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Original Research Article

Prevalence and Aetiology of Pathological Vaginal Discharge among Third- Trimester' Women Attending Antenatal Care at Kampala International University Teaching Hospital

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ABSTRACT

Background: A vaginal discharge means any secretion originating from the vagina except blood. Pathological vaginal discharge predisposes to preterm labor and prematurity which is a leading cause of infant mortality in the world.
Objectives: To determine prevalence and aetiology of pathological vaginal discharge among women in third trimester who attend Antenatal Care (ANC) at Kampala International University Teaching Hospital (KIUTH).
Research methods: A cross-sectional study was carried out from February through April, 2017. 394 of the women in third trimester who attended ANC at KIUTH during the study period were recruited, and data was collected using structured interviewer-administered questionnaire and laboratory investigation on the vaginal discharge specimen. The data was analyzed with the use of SPSS software.
Results: 45.2% of participants had pathological vaginal discharge. Vaginal Candidiasis largely contributed to pathological vaginal discharge (37.1%) while Trichomoniasis contributed the least (2.2%). Bacterial Vaginosis caused 10.1% of the pathological vaginal discharge while 50.6% was due to bacterial infections (of the total of 178 participants, 34.3% had Staphylococcus Species infection, Streptococcus infection at 1.7%, Klebsiella species at 3.4% and mixed infections at 1.1%).
Conclusion: Some pregnant women in third trimester who attend ANC at KIUTH actually harbor pathogenic organisms (Trichomonas spp, Candida spp, Staphylococcus spp, Streptococcus spp, *E. coli* and Bacterial vaginosis) and these organisms put them at risk of poor perinatal outcomes like premature rupture of membranes, chorioamnionitis, etc. Some pregnant women in third trimester have pathogenic bacterial colonization that requires detection and necessary care given.

Key words: Pathological Vaginal Discharge, Antenatal Care

INTRODUCTION

According to Omole, 2011, a vaginal discharge means any secretion originating from the vagina except blood. Vaginal discharge may be normal (physiological) or abnormal (pathological). Physiological vaginal discharge normally increases in pregnancy. Pathological vaginal discharge

can present with variable colors including brown, yellow, green, white or red in color, sometimes with an itchy sensation of genitals and a foul smell or may be asymptomatic. Vaginal discharge normally results from secretion arising from cervix and Bartholin's glands; and shedding of epithelial cells of the vagina which results from bacterial action in the vagina (Spence and Melville, 2007 ; Fettweis *et al.,* 2012; Doerflinger *et al.,* 2014). Identification of microbial causes of pathological vaginal discharge which occurs among pregnant women dates from the twentieth century but majorities of the studies were conducted during the twenty first century (Andrea Seils *et al.,* 2005). Pathological vaginal discharge predisposes to preterm labor and prematurity which is a leading cause of infant mortality in the world. Identification of the aetiology of pathological vaginal discharge helps to reduce on prematurity hence reducing infant mortality. Globally, studies on prevalence of pathological vaginal discharge among pregnant women have revealed varying results; according to the study conducted by da Fonseca *et al.,* (2013), 43% of participants had pathological vaginal discharge during pregnancy. Many studies have been conducted in Africa about pathological vaginal discharge in pregnancy especially in West Africa. One of the latest studies was conducted by Sanusi and Mohammed, (2016), about treatment of abnormal vaginal discharge among pregnant women, 31.5% of study participants were found to have pathological vaginal discharge while Abdelaziz *et al.,* (2014), reported pathological vaginal discharge to have a prevalence of 63% in the third trimester. In Uganda, literature search has revealed scarce information on pathological vaginal discharge during pregnancy. In a study named "Lack of effectiveness of syndromic management in targeting vaginal infections in pregnancy in Entebbe, Uganda", Tann *et al.,* (2006), concluded that Bacterial vaginosis (BV) affects 47.7%; *Trichomonas vaginalis* (TV) affecting 17.3%; Candida affecting 60.6%; and gonorrhoea affecting 4.3% of pregnant women. Normal vaginal discharge has been said to occur in pregnancy, during sex or at some period in menstrual cycle (Dawson *et al.,* 2012; Bossio *et al.,* 2014). During pregnancy, consistence of vaginal discharge changes, most women produce more discharge while pregnant. Pathological vaginal discharge during pregnancy may be due to infection mainly BV, vaginal candidiasis, Trichomonas vaginalis (Donders, 2010; Waters *et al.,* 2008). Other causes include Group B Streptococcus (GBS) and other bacteria. In pregnancy, the lower genital tract changes with hypertrophy of the vaginal walls and increase in blood flow and temperature, and vaginal acidity which is common in this period. These changes protect the uterus, fetus and pregnancy but they predispose to vaginal infection, which requires special attention to prevent vertical transmission. There is evidence that *Trichomonas vaginalis* increases risk of having preterm labor, premature rupture of membranes (PROM) (Choi *et al.,* 2012; Silver *et al.,* 2014; Nakubulwa *et al.,* 2015) and low birth weight infant. The number of women affected by pathological vaginal discharge increases during pregnancy because of increase in estrogen and deposition of glycogen (Hay and Czeizel, 2007; Moaiedmohseni *et al.,* 2012). Bacterial Vaginosis (BV) during pregnancy is a risk factor to Intra-uterine fetal death. According to Brotman, 2011, 10%–30% of pregnant women with BV have preterm labor; however, there is no evidence that treating women with BV helps to reduce the risk of preterm delivery (Hendler *et al.,* 2007). BV is diagnosed basing on clinical criteria (Amsel) or the Nugent criteria which involves Gram stain; both methods are subjective, although the Nugent criteria require a highly skilled personnel and more time (Martínez *et al.,* 2011; Chawla *et al.,* 2013), while organisms can be identified. Lactobacilli bacteria are protective in the vagina because they produce lactic acid, which is produced by fermentation

