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ABSTRACT

Background: Trichomoniasis is a sexually transmitted disease detrimental to pregnant women. They are prone to vaginal pH increase during pregnancy, creating a conducive environment for the parasite. This study assessed the prevalence of *Trichomonas vaginalis* among pregnant women attending an ante-natal clinic in Immanuel General Hospital Eket, Akwa Ibom State.

Methods: Pre-designed questionnaires were administered to randomly selected pregnant women aged 18-49. High vaginal swabs were collected from each participant, and *T. vaginalis* was diagnosed using wet mount and Giemsa-stained microscopy method.

Results: Of the 200 samples collected, 28 (14%) were positive for *Trichomonas vaginalis*. The infection was highest among the age group 26-35 years, with a prevalence of 22 (78.57%). A higher prevalence of 16 (57.14%) was observed among women with elevated vaginal pH (>4.5) than those with lower pH (<4.5). The distribution of *T. vaginalis* by clinical manifestation revealed that all the positive women (28; 27.7%) had vaginal discharge and 11 (14.3%) experienced itching. Few women experienced Dysuria (4; 22.2%) and Dyspareunia (2; 10%). Chi-square analysis showed a significant difference in the age group (p<0.05).

Conclusions: Routine screening of all pregnant women is recommended so that appropriate treatment can be administered early to avoid childbirth complications due to this disease. There is also a need for routine health talks on personal hygiene and safe sex practices.

Keywords: Trichomoniasis, High vaginal swab, Pregnant women, Vaginitis
1. INTRODUCTION

*Trichomonas vaginalis* is a sexually transmitted parasite which occurs in males and females, but most cases are reported in females who show more symptoms than males [1]. The female vagina and male prostate gland are the main habitats of *T. vaginalis*, accommodating a highly complex microbiome and influencing the parasite’s chances of inhabiting its host successfully [2]. It is the most common non-viral sexually transmitted infection globally [3, 4]. An estimate of 376 million new infections of sexually transmitted infections (Chlamydia, Gonorrhea, Syphilis and Trichomoniasis) occur yearly, showing a high infection rate. Trichomoniasis is estimated to be 156 million new cases of the global burden of sexually transmitted infections [5]. It is a risk factor for other sexually transmitted organisms like Chlamydia trachomatis, Neisseria gonorrhoea [6], and bacterial vaginosis [7]. The estimated prevalence of Trichomoniasis in Africa is relatively high compared to other sexually transmitted infections [8-11]. Symptoms in females include vaginitis, dysuria and dyspareunia. Complications of this disease that have been documented in pregnant women include urinary tract infection, cervicitis, oral lesions, pelvic inflammatory disease, low birth weight, premature rupture of membranes, post-abortion infections, and the promotion of HIV infection [4, 12]. Most males show symptoms and seek treatment for urethritis and dysuria [13]. Transmission is by sexual intercourse. Diagnosis is by examination of the vaginal discharge from women and urethra fluid from men. The pH of the vagina can favour *T. vaginalis* infection. This occurs when there is a shift from a semi-acidic pH (3.8-4.5) to a basic pH (4.5-6.0) which is conducive to the growth of the parasite [14, 15]. *T. vaginalis* increases the pH of the vagina.

Studies on Trichomoniasis in Akwa Ibom State are insufficient; therefore, the need to assess the population especially pregnant women who are highly at risk. From research carried out previously, prevalence range from 4.4% to as high as 37.6% in Nigeria [16, 18]. This study sought to identify the population at risk and how to understand the disease better.

2. METHODS

2.1 Study Area

This study was conducted among pregnant women attending the antenatal clinic in Immanuel General Hospital, Eket, Akwa Ibom State. Eket Local Government Area occupies the south central area of Akwa Ibom State, located between latitude 4°33’N and 4°45’N and longitude 7°52’ and 5°02’E [Figure 1].

2.2 Study Population and Design

This study is a descriptive cross-sectional study among pregnant women between January and September 2018 to determine the prevalence of *Trichomonas vaginalis* among pregnant women attending the antenatal clinic in Immanuel General Hospital, Eket. Well-structured questionnaires were used to obtain socio-demographic data, health and treatment practices on Trichomoniasis from all the pregnant women who participated in the study. Pre-test counselling was offered to all pregnant women by a trained nurse.

2.3 Inclusion and Exclusion Criteria

All pregnant women attending the antenatal clinic and 18 years above present at the time of visit were included in the study. All pregnant women below 18 years and on antibiotic treatment were excluded from the study.

2.4 Ethical Considerations

Approval for this study was obtained from the Akwa Ibom State Research Ethics Committee, Ministry of Health, Uyo, Akwa Ibom State (MH/PRS/99/Vol.IV/209). Informed consent was obtained from each pregnant woman before administration of the questionnaire and sample collection.

2.5 Sample Size Determination

The sample size was calculated using the formula:

\[ N = Z^2 \times pq/d^2 \]

Where \( N \) = Desired sample size

\( Z = 1.96 \)

\( p = 5\% \) or 0.05

\( q = 1 - p = 0.95 \)

\( d = 0.03 \) or 3% as margin of error

\( N = 200 \) after adjusting for possible loss of sample and incomplete questionnaires.

