



Prevalence of Bacterial, Trichomonas and Candidal Vaginosis among Females in Angwan-Fulani, Palladan in Zaria, Nigeria

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Authors' contributions

This work was carried out in collaboration with all authors. Authors DEA and JOO designed the study, wrote the protocol and wrote the first draft of the manuscript. Author AO performed the statistical analysis. Author MU managed the analyses of the study and the literature searches. Author RM was actively involved in sample collection and laboratory analysis. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study was conducted to determine the prevalence of agents of vaginitis among females in Angwan-Fulani, Palladan-Zaria.

Study Design: Experimental design used was a completely randomized design (CRD).

Place and Duration of Study: Department of Science Laboratory Technology, Nigerian Institute of Leather and Science Technology, Zaria, Kaduna-Nigeria between February-November, 2015.

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Methodology: Total of 150 Samples of High Vaginal Swabs (HVS) were collected from the participants and examined for pathogenic organisms. Demographic information was collected using structured questionnaire. Samples were examined using standard bacteriological methods and microscopically. Direct wet-mount preparation for the detection of *Trichomonas vaginalis* was employed following a preliminary growth of the parasite in a selective Diamond's medium.

Results: The results of this study indicated that 139 (92.66%) out of 150 samples had at least one infection. The organisms isolated include *Candida albicans*, *Streptococcus pyogenes*, *Staphylococcus aureus* and *Trichomonas vaginalis*. The age group >25 years had the highest prevalence. Mixed infections were observed.

Conclusion: The findings showed that vaginitis is common in the study area. Urgent attention is needed by Health Authority for wider screening and treatment.

Keywords: Vaginal thrush; prevalence; public health; vaginitis; etiology; candidiasis; trichomoniasis.

1. INTRODUCTION

Vaginitis is a medical term used to describe various conditions that causes infection or inflammation of the vagina. These conditions can result from a vaginal infection as well as irritations caused by microorganisms such as bacteria, yeast, parasites or viruses as well as irritations from chemicals in creams, sprays, antiseptic soaps or even clothing that is in contact with genital area. In some cases vaginitis results from organisms that are passed between sexual partners [1].

Vaginal infections are composed of three primary conditions, bacterial vaginitis (caused by *Staphylococci*, *Gardnerella*, *Neisseria* and *Streptococci*), Yeast thrush (caused by *Candida albicans*) and Protozoan (caused by *Trichomonas vaginalis*). Other agents such as *Chlamydia* and *Mycoplasmas* have been incriminated in vaginosis. *Trichomonas vaginalis* causes infection of the genital tissues of the vagina with vaginal discharge [1].

Thrush is the inflammation of both vagina and vulva caused by *Candida albicans*. Bacterial vaginosis is the inflammation or infection of the vagina caused by bacteria. It is also a condition in which the balance of bacteria inside the vagina becomes disrupted as a result of hormonal changes, immunosuppression, pregnancy or concurrent diseases that affect the normal function of the immune system. Approximately, about 50% of all women with bacterial vaginitis have no symptoms but, the main sign is the vaginal discharge (vaginal discharge may become watery and thin, the discharge may become grey or white, and it may also have strong and unpleasant smell often described as fishy). The normal vagina usually contains mostly 'good' bacteria such as *Lactobacillus acidophilus*

and few harmful ones. Bacterial vaginitis occurs when these harmful bacteria grow or increase in numbers [2].

Vaginosis has been associated with many gynaecological and obstetric complications such as cervicitis, salpingitis, endometritis, postoperative infections, urinary tract infections, pelvic inflammatory disease, mild abnormal Pap smear results and possible link with cervical intraepithelial neoplasia, preterm delivery, premature rupture of the membranes, chorioamnionitis and postpartum endometritis. Factors that increase the risk of vaginosis are multiple partners, exposure to semen, prior trichomoniasis, intrauterine device usage, smoking, indigent population and frequent use of scented soap [3].

The healthcare need due to the lack of adequate healthcare facilities and the many predisposing factors such as indigence, multiple sexual partners and poor personal and environmental hygiene in this area informed this study.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted at Angwan-Fulani in Palladan area, Zaria, Kaduna State, Nigeria. The Community is located near the Nigerian College of Aviation Technology. The area is located 81 kilometres away from the State capital, Kaduna. Zaria is a major city in Kaduna State in Northern Nigeria, also known as Zazzau. It comprises of a total population of 408,198 people in 2006 census. Zaria is in Northern Guinea Savannah zone, which lies between longitude 11° 03'N and latitude 07° 42'E, with total land area of 300 km². Zaria is about 300 kilometres away from Abuja, the capital city of Nigeria [4,5].