accumulates and decreases the pH to a protective level of 4.5 or lower (O'Hanlon *et al.,* 2013; Mendes-Soares *et al.,* 2014).

MATERIALS AND METHODS

Study design

A descriptive and analytical cross-sectional study was conducted to study prevalence and aetiology of pathological vaginal discharge among third- trimester women attending antenatal care at Kampala International University Teaching Hospital.

Study population

The study population was obtained using selection criteria i.e. inclusion and exclusion criteria. The study population involved women in third trimester who attend Antenatal care at Kampala International University Teaching Hospital.

Selection criteria

Inclusion Criteria: Third trimester' pregnant women attending ANC at KIUTH who had vaginal discharge were included in the study. Gestation age was calculated from the first day of the last menstrual period and early ultrasound scan; those found to be beyond 28weeks and above are taken to be in third trimester. The research participants were those who attended Antenatal care at KIUTH during the study period. Only those women that consented were included in the study.

Exclusion Criteria: Those who had unprotected sex in the previous 24 hour were also excluded because this would alter the pH of the vaginal discharge. Those women who did not consent were excluded from the study

Sample size

A sample size of 394 Human research participants was targeted.

Sample size determination

The sample size was achieved at a 5% level of precision at 95% confidence level and calculated using the Keish and Leslie (1965) formula shown below;

$N= (Z)^2p(1-p)/d^2$. N=Number of participants

Z=1.96

P-prevalence=63% (0.63) (Abdelaziz *et al.,* 2014). D= 0.05

$N= (1.96)^2*0.63(1-0.63)/ (0.05)^2$

N=358.

Adjusting for non- response, incomplete data; we added 10% to arrive at an estimated sample size of 394 Human research participants.

