

Microbiological profile of abnormal vaginal discharge and its antimicrobial susceptibility pattern in a Tertiary Care Hospital, Gujarat

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Abstract

Introduction and Objective: Abnormal vaginal discharge is associated with adverse pregnancy outcomes, increase morbidity and mortality with emergence of widespread resistance to antimicrobials. The knowledge of the causative agents of abnormal vaginal discharge will be helpful in the selection of empiric antimicrobial therapy. The present study was conducted to isolate and identify the pathogens associated with abnormal vaginal discharge and to find out its antibiotic susceptibility pattern.

Materials and Method: Total 400 cases complaining of abnormal vaginal discharge were studied, between the age group of 15-50 years during period of August 2012 to June 2014 in CUSMC Microbiology Department, Gujarat. Samples were processed as per standard guidelines.

Results: Out of 400 samples, 191 (47.8%) yielded growths of organisms. From this 174 (91.09%) were monomicrobial, while 17 (8.9%) were polymicrobial making a total of 208 isolates. Common isolated infections include, Vulvovaginal Candidiasis (54.3%), followed by Aerobic Vaginitis (37.9%), Bacterial vaginosis (4.80%) and *Trichomonas vaginalis* (2.88%). Prevalence of ESBL Production was 26.6% for *Klebsiella sp.* and 47% of *E.coli* were ESBL producers. *C. albicans* showed 87.9% sensitivity towards Fluconazole and 90.3% to Voriconazole. Among non albicans species *C. krusei* showed totally resistance to Fluconazole and 70% sensitivity to Voriconazole.

Conclusion: Incidence of abnormal vaginal discharge was 47.8%. Vulvovaginal Candidiasis most commonly caused by *C. albicans* (73.4%). Aerobic vaginitis is most commonly caused by *E.coli* (41.7%) Most isolates were multidrug resistance.

Keywords: Abnormal vaginal discharge, Pathogens, Adverse pregnancy outcomes, Multidrug resistance organisms, Antimicrobial sensitivity pattern.

Introduction

Abnormal vaginal discharge is a frequent complaint of women seen in the Gynecologic clinic. Various causes of abnormal vaginal discharge like 1) Infective: Bacterial vaginosis (BV), vaginal candidiasis (VVC), *Trichomonas vaginitis*, genital herpes, HPV infection, infection caused by *Mycoplasma/Ureaplasma* and Cervicitis caused by Chlamydial infection, Gonorrhoea, Syphilis, HIV and HPV infection. 2) Atrophic: Postmenopausal due to oestrogen deficiency also known as senile vaginitis. 3) Foreign body: forgotten pessary or tampon. 4) Chemical: Chemical irritation or allergy 5) Neoplastic: Fibroid polyp or malignancy.⁽¹⁾ Vaginitis is a common clinical syndrome accounting for approximately 10 million OPD visit each year.⁽²⁾ Although some pathologic conditions causing vaginitis are well defined like BV, VVC, Trichomoniasis yet, 7-72% of women with vaginitis may remain undiagnosed and such forms of abnormal vaginal flora neither considered as normal, nor can be called bacterial vaginosis have been termed as 'intermediate flora' and its management probably differ from that of bacterial vaginosis. It is known as Aerobic vaginitis. It is of crucial importance in pregnant females at risk of pre term delivery.⁽³⁾ Majority of cases of VVC are caused by *C. albicans*; however, incidences due to non- albicans species of *Candida* appear to be increasing.⁽⁴⁾ Trichomoniasis is a

sexually transmitted disease occur worldwide, with an estimated incidence of 180 million women afflicted per year.⁽⁵⁾ Reproductive tract infections are generally seen as a silent epidemic can have severe consequences including Premature rupture of membrane (PROM), preterm delivery, low birth weight and post partum endometritis, miscarriage, neonatal blindness, increased risk of HIV infection and death.⁽⁶⁾ Unfortunately in our part of world there is culture of silence regarding reproductive health problems; hence most of the women with vaginal discharge avoid visiting hospitals. There is a need for creating community awareness about health care facilities and instills self concern in women for their own health needs. This hospital based observational study of microbiological profile of vaginal discharge conducted in the Department of Microbiology, C. U. Shah Medical College and Hospital, Surendranagar gives some indication of the likely burden of the disease in the population studied and highlights some associated factor.

Materials and Method

The present study was approved by Institutional ethical committee: Human Resource on 30/11/2012. (Ethical approval letter attached) The study was carried out in the Department of Microbiology in a tertiary care hospital in Gujarat. Total 400 patients with complain of abnormal vaginal discharge visiting

Gynecology OPD were included in study during the period from July 2012 to March 2014.

History and examination: Informed consent and detailed history was taken like age, marital status, pregnancy status, methods of contraception, complain like type of vaginal discharge, colour, consistency, and associated complains.

