

# Microbial Pattern of Abnormal Vaginal Discharge in Reproductive Age Women Presenting in a Tertiary Health Facility in Imo State Nigeria

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## ABSTRACT

**Background:** Abnormal vaginal discharge, a common gynecological issue in reproductive-age women, is primarily caused by microbial pathogens. Since these organisms have been linked to cause severe consequences for the fetus and mother, it is crucial to determine their microbiome patterns. This study, therefore assessed the microbial pattern of abnormal vaginal discharge in reproductive-age women presenting in a tertiary health facility in Imo State Nigeria

**Methods:** This was a cross-sectional study conducted among 368 women between 18-45 years who attended the General Outpatient Clinic of the Federal University Teaching Hospital, Owerri between February and April 2023 recruited via systematic sampling technique. Demographic data were obtained using a pre-tested, structured interviewer-administered questionnaire. Two vaginal swab samples were collected from each participant for wet mount and Gram staining, while an endocervical swab was collected for microbial culture. Gram staining and culture were for identification and characterization of the microorganisms. Data were analyzed using SPSS version 25. Quantitative variables were summarized using means and standard deviation while categorical variables were summarized using frequencies and percentages.

**Results:** The mean age of the participants was 30 ± 4.5 years. Majority of the participants (95.6%) reported a past history of abnormal vaginal discharge while 20.1% reported current history of abnormal vaginal discharge. The associated symptoms reported were vulval itching (81.1%), burning sensation (64.9%), dysuria (37.8%), and dyspareunia (27%). The commonest aetiologic agents isolated from the vaginal discharge specimen were *Candida albicans* (63.5%), Group B *Streptococcus* (6.8%), and *Trichomonas vaginalis* (2.7%). Polymicrobial agents accounted for 10.8%.

**Conclusions:** The identification of the common aetiologic agents and associated symptoms of abnormal vaginal discharge in reproductive-age women will improve early diagnosis and prompt treatment of abnormal vaginal discharge in reproductive-age women.

**Keywords:** Microbial pattern, Abnormal vaginal discharge, Reproductive age women, , Nigeria

## INTRODUCTION

Abnormal vaginal discharge (AVD) is one of the commonest gynaecological complaints among women of reproductive age in sub-Saharan Africa; it is associated with sexually transmitted infections and bacterial vaginosis.<sup>1</sup> It is also a common reason for primary care consultation in women of reproductive age. It affects women of all ages, race, ethnicity, religion, and socioeconomic status globally.<sup>1</sup> It is estimated that more than three-fourths of reproductive-age women will have at least a single

episode of bothersome vaginal discharge in a calendar year and many of them will have recurrent episodes.<sup>1,2</sup> AVD constitutes a significant emotional burden for women who experience it and has been reported to generate feelings of guilt, shame, and low self-esteem. It is also reported to be a source of spousal abuse, due to the misconstrued belief that abnormal vaginal discharge is synonymous with sexually transmitted infection or poor personal hygiene.<sup>3,4</sup> Many studies have reported prevalence rates of the common aetiologic agents of abnormal vaginal

The respondents with vaginal discharge were also counselled on the need to collect samples of vaginal discharge for microbial culture. The procedure for sample collection was first explained to the respondents before informed consent was obtained. A female chaperone, who also functioned as an assistant was present during all the examinations. The procedure required the respondents to lie in a dorsal position. Any anatomical changes in the genitalia were also noted. Some pathologic changes such as vulval excoriation, vulval hyperaemia, female genital mutilation, and cervical changes were noted. Sterile gloves were worn and asepsis was maintained. A sterile disposable Cusco's speculum was introduced to expose the cervix. The colour, consistency, and odour of the discharge were noted. Three sterile swab sticks were used for each subject. The swab sticks were labelled with the subject's code/ serial number prior to the procedure. Two samples were collected from the posterior vaginal wall and labeled A and B respectively. The third swab stick C was used for the endo-cervical swab.

The sample collected from the posterior vaginal wall (A) was smeared on two grease-free slides A1 and A2, which had been marked with paper tape and labeled the subject's code number. Slide A1 was used for immediate wet mount microscopy by the addition of two drops of normal saline/KOH from a Pipette, covered with a coverslip, and viewed with a x 10 and x40 magnification. The aim was to look out for motile flagellated protozoan Trichomonas, clue cells, which are distorted vaginal epithelial cells, or the characteristic yeast buds or hyphae of Candida species. Slide A2 was sent to the laboratory for Gram staining and identification of other cells and organisms. Sample B was sent to the laboratory for the culture of the most likely organism based on the clinical features and wet mount clues. Sabouraud –Dextrose agar was used for the culture of Candida species, and Chocolate or Blood-agar was used to culture possible organisms such as Streptococcus and Staphylococcus. Sample C (the endo-cervical sample) was used for the culture of Neisseria using Chocolate agar in the presence of carbon dioxide. All incubations were done at about 37°C for 48 hours.

