TRICHOMONAS VAGINALIS INFECTION AMONG ADOLESCENT GIRLS IN SOME SECONDARY SCHOOLS IN BENIN CITY, EDO STATE, NIGERIA
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ABSTRACT

Trichomonas vaginalis is the most common non-viral sexually transmitted disease (STD) and one of the neglected parasitic infections. This study aimed to determine the prevalence of T. vaginalis infection among adolescent girls in some secondary schools in Edo State, Nigeria. A total of 272 girls were recruited in this study. The participants’ age ranged from 13 to 18 years. Two high vagina swab specimens were collected from each participant. The specimens were analyzed using wet mount examination and culture methods. A prevalence of 9.2% of T. vaginalis was observed among adolescent girls in this study. Level of education of parents, occupation of mothers, sexual relationship and clinical manifestation of participants significantly affected the prevalence of T. vaginalis infection among adolescent girls attending secondary school. Culture method detected more cases of T. vaginalis infection than the wet mount technique. The use of culture method in routine diagnosis of T. vaginalis infection is advocated as this will reduce cases of infertility resulting from undetected and untreated infection as well as the risk of HIV transmission and acquisition.

Key words: Adolescent girls, Benin City, Trichomonas vaginalis

TRICHOMONAS VAGINALIS INFECTION CHEZ LES ADOLESCENTES DANS CERTAINES ÉCOLES SECONDAIRES À BENIN CITY, EDO STATE, NIGERIA
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Résumé
Trichomonas est le plus souvent non virale maladie transmise sexuellement (MTS) et l'une des infections parasitaires négligées. Cette étude visait à déterminer la prévalence de l'infection à T. vaginalis chez les adolescentes dans certaines écoles secondaires à Edo State, Nigeria. Un total de 272 jeunes filles ont été recrutées dans cette étude. L'âge des participants variait de 13 à 18 ans. Deux spécimens ont été prélevés du vagin-tige de chaque participant. Les spécimens ont été analysées à l'aide de l'état frais et l'examen des méthodes de culture. Une prévalence de 9.2 % de T. vaginalis a été observée chez les adolescentes dans cette étude. Le niveau de scolarité des parents, la profession des mères, des relations sexuelles et de manifestation clinique des participants touchés de manière significative la prévalence de l'infection à T. vaginalis chez les adolescentes fréquentant l'école secondaire.

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Sexually transmitted infections (STIs) are the most common public health problem in Africa and high rates of STI in adolescents and young adults indicate their vulnerability to HIV infection (4). T. vaginalis has a cosmopolitan distribution and has been found in all racial group and socioeconomic strata; with no seasonal variability. Trichomoniasis commonly associated with other sexually transmitted diseases (5, 6). The preferred cells infected by T. vaginalis are those of squamous epithelium origin involving the vagina, urethra as well as the endocervix (7, 8). This parasitic infection is frequently asymptomatic in adults. However, symptomatic women may complain of vaginal discharge, vulvovaginal soreness, pruritus, odour and irritation (8, 9). The disease is a recognized cause of urethritis associated with scanty, clear to mucopurulent discharge, dysuria, and burning sensation immediately after sexual intercourse (10). Complications of this disease in both men and women have been reported and they include increased risk of HIV, premature rupture of membranes, premature labour, pelvic inflammatory disease, low birth weight, infection of the adnexa, endometrium and Bartholin glands (in women), prostatitis, balanoposthitis, epididymo-orchitis (in men) and possibly infertility (9, 11, 12, 13, 14). It has been reported that T. vaginalis infection in adolescent girls is likely to remain undetected and untreated, causing increasing morbidity and reducing their fertility as well as increasing their risk of other reproductive tract infection and human immunodeficiency virus (15). This has not been well studied in our locality therefore, this study aimed to determine the prevalence of T. vaginalis infection among adolescent girls in some secondary schools in Edo State, Nigeria.

