



Original Research Article

## A Case Study of the Incidence and Risk Factors of Vaginal Candidiasis in a Girl's Senior High School in Bolgatanga, Ghana

Eunice Essel<sup>1</sup>, Lucas Amenga-Etego<sup>2</sup>, Stephen Laryea Quaye<sup>3</sup>

<sup>1</sup>Assistant Lecturer, <sup>2</sup>Research Fellow/ Laboratory Director, <sup>3</sup>Senior Research Officer/ Deputy Laboratory Manager,

<sup>1</sup>Department of Applied Biology, University for Development Studies, Navrongo, Ghana

<sup>2,3</sup>Navrongo Health Research Centre, Navrongo, Ghana.

Corresponding Author: Eunice Essel

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### ABSTRACT

**Background:** Vaginitis is a wide spread inflammatory condition of the female genital tract. It affects a wide range of women all over the world. The condition is caused by several types of microorganism including yeast, especially *Candida* species.

**Objective:** The aim of this study was to assess the incidence of vaginal candidiasis in a Girl's Senior High School in Bolgatanga, Ghana.

**Methodology:** High Vaginal Swabs were randomly taken from consenting female students for the study. The students also completed a structured questionnaire assessing demographic characteristics, symptoms, and risk factors of candidiasis. A total of 94 students between the ages of 17 and 23 were randomly recruited for the study. Standard microbiological techniques such as Gram's stain, wet mount and culture were used to analyse the swabs.

**Results:** *Candida* species was isolated from 24 of the 94 students representing 25.5%. The highest incidence rates of 50.0% were recorded in the 21 years old participants followed by 45.5% in the 20 years group. Among the symptoms, vaginal itching and burning sensation recorded the highest percentages among the positive for *Candida* participants; 30.0% and 29.2% respectively. The most common associated risk factors contributing to vaginal candidiasis in this study was antibiotic use which recorded 50.0% while initiation of sexual activity recorded 32.1%.

**Conclusion:** The results of the study revealed that antibiotic use and sexual activities contributed to the development of candidiasis in the girls.

**Keywords:** Vaginal Candidiasis, Risk Factors, Incidence, Girls

### INTRODUCTION

Vaginitis is an infection of the vaginal mucosal membrane and it inflicts millions of females' worldwide. The most familiar form of vaginitis is those caused by yeast infection. Prevalence of candidiasis is estimated at twenty- two percent (22%) and

this percentage is similar in both adults and adolescent female. <sup>[1]</sup> It has also been established that seventy-five percent (75%) of all women have one episode of candidiasis in their lifetime. <sup>[2]</sup> *Candida albicans* is the frequently isolated species in most cases of candidiasis. However, other

non-albicans species of *Candida* such as *C. glabrata* and *C. tropicalis* have also been found and implicated. [3] Yeast infections produce a thick, white discharge from the vagina. The discharge can be watery, often has no odour and usually cause the vagina and vulva to become itchy and inflamed.

Self-reported history of vaginal candidiasis among students is reported to be 20%, [4] while a proportion of 45% is recorded in a general sampled population [5] and 72% recorded in family practice clinic users. [6] An estimated amount of six hundred million dollars is spent on the diagnosis and treatment of vaginal candidiasis among women aged 15 to 45 years per year. [5] Antifungals available over the counter can cure the condition, but some 15% to 20% of women will experience the infection within 1 to 3 months for the second time. [7]

Vaginal infection is very common in teenagers and pubertal girls even though most cases are asymptomatic. This study was therefore aimed to measure the incidence of candidiasis using three standard microbiological methods. Also, associated risk factors among students were assessed.

## **METHODOLOGY**

### ***Study Area***

The study was conducted at an all girl's senior high school. The school is located in the Upper East Region of Ghana and it is situated in the regional capital, Bolgatanga. Students who attend the school come from various parts of the country. The Bolgatanga municipality has a land area of 7290 sq km and it is bordered to the North by Bongo District, South and East by Talensi-Nabdan District and Kasena-Nankana Municipality to the West.