2.2 Study Population

The study population comprises of females living in Palladan, Zaria-Kaduna State. The study was carried out among apparently healthy females and anyone who consented for sampling. The bio-data of the respondents were obtained from volunteers prior to sample collection using structured questionnaire. The aim and objectives of the study, its benefits, as well as implications were communicated to the volunteers in their local language prior to recruitment into the study. Informed oral consent was sought and obtained from the participants. Those who gave their consent but were not available for sampling were excluded from the study.

2.3 Sample Collection

Simple randomized sampling technique was employed in the sample collection. Sterile high vaginal swab stick was used to collect samples of each volunteer using the procedure specified in Cheesbrough [5]. All High vaginal swab (HVS) samples were collected by a trained personnel using sterile swab stick. Patients were advised on a preliminary vaginal cleansing prior to the collection of the samples. The samples were collected from the cervical lumen with the help of sterile speculum. The swab sticks were closed immediately into the sterile non-pyrogenic swab envelopes after the swab was collected to avoid contamination. The samples were immediately transported to the laboratory in Amies transport medium and processed within 30-60 minutes after collection.

2.4 Bacteriological Analysis

The samples collected were inoculated on Blood agar, MacConkey agar, Diamond's agar, and Sabouraud's Dextrose agar. The media were prepared according to the manufacturers' instructions. All culture plates were incubated at 35-37°C overnight. The inoculated Sabouraud Dextrose agar plates were incubated at room temperature for up to 48-76 hours. Following incubation, smears were prepared and observed microscopically, and the bacterial isolates were purified, biochemically characterized and identified [6,7].

2.5 Microscopic Examination

Direct wet-mount preparation for the detection of *Trichomonas vaginalis* was employed following a

preliminary growth of the parasite in a selective Diamond's medium as adopted by Cheesbrough and Schirm et al. [6,8]. Gram smear was prepared using bacterial isolates, fixed with methanol and stained by the Gram technique. The preparation was viewed under the 40X and 100X objectives for the presence of pus cells and bacteria [6]. The moulds and yeast isolates were observed microscopically for the arrangement of hyphae and spores using Lactophenol in cotton-blue stain. The yeast isolates were further characterized using various sugar fermentations, such as glucose, galactose, sucrose, fructose, and dextran [9]. The suspected *Candida albicans* isolates with milky colonies and smell like that of the bakers' bread was further confirmed as *Candida albicans* using Germ-tube test [6,10].

2.6 Statistical Analysis

Data generated in this study were analysed by simple percentages.

3. RESULTS AND DISCUSSION

3.1 Results

Out of one hundred and fifty (150) samples, 139 (92.66%) were positive for vaginosis. The microorganisms isolated include *Candida albicans* which had the highest prevalence of 35.25% and *Streptococcus pyogenes* with 28.05% prevalence. Others were *Staphylococcus aureus* and *Trichomonas vaginalis* which had percentage prevalence of 23.02% and 13.67% respectively (Table 1).

The age-specific distribution of the infection showed that, the age group >25 years had the highest percentage prevalence of 94.74% (Table 2). There were mixed infections of *Staphylococcus aureus* and *Streptococcus pyogenes* as well as *Candida albicans* (Table 3). Past history of vaginitis among the participants showed that those with symptoms of vaginosis have a higher prevalence than those that were asymptomatic (Table 3).