2.6 Questionnaire Administration

Well-structured questionnaires were administered to 200 randomly selected pregnant women who met the criteria. The questionnaire accessed socio-demographic data, knowledge, health, and treatment practices on Trichomoniasis.
2.7 Sample Collection and Laboratory Analysis

High vaginal swab samples were collected by doctors, nurses and medical laboratory scientists for six months (April-September, 2018). Each sample was collected using a bivalve vaginal speculum passed into the vagina. Vaginal secretion was obtained from the lateral or posterior fornix of the vagina as the patient laid (lithotomy position) with a sterile cotton swab stick. The pH reading was recorded for each sample with pH paper. Samples were transferred to the diagnostic laboratory, smeared directly onto a labelled clean glass slide, and covered with a cover slip. It was examined immediately under low power (x10) and high power (x40) on the microscope for the presence of flagellated protozoan by trained and experienced laboratory scientists using the wet mount method [16] and Giemsa stained smear [17]. A second smear using Giemsa stained technique was prepared by making a smear on a glass slide. It was air-dried and fixed in absolute methanol for a minute. Giemsa stain of 1 in 10 dilutions was poured on the smear and allowed to stain for ten minutes, after which it was washed, air-dried, and examined with oil immersion (x100) magnification under the microscope. A dark blue stained internal structure, red nucleus, and flagella indicated a positive result.

2.9 Data Analysis

Data were entered and analysed using Microsoft excel and SPSS version 23, respectively. The Chi-square test was used in analysing statistical significance between socio-demographic data and prevalence when the p-value was < 0.05.

3. RESULTS AND DISCUSSION

The Two hundred pregnant women aged 18-49 participated in the study. Ages 26-35 had the highest frequency (87; 43.5%) of T vaginalis. Most pregnant women (55.5%) were in their second trimester and married (95%). Table 1 shows the prevalence and characteristics of the study population.

The overall prevalence of *Trichomonas vaginalis* was 14% (Table 1). This shows the distribution of *Trichomonas vaginalis* infection with sociodemographic characteristics and prevalence. The age group 26-35 years had the highest (78.57%), and the age group ≥ 36 years had the lowest (3.57%) prevalence. Table 2 shows the prevalence of *T. vaginalis* based on the method of diagnosis among pregnant women. The wet mount and Giemsa-stained smear methods obtained a similar prevalence (14%).

The distribution of *T. vaginalis* according to vaginal pH (Table 3) revealed that women with vaginal pH greater or equal to 4.5 had the highest prevalence (73.9%) compared to those with a lower pH of less than 4.5 (26.1%). Prevalence concerning clinical manifestation showed that out of 101 women with vaginal discharge, 28 (27.7%)...
tested positive and of the 77 who reported itching\textsuperscript{11} (14.3%) were positive. Similarly, out of the 18 women with Dysuria and 20 with Dyspareunia, 4 (22.2%) and 2 (10%) were positive, respectively.

**Table 1.** Sociodemographic characteristics and Prevalence of the Study Population

<table>
<thead>
<tr>
<th>Characters</th>
<th>No. examined (%)</th>
<th>No. positive (%)</th>
<th>Prevalence rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25</td>
<td>44 (22)</td>
<td>5 (17.8)</td>
<td>2.5</td>
</tr>
<tr>
<td>26-35</td>
<td>87 (43.5)</td>
<td>22 (78.6)</td>
<td>11.0</td>
</tr>
<tr>
<td>≥ 36</td>
<td>69 (34.5)</td>
<td>1 (3.6)</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200 (100)</strong></td>
<td><strong>28 (100)</strong></td>
<td><strong>14.0</strong></td>
</tr>
<tr>
<td>Gestational Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1\textsuperscript{st} Trimester</td>
<td>40 (20)</td>
<td>5 (17.8)</td>
<td>2.5</td>
</tr>
<tr>
<td>2\textsuperscript{nd} Trimester</td>
<td>111 (55.5)</td>
<td>11 (39.3)</td>
<td>5.5</td>
</tr>
<tr>
<td>3\textsuperscript{rd} Trimester</td>
<td>49 (24.5)</td>
<td>12 (42.9)</td>
<td>6.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200 (100)</strong></td>
<td><strong>18 (100)</strong></td>
<td><strong>9.0</strong></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>10 (5)</td>
<td>2 (7.1)</td>
<td>1.0</td>
</tr>
<tr>
<td>Married</td>
<td>190 (95)</td>
<td>26 (92.9)</td>
<td>13.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200 (100)</strong></td>
<td><strong>28 (100)</strong></td>
<td><strong>14.0</strong></td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>18 (9)</td>
<td>3 (10.7)</td>
<td>1.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>112 (56)</td>
<td>21 (75.0)</td>
<td>10.5</td>
</tr>
<tr>
<td>Tertiary</td>
<td>70 (35)</td>
<td>4 (14.3)</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>200 (100)</strong></td>
<td><strong>28 (100)</strong></td>
<td><strong>14.0</strong></td>
</tr>
</tbody>
</table>