### ***Sample collection and Questionnaire administration***

A total number of ninety-four (n=94) consenting students between the ages of 17 and 23 years were randomly selected for the

study. Participants were educated and advised on how to obtain a High Vaginal Swab devoid of contamination with the vaginal orifice. A structured questionnaire assessing the demographic information, symptoms, and risk factors was also administered. Vaginal swab samples obtained from consenting students were sent to the lab for processing and analysis.

### ***Laboratory Analysis***

Three techniques were employed in the laboratory to analyze the swabs taken from the participants. These techniques are culture, Gram-staining and the wet mount.

### ***Culture Technique***

To obtain discrete colonies, each swab was inoculated onto Sabouraud Dextrose Agar plates, streaked and incubated aerobically at 35°C to 37°C for 18-24 hours. Growth was observed after the period of incubation and characteristic colonial morphology of *Candida* were noted. *Candida* has a smooth, large, white to cream coloured colonies with glabrous to waxy appearance.

### ***Gram Staining Technique***

A smear was prepared by rolling the swab on a clean glass slide. The slide was heat fixed by passing over a Burnsen burner flame for three times. The film was flooded with crystal violet for one minute and was washed with clean water and again flooded with Gram's iodine for 30 seconds. The film was decolourized with acetone-alcohol and washed immediately with water and counter stained with neutral red for 30 seconds. The film was washed with clean water and allowed to air dry, then examined under the microscope at x100 magnification with oil immersion. Upon examination of the stained preparation, the yeast cells were seen as large violet oval cells indicating Gram positive.

### ***Wet Mount***

A volume of 200µl of sterile normal saline was placed into the tube containing

the swab stick. The bottom of the tube was tapped gently for few seconds. A drop of saline mixture was placed on a glass slide and covered with a cover slip. The preparation was examined under the microscope using 100 and 400 magnification. Upon examination, oval budding cells *Candida* species were seen and noted.

## RESULTS

Results obtained from laboratory work on 94 samples that were collected for the study are shown in Table 1. A similar proportion, 23.9% of *Candida* isolates was obtained for both wet preparations and gram stained smear. However, 25.5% of samples cultured showed typical *Candida* colonies. Table 2 presents' data on percentage of *Candida* isolated among various ages and Table 3 presents data on symptoms and risk factors. The highest incidence rates of 50.0% were recorded in the 21 years old participant followed by 45.5% in the 20 years group (Table 2). Among the

symptoms, vaginal itching and burning sensation recorded the highest percentages among the positive for *Candida* participants; 30.0% and 29.2 respectively (Table 3). The most common associated risk factors contributing to vaginal candidiasis in this study was antibiotic use which recorded 50.0% while initiation of sexual activity recorded 32.1% (Table 3).

Table 1. Percentage of *Candida* isolated among Test type.

Test type	<i>Candida</i> isolated (%) N= 94
Wet preparation/ mount	22 (23.9)
Gram stain	22 (23.9)
Culture	24 (25.5)

Table 2. Percentage of *Candida* isolated among various ages.

Age (yrs)	Students in various ages (%)	<i>Candida</i> isolated among various ages (%)
17	8 (8.5)	1 (12.5)
18	30 (31.5)	11 (37.7)
19	40 (42.6)	6 (15.0)
20	11 (11.7)	5 (45.5)
21	2 (2.1)	1 (50.0)
22	2 (2.1)	0 (0.0)
23	1 (1.1)	0 (0.0)
Total	94 (100)	24 (25.5)

Table 3: Percentage distribution of symptoms of candidiasis, nature of vaginal discharge, associated risk factors and its break down among *Candida* positive and negative participants.

