Prevalence of *Gardnerella vaginalis* Infection in Women Attending Hospitals in Jos, Nigeria

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With 4 tables

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**ABSTRACT**

A study designed to determine the prevalence of *Gardnerella vaginalis* in women presenting with non-specific vaginitis as well as the antibiogram of the isolates to commonly used antibiotics were undertaken. The survey involved the examination of high vaginal swabs (HVS) from one hundred and two (102) volunteer patients seen at the Jos University Teaching Hospital (JUTH) and the Plateau Specialist Hospital, both in Jos, Nigeria. Of the total number of the study population, 11(10.78%) harboured *G. vaginalis*. The age group 26 - 30 years had the highest rate (7, 6.86%). There appeared to be a relationship between patients who presented with vaginal discharge with isolation of *G. vaginalis* since all the isolates were associated with discharge. “Clue cells” finding was an important indicator of infection since 53.85% of all culture-positive specimens had “clue cells” while only 4.5% without “clue cells” harboured the organism (p<0.05). Isolates were very sensitive to metronidazole, ceftazidime, ofloxacin, cefuroxime, cephalexin and augmentin. The study demonstrated that *G. vaginalis* was associated with non-specific vaginitis in Jos and that the “clue cells” finding as well as the presence of vaginal discharge were important diagnostic makers for the infection. Metronidazole was the drug of choice in treating the disease condition.

**Key words:** Vaginitis, *Gardnerella vaginalis*, prevalence, ‘Clue cells’, susceptibility

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**Introduction**

Bacterial vaginosis is one of the most frequent infections during a woman’s reproductive age [Villegas *et al.*, 1995]. The disease condition is characterized by an abundant and odorous vaginal discharge; however, more than half of patients with demonstrable signs of bacterial vaginosis do not report symptoms at all [Ceruti *et al.*, 1984]. Anaerobic vaginosis is characterized by a grey, green, yellow often frothy discharge with putrid fishy odour that may be strongest after coitus usually associated with the presence of amines [Collee *et al.*, 1989]. Bacterial vaginosis is associated with several microorganisms including *Gardnerella vaginalis*, *Bacteroides*, *B. haemolyticus*, streptococci and *Mobiluncus*/Falcivibrio species [Romiti *et al.*, 1984a]. Investigations of vaginal discharge in gardnerellosis is commonly unrewarding hence many lower genital tract

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infections remain unexplained and are loosely referred to as non-specific vaginitis [Editorial, 1978]. \textit{G. vaginalis} is now probably the commonest cause of vaginitis and vaginal discharge in Nigerian women [Ogunbanjo, 1989]. Therefore, in recent years, there has been renewed interest in the role of this organism in non-specific vaginitis.

This paper presents data obtained from a pilot study which was focused on establishing the prevalence of \textit{G. vaginalis} among patients attending the Jos University Teaching Hospital (JUTH) and the Plateau Specialist Hospital, both in Jos, Nigeria.

\section*{Materials and Methods}

\subsection*{Study population}

The study population was drawn from patients seen at the General Outpatient Department of the Jos University Teaching Hospital (JUTH) and the Plateau Specialist Hospital, both in Jos metropolis, Nigeria. One hundred and two (102) women were involved in the study of which 90 (88.2\%) presented with vaginal discharge while 12 (11.8\%) had no discharge. The mean age of the subjects was 28.14 years with a standard deviation of 7.3.

\subsection*{Laboratory studies}

\textbf{Collection of specimens}

Two high vaginal swabs (HVS) were collected from each of the patients used in this study by a medical officer in the different hospitals using a sterile speculum. Information was also obtained from each of the subjects by one of the researchers (AAA) regarding age, occupation, education, and marital status, among others.

