PREVALENCE OF VULVOVAGINAL CANDIDIASIS, TRICHOMONIASIS AND BACTERIAL VAGINOSIS AMONG PREGNANT WOMEN RECEIVING ANTENATAL CARE IN SOUTHWESTERN NIGERIA

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Vaginal infections in pregnancy are associated with considerable discomfort and adverse pregnancy outcomes including preterm delivery, low birth weight and increased infant mortality and also predisposition to HIV/AIDS. This study evaluated the prevalence and factors associated with vulvovaginal candidiasis, trichomoniasis and bacterial vaginosis among women attending antenatal clinic at a hospital in Nigeria. A semi-structured questionnaire was administered and high vaginal swab samples were obtained from consenting pregnant women. The samples were processed following standard protocols. The prevalence of vulvovaginal candidiasis was 36%, while those of trichomoniasis and bacterial vaginosis were 2% and 38%, respectively. Infections were higher in the third trimester and many women admitted to practices that increase risk of these infections. Significant association was found between recent intake of antibiotics and vaginal candidiasis, same association was also found with bacterial vaginosis. Adequate investigation and prompt treatment will reduce the morbidity and attendant effects of these prevalent infections on mother and fetus.

Keywords: vaginal infections, vulvovaginal candidiasis, bacterial vaginosis, trichomoniasis, pregnancy

Introduction

Vaginal infections (bacterial, fungal, and parasitic) affect women worldwide and could be of exogenous or endogenous origin. The common ones include vulvovaginal candidiasis, bacterial vaginosis, and trichomoniasis.

In bacterial vaginosis (BV), the normal balance of bacterial flora in the vagina is disrupted and characterized by an overgrowth of anaerobic bacteria and lack of normal lactobacilli [1]. It is sometimes accompanied by discharge, odor, pain, itching, or burning and is especially common during pregnancy [1]. An association between BV and pelvic inflammatory disease has also been described [2]. Awareness has increased in the past few decades on the importance of bacterial vaginosis in pregnancy, and it has been discovered that pregnant women with this infection are at risk of adverse pregnancy outcomes including spontaneous abortion, preterm labor, premature birth, preterm premature rupture of the membranes, amniotic fluid infection, postpartum endometritis, and postcesarean wound infections [3, 4].

Mucosal candidiasis, especially vulvovaginal candidiasis (VVC), is one of the most common fungal diseases in normal healthy women [5, 6]. Approximately 75% of the female population suffers at least one episode during their lives [7, 8]. *Candida albicans* is the causative agent in most cases [5, 7, 9]. Pregnancy, diabetes mellitus, and antibiotic treatment are the most common predisposing factors [5–8]. Some studies have shown that vulvovaginitis has increased in the past three decades due to antifungal resistance in the *Candida* species and a change in women's health quality [7, 10–12]. Vulvovaginal candidiasis has been noted to be more common in pregnancy, and pregnant women have higher rates of recurrent infections.

Trichomonas vaginalis, a flagellated protozoan, is the causative agent of trichomoniasis, which is the most prevalent nonviral sexually transmitted infection worldwide with an estimated 180 million infections acquired annually [13, 14]. The pregnant women infected with this parasite may be at risk of unfavorable birth outcomes such as premature rupture of membranes, premature labor, and low birth weight [1]. Trichomoniasis is associated with a 30%

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increase in low birth weight infants and a 30% increase in risk of preterm births [15]. Trichomoniasis is also associated with infertility, enhanced predisposition to neoplastic transformation in cervical tissues, and, as with other sexually transmitted infections, an increased risk of transmission of *human immunodeficiency virus* (HIV) by as much as two-fold [15–18].

These infections when present in the pregnant woman put her and her unborn child at risk if not detected and adequately treated. In Nigeria, there is scarce data on the prevalence of adverse pregnancy outcomes associated with genital infections. However, a study done in southeastern Nigeria found that about 20% of women with trichomoniasis in pregnancy had preterm delivery while delivery of low birth weight infants was found in 24% [19]. This emphasizes the importance of screening and treating infected pregnant women to prevent these unwanted effects.

This study was therefore conducted to determine the prevalence of these vaginal infections, vulvovaginal candidiasis, trichomoniasis, and bacterial vaginosis, among pregnant women attending antenatal clinic in our environment, Osogbo, Southwestern Nigeria.