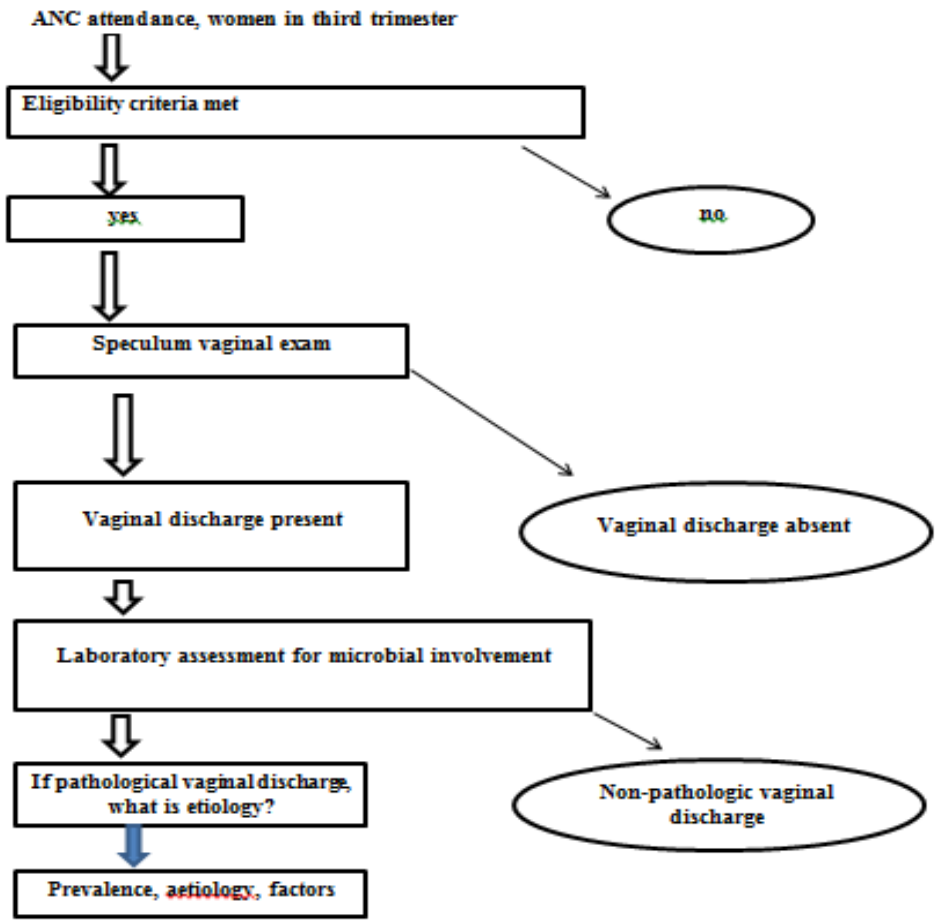
Sampling techniques

Pregnant women in the third trimester who attended ANC at KIUTH during the study period, and were found to have vaginal discharge on examination were recruited into the study by consecutive sampling. This was done to ensure that the sample size was realized faster because not all pregnant women are in third trimester.

Data collection instruments

Structured interviewer-administered pre-tested questionnaire was used to collect data on demographic profile and relevant clinical complaints. The questionnaire involved the following; serial number, date, age, address, educational status, telephone contact, occupation, LNMP, EDD, gravidity, gestation age, religion, ethnicity, marital status, number of sexual partners, practice of orogenital sex, whether they smoke, douching, statement of their monthly income, about assets that they own at home, whether they rent, number of children in the family, HIV status, Diabetes mellitus, history of abortion or vaginal discharge in the previous pregnancy, history of preterm labor in the current pregnancy, history of Urinary tract infection and history of hospitalization in the current pregnancy . A detailed history was elicited (English), translated where necessary for women who did not understand English; and a vaginal examination using a sterile cusco's speculum was performed. Presence or absence of vaginal discharge was noted. The amount, odour, colour and consistency of vaginal discharge were noted. The pH of the discharge was also taken in the same setting. Swabs (3) (high vaginal swab) were taken using sterile swab sticks and labeled.

Figure 2: Flow of activities



Sample collection and transportation

Vaginal swab specimens were obtained from each subject through a sterile speculum examination and swabbing. Three vaginal swabs were obtained from each participant and placed into vaginal swab containers. Once specimens were obtained, they were transported immediately to the Microbiology Laboratory Department of KIUTH. Speculum examination and specimen collection was performed by the principle investigator, and some by the midwives employed by KIUTH in ANC section. Consent was obtained and the questionnaire was subsequently filled by the one who examined and obtained specimen. The principle investigator also checked the questionnaires for completeness before and after use in the laboratory.

Specimen processing

After specimen submission to the laboratory, it was processed immediately to identify pathogenic microorganisms according to established methods below for diagnosis in this study.

Method of diagnosis of Bacterial Vaginosis

Bacterial vaginosis was diagnosed using the Amsel's clinical criteria and standard microbiological techniques according to U.S. Preventive Services TASK FORCE, 2006. The Amsel's clinical diagnosis requires three of four criteria to be met: the first is a vaginal pH greater than pH 4.5; the second is the presence of clue cells; the third is a milky, homogeneous vaginal discharge; and the fourth is the release of amine (fishy) odour after addition of 10% potassium hydroxide to the specimen.