When the speculum was withdrawn, the discharge on the well of the speculum was subjected to the litmus and the whiff tests. A pH meter strip (1-14 range) was dipped into the discharge on the well of the speculum and the pH of the vaginal fluid was read within one minute. The pH was determined and recorded. The whiff test was also done by adding drops of KOH to the discharge on the speculum to observe the presence or otherwise of a whiff of fishy odour. Candida albicans

was suspected when the discharge had a curdy or cheese-like appearance, with associated symptoms such as pruritus, dysuria, superficial dyspareunia, or excoriation of the vulva, and the pH of the discharge was less than 5. The organism was demonstrated on a wet mount or Gram stain. The growth of Candida albicans in Sabouraud-dextrose agar with its characteristic hyphae was diagnostic.

Neisseria gonorrhoeae, can be identified on Gram stain as intracellular, gram negative (pinkish) diplococci. It can also be grown in Thayer-Martin agar after 48 hours or in carbon dioxide enriched chocolate agar. It has a typical morphology. It is oxidase positive and lactose fermenting. Inoculation into the media should be done as early as possible because the organism is sensitive to drying.<sup>3</sup> Similarly, Chlamydia trachomatis which is a minute intracellular organism is not routinely seen in either wet mount or gram stain. It also has gram negative characteristics. Often times, it co-infects with gonococcus as sexually transmitted infections. It can however be diagnosed via rapid diagnostic tests. The nucleic acid amplification test using ligase chain reaction or polymerase chain reaction, which is the gold standard, can also be employed. Immuno-chromatographic cassettes which were readily available and easy to use are also employed in the diagnosis of Chlamydia using endo-cervical samples. This appears to be the most popular and widely used method and was also used in this study. It has sensitivity of up to 75% and specificity of up to 99 in the diagnosis of Chlamydia trachomatis.<sup>13</sup>

#### Data Analysis:

Data were entered and analyzed using IBM Statistical Product and Service Solutions (SPSS) version 25. Quantitative variables were summarized using means and standard deviation while categorical variables were summarized using frequencies and percentages. Results were presented in tables and charts.

#### Ethical Clearance:

The study was approved by the Health Research and Ethics Committee of the Federal University Teaching, Hospital, Owerri. Written informed consent was obtained from the study participants before data collection. Confidentiality and voluntary participation were ensured. Respondents that were positive for vaginal infections were referred to the gynaecology clinic for expert management.

## RESULTS

Socio-demographic characteristics of the participants  
The mean ( $\pm$ SD) age of participants was  $30 \pm 4.5$  years. Majority of the participants, 229 (62.2%), had tertiary education. More than half of the participants, 201(54.6%), were married. As regards occupation,

most of the respondents, 185 (50.3%), were students while about one-quarter, 98 (26.6%), were civil servants as shown in Table I below.

**Table I: Socio-Demographic Characteristics of Respondents**

Variables	Frequency	Percentage (%)
<b>Age</b>		
18 – 25	120	32.6
26 – 35	154	41.8
36 – 45	94	25.6
<b>Level of Education</b>		
No formal	3	0.8
Primary	16	4.4
Secondary	120	32.6
Tertiary	229	62.2
<b>Marital status</b>		
Single	160	43.5
Married	201	54.6
Divorced	3	0.8
Widowed	4	1.1
<b>Occupation</b>		
Student	185	50.3
Civil servant	98	26.6
Housewife	53	14.4
Farmer	13	3.5
Business	19	5.2

### Prevalence and characteristics of abnormal vaginal discharge:

Majority of the participants, 351 (95.6%), reported having had an experience at least one episode of bothersome vaginal discharge in their lifetime, with 74 (20.1%) participants having the problem at the time of the survey. Among the respondents who had abnormal discharge, the majority of them, 30 (40.5%), reported more than four episodes in the past year while 14 (18.9%) subjects reported having two or three episodes in the past year. The majority of the participants with abnormal discharge, 44 (59.5%), reported their perception of the present discharge as of moderate while 13 (17.5%) respondents reported it as severe. Thirty-one of the respondents, (41.9%), reported that their discharge was worse immediately after menses, while 26 (35.1%) participants reported worsening symptoms after sexual intercourse. The commonest colour of the discharge as reported by 61 (82.4%) respondents was creamy, followed by yellow in seven respondents (9.5%). About one-third of the respondents, 24 (32.4%), reported occurrence of abnormal odour with the discharge as shown in Table II below.