Materials and methods

The study was carried out in Ladoke Akintola University (LAUTECH) Teaching Hospital, Osogbo, in Southwestern Nigeria. Although this is a tertiary care facility, the antenatal clinic is run on a secondary care basis. This

was a descriptive cross-sectional study carried out in a ten month period from July 2011 to April 2012. Approval for the study was granted by the Ladoke Akintola University of Technology Teaching Hospital Ethics Committee.

Consenting pregnant women in their first, second, and third trimesters were recruited for the study during the once weekly booking clinic as a representative cluster of pregnant women. A semi-structured questionnaire was administered after explaining the details of the study and procedure and thereafter obtaining their consent. High vaginal swab specimens were then collected by the attending physician following standard procedures. The samples were immediately transported to the microbiology laboratory for processing.

All specimens collected were examined on saline wet mounts for *T. vaginalis* and yeast cells by direct microscopy. Modified Trichomonas medium No. 1 (Oxoid) was used as the culture medium for *T. vaginalis* with samples incubated at 37 °C in microaerophilic jars and examined at 2-day intervals as described [20].

For isolation and identification of *Candida* spp., samples were cultured on Sabouraud dextrose agar and incubated at 37 °C for 48 h. *Candida* isolates were identified by carbohydrate assimilation, germ tube test, and formation of chlamydospores.

An assessment of bacterial vaginosis was made using the Nugent's scoring system [21].

Data analysis was done using the SPSS version 18.0 software (SPSS Inc., Chicago, IL). Descriptive statistics such as percentages, ratios, and frequency tables were

Table 1. Prevalence of vaginal infections among pregnant women

Vaginal infection	Vulvovaginal candidiasis	Trichomoniasis	Bacterial vaginosis
	No. (%)	No. (%)	No. (%)
Positive	36 (36)	2 (2)	38 (38)
Negative	64 (64)	98 (98)	62 (62)
Total	100	100	100

Table 2. Distribution of vaginal infections

	No. of women	Vulvovaginal candidiasis	Trichomoniasis	Bacterial vaginosis	Vaginal infections
		No. (%)	No. (%)	No. (%)	Total no. (%)
Age group					
21–25	7	1 (14.3)	0 (0)	0 (0)	1(14.3)
26–30	56	19 (33.9)	0 (0)	23 (41.1)	42 (75)
31–35	32	15 (46.9)	2 (6.3)	15 (46.9)	32 (100)
36–40	5	1 (20)	0 (0)	0 (0)	1 (20)
Trimester					
1st	48	1 (2.1)	1 (2.1)	10 (20.8)	12 (25)
2nd	24	9 (37.5)	0 (0)	12 (50)	21 (87.5)
3rd	28	26 (92.8)	1 (3.5)	16 (57.1)	43 (100)
Total	100	36	2	38	76

used to summarize our findings. Fisher's exact test was used to compare proportions in different groups. Statistical significance was set at $P < 0.05$.

Results

A total of one hundred (100) high vaginal swabs samples were collected from pregnant women within the age range of 21–39 years and with a mean age of 28.1 years. There were 76 cases of vaginal infections among these women as shown in *Table 1*. Thirty-six percent had VVC, 2% had trichomoniasis, while 38% were positive for bacterial vaginosis.

Vaginal infections were very common among the older age group and also in the third trimester as most women in both of these groups had at least one infection. There were 15 women with mixed infections, and all had mixed candidiasis and bacterial vaginosis.

Prevalence of vulvovaginal candidiasis

The highest prevalence of VVC was seen in the age group 31–35 years, and virtually, all the women (about 93%) in their third trimester were infected (*Table 2*).

Ten of the participants indicated recent use of antibiotics; eight (80%) of these had VVC compared to 28 (31%)

out of 90 without a history of antibiotic treatment. There was a significant association between antibiotics use and VVC ($P = 0.035$).

Six (35%) of the 17 women who also admitted to regular douching were positive for candidiasis, which is also similar to the proportion of cases among those who did not douche ($P = 0.2$) (*Table 3*).

Prevalence of trichomoniasis

There were very few cases of trichomoniasis in this study, and they were found in the older age group of 31–35 years; similar to other vaginal infections, we did not find any trimester to be particularly susceptible to *T. vaginalis* infection (*Table 2*). There was no significant difference in the prevalence of trichomoniasis among those who had taken antibiotics and those who had not ($P = 1.407$). None of the women who practiced douching had trichomoniasis, but there was no association between douching and trichomoniasis (*Table 3*).

Prevalence of bacterial vaginosis

The prevalence of BV appeared to increase with higher gestational age from about 21% in the first trimester to 57% in the third (*Table 2*).

