



Prevalence of *Trichomonas vaginalis* Infection among Women of Reproductive Age in Anambra State, South Eastern, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors CAI and JCO designed the study, carried out the field and the laboratory analyses of the study. Author JCO performed the statistical analysis, wrote and proof-read the manuscript. Authors IN and OAO managed the literature searches and wrote the protocols. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This study was undertaken to determine the prevalence of *Trichomonas vaginalis* infection among women of reproductive age in some selected hospitals in Awka, Anambra State, Nigeria.

Methods: This study, conducted from October to December 2021, involved 200 women aged 20 years and above as participants. Prior to specimen collection, informed consent was obtained from each woman by qualified medical personnel. High vaginal swab sticks, labeled and sterile, were used to meticulously and aseptically collect specimens from the high vaginal area. A few drops of normal saline were added to each swab stick, and within 30 minutes of collection, a wet mount examination was performed to ensure optimal results. For the wet preparation of vaginal discharge, a drop from the sample was applied to a clean glass slide with a cover slip, avoiding the trapping of air bubbles. The wet smear was then examined under a microscope using a low-power objective (x10) followed by a high-power objective (x40) to detect motile *T. vaginalis*. The vaginal secretion was characterized by the presence of epithelial cells, white blood cells, and red blood cells. The *T. vaginalis* trophozoite was identified based on its oval shape, flagellation, and distinct jerky movement.

Results: The study area had an overall prevalence rate of 11.0% for *T. vaginalis* infection. Among the selected hospitals, COOUTH had the highest prevalence at 13.24%, while Rock Foundation Hospital had the lowest at 6.67%. Prevalence varied across age groups, with the highest rate of 16.42% found in the 30-39 years age group, and the lowest rate of 5.0% in the 20-29 years age group. Divorced women had the highest prevalence at 60.0%, while singles had the lowest at 4.7% among the marital groups. Among different occupations, traders had the highest prevalence at 12.24%, whereas students and civil servants had the lowest rates at 4.0% and 7.72%, respectively. *T. vaginalis* infection was only observed in non-pregnant women, with a prevalence rate of 13.3%.

Conclusion: *T. vaginalis* infection is prevalent among sexually active women of reproductive age in the study area. The findings highlight the importance of practicing good personal hygiene and being faithful to a single sexual partner. It is recommended to raise public awareness regarding the prevention and control of *T. vaginalis* in order to reduce its prevalence among women in the study area.

Keywords: Prevalence; *Trichomonas vaginalis*; infection; women; reproductive age; Anambra.

1. INTRODUCTION

Trichomonas vaginalis infection is a well-known sexually transmissible infections (STI) globally. It is a treatable STDs that infect the urogenital tract of sexually active women and men, causing substantial vaginal and cervical ulceration" [1]. "After bacterial vaginosis and candidiasis, this infection ranks third among the diseases that usually cause vaginal symptoms. *T. vaginalis*, the causative organism, is extremely specific for the genitourinary tract and has been isolated from all genitourinary areas, plus the uterus" [2]. "*T. vaginalis* has been known as a broad-based parasite of the genital tract in both males and females. The life cycle of this parasite is not well known, as it is recognized to be only as trophozoites and doesn't have a cystic stage" [3]. "The trophozoite is an oval parasite with five flagella and an axostyle used to anchor to surfaces" [4]. "It has a yearly prevalence of about 180 million cases in the world" [5]. A lot of cases of trichomoniasis are localized in regions of small income, principally in Africa, where the

prevalence rate is estimated between 15 to 37% [6,7,8], due to a dearth of sufficient facilities for healthcare [5]. "The infection is largely acquired through sexual contact and rarely through non-sexual contact through contact with fomites" [2]. "The symptoms of *T. vaginalis* are usually seen in women more than in men" [9]; "they may comprise frothy-greenish, foul-smelling vaginal discharge followed by vulvovaginal irritation, postictal bleeding, frequency in micturition, lower abdominal pains and dysuria" [10]. "Lower birth weight infants, neonatal mortality, preterm delivery, preterm rupture of membranes, and morbidity are symptoms related with pregnancy" [11]. "The public health significance of this infection is underscored by the fact that *T. vaginalis* infection is prevalent in women of reproductive age and is linked with stern adverse pregnancy consequences" [12]. "This infection could also increase the risk of human immunodeficiency virus (HIV) transmission and other STD infections, which are witnessed significantly more commonly in women" [13]. This present study was designed

to determine the prevalence of *Trichomonas vaginalis* infection among women of reproductive age in Awka, Awka South, and Anambra State.