**Table II: Prevalence and Characteristics of Abnormal Vaginal Discharge**

Variable	Frequency	Percentage
<b>Ever had abnormal vaginal discharge</b>		
Yes	351	95.4
No	17	4.6
<b>Present discharge</b>		
Yes	74	20.1
No	294	79.9
<b>Duration</b>		
< 1 year	14	18.9
1– 5 years	32	43.2
>5 years	28	37.9
<b>Frequency in 1yr</b>		
Once	25	33.8
2 – 3	14	18.9
>4	30	40.5
Continuous	5	6.8
<b>Severity</b>		
Mild	17	23.0
Moderate	44	59.5
Severe	13	17.5
<b>Timing</b>		
Before menses	10	13.5
After menses	31	41.9
After sex	26	35.1
At all times	7	9.5
<b>Odour</b>		
Yes	24	32.4
No	50	67.6
<b>Colour</b>		
Milky/whitish	61	82.4
Yellowish	7	9.5
Brown	6	8.1

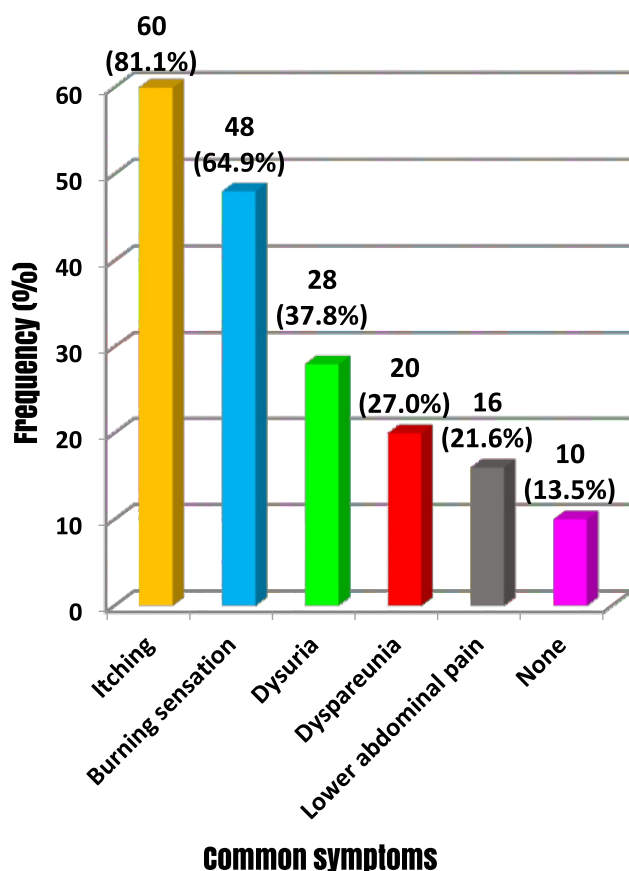
### Aetiologic agents isolated from vaginal discharge:

The commonest aetiologic agents isolated from the vaginal discharge specimens were *Candida albicans* in 47 (63.5%) respondents, Group B *Streptococcus* in five respondents (6.8%), and *Trichomonas vaginalis* in two respondents (2.7%). Polymicrobial agents were detected in eight respondents (10.8%). There was no identifiable agent in the samples of 12 respondents (16.2%). The findings are shown in Table III below.

**Table III: Distribution of aetiologic agents in participants with vaginal discharge**

Organism	Frequency	Percentage (%)
None	12	16.2
Candida Albicans	47	63.5
T. Vaginalis	2	2.7
Group B Streptococcus	5	6.8
Polymicrobial	8	10.8

Symptoms that are associated with vaginal discharge: The symptoms associated with abnormal vaginal discharge were vulval itching, burning sensation, dysuria, dyspareunia, and lower abdominal pain. Many of the participants with abnormal vaginal discharge had multiple co-existing symptoms. These are illustrated in Figure 1 below.

**Figure 1: Bar chart showing the symptoms associated with vaginal discharge.**

## DISCUSSION

This study determined the burden and common aetiologic agents of abnormal vaginal discharge among women of reproductive age and identified a high burden of abnormal vaginal discharge and the associated pathogenic organisms. The commonest aetiologic agents isolated were *Candida albicans*,

Group B *Streptococcus*, *Trichomonas vaginalis*. This is a considerable burden, bearing in mind the far-reaching complications and comorbidities associated with these conditions. The findings are in agreement with the outcome of a similar study in Owerri, Imo State.<sup>5</sup>

