ERRATUM

1. Ibrahim SM, Mohammed B, Yahaya M, Audu BM, Ibrahim HA on the article "Prevalence of Vaginal Candidiasis among Pregnant Women with Abnormal Vaginal Discharge in Maiduguri" on Page Nig. J. Med 2013. 138-142. Should read: Ibrahim SM, Bukar M, Mohammed Y, Audu BM, Ibrahim HM.

2. Mohammad RJ, Gholam T, Zahed M on the article "Dislocation of the Zygomatic Bone into the Nasal Cavity" on Page Nig. J. Med 2013. 151-153. Should read: Jamalpour MR, Farhangi GR, Mohammadi Z.

3. Mbachu 1, Udigwe GO, Okafor CI, Umeonunihu OS, Ezeama C, Eleje GU on the article "The Pattern and Obstetric Outcome of Hypertensive Disorders of Pregnancy in Nnewi, Nigeria" on Page Nig. J. Med 2013. 117-122. Should read: Mbachu II, Udigwe GO, Okafor CI, Umeonunihu OS, Ezeama C, Eleje GU.

4. Olusola AS on the article "Profile of Ear Diseases among Elderly Patients in Sagamu, South-Western Nigeria" on Page Nig. J. Med 2013. 143-147. Should read: Sogebi OA.

5. Choriocarcinoma in Enugu, South east Nigeria: A Need for a Shift From Mortality to Survival by: Dim CC, Ezegwui HU. This has been re-published due to some missing signs in the result section of the abstract in Nig. J. Med vol. 22. No. 2, April-June 2013.

Original Article

Prevalence of Vaginal Candidiasis among Pregnant Women with Abnormal Vaginal Discharge in Maiduguri

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ABSTRACT

BACKGROUND: Pregnancy represents a risk factor in the occurrence of vaginal candidiasis.

OBJECTIVES: To determine the prevalence and clinical features associated with abnormal vaginal discharge and C. albicans infection in pregnant women.

METHODS: High vaginal swab samples and data on epidemiological characteristics were collected from 400 pregnant women with complaints of abnormal vaginal discharge at booking clinic of University of Maiduguri Teaching Hospital. The data was analysed using SPSS 16.0 statistical software.

RESULTS: The prevalence of abnormal vaginal discharge in pregnancy was 31.5%. The frequency of abnormal vaginal discharge was 183 (45.8%) among those aged 20-24 years, 291 (72.8%) in multipara, 223 (55.8%) in those with Primary education and 293 (73.2%) in unemployed. Vulval pruritus 300 (75.0%) was significantly related to abnormal vaginal discharge (P<0.001).

The prevalence of C. albicans was 41%. The frequencies of Vulval itching, Dyspareunia and vulval excoriation among those with candidiasis were 151 (50.3%), 14 (56.0%) and 75 (75.0%) respectively (P<0.001).

CONCLUSION: The prevalence of abnormal vaginal discharge in pregnancy was high in this study and C. albicans was the commonest cause. It is recommended that a pregnant woman complaining of abnormal vaginal discharge be assessed and Laboratory diagnosis done in order to give appropriate treatment.

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INTRODUCTION

Vulvovaginal candidiasis (VVC) is a common cause of vaginal discharge worldwide[1,2]. It is estimated that approximately 75 % of women will experience an episode of VVC[3]. Candidiasis is caused by the fungus, Candida species. Predisposing factors to VVC include pregnancy, diabetes mellitus, immunosuppressive therapy, oral contraceptives, immunodeficient conditions, tight fitting and nylon undergarments[1]. Few studies in Africa reported prevalences of 65 %[4], 42 %[5] and 23 %[6] in Benin city, Nigeria, Addis Ababa, Ethiopia and Papua, New Guinea respectively. Similarly, studies in India reported incidences ranging from 45-61 %[7,8]. Most patients with vulvovaginal candidiasis will complain of vaginal discharge[1]. In acute case, vulval pruritus and burning are the main symptoms[9]. The diagnosis depends both on the demonstration of a species of Candida and the presence of clinical symptoms. Diagnostic tests include a positive wet-mount test or potassium hydroxide preparation. Vaginal pH usually remains normal in VVC.

In spite the over 25 % prevalence of vulvovaginal candidiasis in pregnancy[10], published data regarding it in pregnancy in developing countries are few[4]. More also, similar study has not been carried out in the North-Eastern Nigeria. The purpose of the study was to determine the prevalence and clinical features associated with vaginal discharge in pregnancy, and to determine the frequency of C. albicans infection among these women attending the antenatal clinic of University of Maiduguri Teaching Hospital.