2. MATERIALS AND METHODS

2.1 Study Area

The study was carried out in four selected hospitals in Awka, Awka South Local Government Area of Anambra State, between October and December 2021. These hospitals include Chukwuemeka Odumegwu Ojukwu University Teaching Hospital (COOUTH), Regina Caeli Specialist and Maternity Hospital, Rock Foundation Hospital, and Eldorado Multi-Specialist Hospital. These hospitals are major healthcare facilities in Awka. Awka is the capital of Anambra State and is located in the southeast region of Nigeria. According to the 2006 Nigerian Census, it has an estimated population of 301,657. Its geographical coordinates include latitude of 6.2°N and a longitude of 7.1°E, and it lies in the rainforest belt of Nigeria. Awka is situated about 25 miles (40km) northeast of Onitsha and 45 miles (72 km) southeast of Enugu. Awka experiences two marked seasons: a wet season of abundant rainfall that begins in April and ends in October, and a dry season that lasts from November to March. The temperature ranges between 22°C and 37°C and has an average annual rainfall of between 152 cm and 203 cm.

2.2 Study Population and Questionnaire Administration

The study population consists of a total of 200 women drawn from the four selected hospitals in Awka. Women of reproductive age not less than 20 years old were used for the study. A well-structured questionnaire was distributed to the participants to seek information such as age, marital status, occupation, and pregnancy status. The obtained bio data was used to determine the independent variables in the transmission of *T. vaginalis* infection.

2.3 Specimen Collection

Specimens of vaginal discharge were carefully collected aseptically from the high vaginal area using a well-labeled, sterile, non-abrasive swab stick. The samples were collected with the aid and supervision of the medical staff of the

hospitals. The samples were taken to the hospital laboratory units and microscopically examined within 2 hours of collection.

2.4 Parasitological Examination

A few drops of normal saline were added to each vaginal swab stick. Each specimen was then placed on a clean, grease-free slide covered with a cover slip and examined microscopically with low power (x10) and high power (x40) objectives [10]. Identification of the presence of *T. vaginalis* was done according to [14]. Onyido, et al. [14] Stated that the presence of *T. vaginalis* is detected by the characteristic jerky movement of the parasite and identified by the characteristic four flagella, axostyle, and oval shape.

2.5 Data Analysis

The data obtained were analyzed by IBM SPSS Statistics, version 21.0. Differences and associations between categorical variables were tested using Pearson's chi-square test and considered statistically significant at $P < 0.05$. The resulting output was presented in tables.

3. RESULTS

Table 1 shows the overall prevalence of *T. vaginalis* infection among the hospitals used in this study. Out of 200 women examined, 22 (11.0%) were positive, while 178 (89.0%) were negative. The prevalence as recorded was 10 (12.5%) in Regina Caeli Specialist Hospital, 9 (13.24%) in COOUTH, 3 (6.67%) in Rock Foundation Hospital, and none were positive in Eldorado Multi-specialist Hospital. The differences observed were not statistically significant at $P < 0.05$.

Table 2 shows the age-specific prevalence of *T. vaginalis* infection among the participants. Out of the 60 women in the age group 20–29, 3 (5.0%) were positive. In the age group of 30-39, 11 (16.42%) out of 67 were positive. Of the 58 women in the age group 40–49, 8 (13.8%) were positive. In the last age group, 50–59, none of the 25 women examined were positive. *T. vaginalis* infection was significantly higher among reproductive women aged 30-39 (16.42%) than in other age groups ($P < 0.05$).

Table 3 shows the rate of prevalence of *T. vaginalis* infection according to the marital status of the participants. Out of the 86 single participants, 4 (4.7%) tested positive. Out of 100

married women examined, 15 (15.0%) were positive. 3 (60.0%) out of 5 divorced women were positive. All nine widowed women used for the study were negative. *T. vaginalis* infection has a likelihood of being significantly higher in divorced women than in married and single women ($P < 0.05$).

