

A Prospective, Observational Study On Risk Factors, Demographic and Clinico- Microbiological Profile in Pregnant Women with Infected Vaginal Discharge

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Abstract

Background: Vaginal discharge is a common complaint during pregnancy and can be caused by bacterial, fungal, or protozoal infections. Physiological and immunological changes of pregnancy can render women susceptible to vaginal infection that may have negative impacts on maternal and pregnancy outcomes. Thus early identification of risk factors and microbiological evaluation are important. **Material and Methods:** It was a prospective, observational, hospital based study of 140 pregnant women with infected vaginal discharge in Department of obstetrics and Gynaecology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand, Rajasthan. Demographic and obstetric characteristics, medical and surgical history, clinical manifestations, vaginal discharge characteristics and microbiological profile were evaluated. Four high vaginal swabs were taken from the posterior fornix for Gram stain; potassium hydroxide preparation, saline wet mount and bacterial/fungal culture with antimicrobial susceptibility testing. Vaginal pH, Amsel criteria and Nugent scoring were also evaluated. Data was analysed using SPSS version 25.0 and a p value of <0.05 was considered statistically significant. **Results:** Most participants were aged 26–30 years (55; 39.29%), from rural areas (100; 71.43%), primigravida (66; 47.14%), and in the third trimester (65; 46.43%). 70 (50.00%) women had lower socioeconomic status. Anaemia (40; 28.57%), diabetes (32; 22.86%), IUCD use (27; 19.29%), and previous urinary tract infection (23; 16.43%) were common. The most common presentation (63; 45.00%) was thick curdy discharge followed by thin excessive discharge (36; 25.71%). Culture was positive in 70 (50.00%) women. E. coli (38, 27.14%) and C. albicans (33, 23.57%) were the most common organisms. The most frequent diagnosis was aerobic vaginitis (80; 57.14%) followed by vaginal candidiasis (47; 33.57%). **Conclusion:** Pregnant women with infected vaginal discharge exhibited a variety of clinical and microbiological characteristics, which justify systematic clinical and microbiological assessment for proper diagnosis and treatment.

Keywords: Pregnancy, Vaginal discharge, Aerobic vaginitis, Candidiasis, Microbiological profile.

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INTRODUCTION

Vaginal discharge is among the most common genitourinary complaints in women of reproductive age, and is especially common during pregnancy.^[1] Physiological vaginal discharge during pregnancy is usually clear-white, non-irritating, and non-odorous; abnormal discharge may have other characteristics, such as color, consistency and odor, as well as other symptoms, including pruritus, dysuria, burning, redness, or lower abdominal pain.^[2] Pathological vaginal discharge is most likely caused by infection, such as vulvovaginal candidiasis, bacterial vaginosis and trichomoniasis.^[3] The clinical picture can be very variable and the presence of vaginal discharge does not always allow a diagnosis to be made, requiring appropriate clinical and microbiological assessment.^[4]

During pregnancy, the hormone, metabolic and immunological status changes significantly which affects

the vaginal ecosystem and its microbial makeup.^[5] The high oestrogen levels favour the growth and dominance of Lactobacillus species and contribute to glycogen deposition in the vaginal epithelium, which helps to maintain the normal vaginal microbiome.^[6] But, changes in this physiological environment can make pregnant women more susceptible to vulvovaginal infections. Young maternal age, low

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socioeconomic status, poor hygiene, anaemia, diabetes mellitus, urinary tract infection and previous history of vaginal discharge have been associated with an increased risk of abnormal vaginal discharge.^[7,8] The identification of these factors can aid in identifying women who need to be further assessed clinically in their antenatal care.^[9]