The pH was determined directly by applying a swab on a pH paper in the range covering pH 4.0 to pH 6.5. The swab was then inserted into 0.2 mL of normal saline in a test tube; a drop of this extract was placed

on a glass slide. A 10% potassium hydroxide drop was put on another glass slide. The swab was then stirred in the 10% potassium hydroxide and immediately evaluated for the presence of a fishy odour. Both drops were then covered with a coverslip and examined at 400x magnification under a light microscope. Clue cells were identified as vaginal epithelial cells with a heavy coating of bacteria that the peripheral borders are obscured. Amsel's criteria has sensitivity of 91%, specificity of 91%, positive predictive value of 86%, negative predictive value of 94%, and accuracy of 91% (Mohammadzadeh *et al.*, 2015).

Wet mount

Microscopy was performed according to procedure described by Kelly, 1990, using sterile swabs; secretions were obtained from the posterior fornix. We placed the sample in 1 ml of saline and shook to mix, then took a drop of this mixture and placed it on a slide. We then covered with a cover slip. The slide was looked at promptly under a microscope.

Culture

Methods used

Isolation of *E. coli*

Isolation and identification of bacteria was done by streaking sample on blood agar, chocolate agar, Eosin Methylene blue (EMB) agar and MacConkey agar. Inoculated plates were incubated at 37º C for 24 hours. Single well defined colony was further sub-cultured on nutrient agar and pure culture obtained. Identification of bacteria was performed on the basis of cultural characteristics; Gram's staining reaction, and biochemical tests.

Gram's staining

Gram's staining of the pure culture was done according to the method described by (Cheesbrough, 2006). Briefly, a single colony was picked up with a bacteriological wire loop, smeared on separate glass slide and fixed by gentle heating. Crystal violate was applied on each smear to stain for two minutes and then washed with running tap water, treated with lugols iodine, decolorize with acetone alcohol and counterstained with Safranin. The slides was washed with water and allowed to air dry. It was examined by a light microscope under oil immersion lense (100X). Gram negative rods observed as they appear red or pink in colour.

BIOCHEMICAL TESTS

Sugar fermentation test (TSI agar)

The sugar fermentation test was performed by inoculating isolated colonies on slant TSI culture of the organisms into each tube containing three basic sugars (e.g., sucrose, lactose, and glucose) and was incubated for 24 hours at 37º C. Acid production was indicated by the color change from reddish to yellow in the medium and the gas production was noted by the appearance of gas bubbles. TSI agar with the above mentioned characteristics were considered presumptive for *E. coli.*

Indole test

Two ml of peptone water was inoculated with the 5 ml of bacterial culture and incubated at 37 ℃ for 24-48 hours. Kovac's reagent (0.5ml) was added, shaked well and examined after 1 minute. A red color in the reagent layer indicated indole positive test suggestive of *E. coli*.

Isolation of *Klebsiella species*

Cultural characteristics of Klebsiella species colonies appeared pink (lactose positive colonies) and mucous on MacConkey's agar, morphologically gram stain showed gram negative rods.

Identification

Triple sugar iron agar indicated sucrose, glucose and lactose fermentation (butt and slant yellow), with gas production, urea positive, indole negative, and citrate positive.

Isolation of *Staphylococcus species and Streptococcus species*: Samples collected were inoculated on blood agar, chocolate agar and MacConky agar and incubated at 37^{O}C for 24-48hrs and chocolate agar plates were placed in candle jar which provide 10% carbon dioxide.

Identification

Colony morphology was observed morphologically, organisms isolated were determined by gram staining which gram positive cocci were observed. Catalase test was performed on the Gram positive organisms and those found positive were sub-cultured in mannitol salt agar (MSA) and incubated at 37^{O}C for 18- 24hrs. *Staphylococcus aureus* produced golden yellow colonies. This was followed by coagulase test which confirmed *Staphylococcus aureus*. Non- coagulase positive *Staphylococcus spp* did not ferment mannitol. Catalase negative test was indicative of Streptococcus species and this was further confirmed by subculturing on blood agar to differentiate Streptococci species by type of hemolytic reaction produced.

