Trichomonas vaginalis infection in Nigerian pregnant women and risk factors associated with sexually transmitted infections

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Abstract
Trichomoniasis poses a public health threat to pregnant women and neonatal health. This study evaluated Trichomonas vaginalis and other common sexually transmitted infections (STIs) status in pregnant women, and risk factors associated with them. The study was cross-sectional and descriptive and a total of 198 pregnant women were recruited for T. vaginalis screening by microscopic examination. Questionnaires were also administered to 108 pregnant women to access information related to socio-demography and other factors associated with STI transmission. The overall prevalence of T. vaginalis was 18.7%. While prevalence of T. vaginalis was neither age nor parity dependent (p > 0.05), women in their first trimester showed significantly higher prevalence of trichomoniasis compared to women in their second and third trimesters (p < 0.05). The frequency of STIs was lowest (18.2%) and highest (71.4%) in age groups ≥ 39 and 15–20 years, respectively. Low levels of education, multiple sexual partners, lack of knowledge on partners’ STI history, and having sex under the influence of alcohol or drugs were risk factors for for STIs (p < 0.05). We found a high prevalence of T. vaginalis in pregnant women, with those at an early gestational age at greater risk. The improved education of women on safe sex and the need to know partners’ STI status are advocated.

Keywords
Maternal trichomoniasis, sexually transmitted infection, women, Trichomonas vaginalis, pregnancy, Africa, transmission risk factors

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Introduction
Over 25 infectious agents are transmitted primarily through sex; however, hepatitis B virus, Trichomonas vaginalis, herpes simplex, human immunodeficiency virus (HIV), Neisseria gonorrhoeae, chlamydia and Treponema pallidum infections are more common.¹,² In the last decade, approximately 340 million new cases of gonorrhoea, chlamydial infection, syphilis, and T. vaginalis infection occurred annually, with the majority of them in developing countries.² Across the world, 2.5, 3.0, 5.6, 6.7, and 11% prevalence of syphilis, gonorrhoea, HIV, herpes, and chlamydia, respectively, have been reported in pregnant women.³–⁶ T. vaginalis infection is one of the most prevalent sexually transmitted infections (STIs).⁷ The disease spectrum ranges from an estimated 10–50% asymptomatic carriers to individuals with profound acute, inflammatory disease.⁸,⁹ Symptoms of T. vaginalis infection in women include frothy/greenish/foul smelling vaginal discharge, dysuria, vulvo-vaginal irritation, and lower abdominal pain, which is more pronounced during pregnancy and menstruation.¹⁰ In pregnancy, T. vaginalis has been implicated in adverse birth outcomes such as low birth weight, preterm labour, neonatal morbidity and mortality.¹¹ Others include upper reproductive tract post-caesarian...
infections and reversible infertility. Neonatal infection through direct vulvo-vaginal contamination occurs in 2–17% of female babies born to infected women. The transmission of the infection is primarily related to sexual contact, with incidence depending on the proportion of the population infected, poor personal hygiene, multiple sex partners and low socio-economic status. T. vaginalis has traditionally been a marker for risk of other common STIs such as Chlamydia trachomatis and Neisseria gonorrhoeae.

There is also a strong association between T. vaginalis and HIV. In this study, we tested pregnant women for T. vaginalis and investigated other common STIs through a questionnaire, in order to determine their prevalence in this population and established common risk factors implicated in STIs.

Materials and methods

Study population

The study was conducted in Ifako Ijaiye General Hospital, Agege, Lagos State, Nigeria between May and August, 2014. Agege is a suburb and local government area in Ikeja division of Lagos State and is inhabited mostly by the Aworis and traders from different parts of the country. It is a highly commercialised community with many recreational centres.

Study design and sample size determination

The study was cross-sectional and descriptive and included only pregnant women who gave informed consent and had not received antibiotics at least two weeks prior to the study. The average prevalence (12.5% ± 5.5) computed from various similar studies across Nigeria and 5% precision was used to calculate the minimum sample size of 168 subjects. Overall, 198 pregnant women were recruited for T. vaginalis infection prevalence study. However due to resource limitation, 108 women were recruited for questionnaire analysis for other STIs. These women were recruited from those who presented to the STIs out-patient clinic at Ifako Ijaiye General Hospital, Lagos State.

Laboratory testing and questionnaire administration

Patients to be screened were first counselled by a trained counsellor before specimen collection. High vaginal swab (HVS) exudates were collected by sterile swab via speculum examination and wet smears were made using a drop of normal saline on microscope slides. The preparations were covered with a cover slip and examined immediately under the microscope. The women who were diagnosed positive for T. vaginalis infection were referred, counselled and administered treatment accordingly. A pretested structured questionnaire was administered to pregnant women to obtain information related to age, education, occupation, number of sexual partners, condom use pattern, and obstetric history. The occurrence of other STIs such as chlamydia, pelvic inflammatory disease (PID), HIV, herpes, gonorrhoea, genital warts and syphilis was determined through the use of questionnaire. The women’s responses regarding their STI status were confirmed by their medical record.