The significance of vaginal discharge during pregnancy is that the presence of infected material in the vagina can have a negative impact on the mother and fetus if not treated.^[10] Pathological vaginal discharge has been linked to complications like low birth weight, preterm birth, premature rupture of membranes, chorioamnionitis, post-caesarean wound infection and postpartum endometritis.^[11] In addition, clinical signs of dysuria and lower abdominal pain may mimic those of urinary or upper genital tract infections, requiring careful differentiation. Thus, laboratory investigations such as direct microscopy, Gram stain, wet mount, potassium hydroxide, vaginal pH, Amsel's criteria, Nugent score, and culture with identification of microorganisms causing the infection should be correlated with clinical findings for accurate diagnosis. Early identification and proper management during antenatal care may help in timely treatment and possibly minimize infection associated maternal and perinatal complications. Although vaginal discharge is a frequent occurrence during pregnancy, the clinical picture and microbiological profile may vary depending on the population and the local epidemiological characteristics. Therefore, a systematic review of demographic data, possible risk factors, clinical presentations and causative microorganism in pregnant women presenting with abnormal vaginal discharge is helpful in enhancing their diagnosis and management. The present study was conducted to find out the risk factors, demographic and clinical profile of infected vaginal discharge among pregnant women and to assess the common infectious agents responsible for infected vaginal discharge.

MATERIALS AND METHODS

It is a prospective, observational, hospital based study done in the Department of Obstetrics and Gynaecology, Ananta Institute of Medical Sciences and Research Centre, Rajsamand, Rajasthan. This study was conducted for 18 months after the approval of the Institutional Ethics Committee. All pregnant women who came to the outpatient and in-patient departments with clinically suspected infected vaginal discharge in any trimester were included. Women with antibiotics or vaginal medications in the last 14 days and women with normal mucoid vaginal discharge, leakage per vaginum and bleeding per vaginum were excluded. Fourteen percent of the eligible pregnant women were included.

Each participant underwent a detailed clinical history, clinical examination and appropriate laboratory investigations. Complete blood count and urine routine/microscopic examination were performed routinely. The socioeconomic status of the participants was determined by Modified Kuppuswamy socioeconomic scale, which was calculated based on per-capita family income and the income classification. Four high vaginal swabs were aseptically taken from posterior fornix of the vagina for microbiological evaluation. Specimens were examined directly, Gram stained, prepared with potassium hydroxide (KOH), examined as a saline wet-mount, and cultured microbiologically with antimicrobial susceptibility testing.

Vaginal samples were mixed with sterile normal saline on clean glass slides and examined microscopically for the presence of yeast cells, hyphae/pseudohyphae and *Trichomonas vaginalis* for direct microscopic examination. Bacterial morphology and clue cells were examined by gram stained smears at 100× in the oil immersion. Bacterial vaginosis was evaluated by amsel's criteria and Nugent scoring. Trichomoniasis was confirmed by the presence of *T. vaginalis* in wet mount and vaginal candidiasis was determined by the presence of *Candida* species in KOH preparation. The fourth high vaginal swab was collected for bacterial and fungal culture and the organisms isolated were identified and tested for antimicrobial susceptibility.

Data was entered and analysed in SPSS software version 25.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies and percentages, and continuous variables were presented as mean $\pm$ standard deviation or median (IQR), as appropriate. Independent-samples t test was used for comparison of continuous variables between two groups, and the chi-square test was used for comparison of categorical variables. A two-sided p value <0.05 was considered statistically significant.

RESULTS

Among the 140 pregnant women included in the study, the majority were aged 26–30 years (55, 39.29%), followed by those aged 21–25 years (42, 30.00%), whereas 27 (19.29%) were aged <20 years and 16 (11.43%) were aged 31–35 years. The majority of the participants were from rural areas (100, 71.43%) and 40 (28.57%) were from urban areas. Regarding obstetric characteristics, 66 (47.14%) women were primigravida, 46 (32.86%) were gravida 2, and 28 (20.00%) were gravida ≥ 3 . Most of the women were in third trimester (65, 46.43%), second trimester (49, 35.00%) and first trimester (26, 18.57%). In terms of socioeconomic status, 70 (50.00%) were in the lower socioeconomic group, 48 (34.28%) in the middle, and 22 (15.72%) in the upper socioeconomic group. [Table 1].