Table 4 shows the prevalence of *T. vaginalis* infection based on the occupation of the participants. Out of 98 traders examined, 12 (12.24%) were positive. Out of 30 students who participated in the study, 4 (10.0%) were found to be positive. Among the civil servants, 7 (9.72%)

out of 72 turned out to be positive. Hence, *T. vaginalis* infection is likely to be significantly higher in traders than in students and civil servants ($P < 0.05$).

Table 5 shows the prevalence of *T. vaginalis* infection among pregnant and non-pregnant women that participated in the study. All 35 pregnant participants were negative. However, 22 (13.3%) of the 165 non-pregnant women used in the study were positive. *T. vaginalis* was observed only among non-pregnant women. *T. vaginalis* infection was significantly higher in non-pregnant women ($P < 0.05$).

Table 1. Prevalence of *T. vaginalis* infection among participants in the hospitals used

Name of hospitals	Number examined	Number infected	Prevalence (%)
Regina Caeli Specialist Hospital	80	10	12.50
COOUTH	68	9	13.24
Rock Foundation Hospital	45	3	6.67
Eldorado Multispecialist Hospital	17	0	0.00
Total	200	22	11.00

Table 2. Prevalence of *T. vaginalis* infection in the different age groups of participants

Age Groups	Number Examined	Number Infected	Prevalence (%)
20 - 29	60	3	5.00
30 - 39	67	11	16.42
40 - 49	58	8	13.80
50 - 59	25	0	0.00
Total	200	22	11.00

Table 3. Prevalence of *T. vaginalis* infection based on the marital status of the participants

Marital status	Number examined	Number infected	Prevalence (%)
Single	86	4	4.70
Married	100	15	15.00
Divorced	5	3	60.00
Widowed	9	0	0.00
Total	200	22	11.00

Table 4. Prevalence of *T. vaginalis* infection based on the occupation of the participants

Occupation	Number examined	Number infected	Prevalence (%)
Students	30	4	10.00
Traders	98	12	12.24
Civil servants	72	7	9.72
Total	200	22	11.00

Table 5. Prevalence of *T. vaginalis* infection among pregnant and non-pregnant participants

Pregnancy status	Number examined	Number infected	Prevalence (%)
Pregnant	35	0	0.00
Non-pregnant	165	22	13.30
Total	200	22	11.00

4. DISCUSSION

This study showed an overall prevalence of 11.0%, out of the 200 women from the four selected hospitals. The prevalence is higher than the findings of [15], who observed a prevalence of 3.3% among women in Kwampe Community, Plateau State of Nigeria. The result declined slightly from the findings of [16], who presented a prevalence of 13.3% among 300 females studied at Umunze community in Orumba Local Government Area of Anambra State, Nigeria. However, this prevalence is lower than the result of [17], who observed a prevalence level of 17.5% among women attending hospitals and health centers in Onitsha North Local Government Area of Anambra State. It is also lower than that of [14], who reported a *T. vaginalis* prevalence of 15.0% among rural women in the Ekwulumili community, Anambra State, Southeast Nigeria. “The prevalence of 11% observed in this present study could be explained by the fact that the majority of cases of trichomoniasis are localized in regions of low income, particularly in African countries, where the prevalence rate ranges from 11 to 37%” [8].

The prevalence of *T. vaginalis* infection varied in the selected hospitals used in the study. The highest prevalence was recorded at Chukwuemeka Odumegwu Ojukwu University Teaching Hospital, COOUTH (13.24%), and the least at Rock Foundation Hospital (6.67%). However, a high prevalence of 12.5% was observed at Regina Caeli Specialist Hospital. This is in agreement with the report of [17], which showed that the prevalence of *T. vaginalis* infection is not dependent on the hospitals or health centers used for the study. This could be a result of a lack of adequate resources for healthcare [5]. “*T. vaginalis* infection is thought to be widely incorrectly diagnosed owing to various factors, including a lack of routine testing, the low sensitivity of a commonly used diagnostic technique (wet mount microscopy), and non-specific symptomatology” [18]. The prevalence changes in the various hospitals could be due to misdiagnosis and inadequate laboratory testing.