3.2 Discussion

The prevalence of vaginosis in the study area was 92.66% (Tables 1 and 2). This report is similar to the findings of Amale et al. [11] who recorded 95.8% prevalence among University students in Nigeria and it agrees with David [12] who suggested that at least 1 in every 5 women experience vaginal infection and about 50% of

Table 1. Prevalence of organisms diagnosed in the study area

Infective organisms	Number of females examined	Number of positive isolates	Percentage of positive isolates (%)
<i>Candida albicans</i>	150	49	35.25
<i>Staphylococcus aureus</i>	150	32	23.02
<i>Streptococcus pyogenes</i>	150	39	28.05
<i>Trichomonas vaginalis</i>	150	19	13.67
Total	150	139	92.66

Table 2. Prevalence of vaginal infections in relation to age

Age group (yrs)	No. of females examined	Percentage positive (%)	Percentage negative (%)
16-20	46	43 (93.48)	03 (06.52)
21-25	66	60 (90.90)	06 (09.10)
> 25	38	36 (94.74)	02 (05.26)
Total	150	139 (92.66)	11 (07.33)

women will experience it at some point in their life. This may be related to the physiology and hormonal changes that occur in women of reproductive age at some points of their life.

Table 3. History and clinical status of vaginitis in the study area

History and clinical status	Percentage (%)
Previous vaginitis treated yet infected	51.80
Infected with symptoms	43.88
Infected with no symptoms	4.32
Mixed infection	6.47
Single infection	93.53

The most prevalent pathogen was *Candida albicans* (35.25%); this could have resulted from prolonged antibiotic therapy, pregnancy, concurrent immunosuppressive diseases, diabetes, and/or use of oral contraceptives, all of which favour opportunistic pathogenicity by the yeast. The second most prevalent isolate was *Streptococcus pyogenes* (28.05%), this implies that females are susceptible to this bacterium probably due to the proximity of the vagina to their anus, from where the bacteria can easily be massaged into their urethra during improper cleaning from back to the front after defecation, urination or bowel movement, and during sexual intercourse as reported by Johnson [13]. The prevalence of *Staphylococcus aureus* was found to be 23.02% (Table 1); this may be as a result of haematogenous or ascending infections. Also, since the bacterium is a normal flora of human

body that inhabits the skin, the infection may be due to improper hygiene or sharing of dirty panties amongst females. The flagellated parasite, *Trichomonas vaginalis* was found to be 13.67% (Table 1). This report agrees with the work of Johnson [13] who reported that this organism usually causes infection when the normal acidity of the vagina is disturbed or when sexually transmitted from the urethra of males since majority of the study participants were married and from polygamous families which may place their husbands as vehicles for the transmission of this agent from an infected woman to susceptible ones.

Out of 139 positive samples, 33.80% had previous history of vaginal infections which were treated in the past. Some of these patients were still diagnosed of the infections. This implies that the previous infections were either not treated properly or the infections were chronic or recurrent. This agrees with the work of Carol [2], who suggested that vaginal infection could be symptomatic or asymptomatic, acute, chronic, recurrent, complicated or uncomplicated and therefore require careful and proper treatment.

Based on age distribution, the results indicated that the age group >25 years had the highest percentage prevalence of vaginal infection. This may not be unconnected with the physiological activities of female reproduction and several hormonal and pH changes which are prominent within this age group as asserted by Aboyeji and Nwabuisi [14]. Cases of mixed infections recorded could have originated from gastro-intestinal fistulae, misuse of antibiotics,

secondary infections, or unprotected sexual contact with multiple sex partners as reported by Adad et al. [15].

The high prevalence of pathogenic organisms observed in this study may have resulted from the unclean state of the environments at homes, leaving sanitary pads for long period of time during menstruation as well as lack of personal hygiene among the females. Improper use of the environment (use of damaged toilets and bathrooms) could result in infections because the chance of getting infected with urinary tract pathogens is high in females due to their wide vulva and short urethra (5 cm) compared to the urethra of the males which is longer (about 20 cm) [16].

4. CONCLUSION

A relatively high prevalence of *Candida albicans* was documented in this study. Although the prevalence of *C. albicans* was high, the findings are similar to those of other researchers in various parts of the country. There should be public enlightenment program for women in this study area on the importance of personal hygiene, the use of condom for safe sex, appropriate and safe use of antibiotics and vaginal contraceptives as well as proper choice of clothes to avoid wearing tight fitting polyester under pants that allow the overgrowth of pathogenic organisms. Routine medical check-up should be provided by government at a subsidized cost to the inhabitants of this area to enhance early detection and treatment of health issues to avoid complications.

Finally, we recommend here that further studies should be carried out to determine the prevalence of these agents of vaginitis among the diabetics and the immunosuppressed patients in the study area.

CONSENT

Institutional ethical approval was obtained for this research as well as informed oral consent sought and obtained from the participants in the study area.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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