Table 1: Demographic and obstetric characteristics of the study participants (N=140)

Variable	Category	n (%)
Age (years)	<20	27 (19.29%)
	21–25	42 (30.00%)
	26–30	55 (39.29%)
	31–35	16 (11.43%)

Residence	Urban	40 (28.57%)
	Rural	100 (71.43%)
Gravida	G1	66 (47.14%)
	G2	46 (32.86%)
	≥G3	28 (20.00%)
Trimester	First	26 (18.57%)
	Second	49 (35.00%)
	Third	65 (46.43%)
Socioeconomic status	Upper	22 (15.72%)
	Middle	48 (34.28%)
	Lower	70 (50.00%)

As far as medical and surgical history is concerned, 46 (32.86%) women had no significant medical and surgical history. Forty (28.57%) of the participants had anaemia and 32 (22.86%) had diabetes. IUCD use was found in 27 (19.29%) women and history of urinary tract infection was present in 23 (16.43%). Previous D&E, MTP, and D&C

were reported in 11 (7.86%), 9 (6.43%), and 4 (2.86%) women, respectively. The percentages were not mutually exclusive, as some participants had more than one medical or surgical history, and thus did not add up to 100%. [Table 2]

Table 2: Medical and surgical history of the study participants (N=140)

Medical/surgical history	n (%)
No significant history	46 (32.86%)
Anaemia	40 (28.57%)
Diabetes	32 (22.86%)
IUCD	27 (19.29%)
Previous D&E	11 (7.86%)
Previous MTP	9 (6.43%)
Previous D&C	4 (2.86%)
History of UTI	23 (16.43%)

The clinical characteristics of vaginal discharge revealed that the most common was thick curdy discharge (63, 45.00%), thin excessive discharge (36, 25.71%). Of the total sample, 30 (21.43%) had grayish-white/fishy discharge, 27 (19.29%) had foul/frothy discharge and 25 (17.86%) had purulent discharge. The most common sign and symptom was dysuria (48 women, 34.29%), followed by itching and

irritation (39 women, 27.86%), local swelling (36 women, 25.71%), and local redness (33 women, 23.57%). 13 (9.29%) participants complained of burning micturition and 12 (8.57%) complained of lower abdominal pain. Percentages were not mutually exclusive as more than one discharge characteristic and symptom may have been present in the same participant. [Table 3]

Table 3: Clinical characteristics of vaginal discharge and associated symptoms (N=140)

Variable	n (%)
Type of vaginal discharge	
Thick curdy discharge	63 (45.00%)
Thin excessive discharge	36 (25.71%)
Purulent discharge	25 (17.86%)
Foul/frothy discharge	27 (19.29%)
Grayish-white/fishy discharge	30 (21.43%)
Associated signs and symptoms	
Dysuria	48 (34.29%)
Itching and irritation	39 (27.86%)
Local swelling	36 (25.71%)
Local redness	33 (23.57%)
Burning micturition	13 (9.29%)
Lower abdominal pain	12 (8.57%)

Of the women, 70 (50.00%) had a positive culture and 70 (50.00%) had a negative culture. Of the organisms reported, Escherichia coli was the most common organism isolated (38, 27.14%), followed by Candida albicans (33, 23.57%) and Klebsiella pneumoniae (18, 12.86%). Staphylococcus

aureus was found in 16 (11.43%) women and yeast not Candida albicans (YOCA) in 14 (10.00%). Acinetobacter baumannii complex and Enterococcus spp. were isolated in 8 (5.71%) and 4 (2.86%) participants, respectively. [Table 4]

Table 4: Microbiological profile of vaginal discharge (N=140)

Microbiological finding	n (%)
Culture result	
Positive culture	70 (50.00%)

Negative culture	70 (50.00%)
Organism isolated	
Escherichia coli	38 (27.14%)
Candida albicans	33 (23.57%)
Klebsiella pneumoniae	18 (12.86%)
Staphylococcus aureus	16 (11.43%)
Yeast other than C. albicans (YOCA)	14 (10.00%)
Acinetobacter baumannii complex	8 (5.71%)
Enterococcus spp.	4 (2.86%)

The most common clinical diagnosis in the study population was aerobic vaginitis, which was seen in 80 (57.14%) women. 47 (33.57%) were diagnosed with vaginal candidiasis and 36 (25.71%) had non-pathological

discharge. Fifteen (10.71%) women had bacterial vaginosis and 3 (2.14%) had trichomoniasis. Reported diagnostic categories in the provided data were not mutually exclusive and so the percentages add up to more than 100%. [Table 5]

