR and related techniques are neither routinely used nor readily available for T. vaginalis in Nigeria and in many parts of the sub-Saharan Africa, at least in the hospital district level. It is thus suggested that careful clinical examination and selective use of wet-mount examination together with wider use of more sensitive tests for subclinical infection, such as culture or direct immunofluorescent staining of vaginal fluid, could lead to improved detection and control of T. vaginalis infection (5).

In this study, age-related prevalence of T. vaginalis infection indicated the highest occurrence among women of 20-25 years old, although no statistically significant difference was observed ( $P<0.05$ ). In a similar study in Apia, Samoa, pregnant women less than 24 years old were the most infected, and being a young pregnant woman was independently associated with current trichomonal infection (25). This was contrary to findings on the rates and risk factors for trichomoniasis among pregnant inmates in New York, USA, where a significant association was established between trichomoniasis and older age (16). The implication of this from our observation is that prevention efforts for T. vaginalis infection should be targeted at all women of child bearing age.

Nearly all the subjects classified as business women were

traders and they were more infected with *T. vaginalis*. The reason for this outcome was somewhat obscure from this study, although a statistically significant difference was observed ( $P < 0.05$ ). Further studies incorporating a systematic assessment of behavioural factors associated with the sexual habits are advocated and might help to provide a better interpretation of the relationship between trichomoniasis and demographic factors such as religion and occupation.

Parity and pregnancy trimester were related to *T. vaginalis* infection and the risk factors associated with significant infection were primiparae and third trimester. Although infection was not associated with parity or gestational age (trimester) in a similar study in Port Moresby, Papua New Guinea (<sub>26</sub>), but Cotch et al.<sub>(3)</sub> noted that vaginal infection with *T. vaginalis* at mid-gestation was significantly associated with low birth weight, preterm delivery, and preterm delivery of a low birth weight infant. A randomized, controlled prospective study is therefore urgently needed to assess the extent to which, if any, trichomoniasis is related to the high perinatal morbidity and mortality from low birth weight in Nigeria.

Women with *T. vaginalis* infection in this investigation were significantly more likely to be less educated ( $P < 0.05$ ), and having no formal education was a major risk factor for trichomoniasis. This is consistent with findings of previous studies in Maryland, USA (<sub>8</sub>) and in Ilorin, Nigeria (<sub>14</sub>), where low level of education was associated with significant *T. vaginalis* infection among pregnant women. Therefore, there is the need for providing proper counselling and education on sexual behaviour and genital hygiene besides treatment to control and prevent trichomoniasis. Since *T. vaginalis* is primarily sexually transmitted, educational efforts must be aimed at high risk groups including women without any formal education and must be explicit regarding the behaviours that lead to the spread of *T. vaginalis*, HIV and other STIs. This is very crucial to maternal health because other vaginal infections such as bacteria vaginosis, or bacteria excess syndrome, and vaginal candida are frequent coinfections in pregnant women harbouring *T. vaginalis* (<sub>17,27</sub>). Given that the level of promiscuity will often be difficult to modify within a population as is commonly the case in Nigeria, then educational campaigns are best focused upon the use of barrier precautions, particularly condom use. This is very important because women using barrier precautions in the six months before becoming

pregnant have been found to be far less likely to be colonized *T. vaginalis* (<sub>18</sub>).

In conclusion, as a public health measure, routine surveillance of trichomoniasis among women of child bearing age and prompt treatment of infected individuals are recommended. The control and prevention of trichomoniasis could also be enhanced by targeting the sexual partners of infected women for treatment and risk-reduction health education.

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