\textbf{Processing of samples}

Processing of samples was done according to the methods described by Collee \textit{et al.} [1989]. Briefly, one swab was inoculated directly onto enrichment broth while the other was used to prepare inoculum for both chocolate and peptone-starch-dextrose agar, prepare wet mount and Gram stain. Wet mount was done to rule out other causes of vaginitis, such as \textit{Trichomonas vaginalis} and \textit{Candida} species.

\textbf{Culture and identification}

The inoculated culture media were incubated aerobically at 37°C for 48 h in a candle jar. The enrichment broth to which swab specimen was inoculated was sub-cultured onto a modified medium of Ison \textit{et al.} [1982], and incubated at 37°C for 48 h. Confirmation of \textit{G. vaginalis} was based on colonial morphology, haemolysis, Gram staining reaction, catalase test, oxidase test and sodium hippurate hydrolysis reaction.

\textbf{Antimicrobial susceptibility testing}

Sensitivity of isolates to antimicrobial agents was determined on chocolate agar using the diffusion technique of Bauer \textit{et al.} [1966]. Briefly, about five colonies of each isolates were emulsified in Bijou bottles containing 3 ml normal saline. A sterile cotton swab was then dipped into the suspension and the swab turned against the side of the bottle to remove excess fluid. The inoculated swab was then streaked across the surface of the chocolate agar.

The inoculated plates were allowed to dry for about 4 - 5 minutes before the antibiotic discs were aseptically placed on them. The plates were incubated at 37°C overnight and the zones of growth inhibition determined. Zones of inhibition of \&lt; 18 mm were considered sensitive, 13 - 17 mm intermediate and \&lt; 13 mm resistant. Interpretation of results was done using zone-size interpretive chart according to Bauer \textit{et al.} [1966]. Antimicrobial discs with the following concentration were used, cephalexin (CL), 30 mcg, cefuroxime (CXM) 30 mcg, metronidazole (MET) 100 mcg, cefazidime (CAZ) 30 mcg, ofloxacin (OFX) 5 mcg, and augmentin (AUG) 30 mcg.

\textbf{Statistical analysis}

The Chi-square and the Fisher exact tests as described by Kelly and Onyeka [1992] were used to compare the relatedness or otherwise of the data obtained.

\section*{Results}

Table 1 shows the age distribution of the study population as well as the number of subjects positive for \textit{G. vaginalis}. A total of 11 (10.78\%) patients harboured the organism with the age group of 26 - 30 years mostly affected (7; 6.86\%).

Table 2 shows the prevalence of \textit{G. vaginalis} in women in relation to the presence or absence of vaginal discharge. All the isolates were recovered from women with vaginal discharge.

Table 3 is a comparison of "clue cell" finding with \textit{G. vaginalis} isolation. Most of the isolates (7; 53.85\%) were associated with "clue cell".
Prevalence of *Gardnerella vaginalis* infection in women

Table 4 shows the susceptibility patterns of the isolates to some antimicrobial agents. All *G. vaginalis* isolates were 100% sensitive to metronidazole, ceftazidime, ofloxacin, cefuroxime, cephalaxin and augmentin.

**Table 1. Age distribution of women with *G. vaginalis***

<table>
<thead>
<tr>
<th>Age (yrs)</th>
<th>No. tested</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 - 15</td>
<td>2</td>
<td>1 (0.98)</td>
</tr>
<tr>
<td>16 - 20</td>
<td>10</td>
<td>1 (0.98)</td>
</tr>
<tr>
<td>21 - 25</td>
<td>25</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>26 - 30</td>
<td>36</td>
<td>7 (6.86)</td>
</tr>
<tr>
<td>31 - 35</td>
<td>16</td>
<td>1 (0.98)</td>
</tr>
<tr>
<td>36 - 40</td>
<td>6</td>
<td>1 (0.98)</td>
</tr>
<tr>
<td>41 - 45</td>
<td>4</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>46 - 50</td>
<td>2</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>51 - 55</td>
<td>1</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td></td>
<td>102</td>
<td>11 (10.78)</td>
</tr>
</tbody>
</table>