**Table 2.** Prevalence of Trichomoniasis based on the methods of diagnosis

<table>
<thead>
<tr>
<th>Method of Diagnosis</th>
<th>Positive (%)</th>
<th>Negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Mount</td>
<td>28 (14)</td>
<td>172 (86)</td>
</tr>
<tr>
<td>Giemsa-stained smear</td>
<td>28 (14)</td>
<td>172 (86)</td>
</tr>
</tbody>
</table>

**Table 3:** Distribution of *T. vaginalis* according to vaginal pH

<table>
<thead>
<tr>
<th>Vaginal pH</th>
<th>No. examined</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 4.5</td>
<td>46</td>
<td>12 (26.1)</td>
</tr>
<tr>
<td>≥ 4.5</td>
<td>154</td>
<td>16 (73.9)</td>
</tr>
</tbody>
</table>

**Table 4:** Distribution of *T. vaginalis* among pregnant women according to clinical manifestation.

<table>
<thead>
<tr>
<th>Clinical Manifestation</th>
<th>No. examined</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal discharge</td>
<td>101</td>
<td>28 (27.7)</td>
</tr>
<tr>
<td>Itching</td>
<td>77</td>
<td>11 (14.3)</td>
</tr>
<tr>
<td>Dysuria</td>
<td>18</td>
<td>4 (22.2)</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>20</td>
<td>2 (10)</td>
</tr>
</tbody>
</table>

In conclusion, this study confirms reports of previous studies on the prevalence of *T. vaginalis* among pregnant women in Nigeria [18-23]. *Trichomonas vaginalis* is distributed worldwide [24]. The overall prevalence rate recorded was 28 (14%). This agrees with similar studies in Nigeria by Alexander *et al.* and Ogbonna *et al.* [18, 25], whose prevalence rates were 34% and 37.6%, respectively. This is considerably high compared to lower prevalence rates of 4.4% in Taraba [16], 4.7% in Uyo [22], 13% in Niger Delta region [19], 17% in Sokoto [23] and 17.5% in Onitsha [26]. The difference in prevalence rate can be attributed to the sensitivity of diagnostic methods used and the contrast in the level of knowledge in the population under study. The age group 26-35 years [27] had the highest prevalence of 22 (78.6%). This is in agreement with Alexander *et al.* and Ukatu *et al.* [18, 23], who observed the highest prevalence of (44 %) and (20%) in the age group 21-30 years. Ukatu *et al.* [23] also observed (20%) and (30%) in age groups 25-31 years & 32-38 years, respectively. This disagrees with Ojurongbe *et al.* [20], who observed the highest prevalence in the age group 20-30 years. This may be attributed to a higher frequency of sexual activity in the age group 36 – 35 years.

Concerning trimester, the prevalence of *T. vaginalis* increased with the pregnancy trimester. Prevalence was highest in the third trimester (6%) and lowest in the first trimester (2.5%). This is consistent with findings from similar studies carried out in the southwest by Alexander *et al.* [18] and in the southeast region of Nigeria by Obijjure and Ogbufiu [27]. This could result from other factors such as physiological factors, drug use etc.

Women educated to the tertiary level had a low prevalence rate (2%) compared to women who attained only secondary education (10.5%). The least prevalence was recorded in women with only a primary level of education (1.5%), contrary to findings by other researchers [18] who reported peak prevalence in women with a primary level of education; and also [28] who reported peak prevalence among women with no formal education. Health talks given during ante-natal visits might have influenced women with only primary education thereby resulting in the least prevalence rate.

Low pH was recorded in fewer women as compared to women with higher pH values. There were more positive cases in women with a higher pH value (16%) compared to women with a lower pH value. This is in line with the fact that *T. vaginalis* thrives well in an alkaline environ-
ment than in an acidic environment [15, 29, 30]. As regards clinical manifestation, 27.7% of women with vaginal discharge were positive for T. vaginalis, 14.3% for itching, and 4% for dysuria. Trichomoniasis is associated with a characteristic frothy greenish vaginal discharge, itching, dysuria, and burning, as observed in studies conducted in other places [18, 22, 30].

In this study, the prevalence of Trichomoniasis (14%) among pregnant women is influenced by age, gestational age, educational level, and clinical symptoms. Early detection of the disease through routine screening of all pregnant women is highly recommended. Awareness through routine health talks about sexually transmitted diseases and effective treatment for confirmed positive pregnant women during ante-natal visits will go a long way in reducing the prevalence rate of the disease.

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Conflicts of interest

The authors declare that there is no conflicts of interest regarding the publication of this paper.

Authors’ Contributions

LEU conceived and designed the study, contributed to laboratory analysis, data analysis tools, statistical analysis and drafted manuscript, conceptualized the work, contributed review of the manuscript. EEO contributed to review of the manuscript and statistical analysis. All authors approved the final copy of the manuscript.

REFERENCES

1. Kissinger, P. Epidemiology and treatment of Trichomoniasis, Current Infected Disease Representation. 2015; 17:484