Our study found that *Candida albicans* was the commonest aetiologic agent associated with abnormal vaginal discharge in about two-thirds of the respondents with current discharge. Though high, the prevalence of candidiasis is not unexpected, considering that factors associated with the emergence and overgrowth of *Candida* in the vagina were very prevalent among the study population. These factors include antibiotic abuse which has been observed to be common in the study area due to the unregulated procurement of antibiotics from pharmacies as over-the-counter medications. The frequent use of antibiotics has been reported to destroy the protective lactobacilli, with the emergence and proliferation of *Candida albicans*.<sup>14</sup> In contrast to our finding, similar study findings in Lagos<sup>7</sup> and Kano State<sup>8</sup> Nigeria showed a lower prevalence of *Candida albicans*, 22.1%,<sup>7</sup> and 24.2%,<sup>8</sup> respectively while a higher prevalence of 84.5%<sup>9</sup> was reported in Kano State, Nigeria. However, findings from Ogun state Nigeria,<sup>6</sup> and Bangladesh,<sup>15</sup> reported somewhat similar prevalence, 54.7%,<sup>6</sup> and 53.6%.<sup>15</sup> The slight differences in the prevalence of different aetiologic agents noted in these studies could be explained by differences in the methods used in the identification of the organisms.

In addition, in our study, polymicrobial agents were noted to be a common cause of abnormal vaginal discharge for which *Gardnerella vaginalis* is usually the chief organism. Further study is necessary to assess the contribution of common practices such as antibiotic abuse, douching, and termination of pregnancy as risk factors for bacterial vaginosis. Group B *Streptococcus* was isolated in the samples of 7% of the respondents. The finding is concerning and aligns with a study by Okon et al,<sup>16</sup> which reported the isolation of Group B *Streptococcus* (GBS) in abnormal vaginal discharge among women in Maiduguri, with a prevalence of 9.8%. The authors of that study highlighted that GBS colonization is associated with many obstetric and gynaecological complications, including preterm labour, fetal prematurity, chorioamnionitis, and neonatal sepsis, emphasizing the potential implications of this finding for maternal and neonatal health.

*Staphylococcus aureus* was not identified in this study. *Staphylococcus* is a normal skin commensal and is not

known to be a common cause of abnormal vaginal discharge. In one study by Verma et al<sup>17</sup> where *Staphylococcus aureus* was isolated, the researchers remarked that it could be as a result of contamination due to wrong technique. This is contrary to the belief by majority of unorthodox practitioners that *Staphylococcus aureus* is strongly implicated in abnormal vaginal discharge, and associated diseases. *Neisseria gonorrhoea* and *Chlamydia trachomatis* were not isolated as aetiological agents in any of the respondents with abnormal vaginal discharge. Some studies also noted a declining prevalence of gonococcus and chlamydia infections. Wariso et al<sup>18</sup> in PortHarcourt Nigeria reported a low prevalence of *Neisseria gonorrhoea* and *Chlamydia trachomatis* even among the high-risk groups. The high-risk population included subjects with multiple sexual partners and unmarried. This observation was attributed to the indiscriminate use of antibiotics in the study locality, which could have had an inadvertent therapeutic impact on the organisms. In another study, Nwadioha et al,<sup>19</sup> reported a low prevalence of *Neisseria gonorrhoea* (0.5%). The declining prevalence of *Neisseria gonorrhoea* and *Chlamydia trachomatis* in the study locality is similar to the reports of a study by Opoku et al<sup>20</sup> conducted in Ghana, with low prevalence rates of *Neisseria gonorrhoea* and *Chlamydia trachomatis* at 4.9% and 0.9% respectively. Their finding was attributed to increased safer sexual attitudes among the study population.

In 16.2% of the samples no organisms were isolated. It is possible that the abnormal vaginal discharge may have been caused by a pathogenic microbiologic agent that cannot be isolated by the methods used or the pathogenic organism is rare and therefore not detected in the approaches employed for microbial isolation and identification in this study.<sup>20</sup>

### Limitations of the study:

The current approach used for isolating and identifying microbial organisms in the study may have limitations in detecting rare organisms that are not sensitive to these methods. The criteria for diagnosis could be complex, leading to potential false-negative results. Additionally, the study focused on unilateral causes for diagnosis based on clinical presentation and discharge characteristics, without determining associations between aetiological agents with specific risk factors. Therefore, further research using advanced techniques is needed to enhance microbial agent detection sensitivity and explore risk factors for abnormal vaginal discharge.

### conclusion:

The study revealed a high prevalence of abnormal

vaginal discharge among the participants, primarily attributed to *Candida albicans*, Group B *Streptococcus*, and *Trichomonas vaginalis*. These organisms are linked to considerable complications and co-morbidities. The identification of key aetiological agents emphasizes the need for targeted interventions, health education, and improved diagnostic and treatment practices to enhance reproductive health outcomes in the population.

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