	Distribution (%) N=94	Positive for <i>Candida</i> (%)	Negative for <i>Candida</i> (%)
Symptoms of candidiasis			
Vaginal itching	60 (63.8)	18 (30.0)	42 (70.0)
Vaginal irritation	22 (23.4)	6 (27.3)	16 (72.7)
Vaginal discharge	53 (56.4)	15 (28.3)	38 (71.70)
Burning sensation	24 (25.5)	7 (29.2)	17 (70.3)
Nature of vaginal discharge			
White	48 (51.1)	8 (16.7)	40 (83.3)
Cream	38 (40.4)	11 (29.0)	27 (71.0)
Yellow	8 (8.5)	5 (62.5)	3 (37.5)
Associated risk factors			
Insertion of herbs and ointment	7 (7.4)	2 (28.6)	5 (71.4)
Wash vagina with soap	37 (39.3)	10 (27.0)	27 (73.0)
Antibiotic use	2 (2.1)	1 (50.0)	1 (50.0)
Sexual active	28 (29.80)	9 (32.1)	19 (67.90)

## DISCUSSION

The results revealed that 25.5% of students have vaginal candidiasis. This was

detected by actual isolation through culture and subsequent wet mount and gram staining. Considering the ages of these students and the fact that this is a non hospital base research, the prevalence rate of the infection can be said to be high when compared to the prevalence of 22% in both adolescent and adults in the USA. [1] Similarly, 21% prevalence has been recorded in studies conducted in Ghana. [8, 9]

Incidence rate within ages 18, 20 and 21 years were particularly high in our study (37.7%- 50.0%). This does not conform to the 25.6% reported by Abruquah [8] in Ghana among a similar age bracket, even though their incident rate was also high for their study. The result obtained is indicative of a potential silent *Candida* infection that could be wide spread among students. Report by CDC [10] in the USA revealed that Candidiasis is one of the most familiar forms of vaginitis associated with discharge. The high prevalence among participants may be attributed to self-report douching (28.6%), sexual activeness (32.1%) and antibiotic use (50.0%) which was the main risk factors reported in the study. Low levels of personal hygiene among students compounded with insanitary conditions in the boarding house could have contributed to the high incidence of candidiasis.

The study also revealed that vaginal itching is the most common symptom among participants who tested positive for *Candida* with a percentage of 30.0, followed by burning sensation (29.2%), vaginal discharge (28.3%) and irritation (27.3%). Our finding is consistent with that of Grigorious *et al.*, [11] which also reported pruritus or itching (85.5%) as the most common symptom followed by vaginal discharge (66.1%). Ahmad and Khan [12] in India also reported in their work that the most common signs and symptoms in 215 women with vaginal *Candida* infection were pruritus/ itching with or without vaginal

discharge and vaginal erythema/inflammation.

Approximately 70% of participants who tested negative for *Candida* recorded at least a symptom of vaginal candidiasis. This trend could be explained by implicating a non *Candida* related cause such as bacterial vaginosis.

In this study, one out of two students (50.0%) who were on antibiotic treatment tested positive for *Candida*. This can be attributed to the fact that the use and abuse of antibiotic predisposes one to reduced levels of protective vaginal normal flora that allows excessive growth of *Candida*. [13,14] However no specific type of antibiotic has been ascertained to cause or associated with vaginal candidiasis. [15]

The age of the students did not play a major role in the prevalence of candidal vaginitis. However, individual difference in practices such as sexual activity appears to be associated with the infection and it is also suggestive that candidiasis among the students is age dependent. A prevalence of 42% has been reported to occur in sexually active adolescent. [16] Studies done in the USA among students suggest that the frequency of first diagnosis increased after age 17, with an estimated 5.4% of women experiencing the condition by age 25. [17] In a proportional hazard model of age at first diagnosis, candidal vaginitis was associated with initiation of sex. [17] Studies by Foxman [4] and Reed [5] have also suggested that sexual activity is associated with vaginal candidiasis. However, the mechanism by which sexual activity may increase the risk for the condition is not known, but the possibilities may include sexual transmission of *Candida* and trauma facilitating the invasion of the vagina mucosa.

## CONCLUSION

This study revealed an incidence rate of 25.5% for vaginal candidiasis amongst the girls. It also revealed that antibiotic use, sexual activities and presumed low personal hygiene contributed to the development of condition.

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