MATERIALS AND METHODS

Study area
This study was conducted at some secondary schools in Benin City, Edo State, Nigeria. Edo State is situated in the Midwestern part of Nigeria. The state is located within the low rain forest zone of Nigeria and has two seasons, dry and wet. The dry season lasts from mid-October to March or April while the raining season lasts from April to September. Edo State has a population of about 3, 218, 332 (National Population Census, 2006). The secondary schools were: Ezomo College, Iyowa; Ebomisi Secondary School, Ugbojiob; Oba Erediuawa Secondary School, Utekon; Uwelu Secondary School, Uwelu and Egor Secondary School, Egor, Edo State, Nigeria. These secondary schools are situated in Egor and Ovia Northeast Local Government Areas of Edo State, Nigeria.

Study population
A total of 272 girls were recruited in this study. The participants’ age ranged from 13 to 17 years. Serial sampling method was used and participants attending secondary schools whose parents or guardians gave consent were recruited for this study. Adolescent girls that did not return their consent form from their parents or guardians were excluded from the study. Information on demographic characteristics was obtained from participants by administering a well-structured questionnaire bothering on biodata, sexual relationship and personal hygiene. The Ethics and Research Committee of the Ministry of Health, Edo State approved the protocol of this study.

Specimen collection
Two high vagina swab specimens were collected from each participant. The specimens were analyzed using wet mount examination and culture methods were employed. Briefly, a drop of normal saline was added to the exudate collected with the swab and mixed. A drop of the emulsified vagina exudate was placed on a grease free slide, covered with a coverslip and examined microscopically for the presence of T. vaginalis (16). The Dorset culture medium was the culture medium used where the exudate on the second swab was inoculated on the medium and kept in the incubator anaerobically at 37°C for 3 days. Detection of growth was checked daily for T.
vaginalis. The culture plates were examined for growth of T. vaginalis on days 1, 2 and 3 (17).

Statistical analysis
The frequency data were compared using the Chi square (\(X^2\)) whereas the odd ratio was calculated for the potential risk factors. The INSTAT software (Graph PAD software Inc, La Jolla, CA) was used in the analyses.

RESULTS
Out of the 272 participants, 15 (5.5%) and 25 (9.2%) were positive for T. vaginalis infection using wet mount and culture methods respectively. In addition, diagnostic method did not significantly affect the prevalence of trichomoniasis among the secondary school girls (\(P=0.1385\)) with the culture method recording more cases of T. vaginalis (Table 1).

| TABLE 1: DIAGNOSIS OF T. VAGINALIS BY WET MOUNT AND CULTURE TECHNIQUES |
|---|---|---|---|---|
| Method of diagnosis | No. sampled | No. positive (%) | OR | 95% CI | P value |
| Wet mount | 272 | 15 (5.5) | 0.5767 | 0.296, 1.120 | 0.1385 |
| Culture | 272 | 25 (9.2) | 1.734 | 0.893, 3.368 |

\(P<0.05\)

| TABLE 2: RISK FACTORS ASSOCIATED WITH T. VAGINALIS INFECTION AMONG ADOLESCENT GIRLS |
|---|---|---|---|---|
| Characteristic | No. sampled | No. positive (%) | OR | 95% CI | P value |
| Age | | | | | |
| 13-15 | 129 | 14 (10.8) | 1.461 | 0.637, 3.345 | 0.4058 |
| 16-18 | 143 | 11 (7.7) | 0.684 | 0.298, 1.568 |
| Religion | | | | | |
| Muslim | 258 | 23 (8.9) | 0.587 | 0.123, 2.787 | 0.3752 |
| Christian | 14 | 2 (14.3) | 1.703 | 0.3588, 8.083 |
| Educational status of Participants’ father | | | | | |
| None | 16 | 0 (0) | | | 0.0138 |
| Primary | 65 | 12 (18.5) | | | 0.0375 |
| Secondary | 170 | 11 (6.5) | | | 0.1395 |
| Tertiary | 21 | 1 (4.8) | | | 0.0386 |
| Educational status of Participants’ mother | | | | | |
| None | 10 | 0 (0) | | | 0.0264 |
| Primary | 51 | 10 (19.6) | | | 0.2395 |
| Secondary | 166 | 13 (7.8) | | | 0.1562 |
| Tertiary | 45 | 2 (4.4) | | | 0.2395 |
| Occupation of participants’ father | | | | | |
| Farmer | 48 | 5 (10.4) | | | 0.1556 |
| Business man | 169 | 18 (10.7) | | | 0.1556 |
| Civil servant | 55 | 2 (3.6) | | | 0.1556 |
| Occupation of participants’ mother | | | | | |
| Farmer | 30 | 6 (20.0) | | | 0.0153 |
| Business man | 201 | 19 (9.5) | | | 0.0153 |
| Civil servant | 48 | 0 (0) | | | 0.0153 |
| Location | | | | | |
| Rural | 179 | 21 (11.7) | | | 0.0912 |
| Semi-urban | 42 | 3 (7.1) | | | 0.4596 |
| Civil servant | 51 | 1 (1.9) | | | 0.4596 |
| Sexual relationship | | | | | |
| Yes | 94 | 21 (22.3) | 12.514 | 4.149, 37.740 | <0.0001 |
| No | 178 | 4 (2.3) | 0.079 | 0.026, 0.241 |
| Type of toilet | | | | | |
| Bush | 26 | 3 (11.5) | | | 0.7328 |
| Pit latrine | 71 | 5 (7.0) | | | 0.1556 |
| Water cistern | 175 | 17 (9.7) | | | 0.1556 |