Isolation of *Candida spp*

Samples from blood and chocolate agar suspected to be fungi were stained with gram stain and positive yeast Gram stain slides were sub-cultured on Sabouraud dextrose agar (SDA) and incubated aerobically at 37^{O}C for 24-48hrs.

Direct Microscopy: Potassium hydroxide preparation of the sample was made on microscope slides which revealed non-pigmented septate hyphae with dichotomous branching.

Colony from SDA was picked and smeared on a microscope slide and then stained with Gram stain which revealed the presence of Candida hyphae and Yeast seen as dark blue.

Identification

Germ tube test was done to identify *C. albican* by the induction of hyphal outgrowths (germ tube).

Method of diagnosis of trichomoniasis.

Identification of trichomonas was by wet slide preparation using normal saline, then microscopy carried out to identify motile trichomonads.

Other bacteria: BA/ MacConkey agar and Eosin Methylene blue agar for gram negatives. Gram positives like staphylococcus species were isolated by culturing on Mannitol-salt agar (MSA). The specimens were also isolated by culturing on Chocolates and blood agar.

Quality assurance

Every twentieth specimen was taken to two different laboratories, one a control laboratory to ensure that reliable results were being obtained in the study laboratory. The microbiology laboratory of Kampala International University (university section) was used as a control laboratory because it is near to the study site and it is an independent laboratory from the Kampala International University Teaching Hospital laboratory.

Data management

Raw data was obtained, entered in Microsoft Excel Worksheet. The coded data was exported and inserted into SPSS software for analysis.

Data analysis

All data analysis was carried out in SPSS Version 20. The socio-demographic and clinical characteristics of study participants were summarized descriptively using means, medians (for non-normally distributed variables) and frequencies/proportions for categorical variables. The prevalence of Pathological vaginal discharge was summarized as percentages depicted in a pie chart. 95% CI was obtained for positive pathological discharge for inferential purposes. The causes of pathological discharge were summarized as frequencies and percentages.

Ethical Considerations

Informed consent

Adequate explanation was made to the study participants in English and the local language (Runyankole). Sterile speculum examination was performed using a cusco's speculum before obtaining consent from the study participants and vaginal discharge (if present) specimen was obtained by use of swab sticks. All pregnant women who came to KIUTH for ANC were examined vaginally for presence of vaginal discharge. Informed consent was sought from those women who were found to have vaginal examination during speculum examination. For women who did not allow

to consent, the specimen that had been obtained was discarded. It was emphasized that they could withdraw from the study at any stage without compromising the quality of care they deserved thereafter. Confidentiality was ensured as only the principle investigator together with the research assistants had access to the results and there was no unauthorized access to such information by any other parties. The risks anticipated in the study included accidental injuries during examination but none happened. Those women participating had access to screening for infections which can predispose to poor perinatal outcome. Those women who were found to have infection were offered treatment. Recruitment was after voluntary acceptance and a consent form had to be signed. Pregnant minors (emancipated minors or those under the age of 18 years) did not require presence of their guardians to consent; these procedures were approved by the Mbarara University of Science and Technology- Institutional Review and Ethics Committee. All women had the right to opt out at any stage without questioning. Approval to carry out the study was sought from the department of Obstetrics and Gynaecology of Kampala International University Teaching Hospital and the Institutional Research Ethics Committee of Mbarara University of Science and Technology. This approval letter was presented to the hospital administration. Consent of the pregnant mothers to take part in this study was sought and patients who agreed were assured of strict confidentiality about their information. The consent form included the objectives of the study, how this study would benefit the individual participating, the potential risks/hazards and measures taken to counter these hazards, how confidentiality was ensured, and the freedom to leave the study whenever they wished without compromising any services they may have needed afterwards.