Table 5: Clinical diagnosis among the study participants (N=140)

Diagnosis	n (%)
Aerobic vaginitis	80 (57.14%)
Vaginal candidiasis	47 (33.57%)
Non-pathological discharge	36 (25.71%)
Bacterial vaginosis	15 (10.71%)
Trichomoniasis	3 (2.14%)

When distribution of vaginal discharge was done based on gravida, it was found that thick curdy discharge was most common (34, 64.15%) in primigravida, followed by gravida two (12, 22.64%) and gravida $\geq$ three (7, 13.21%). Thin excessive discharge was reported in 10 (27.78%) primigravida women, 16 (44.44%) gravida 2 women, and 10 (27.78%) women with gravida $\geq$ 3. Purulent discharge was observed in 5 (23.81%), 10 (47.62%), and 6 (28.57%)

women in the respective gravida groups. Foul/frothy discharge was reported in 12 (63.16%) primigravida women, 5 (26.32%) gravida 2 women, and 2 (10.53%) women with gravida $\geq$ 3, whereas grayish-white/fishy discharge was observed in 5 (45.45%), 3 (27.27%), and 3 (27.27%), respectively. There was a statistically significant association between gravida and distribution of discharge ($\chi^2=18.41$, $p=0.016$). [Table 6]

Table 6: Association between type of vaginal discharge and gravida

Gravida	Thick curdy discharge n (%)	Thin excessive discharge n (%)	Purulent discharge n (%)	Foul/frothy discharge n (%)	Grayish-white/fishy discharge n (%)	Total n (%)
G1	34 (64.15%)	10 (27.78%)	5 (23.81%)	12 (63.16%)	5 (45.45%)	66 (47.14%)
G2	12 (22.64%)	16 (44.44%)	10 (47.62%)	5 (26.32%)	3 (27.27%)	46 (32.86%)
$\geq$ G3	7 (13.21%)	10 (27.78%)	6 (28.57%)	2 (10.53%)	3 (27.27%)	28 (20.00%)

The distribution of presenting symptoms among the various types of vaginal discharge showed that dysuria was most common in women with thick curdy discharge (30, 56.60%) whilst itching was most common in women with grayish-white/fishy discharge (6, 54.54%) and foul/frothy discharge (9, 47.36%). 4 (19.05%) women with purulent discharge reported lower abdominal pain and a smaller proportion of women in the other discharge groups. Thin excessive discharge had a local redness in 11 (30.56%) women while

foul/frothy discharge had a local redness in 6 (31.58%) women. The most common local swelling was associated with foul/frothy discharge (12, 63.16%) followed by grayish-white/fishy discharge (4, 36.36%). Burning micturition was also reported in 10 (90.90%) women with grayish-white/fishy discharge, which should be checked on the original master chart before submission of the manuscript. [Table 7]

Table 7: Association between type of vaginal discharge and presenting symptoms

Symptom	Thick curdy n (%)	Thin excessive n (%)	Purulent n (%)	Foul/frothy n (%)	Grayish-white/fishy n (%)
Dysuria	30 (56.60%)	8 (22.22%)	6 (28.57%)	2 (10.53%)	2 (18.18%)
Itching	13 (24.53%)	6 (16.67%)	5 (23.81%)	9 (47.36%)	6 (54.54%)
Lower abdominal pain	3 (5.66%)	2 (5.56%)	4 (19.05%)	2 (10.53%)	1 (9.09%)
Redness	10 (18.87%)	11 (30.56%)	3 (14.29%)	6 (31.58%)	3 (27.27%)
Swelling	6 (11.32%)	8 (22.22%)	6 (28.57%)	12 (63.16%)	4 (36.36%)
Burning micturition	1 (1.89%)	1 (2.78%)	1 (4.76%)	0 (0.00%)	10 (90.90%)