Table 3. Risk factors for vaginal infections

Characteristic	Vulvovaginal candidiasis			P value
	Yes	No	Total	
Recent antibiotics				0.035
Yes	8 (80)	2 (20)	10	
No	28 (31.1)	62 (68.9)	90	
Douching				0.218
Yes	6 (35.3)	11 (64.7)	17	
No	30 (36.1)	53 (63.9)	83	
Trichomoniasis				
Recent antibiotics				1.407
Yes	0 (0)	10 (100)	10	
No	2 (2.2)	88 (97.8)	90	
Douching				0.687
Yes	0 (0)	17 (100)	17	
No	2 (2.4)	81 (97.6)	83	
Bacterial vaginosis				
Recent antibiotics				0.028
Yes	7 (70)	3 (30)	10	
No	31 (34.4)	59 (65.6)	90	
Douching				0.204
Yes	7 (41.2)	10 (58.8)	17	
No	31 (37.3)	52 (62.7)	83	

The prevalence of bacterial vaginosis among those who had taken antibiotics was 70% which was much higher than that in the other group (34%). A positive association was found between recent antibiotic intake and BV infection ($P = 0.028$).

Despite the higher prevalence of BV among women who douche regularly (41.2%) compared to women who did not (37.3%), a statistically higher risk was not found ($P = 0.204$) (Table 3).

Discussion

Our study found a high prevalence of vaginal infections in these pregnant women particularly vulvovaginal candidiasis and bacterial vaginosis. This picture has been described in other regions, but our study is one of the few in this environment that investigate these three related infections concurrently among pregnant women.

The incidence of yeast infections has greatly increased in recent times especially with the widespread use of broad-spectrum antibiotics and immunosuppressive treatment. Candidiasis is an important yeast infection that is especially common in pregnancy with the attendant risk of the pregnant woman harboring *Candida* spp. and infecting their babies during the perinatal period. Our study found at least one in every three women to be infected which is similar to many reports including 30% by Okonkwo and Umeanaeto and 37.4% by Guzel et al. [22, 23]. Guzel et al. also found that the prevalence increased with gestational week, and this is related to our finding of increasing prevalence with trimester [23]. We found the prevalence to be highest in the third trimester as virtually all of these women had candidiasis compared with 37.5% of those in their second trimester and 25% of first trimester pregnancies which was also reported by an earlier study [22]. Vaginal candidiasis, though not a very serious infection, requires adequate attention since it can be troublesome and cause considerable discomfort at a time when the subject is already experiencing some amount of discomfort due to the pregnancy itself. It may also be indicative of serious underlying morbidity such as diabetes mellitus.

The prevalence of trichomoniasis in this study was quite low at 2%, and it appears that there is a variation in the prevalence of this infection even in our environment with figures ranging from 2.8% to 18% [18, 24, 25]. However, the prevalence of trichomoniasis appears to be relatively lower than the other vaginal infections and seems to have declined when compared with earlier reports [26]. Trichomoniasis, caused by *T. vaginalis*, is a problematic sexually transmitted disease mainly in women, where it may be asymptomatic or cause severe vaginitis [27].

Bacterial vaginosis was found in 38 (38%) of study participants which is in agreement with findings from other studies [28]. Some have advocated routine screening of all pregnant women for BV based on paucity of predictive factors and the high risk of untreated infection affecting the fetus.

We explored the relationship between two identified risk factors for these infections, douching and recent intake of antibiotics. The prevalence of VVC was 80% among antibiotics users, as eight out of the ten women who had taken antibiotics recently had VVC compared with 31% among nonusers (28 out of 90), which is highly suggestive of a positive correlation between recent antibiotics ingestion and development of vulvovaginal candidiasis. This relationship was also statistically significant in agreement with several other studies that have linked candidiasis to ingestion of antibiotics [29–31]. A similar relationship was also found with bacterial vaginosis (70% vs. 34%), which was significant as well. We, however, could not demonstrate any relationship between antibiotics use and the prevalence of trichomoniasis.

Douching is a practice associated with numerous adverse outcomes including predisposition to vaginal infections such as bacterial vaginosis and candidiasis [32, 33]. We, however, did not find any significant association between douching and occurrence of any of these three infections in our study population despite these reported links. Our limitation of small sample size may have interfered with the ability to fully explore these associations.

Conclusion

Pregnant women are at high risk of vaginal infections especially in the second and third trimesters. Adequate investigation and prompt treatment will prevent adverse effects on mother and fetus.

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