Ethical approval

The study protocol was reviewed and approved by the Olabisi Onabanjo University, Ethics Review Committee.

Statistical analysis

Chi square and Fisher’s exact tests were used to assess differences in proportions between maternal T. vaginalis infection and variables such as age, trimester and parity. The same was used to assess differences in proportions of other questionnaire responses. A p value less than 0.05 was statistically significant.

Results

The mean age of the women was 35.1 ± 6.2 years. The overall prevalence of T. vaginalis in pregnant women in the study area was 18.7%. While prevalence of T. vaginalis was neither age nor parity dependent (p > 0.05), women in their first trimester showed a significantly higher prevalence of T. vaginalis compared to those in their second and third trimesters (p < 0.05) (Table 1). The proportion of women with a single sexual partner increased with age while younger women were more likely to report multiple sexual partners. The proportion of women with multiple sexual partners varied significantly across the ages of the women (p < 0.0001). The overall prevalence of STIs as obtained from response to questionnaire was 45.4%. Self-reported history of STIs was least (18.2%) and highest (71.4%) in age group ≥39 and 15–20 years, respectively (Table 2). STIs occurrence (except for chlamydia and gonorrhoea) was not associated with the women’s ages (p > 0.05).

The prevalence of chlamydia (28.6%) and gonorrhoea (71.4%) in age group 15–20 years was significantly higher than the prevalences reported in other age groups (p < 0.05). Although the occurrence of herpes and syphilis were not associated with ages
of the women \((p > 0.05)\), the highest proportions 14.3% and 28.6%, respectively, were recorded in the age group 15–20 years (Table 3). HIV (14.8%) and genital warts (0.9%) were the most and least prevalent STIs according to the women’s questionnaire report (Table 3). HIV infection was significantly associated with \(T. vaginalis\) \((p < 0.0001)\). Women’s level of education was associated with STIs \((p < 0.05)\) (Table 4). The occurrence of STIs was significantly higher in those with only primary school education (61.1%) compared with those with secondary (36.4%) and tertiary education (25.3%). Housewives (50.0%) and civil servants (20.0%) had the highest and lowest occurrence of STIs. However,
proportions of STIs in relation to occupation of the women were not significant (p > 0.05). STIs were significantly higher in those with multiple sexual partners (57.1%) than those with single sexual partners (23.8%) (p < 0.05). Women who never used condoms (45.5%) had a higher occurrence of STIs than those with regular condom use (29.5%), although variation in condom use pattern was not significant with occurrence of STIs (p > 0.05) (Table 4). The prevalence of STIs in those whose partners had history of STIs (80.0%) was significantly higher than those whose partners did not have an STI history (7.8%) (p < 0.0001). Prevalence of STIs was significantly higher (62.9%) in those who had sex under the influence of drugs or alcohol than those whose sexual behaviour was not influenced by drugs or alcohol (17.8%) (p < 0.0001).

Discussion

The mean age of the women (35.1 ± 6.2 years) was high and seemed not to be a typical representative of the pregnant women population. This aberration was probably due to a higher proportion of multigravid pregnant women in the study population. There was a high prevalence of *T. vaginalis* in this study. The women were likely to be at high risk as the samples were taken from women who self-presented to the STI clinic.

Implicated in the transmission of *T. vaginalis* are the physiological changes that occur during pregnancy, including pelvic vascularity and oestrogenic activity on the vaginal epithelium which causes growth, maturation and exfoliation of the squamous cells and an increase in glycogen deposits in vaginal epithelial cells, the effects of which favour parasite multiplication and transmission. Preterm labour, low birth weight and increased rates of neonatal death are the major adverse effects of maternal trichomoniasis.

The prevalence of *T. vaginalis* (18.7%) recorded in this study is higher than most reports in Nigeria. For example, prevalences of 4.7, 5.2, 11.0, 12.3 and 17.7% have been reported in Ilorin, Calabar, Maiduguri, Abakaliki and Uyo, respectively. Our study, however, showed a similar prevalence with the 18.7% recorded in Zaria, but a lower prevalence than the 24.1% observed in Jos. Compared with the rest of the world, our study showed a higher prevalence than the values reported in Iran (3.3%), Turkey (12.3%) and the Australian aboriginal population (8.4%), but lower than the prevalences of 24.7%, 34.0% and 49.2% reported in Tanzania, Kenya and South Africa, respectively. This prevalence suggests that maternal *T. vaginalis* infection is an important public health threat in Nigerian urban populations. The differences observed in the prevalence of *T. vaginalis* in this study compared with others could be attributed to socio-cultural and environmental differences. Compared to other STIs like HIV and gonorrhoea, *T. vaginalis* infection is neglected in terms of public awareness and the implementation of concerted control measures. Thus, the significantly higher rate of infection recorded in this study’s microscopic diagnosis compared to the relatively low prevalence in the women’s questionnaire and medical reports.