A positive culture was seen in a majority of the women with thick curdy and purulent discharge. In this cross tabulation, all 53 women with thick curdy discharge had positive culture and 17 (80.95%) women with purulent discharge

had positive culture. However, all women with thin excessive discharge (36, 100.00%), foul/frothy discharge (19, 100.00%) and grayish white/fishy discharge (11, 100.00%) had negative culture except the four women with

purulent discharge who had negative culture. The distribution of culture positivity and negativity was equal with 70 (50.00%) women in each. There was a significant

relationship between the type of discharge and culture results ($\chi^2=127$, $P<0.001$). [Table 8]

Table 8: Association between type of vaginal discharge and culture result

Culture result	Thick curdy n (%)	Thin excessive n (%)	Purulent n (%)	Foul/frothy n (%)	Grayish-white/fishy n (%)	Total
Positive	53 (100.00%)	0 (0.00%)	17 (80.95%)	0 (0.00%)	0 (0.00%)	70 (50.00%)
Negative	0 (0.00%)	36 (100.00%)	4 (19.05%)	19 (100.00%)	11 (100.00%)	70 (50.00%)

The organism isolated varied according to the type of vaginal discharge. In women with thick curdy discharge, *C. albicans* was the most common isolate in 33 (52.38%) cases followed by *YOCA* in 14 (22.22%) and *E. coli* in 8 (12.70%). *E. coli* was the most common isolate among women with purulent discharge (16/64.00%) followed by *S. aureus* (6/24.00%). Among the women presenting with

foul/frothy discharge, *K. pneumoniae* was the most common isolate (10, 37.04%) followed by *A. baumannii* complex (7, 25.93%). In the grayish-white/fishy discharge, *E. coli* was reported in 10 (33.33%), *K. pneumoniae* in 6 (20.00%) and *S. aureus* in 4 (13.33%). The type of vaginal discharge was statistically significant with the organism isolated on culture ($\chi^2=300.96$, $p<0.001$). [Table 9]

Table 9: Association between type of vaginal discharge and organism isolated on culture

Organism isolated	Thick curdy n (%)	Thin excessive n (%)	Purulent n (%)	Foul/frothy n (%)	Grayish-white/fishy n (%)
Negative	4 (6.35%)	36 (100.00%)	0 (0.00%)	0 (0.00%)	10 (33.33%)
<i>E. coli</i>	8 (12.70%)	0 (0.00%)	16 (64.00%)	4 (14.81%)	10 (33.33%)
<i>C. albicans</i>	33 (52.38%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
<i>YOCA</i>	14 (22.22%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
<i>S. aureus</i>	2 (3.17%)	0 (0.00%)	6 (24.00%)	4 (14.81%)	4 (13.33%)
<i>K. pneumoniae</i>	0 (0.00%)	0 (0.00%)	2 (8.00%)	10 (37.04%)	6 (20.00%)
<i>Enterococcus</i> spp.	1 (1.59%)	0 (0.00%)	1 (4.00%)	2 (7.41%)	0 (0.00%)
<i>A. baumannii</i> complex	1 (1.59%)	0 (0.00%)	0 (0.00%)	7 (25.93%)	0 (0.00%)

There was a wide range of clinical diagnosis depending on the nature of vaginal discharge. In women with thick curdy discharge, the most common diagnosis made was vaginal candidiasis (47, 74.60%) and aerobic vaginitis (13, 20.63%). All the 36 women with thin excessive discharge had been classified as non-pathological discharge. Of the women who had purulent discharge, 21 (84.00%) were diagnosed with aerobic vaginitis and 4 (16.00%) with bacterial vaginosis. Among women with foul/frothy

discharge, aerobic vaginitis was the most common diagnosis (81.48%, 22/27), followed by bacterial vaginosis (11.11%, 3/27) and trichomoniasis (7.41%, 2/27). Aerobic vaginitis was reported in 24 (80.00%) and bacterial vaginosis in 6 (20.00%) women with grayish-white/fishy discharge. There was a statistically significant relationship between discharge characteristics and clinical diagnosis ($p<0.001$). [Table 10]