RESULTS

Socio-demographic, medical and obstetric characteristics of study participants

Table 1: Distribution of characteristics of study participants

Variable	Summary measure
Median age (IQR)	25 (22-29)
Median gravidity (IQR)	2 (1-3)
Median parity (IQR)	1 (0-2)
Education n (%)	
None	5(1.3)
Primary	156(39.6)
Secondary	161(40.8)
Tertiary	72(18.3)
Total N	394 (100%)
Religion n (%)	
Anglican	170(43.1)
Catholic	148(37.6)
Muslim	44 (11.2)
Born again	20 (5.1)
SDA	7 (1.8)
Other	2 (0.5)
Not stated	3 (0.7)
Total N	394(100%)
Occupation n (%)	
Saloon	14 (3.6)
farmer/peasant	174 (44.2)
Business	47(11.9)
Teacher	35 (8.9)
Nurses/midwives	6 (1.5)
Other	118 (29.9)
Total	394 (100%)
Income in UGX n (%) per month	
≤ 0.5 million	287 (72.8)
>0.5million	74(18.8)
Not stated	33(8.4)
Total N	394 (100%)

Table 1 to be Continued…	
Marital status n (%)	
Married	357 (90.6)
Single	32 (8.1)
Cohabiting	5 (1.3)
Total N	394 (100)
Vaginal douching n (%)	
No	183 (46.4)
Yes	211 (53.6)
Total N	394 (100)
Mean Vaginal PH (Sd)	**4.26 (0.2)**
Smell of Vagina discharge (%)	
Offensive	30 (7.6)
Non-offensive	364 (92.4)
Total N	394 (100)
Mean number of sexual partners (Sd)	**1.02 (0.1)**
Orogenital sex n (%)	
No	360 (91.4)
Yes	18 (4.6)
Not stated	16 (4.0)
Total	394 (100)
HIV status n (%)	
Negative	349 (88.6)
Positive	32 (8.1)
Not stated	13 (3.3)
Total N	394 (100%)
History of STI n (%)	
No	313 (79.4)
Yes	74 (18.8)
Not stated	7 (1.8)
Total N	394 (100%)
Diabetes Mellitus n (%)	
No	385 (97.7)
Yes	1 (0.3)
Not stated	8 (2.0)
Total N	394 (100%)
History of miscarriage n (%)	
No	324(82.2)
Yes	70 (17.8)
Total N	394 (100)
Vaginal discharge in previous pregnancy n (%)	
No	312 (79.2)
Yes	82 (20.8)
Total N	394 (100)
History of disease in current pregnancy n (%)	
No	337 (85.5)
Yes	57 (14.5)
Total N	394 (100%)
Hospitalization in current pregnancy n (%)	
No	359 (91.1)
Yes	35 (8.9)
Total N	394 (100%)
Pathological discharge n (%)	
No	216 (54.8)
Yes	178 (45.2)
Total	394 (100)

The median age of participants was 25 years with lower quartile and upper quartile of 22 years and 29 years respectively. Over 40% of the study participants had attended secondary education. The majority of study participants were Anglicans, 43.14% (170/394). About 3.55% (14/394) of the study participants were saloon workers and over 70% of the women had monthly income of not more than 500,000 Uganda shillings. Approximately 54% of the participants practice vaginal douching. The mean PH of the vagina was 4.3 with 0.2 standard deviations. Approximately 8% of the participants had offensive vaginal discharge. Approximately 19% of the study participants had history of STI's as shown in table 1 above.

The prevalence of pathological vaginal discharge among pregnant women in third trimester attending ANC at KIUTH.

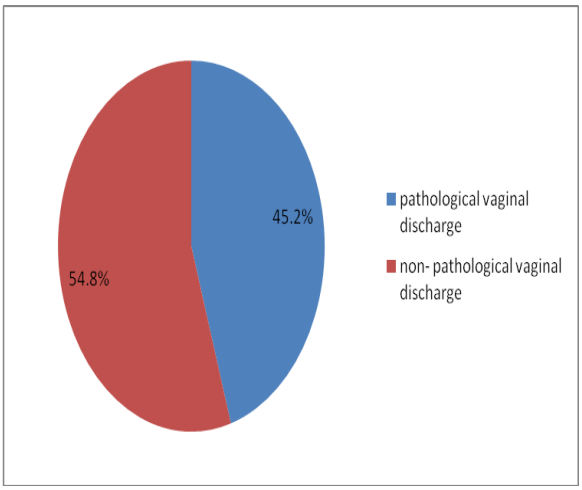


Figure 1: Prevalence of pathological vaginal discharge among third trimester' women attending antenatal care at Kampala International University Teaching Hospital

A total of 394 research participants were recruited in the study and 178 of this total sample size were found to have pathological vaginal discharge. The prevalence of pathological vaginal discharge was 45.2% with 95 % confidence that the true proportion of pathological discharge ranges from 40 – 50% as shown in figure 1 above.