Our study contradicted others that reported age as an important risk factor of *T. vaginalis* transmission in pregnant women. All age groups were equally predisposed to infection. The exact transmission dynamics of *T. vaginalis* infection are not known; however, consistently high prevalence of the disease in sexually active women in resource-poor populations is the most striking epidemiological feature. The gestational age of the women is closely associated with the transmission of *T. vaginalis* in the present study. While our study reported the highest prevalence in the first trimester women, similar to other studies, other reports have favoured a higher prevalence in women in the latter stages of gestation. Although sexual activities in women are
believed to generally decline during pregnancy, most
early-stage first trimester women who are pregnant for
the first time may engage in more sexual acts than others
in later trimesters because they are sometimes unaware
of their pregnancy, resulting in the probable higher
prevalence of T. vaginalis observed in this group. The high
prevalence also observed in the third trimester
women could have serious implications for pregnancy
outcomes and neonatal health.

The significantly higher distribution of chlamydia
and gonorrhoea in the lower age group category con-
trasted with that of T. vaginalis, which showed no asso-
ciation with the age of the women. The higher propor-
tion of multiple sexual partners in younger
women corroborated with a higher prevalence of STIs
observed in the group. The high prevalence of gonor-
rhoea (12.0%) and HIV (14.8%) and occurrence of
other STIs in the population are indicators that T. vagi-
nalis could aid their transmission. Studies have strongly
linked pathological changes induced by T. vaginalis to
an increase in HIV shedding. Therefore, detection
and treatment of T. vaginalis is central to HIV
prevention.

This study showed that education, number of sexual
partners, partners’ STI history and having sex under
the influence of alcohol or drugs were risk factors for
STIs. Educational status has been previously reported
to be a risk factor for T. vaginalis transmission with
consistent significantly higher prevalence rates in
those with lower level of education. Therefore, proper
counselling and education on sexual behaviour and
genital hygiene is necessary for control and prevention
of T. vaginalis during pregnancy. The high prevalence
of STIs among housewives is surprising. However, this
could be as a result of the uneven distribution of the
group compared to others in the survey. The high
prevalence in traders is similar to other reports. Implicated in this is their more active social life with
little or no preventive measures.

The high occurrence of STIs in women whose part-
ners have a history of STIs is expected. Therefore, the
screening of both sexual partners is advocated to pre-
vent the spread of STIs. Of more importance is the high
prevalence of STIs in those without knowledge of their
partners’ STI status. This further stresses the need for
each partner to know their STI status and make
informed decisions regarding their sexual behaviour.

A limitation in this study was the use of a single HVS
sample from the pregnant women for the diagnosis of
T. vaginalis. The true prevalence of the disease might
therefore be underrepresented. Similarly, the use of a
questionnaire to estimate the prevalence patterns of
other STIs and the low number of pregnant women
recruited in this category might as well lead to under-
presentation of the true infection status.

This study showed a high prevalence of maternal T.
vaginalis infection in the study population. The routine
screening of pregnant women for T. vaginalis during
antenatal consultations should be prioritized to abate
probable adverse effects on the foetus. Retesting for
T. vaginalis is recommended for all sexually active women
within three months following initial treatment with
500 mg of metronidazole twice a day for seven days.
Concurrent treatment of all sex partners is critical for
symptomatic relief, microbiologic cure, and prevention
of ongoing transmission and reinfections. Emphasis
should be placed on the education of women about safe
sex and the need to know their partners’ STIs status.
Standard and accessible health care services should be
made available for all for the effective management of
STIs.

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References

1. Gilson RJ and Mindel A. Recent advances: sexually trans-
2. World Health Organisation. Global prevalence and inci-
dence of selected curable sexually transmitted infections:
and syphilis infections among pregnant women attending
antenatal clinics in Tanzania, 2011. BMC Pub Health
gonorrhoea in pregnant Botswana women: time to discard
the syndromic approach? BMC Infect Dis 2007; 7: 27.
5. Bochner AF, Madhivanan IP, Niranjankumar B, et al. The
epidemiology of herpes simplex virus type-2 infection
among pregnant women in rural Mysore Taluk, India.
Chlamydia trachomatis infection in a sample of northern
Brazilian pregnant women: prevalence and prenatal
7. Schwebke JR. Update of trichomoniasis. Sex Transm


44. Kimberly A, Workowski MD and Gail BMD. *Sexually transmitted diseases treatment guidelines* 2014; 270.