Table 10: Association between type of vaginal discharge and clinical diagnosis

Diagnosis	Thick curdy n (%)	Thin excessive n (%)	Purulent n (%)	Foul/frothy n (%)	Grayish-white/fishy n (%)
Vaginal candidiasis	47 (74.60%)	0	0	0	0
Non-pathological discharge	0	36 (100.00%)	0	0	0
Aerobic vaginitis	13 (20.63%)	0	21 (84.00%)	22 (81.48%)	24 (80.00%)
Trichomoniasis	1 (1.59%)	0	0	2 (7.41%)	0
Bacterial vaginosis	2 (3.17%)	0	4 (16.00%)	3 (11.11%)	6 (20.00%)

The antibiotic susceptibility pattern of Gram-negative isolates showed that *E. coli* had the highest reported susceptibility counts for meropenem, vancomycin, and amikacin (13 each), followed by amoxicillin-clavulanate, cefotaxime, piperacillin-tazobactam, levofloxacin, and ciprofloxacin (11 each). Susceptibility was reported in 6 isolates for ceftazidime, while no susceptibility count was reported for ceftazidime-clavulanate. Among *Klebsiella* spp., meropenem, vancomycin, and amikacin showed the

highest susceptibility counts (7 each), followed by ceftazidime (3), whereas amoxicillin-clavulanate, cefotaxime, piperacillin-tazobactam, levofloxacin, and ciprofloxacin each showed susceptibility in 2 isolates. For *Pseudomonas* spp., susceptibility was reported in 2 isolates each for meropenem, vancomycin, amikacin, levofloxacin, and ciprofloxacin, with no susceptibility reported for the remaining tested agents. [Table 11]

Table 11: Antibiotic susceptibility pattern of gram-negative bacterial isolates

Isolate	Amoxicillin-clavulanic acid	Ceftazidime + clavulanic acid	Cefotaxime	Ceftriaxone	Piperacillin-tazobactam	Meropenem	Vancomycin	Amikacin	Levofloxacin	Ciprofloxacin
<i>E. coli</i>	11	0	11	6	11	13	13	13	11	11
<i>Klebsiella</i> spp.	2	0	2	3	2	7	7	7	2	2
<i>Pseudomonas</i> spp.	0	0	0	0	0	2	2	2	2	2

Among the Gram-positive isolates, *Staphylococcus aureus* showed the highest reported susceptibility count for clindamycin (17), followed by amoxicillin-clavulanic acid (13), erythromycin (11), cotrimoxazole (7), and vancomycin (1), while no susceptibility was reported for penicillin, levofloxacin, or ciprofloxacin. Coagulase-negative *Staphylococci* showed the highest susceptibility counts for linezolid and vancomycin (13 each), followed by

erythromycin, levofloxacin, and ciprofloxacin (10 each), clindamycin and cefotaxitin (9 each), and ofloxacin (8). *Enterococcus* spp. demonstrated susceptibility counts of 4 each for linezolid, vancomycin, ofloxacin, and amoxicillin-clavulanic acid, while susceptibility was reported in 2 isolates each for levofloxacin and ciprofloxacin and none for the other tested agents. [Table 12]

Table 12: Antibiotic susceptibility pattern of gram-positive bacterial isolates

Isolate	TMP-SMX	Cefotaxitin	Linezolid	Vancomycin	Penicillin	Ofloxacin	Cotrimoxazole	Clindamycin	Erythromycin	Levofloxacin	Ciprofloxacin	Amoxicillin + clavulanic acid
<i>Staphylococcus aureus</i>	1	1	1	1	0	1	7	17	11	0	0	13
CoNS	4	9	13	13	1	8	0	9	10	10	10	4
<i>Enterococcus</i> spp.	0	0	4	4	0	4	0	0	0	2	2	4

TMP-SMX: trimethoprim-sulfamethoxazole; CoNS: coagulase-negative *Staphylococci*.