MATERIALS AND METHODS

This was a descriptive cross-sectional study conducted in the department of Obstetrics and Gynaecology of University of Maiduguri Teaching Hospital, Maiduguri, North-Eastern Nigeria.

The sample size was calculated based on reported prevalence of pathological vaginal discharge in pregnancy of 54.3 % reported from Jos, Northern Nigeria. Using Taylor's formula[11], n= where z is the standard normal deviate (1.96) at 95 % confidence interval, p is the proportion of the target population estimated to have the disease (54.3 %), q is the proportion of failure which is 1.0-p and d is the degree of accuracy set as 0.05, n was calculated to be 380 (when population is more than 10,000). The desired sample size when population is less than 10,000 was then obtained with Kish's formula[11], n_f = . n_f was obtained as 336. Addition of 20 % attrition gave an approximate sample size of 400. Subsequently, a minimum sample size of 400 was used in the study.

Simple sampling of consecutive pregnant women presenting to the antenatal clinics of UMTH with complaint of abnormal vaginal discharge was done until a sample size of 400 was reached, from 7th December 2010 to 15th July 2011. Patients who douched with chemicals, those with genital malignancy in pregnancy,

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those who used antibiotics in the preceding 4 weeks and those who did not consent were excluded from the study.

Upon counseling and recruitment, information on sociodemographic variables, obstetric history, sexual and reproductive risk factors was obtained. Specifically, the following information was filled: age, marital status, educational status, occupation, occupation of husband, parity and gestational age, abdominal pain, dysuria and vulval pruritus. Abdominal tenderness was also elicited.

Each patient was placed in dorsal position and an appropriately sized sterile Cusco bivalve speculum immersed in warm water was gently inserted in to the vagina to expose the external cervical Os. The vulva, vagina and cervix were inspected for abnormalities such as erythema, excoriation marks and discharge. The colour, smell and consistency were noted. High vaginal swab was collected and immediately taken to the medical microbiology laboratory of the University of Maiduguri Teaching Hospital, for preparation. Infection with Candida species was diagnosed by microscopy of a saline mount which showed a highly refractile, round or oval budding yeast cells and gram-stained smear of material from the vagina which showed gram positive pseudohyphae with budding yeast cells. A germ-tube test to differentiate C. albicans from other species of Candida was also performed.

ETHICAL CLEARANCE

Ethical clearance was obtained from the research and ethical committee of University of Maiduguri Teaching Hospital. Informed consent was obtained from the subjects before enlistment in to the study. Information given to participants was given in both English and Hausa languages. Subjects who were found to be infected from the results of the research were treated, with topical clotrimazole with good outcome.

STATISTICS

The computer program SPSS 16.0 statistical software (Polar engineering and consulting, 2007) was used to analyse the results; association between organisms and studied variables was compared using Chi-Square (X^2) and Fisher's exact tests while P-value < 0.05 was considered significant at 95.0 % confidence level.

RESULTS

During the period of study, 1280 pregnant women were seen at the antenatal booking clinic among which 400 complained of vaginal discharge, giving a prevalence of vaginal discharge in pregnancy of 31.5 %. The prevalence of C. albicans among these women was 41 %. Table 1 shows the socio-demographic characteristics of respondents. The age range of the pregnant women was between 15 and 42 years, with a mean age of 23.55 ± 6.171. The complaint of vaginal discharge decreased with increasing age from 20 years up to the age of 42 years. The parity range was from 0 to 13, with a mean parity of 2.77 ± 2.45. The frequency of abnormal vaginal discharge was 291 (72.8 %) in Para 1 to 4, and 16 (4.0 %) among the grandmultiparae. Overall, 103 (25.7 %) had no formal education while 297 (74.3 %) were educated; primary education had the highest incidence of complaint of vaginal discharge 223 (55.8 %), followed by those with no formal education. The least was among those with secondary and tertiary education with frequencies of 38 (9.5 %) and 36 (9.0 %) respectively. Three hundred and ninety two (98.0 %) of the women who complained of vaginal discharge were married while 6 (1.5 %) and 2 (0.5 %) were single and divorced respectively.