**Table 2. Prevalence of *G. vaginalis* in women with or without vaginal discharge**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. tested</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without discharge</td>
<td>12</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>With discharge</td>
<td>90</td>
<td>11 (12.22)</td>
</tr>
</tbody>
</table>

**Table 3. Comparison of “clue cells” findings with *G. vaginalis* isolation**

<table>
<thead>
<tr>
<th>Test findings</th>
<th>No. tested</th>
<th>No. positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of Clue Cells</td>
<td>13</td>
<td>7 (53.85)</td>
</tr>
<tr>
<td>Absence of Clue Cells</td>
<td>89</td>
<td>4 (4.49)</td>
</tr>
</tbody>
</table>

**Table 4. In vitro antibiotic susceptibility pattern of *G. vaginalis* isolated from women**

<table>
<thead>
<tr>
<th>Antibiotic (mcg)</th>
<th>No. of isolates tested</th>
<th>No. sensitive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cephalaxin (CL)(30)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
<tr>
<td>Cefuroxime (CXM)(30)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
<tr>
<td>Metronidazole (MET)(100)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
<tr>
<td>Ceftazidime (CAZ)(30)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
<tr>
<td>Ofloxacin (OFX)(5)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
<tr>
<td>Augmentin (AUG)(30)</td>
<td>11</td>
<td>11(100.00)</td>
</tr>
</tbody>
</table>

**Discussion**

A total of 102 women were involved in this study in which 11(10.78%) were found to be infected with *G. vaginalis*. This prevalence rate is lower than the 43% reported by Rotowa [1982] and the 20.5% by Cristiano *et al.* [1989], but compares well with the 9.8% prevalence rate documented by Otubu *et al.* [1991] in Jos among
consecutive antenatal clinic attenders. The prevalence rate of *G. vaginalis* is, however, known to vary from country to country, and the infection is most prevalent in countries of high socioeconomic development [Cristiano *et al.*, 1989; Seghal and Nalini, 1990]. The variable prevalence rates may also be due to the different techniques used in the isolation and identification of the organism and to the different makeup of the population as suggested by Cristiano *et al.* [1989].

The highest incidence (7, 6.86%) was recorded in the age group of 26 - 30 years. This lends support to the sexual transmission of this organism. Reports in the literature indicate that the organism has been isolated from the urethrae of male sexual partners. There appears to be a relationship between those who presented with vaginal discharge and the isolation of *G. vaginalis* since all the isolates were associated with vaginal discharge. However, the sample size of those without vaginal discharge is too small to be able to draw a meaningful conclusion. More elaborate future studies are therefore required.

The presence of "clue cells" may not be an absolute indicator of infection with *G. vaginalis*, however, results obtained in this study show that the presence of "clue cells" is a very important diagnostic marker in the diagnosis of this disease condition since 53.85% of all culture-positive specimens had "clue cells", while only 4.5% without "clue cells" actually had *G. vaginalis*. This difference is statistically significant (p<0.05). Rotimi *et al.* [1984b] also reported that there is usually a good correlation between the presence of "clue cells" and presence of *G. vaginalis* in infected patients. Isolates recovered from "clue cells"-negative specimens are presumably non-adherent strains of *G. vaginalis*. Reports in the literature indicate that non-adherent strains of the organism occur [Scott *et al.*, 1989]. It is possible, therefore, that the other 6 (46.15%) reported in this study are due to other causes in consonant with the observation of Moi *et al.* [1984] that *Mobiluncus* as well as *Bacteroides* also attach to epithelial cells.

Metronidazole, ceftazidime, ofloxacin, cefuroxime, cephalaxin and augmentin were found to be highly effective from the *in vitro* sensitivity tests but the effectiveness of metronidazole and cost gives it a hand over others. However, its efficacy must be weighed against its possible toxicity [Pheifer *et al.*, 1978; Balsdon *et al.*, 1980; Sobel, 1990].

References


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