Aetiology of pathological vaginal discharge among pregnant women in third trimester attending ANC at KIUTH.

Table 2 : Aetiology of pathological vaginal discharge

Cause	Frequency	Percent
Bacterial vaginosis	18	10.1
Trichomoniasis	04	2.2
Candidiasis	66	37.1
Other bacteria†	90	50.6
Total N	**178**	**100%**

†Others: *E. coli* (n(%)=18(10.1%); *Staphyloccocus spp* (n(%)=61(34.3%); *Streptococcus spp* (n(%)=03(1.7%); *Klebsiella* (n(%)=06(3.4%); *E. coli* & *Staphylococcus aureus* (n(%)=2(1.1%)

From the total sample size of 394 recruited participants, 178 were found to have pathological vaginal discharge (45.2%). Of the 178 participants, 18 participants were found to have Bacterial Vaginosis (10.1% of pathological vaginal discharge), 4 (2.2%) participants were found to have Trichomonas Infection, 66 (37.1%) participants were found to have Vaginal candidiasis and 90 participants (50.6%) were found to have bacterial causes which included *E. coli, Staphylococcus species, Streptococcus species, Klebsiella.* Simple tabulation of aetiology of vaginal discharge suggests that Candida infection at 37.08% is the major cause of pathological vaginal discharge followed by bacteria (Staphylococcus species) at 34.3%. *Streptococcus spp* contributed the least percentage towards occurrence of pathological vaginal discharge at 1.7%. The results of proportions of aetiological causes of pathological vaginal discharge are as shown in table 2 above.

DISCUSSION

Prevalence of pathological vaginal discharge among pregnant women in the third trimester who attend Antenatal Care at Kampala International University Teaching Hospital.

The prevalence was found to be 45.2% (95 % confidence that the true proportion of pathological vaginal discharge ranges from 40 – 50%). This was slightly similar to 43% and 40% obtained by Fonseca *et al*. (2013) and Cesar *et al*. (2009) in Brazil.

The study findings are not in agreement with similar studies that reported lower prevalence of 31.5% (Sanusi and Mohammed, 2016) and 35.5% (Moaiedmohseni *et al.*, 2012). Additionally, Abdelaziz *et al*. (2014) reported a prevalence of 63% in Khartoum, Sudan which was higher than that obtained in the present study. The relatively high prevalence of pathological vaginal discharge in the current study is probably because of poor health seeking behavior coupled with inadequate knowledge about perineal hygiene among women who seek health care at Kampala International University Teaching Hospital.

5.1.2 Aetiology of pathological vaginal discharge among third trimester' women who attend antenatal care at Kampala International University Teaching Hospital

The etiological causes of pathological vaginal discharge reported in this study included; Candidiasis with prevalence rates (37.1%), bacterial vaginosis (10.1%), trichomoniasis (2.2%) and bacterial infections (50.6). These causes were similarly reported by Aboud *et al*. (2008), Larsson *et al*. (2007) and Tann *et al*. (2006) during the third trimester of pregnancy, although the prevalence are different.

Bacterial infections were the most prevalent causes of pathological vaginal discharge with Staphylococcus spp being highest followed by *E. coli*, Klebseilla spp, and streptococcus spp. This was in agreement with several studies that highlighted these bacteria as predominantly isolated from pathological vaginal discharges (Tann *et al.,* 2006; Kirakoya-Samadoulougou *et al.,* 2008; Akerele *et al.,* 2002). The study obtained a lower prevalence of Staphylococcus spp compared to 51% reported by Akerele *et al*., 2002); however, the prevalence of bacterial causes was higher than 14.5% reported by Andrews *et al*. (2008). Bergeron *et al*. (2000) and Kennedy *et al*. (2009) reported a prevalence of 17.9% and 20 to 30% group B Streptococci respectively in vaginal discharges which was higher than that reported in the present study. The low prevalence of Group B Streptococcal infection in the current study might be because of environmental/climatic differences from that in which other studies were conducted.