TABLE 1: Sociodemographic characteristics of respondents (N = 400)

Characteristics	Frequency (%)
Age	
15-19	106 (26.5)
20-24	183 (45.8)
25-29	62 (15.5)
30-34	40 (10.0)
35-39	6 (1.5)
40-44	3 (0.7)
Parity	
0	93 (23.2)
1-4	291 (72.8)
= 5	16 (4.0)
Educational Status	
No education	103 (25.7)
Primary school	223 (55.8)
Secondary school	38 (9.5)
Tertiary institution	36 (9.0)
Marital status	
Married	392 (98.0)
Single	6 (1.5)
Divorced	2 (0.5)
Occupation	
Employed	107 (26.8)
Unemployed	293 (73.2)
Occupation of husband	
Employed	335 (83.7)
Unemployed	65 (16.3)

The frequency of vaginal discharge was 293 (73.2 %) among the unemployed and 107 (26.8 %) among employed pregnant women. Conversely, 335 (83.7 %) of those whose husbands were employed had complaint of vaginal discharge as shown on table 1.

TABLE 2: Clinical features associated with vaginal discharge in the study group (N=400)

Feature	Frequency (%) Present	Absent
1. **Vulval itching**	300 (75.0)	100 (25.0)
$\chi^2 = 1.011,\ P = 0.000$		
2. **Dysuria**	74 (18.5)	326 (81.5)
$\chi^2 = 44.008,\ P = 0.000$		
3. **Dyspareunia**	25 (6.2)	375 (93.8)
$\chi^2 = 2.082,\ P = 0.149$		
4. **LAT***	24 (6.0)	376(94.0)
$\chi^2 = 1.684,\ P = 0.194$		
5. **Vulval warts**	1 (0.3)	399 (99.7)
Fisher's exact = *1.001, P = 0.317*		

*Lower abdominal tenderness

Table 2 shows the clinical features associated with vaginal discharge in the study group. Majority of the patients 300 (75 %) had vulval pruritus (^{2} = 1.011, P = 0.000), while 74 (18.5 %) of the 400 pregnant women had associated dysuria (^{2} = 44.008, P = 0.000). Dyspareunia, lower abdominal tenderness and vulval warts were seen in only 25 (6.2 %), 24 (6.0 %) and 1 (0.3 %) respectively (P> 0.05).

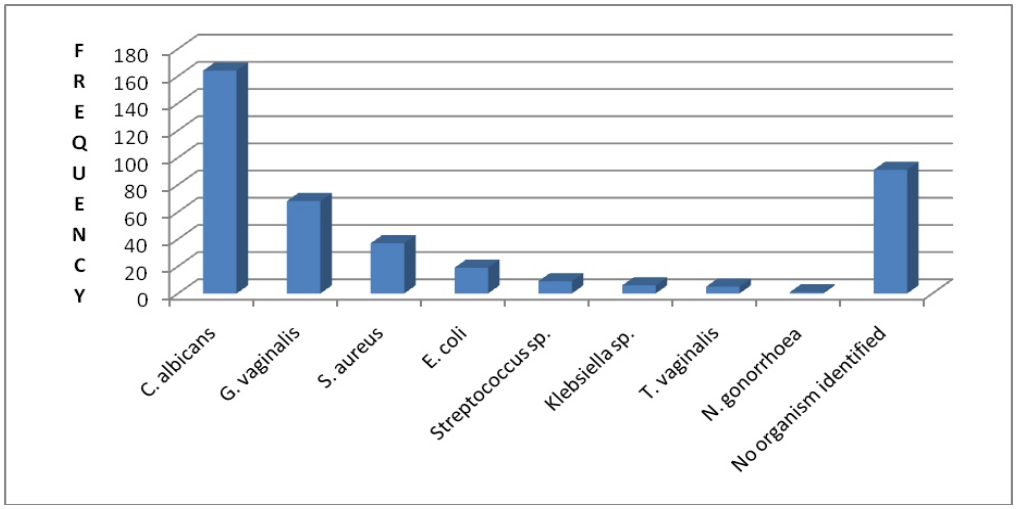
Table 3 illustrates the clinical features associated with vaginal candidiasis in the patients studied. There is significant relationship (P = 0.000) between vulval pruritus and vaginal candidiasis with 151 (50.3 %) of those with pruritus having candidiasis. Significantly more patients with vulval excoriation marks 75 (75 %) and superficial dyspareunia 14 (56%) had candidal infection (P = 0.000). Dysuria was significantly more present among those without candidiasis.

Figure 1 illustrates the proportions of patients with Candida albicans from the vaginal discharge specimens of the 400 patients studied. One hundred and sixty four (41 %) of them had C. albicans infection followed by G. vaginalis 68 (17 %). Other microorganisms isolated include S. Aureus 37 (9.2 %), E. coli 19 (5 %), Streptococcus species 9 (2 %) and Klebsiella sp. 6(1.5 %). While T. vaginalis 5(1 %) and N. gonorrhoea 1(0.3 %) were the least common, no microorganisms were detected in 91(23 %) of the samples.