DISCUSSION

Vaginal discharge is a frequent complaint in pregnancy but it is clinically important to differentiate physiological discharge from pathological infection. The majority of the women (39.29%) were in the age group of 26-30 years and 21-25 years (30.00%) and almost half of them (47.14%) were primigravida. The results are similar to those of Prasad et al. who found a mean maternal age of 26.84 ± 5.51 years and the majority of women in the age group 26-35 years. In the study, pathological vaginal discharge was also prevalent among pregnant women who were attending antenatal care. The present study also revealed that 50.00% of the participants were in lower socioeconomic group as compared to 67.5% reported by Prasad et al. This may be due to the higher proportion of women from lower socioeconomic status who may have different access to healthcare, hygiene practices and other social determinants that may affect the presentation and prevalence of vaginal infections. Most of the women in the current study were in their third trimester (46.43%) which is similar to the findings of other antenatal studies.^[2]

In the present study, several risk factors were identified, the most common being anaemia (28.57%) followed by diabetes mellitus (22.86%) and 19.29% women mentioned IUCD use and 16.43% women had history of UTI. The clinical relevance of these findings is that physiological and immunological changes during pregnancy can affect the susceptibility to genital tract infections and that diabetes

and anaemia could also increase the susceptibility to infection. Prasad et al., also reported anaemia, diabetes and UTI in pregnant women with vaginal discharge, but the percentages varied from one study to another.^[2] The present study also showed that the most common associated symptom was dysuria (34.29%) followed by itching and irritation (27.86%), local swelling (25.71%) and local redness (23.57%). Such findings are similar to those of Prasad et al., where dysuria was the most common symptom followed by itching. The differences in symptom patterns among studies may be due to differences in the organisms involved, and to differences in the definitions and characteristics of the populations studied.^[2]

Thick curdy discharge was the most common clinical presentation (45.00%) followed by thin excessive discharge (25.71%), grayish white/fishy discharge (21.43%) and foul/frothy discharge (19.29%) and purulent discharge (17.86%) in the present study. *Candida albicans* was present in high numbers and this was especially associated with the thick curdy discharge pattern, which was predominant. Overall, *E. coli* was the most frequently reported organism in culture (27.14%), followed by *C. albicans* (23.57%), *K. pneumoniae* (12.86%) and *S. aureus* (11.43%). This microbiological distribution is different from the one reported by Prasad et al., which was candidiasis followed by aerobic vaginitis and trichomoniasis.^[2] In a similar study, Konadu et al. showed that during pregnancy, vulvovaginal candidiasis, bacterial vaginosis and trichomoniasis are important causes of vaginal infection, though the proportions of the infections differ from one population to another.^[12] The differences can be explained by geographic

variation, socioeconomic factors, inclusion criteria in the studies, microbiological methods, and discrepancy between clinically suspected discharge and laboratory-proven infection.

The present study also showed a good correlation between microbiological or clinical diagnosis and clinical appearance of discharge. Thick curdy discharge was most commonly associated with candidiasis, and purulent discharge with aerobic vaginitis, and culture positivity was more common among women with thick curdy discharge and purulent discharge. The discharge characteristics and cultured organism association was statistically significant as was the association between discharge characteristics and clinical diagnosis. This study highlights the importance of using the appearance of vaginal discharge as a clinical clue but not as a diagnostic tool on its own. Identification of causative organism can be improved by laboratory confirmation by microscopy, Gram staining and culture, which will guide appropriate treatment. Similarly, previous studies have shown significant differences between clinical presentation and microbiological confirmation of aetiology, highlighting the need for objective microbiological assessment of pregnant women with abnormal discharge.^[2,12] The high percentage of aerobic vaginitis in the current study also reinforces the fact that bacteria should be taken into account in the evaluation of symptomatic pregnant women, in addition to the more commonly discussed candidiasis, bacterial vaginosis and trichomoniasis.

CONCLUSION

Infected vaginal discharge is one of the most frequent clinical problems in pregnancy and shows great variability in demographic, clinical and microbiological characteristics. In the current study, women from lower socioeconomic status and from the second and third trimesters were a significant proportion of the study population and anaemia, diabetes and history of UTI were common associated factors. The most common clinical presentation was thick curdy discharge and the most common organisms were *Escherichia coli* and *Candida albicans*. The strong correlation among the various features of vaginal discharge, culture findings, organisms isolated and clinical diagnosis, emphasizes the need for systematic clinical and microbiological assessment of pregnant women with abnormal vaginal discharge.

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Conflicts of interest

There are no conflicts of interest.

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