Vaginal candidiasis was the second most common cause of pathological vaginal discharge among the study participants. These findings were in agreement to those by Olowe *et al*. (2014) in Nigeria where they reported 37.4% pathological vaginal discharge, however, it was higher than prevalence found in Accra, Ghana (34.2%) (Apea-Kubie *et al.,* 2006), 30% in South India (Deepa *et al.,* 2014) and 20% in Nigeria (Nurat *et al.,* 2015). The high prevalence of vaginal candidiasis among study participants may be a result of insufficient knowledge, poor hygiene, limited diagnostic centres, poor diet, lack of effective treatment, wearing of tight-fitting underclothing, prolonged antibiotic use which kill the good and beneficial bacteria. Still, it was slightly higher than the findings of Yadav and Prakash, (2016) and Guzel *et al*. (2011) in Nigeria who reported a slightly lower rate of 36.5%, 35% and 36% respectively compared to the present study.

Furthermore, the prevalence of vaginal candidiasis obtained was much lower than that of other related studies which reported 60% in Uganda (Tann *et al.,* 2006), 54% in Nigeria (Ibrahim *et al.,* 2016), 42.37% in India (Kanagal *et al*. 2004). Nelson *et al*. (2013) reported that the third trimester has the highest prevalence of candidiasis (68.09%) (Which is greater than the current study). Still, these findings were in concurrence with the study by Alo *et al*. (2012) who reported that 40% of pregnant women worldwide might be harboring candida species in their vaginas.

According to studies by Mitchell, (2004) showed that recent antibiotic intake and douching have a positive correlation to vaginal candidiasis. This has been reported to cause suppression of the lactobacillus species which serves as a protective organism making way for the yeast to thrive and colonize the vagina (Kennedy *et al.,* 2009).

The study reported *Trichomonas vaginalis* (2.25%) as a potential cause of pathological vaginal discharge which was lower than Tann *et al*. (2006), Romoren *et al*. (2007) and Sutton *et al*. (2007) who reported higher prevalence rates of vaginal discharge due *T. vaginalis* as 17.3%, 19% and 8.7% respectively compared to the present study. This low prevalence may be attributed to the method of diagnosis of Trichomoniasis used in this study (wet slide preparation) which has a relatively lower sensitivity. The low prevalence of *T. vaginalis* obtained in the present study is also be related to the less risky sexual behavior and vaginal hygiene of the participants since high risk sexual behavior

and poor hygiene were reported to predispose to occurrence of trichomoniasis by da Fonseca *et ai.*,(2013), however, other studies reported lower rates of 1.5%, 2.1% (Kirakoya-Samadoulougou *et al.,* 2008; Matini *et al.,* 2012). This signifies that the prevalence of trichomonas infection varies with geographical location, because of difference in climatic conditions. In addition, majority of the participants were married (90.6%) while very few did cohabiting (1.27%). Married couples may be practicing better hygiene practices compared to those who are cohabiting. Married women may also have better supportive partners compared to those who cohabit. The parasite has been reported to increase the risk of having premature rupture of membranes and preterm labor (Nakubulwa *et al.,* 2015, Choi *et al.,* 2012; Silver *et al.,* 2014).

The prevalence of bacterial vaginosis obtained in this study was slightly higher (10.1%) than 6.4% reported by Kirakoya-Samadoulougou *et al*. (2008) in Burkina Faso. Additionally, the results were not parallel to similar studies which reported higher prevalence rates of 47.7% in Uganda (Tann *et al.,* 2006) and 38% (Romoren *et al.,* 2007).

CONCLUSION

significant proportion of pregnant women in third trimester who attend ANC at KIUTH actually harbor pathogenic organisms (Trichomonas spp, Candida spp, Staphylococcus spp, Streptococcus spp, *E. coli* and Bacterial vaginosis) and these organisms put them at risk of poor perinatal outcomes like premature rupture of membranes, prematurity, chorioamnionitis, etc. Some pregnant women in third trimester have pathogenic bacterial colonization that requires detection and necessary care to be given.

Recommendation

Equipping health facility and training of medical personnel to perform routine screening for pathological vaginal discharge for all women during third trimester. Wide screening of infections in the laboratory with adequate media variety so that the different organisms can be identified; also to educate and sensitize women about the risk factors to occurrence of vaginal candidiasis.

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