T. vaginalis infection prevalence varied with respect to age. The highest prevalence was seen among women aged 30-39 (16.42%) and the least in the age group of 20-29 (5.0%). This result is in tandem with the findings of [3], who recorded the highest prevalence among women aged 26–30 (9.32%) and the least prevalence in the age

group of 26–30 (6.10%). The result disagrees with [17], who observed the highest prevalence, in the age group of 21–30 (47.2%) and the lowest prevalence among women aged 31–40 (8.6%). Nevertheless, the result is similar to the findings of [14], who observed a prevalence of 35.0% among the 30-39 age group and 0% amidst the younger age group of 20–29. The result recorded among women aged 40–49 (13.8%) corresponds with the findings of the above-mentioned authors, who also observed prevalence rates of 4.7%, 9.6%, and 8.0%, respectively, among women aged 40–49. On the contrary, none of the women in the age group of 50–59 were positive, which is not in agreement with the findings of [14] (21.43%) and [17] (8.0%). The age-specific prevalence could be as a result of sexual promiscuity amongst the age group of 20–29 and probably as a result of the asymptomatic persistence of earlier infections and inadequate hygiene. However, *T. vaginalis* infection remains prevalent among highly sexually active women aged 30-49. Onyido, et al. [14] reported that 2–3 million infections occur normally among sexually active women. Hence, it is justified since sexual intercourse is the primary route of *T. vaginalis* infection.

The prevalence of *T. vaginalis* also varied with marital status, with divorcees (60%) having the highest prevalence and singles showing the least prevalence (4.7%). A prevalence level of 15% was observed among married women. The high prevalence among divorced women could be due to their sexual promiscuity, as having multiple sex partners play a vital role in prevalence rate. The prevalence among married and single women could be as a result of infected partners, poor hygiene and the persistence of the infection without treatment.

T. Vaginalis prevalence differed among the occupations of the participants. The traders undoubtedly had the highest prevalence of 12.24%, followed by the students (10.0%), and the civil servants had the least prevalence of 9.72%. The result is not in agreement with the findings of [16], who observed that the prevalence was higher in students (6.7%), traders (2.7%), and civil servants (1.3%). The high prevalence among traders could be due to the fact that trading encompasses all sorts of travel. Possibly, the traders engage in transactional sex as they move from location to location. The low prevalence among civil servants and students is a result of a high level of literacy and proper awareness. However, the

prevalence was slightly higher in the present study and could be due to the practice of poor hygiene, high sexual promiscuity, and occasionally non-sexual contact with fomites or surfaces that are contaminated by an infected individual's fluid [2].

T. Vaginalis infection was not detected in all the pregnant women who participated in the study; a prevalence rate of 13.3% was observed in non-pregnant women. The infection was not prevalent in pregnant women, probably as a result of incorrect collection of vaginal discharge from the high vaginal wall. This study represents an initial exploration into the prevalence of *T. vaginalis* infection among women in Awka, Anambra State, Nigeria. It is important to acknowledge that the study's findings may be limited due to the constraints of discharge examination using light microscopy, as this method may not effectively identify minor infections.

5. CONCLUSION

In the study area, it is evident that *T. vaginalis* infection is prevalent among women of reproductive age, particularly those who are sexually active and have multiple sex partners. To reduce the prevalence of this infection among women in this demographic, it is recommended to prioritize proper personal hygiene, promote faithfulness to a single sexual partner, and conduct extensive public awareness campaigns on the prevention and control of *T. vaginalis*.

CONSENT AND ETHICAL APPROVAL

An introductory letter was issued from the Head of the Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, to carry out this project. An ethical approval letter was obtained from the Ministry of Health, Awka, to facilitate the study. Authorized approval of the chief medical directors and management boards of the selected hospitals was sought before the commencement of the study. Participation was voluntary, and informed consent was sought from each participant before the collection of specimens. The study was conducted with strict adherence to the ethical standards and procedures for research with human participants. Participants selected for the study were all women visiting the selected hospitals. Sexually active women aged 20 years and older were used for the study. The females in their menstrual period were exempted from the study.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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