Age (\(P=0.4058\)), religion (\(P=0.3752\)), occupation of father (\(P=0.2793\)), location (\(P=0.0913\)), and type of toilet (\(P=0.7328\)) did not significantly influence the prevalence of trichomoniasis among adolescent girls attending secondary schools. Educational level of father and mother of participants significantly
affected the prevalence of *T. vaginalis* infection in this study (*P* = 0.0138 and *P* = 0.0264 respectively). Occupation of mother affected significantly the prevalence of trichomoniasis among the secondary school girls (*P* = 0.0153) with mothers who are farmers having the highest prevalence (20%). Sexual intercourse was a risk factor for acquiring *T. vaginalis* infection among adolescent girls attending secondary school (OR = 12.514; 95% CI = 4.149, 37.740; *P* < 0.0001). (Table 2).

**DISCUSSION**

*Trichomonas vaginalis* one of the sexually acquired reproductive tract infections and has been labeled a silent epidemic among females, causing gynaecological morbidity and maternal mortality globally (18). Besides, the main issue concerning trichomoniasis is its relationship with serious health consequences like cancer, adverse pregnancy outcomes, infertility and HIV transmission and acquisition (13, 14, 19, 20, 21, 22). The undetected and untreated *T. vaginalis* infection can result in increasing morbidity and infertility among adolescent girls (15). There is a dearth of information on trichomoniasis among adolescent secondary school girls in Edo State, Nigeria.

*T. vaginalis* was observed in 25 (9.2%) out of the 272 adolescent girls in this study using the culture methods whereas 15 (5.5%) from the 25 infected participants were positive for *T. vaginalis* using the wet mount preparation. Others reported similar findings (17, 23, 24). Direct microscopic examination of the vaginal specimen remains the most widely used diagnostic test for *T. vaginalis* infection (10). Culture methods have been reported as the current gold standard for the detection of *T. vaginalis* and should be considered for widespread clinical use (17, 25). We suggest the inclusion of culture methods in the screening of *T. vaginalis*.

Generally, an overall prevalence of 9.2% of trichomoniasis was observed among adolescent secondary school girls in this study. The prevalence of *T. vaginalis* observed in this study is similar to the 9.3% reported by Obunge et al. (26) in Port-Harcourt, Rivers State. However, the prevalence of 9.2% of *T. vaginalis* infection reported in this study is lower than the 25.9% and 24.6% reported among school girls in Zambia (27, 28). The observed difference in prevalence could be attributed to geographical locations, personal hygiene and diagnostic methods used. There is the need to put in place drastic measures otherwise, the high prevalence of *T. vaginalis* infection observed in adolescent girls is likely to remain undetected and untreated, causing a rising pool of infection in the local population, increasing morbidity and reducing their fertility as well as increasing their risk of other reproductive tract infection and human immunodeficiency virus (15).