TABLE 3: Clinical features associated with Vaginal Candidiasis in the study group

Clinical Feature	Frequency (%) Candidiasis	Candidiasis	Total No
1. **Vulval itching**	151 (50.3)	149 (49.7)	300
$\chi^2 = 7.438,\ P = 0.000$			
2. **Dysuria**	16 (21.6)	58 (78.4)	74
$\chi^2 = 1.611,\ P = 0.000$			
3. **Excoriation marks**	75 (75.0)	25 (25.0)	100
$\chi^2 = 2.332,\ P = 0.000$			
4. **Dyspareunia**	14 (56.0)	11(44.0)	25
$\chi^2 = 48.336,\ P = 0.000$			

FIGURE 1: Findings from Microscopy and Culture of Vaginal Discharge Specimens (N = 400)



DISCUSSION

The prevalence of abnormal vaginal discharge in pregnancy in this study was 31.5 %, which is within the prevalences of between 30.0 % and 54.3 % reported from several studies[12-15]. The reason for the similar finding in these studies is because, majority of vaginal discharge in pregnancy has similar aetiology, which are the increasing hormonal influence and blood supply to the genital organs as the gestational age increases until delivery which then result in leucorrhoea, or predispose them to vaginitis with infective vaginal discharge due to alteration in vaginal pH[14,16-18].

Maternal age was found to be associated with the presence of vaginal discharge. Those in early reproductive age group has highest incidence of vaginal discharge, this may reflect the fact that the age group 20-24 years is the most sexually active age group with highest risk of pregnancies[12]. Thereafter, the incidence decreased with increasing age up to 42 years probably because of maturity and improved personal hygiene[14,16,17].

The similarity of this finding to that of Kano, North-western, Nigeria[18] may be explained by the age at marriage and commencement of coitus shared by women from these regions.

Multigravidae constituted the highest group with complaint of vaginal discharge in this study which concurs with other studies done earlier in the Northern part of Nigeria[12,18]. This was probably due to increased coital frequency resulting in reduction in the physiological barrier in the vagina[18].

The risk of having vaginal discharge was highest among those who had only primary education and least among those with secondary and tertiary education which agrees with some previous studies[14,17,18]. This could be due to higher level of enlightenment and utilization of orthodox medicine among those with western education[14,17]. Those who lack western education patronize traditional medicine more[14]. This high patronage of traditional medicine which involves insertions into the vagina predisposes them to vaginal discharge[17]. The increased frequency of vaginal discharge in unemployed patients reflects the role of poverty and dependence in disease causation[16].

Vulval pruritus and dysuria were significant clinical features found to be associated with vaginal discharge. This finding was similar to a previous study which reported rates of 59 % and 18 % respectively[9]. The high rate of vulval pruritus in our study may be explained by the increased frequency of candidiasis among pregnant women with abnormal vaginal discharge[3,9,19,20].

The trio of vulval pruritus, excoriation marks and dyspareunia as seen in patients with candidiasis has been reported in several studies[3,9,19-23]. The appearance of excoriation marks is due to vulval scratching in response to pruritus. Recurrent scratching leads to bruises and inflammatory reactions and scarring if left untreated. Consequently, superficial dyspareunia results.

Candidiasis was the leading cause of vaginal discharge in the study. Although the result was lower than those of some earlier studies done on the same group of patients which reported 80.0 %, 46.0 % and 94.0 %[12,13,18], candidiasis was identified as the most prevalent cause of vaginal discharge in pregnancy in all the studies. The alteration in vaginal pH due to hormonal influence during pregnancy favours the growth of C. albicans[12,14,21]. C. albicans is one of the very few organisms that can survive in this hostile environment, and it proliferates to become pathogenic[21].

Pregnant women should be educated on the characteristics of, and clinical symptoms associated with, abnormal vaginal discharge during health talks at booking clinics. Health education through different media to educate women on the difference between abnormal and normal vaginal discharge is advocated. Candida albicans was the commonest agent of abnormal vaginal discharge among pregnant women while trichomoniasis and gonorrhoea were the least. All cases of vaginal discharge in pregnancy should be investigated properly in order to determine the aetiology to avoid complications.

Inability to identify the non-infective causes of vaginal discharge with the available diagnostic tool and to easily detect some causes of abnormal vaginal discharge due Chlamydia, U. urealyticum and other organisms like viruses by the tools used were some of the limitations encountered in the study.

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