It has been observed that the incidence of sexually transmitted diseases including *T. vaginalis* infection is highest among 15 to 30 years age group (29). The 13-15 years age group had the highest prevalence of trichomoniasis (10.8%) when compared with the 16-18 years age group (7.7%). In addition, age was not a risk factor for acquiring *T. vaginalis* infection (*P* = 0.5978) among adolescent girls attending secondary schools.

Adolescent girls that are Muslims presented with the highest prevalence (14.3%) of *T. vaginalis* infection when compared with their Christian counterparts (8.9%). However, religion was not a risk factor for acquiring *T. vaginalis* infection among the adolescent girls attending secondary schools (*P* = 0.3752).

Individuals with poor personal hygiene and low socio-economic status have been reported to have an increased risk of *T. vaginalis* infection (30). Adolescents that are from home with poor educational background are likely to have poor personal hygiene standards. Level of education of parents of the school girls significantly affected the prevalence of *T. vaginalis* infection (*P* < 0.05) with the girls from father and mother that had primary school education having the highest prevalence of 13.3% and 19.6% respectively. Low level of education has been reported to play a major role in epidemiology of parasitic diseases (2).

Occupation of participants’ father did not significantly affect the prevalence of *T. vaginalis* infection among the adolescent girls (*P* = 0.2793). However, the occupation of participants’ mother greatly affected the prevalence of trichomoniasis among the adolescent girls attending secondary school (*P* = 0.0153) with the girls whose mothers are farmers having the highest prevalence (20.0%). Most farmers are believed to be of poor educational background which is likely to impart on their level of personal hygiene as well as that of their girl child. This may explain the reason for this finding.

Improvement in personal hygiene is more likely to be observed in the urban settings due to access to sexual and reproductive health education from several media as well as the availability of reproductive health services which include treatment and counseling services (15). Girls from the rural settings had the highest prevalence (11.7%) of trichomoniasis when compared with other locations. However, location of adolescent girls did not affect significantly the prevalence of trichomoniasis in this study (*P* = 0.0912). This finding is inconsistent with the report of Nazaret et al. (17) that had higher prevalence of *T.
vaginalis infection from the urban dwellers than their rural counterparts. The reason for this difference is unclear.

The relationship between bacterial vaginosis, Neisseria gonorrhoeae, Chlamydia trachomatis, genital ulcer disease, and the increase in the risk of HIV transmission make early detection and diagnosis of reproductive tract infection particularly T. vaginalis, a major public health imperative (31, 32, 33, 34, 35, 36). T. vaginalis primarily infects the squamous epithelium of the genital tract where it replicates by binary fission. It is transmitted among human host mainly by sexual intercourse (37). In this study, the prevalence of trichomoniasis was strongly associated with sexual intercourse. In addition, sexual intercourse appears to have 4-37-fold increased risk of acquiring T. vaginalis infection among adolescent girls (P<0.0001). Adolescent girls that have had sexual intercourse presented with the highest prevalence (22.3%) when compared with those that did not have sexual (2.3%). The incidence of T. vaginalis infection has been reported to depend mainly on sexual activity (3). This observation may explain our finding.

Participants that used bush as a type of toilet had the highest prevalence (11.5%) of trichomoniasis when compared with other types of toilet (pit latrine 7.0%; water cistern 9.7%). In addition, type of toilet did not significantly affect the prevalence of trichomoniasis among adolescent girls attending secondary school (P=0.7328). This finding is consistent with the report of Crucitti et al. (28). The reason for this finding is unclear.

CONCLUSION

An overall prevalence of 9.2% of T. vaginalis was observed among adolescent girls in this study. Level of education of parents, occupation of mothers and sexual relationship of participants significantly affected the prevalence of T. vaginalis infection among adolescent girls attending secondary school. Culture method detected more cases of T. vaginalis infection than the wet mount technique. The introduction of culture methods to routine diagnosis of T. vaginalis infection is advocated as this will reduce cases of infertility resulting from undetected and untreated infection as well as the risk of HIV transmission and acquisition.

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