Collection and transport of specimen: Three high vaginal swab samples, one for wet mount, second for Gram stain and third for culture were collected. In case of excessive discharge, some amount of discharge directly collected on a slide for wet mount and pH examination from each patient. The specimens were processed for microscopy and culture within an hour and in case of delay the specimens were refrigerated at 4-6°C.

Macroscopic examination: Each sample was observed for color of discharge, consistency and whether foul smell is present or not. pH Examination was done in each cases with the help of pH strip.⁽³⁸⁾

1. Processing for bacterial pathogens.

Microscopic examination: Saline wet mount: Normal saline wet mount preparation was examined for the presence of motile pear shaped Trichomonas, Clue cells, motile curved rods (mobiluncus) and pus cells.⁽¹⁾

Gram Stain: Various characteristics like gram reaction and number of bacteria, presence of yeast cells and hyphae, presence or absence of pus cells and squamous epithelial cells like 'Clue cells' were noted.⁽¹⁾

Whiff's test (Amine test) for bacterial vaginosis: Presence of fishy order by addition of 2 drops of 10% KOH to Vaginal discharge indicates Bacterial vaginosis.⁽¹⁾

Culture: The specimen is inoculated on Nutrient agar, blood agar and MacConkey agar plates and incubated aerobically at 37° C for 24 hours.

Biochemical confirmation test: Specific identification of bacterial isolate was done by microscopic characteristics and biochemical properties as per standard laboratory guidelines.^(1,2,3)

Antibiotic susceptibility testing: Antimicrobial susceptibility testing was performed for all bacterial isolates by modified Kirby Bauer disk diffusion method and also screening for ESBL and MRSA was done as per CLSI guidelines.⁽³⁾

2. Processing for fungal pathogens

Microscopic examination

10% KOH preparation: One drop of 10% KOH was added to the drop of vaginal secretion and examined for budding yeast cells with or without pseudohyphae.⁽¹⁾

Culture: The specimen was inoculated onto SDA plates, Cornmeal agar (to see the different Pattern of hyphae according to species and Chlaymadospore in *C. albicans*) and Candida chrome agar (shows different coloured colonies according to species). Confirmation test was done by Germ tube test, Sugar assimilation test on Yeast Nitrogen Base media and sugar fermentation tests.

Antifungal susceptibility testing: Antifungal susceptibility testing was performed for all candida isolates by modified Kirby Bauer disk diffusion method as per CLSI guidelines.⁽⁴⁵⁾ Mueller-Hinton agar supplemented with 2% glucose and methylene blue were subjected to susceptibility testing for the following antifungals: fluconazole 25 µg and voriconazole 1 µg.

Results

In the present study total 400 patients between the reproductive period of 15-50 years were included. Maximum number of patients 210 (52.5%) were in the age group of 22-28 years, followed by 108 (27%) in the age group of 29-35 years. Out of 400 total patients, 379 (94.7%) were married and 21 (5.3%) were unmarried.

In present study it was found that Incidence of VVC is higher in pregnant women as compared to non pregnant women.

Out of 400 patients complaining of abnormal vaginal discharge, pathogens were isolated from 191 patients. Among 191 positive culture cases, 174 (91.09%) were monomicrobial, while 17 (8.9%) were polymicrobial making a total of 208 (52%) isolates.

In present study, Incidence of VVC is highest 54% followed by Aerobic Vaginitis 38%, *G. Vaginalis* 5% and *Trichomonas vaginalis* is 3% as shown in Chart 1.

Among 191 (47.75%) positive culture cases total 113 (54.3%) were cases of VVC, from which 83 (73.4%) were *Candida albicans*, 18 (15.9%) *C. krusei*, 7 (6.19%) *C. tropicalis* and 5 (4.4%) *C. glabrata*

Out of 191 positive cultures, total cases of Aerobic Vaginitis are 79 (37.9%). Pathogens associated with Aerobic Vaginitis are 33 (41.7%) *E.coli*, 15 (19.08%) *Klebsiella*, 8 *Pseudomonas* (10.12%), 8 (10.12%) *Enterococci sp.*, 6 (7.59%) MRCONS, 6 (7.59%) *S.aureus* and 3 (3.8%) MRSA.

Out of 17 (8.90%) mixed isolates obtained, incidence of *E.coli* and *C. albicans* together is 7 (41.2%) followed by *Klebsiella sp* and *C. albicans* is 3 (17.8%), *S.aureus* and *C. albicans* is 2 (11.7%), *Pseudomonas* and *C. albicans* is 2 (11.7%), *Enterococci sp.* and *C. albicans* is 2 (11.7%) and *E.coli* and *C. krusei* is 1 (5.9%).

Out of total 208 total isolates, Incidence of *G. Vaginalis* is 4.80%. Whereas incidence of *Trichomonas vaginalis* is 2.88%.

Incidence of VVC is highest in pregnant women 27.44% as compared to other infections.

Most common symptoms reported by 132 (33%) women is pruritus followed by low back pain 38 (9.5%), lower abdominal Pain 34 (8.5%) and 33 (8.25%) dysurea.

Incidence of infections is most commonly associated with barrier method users 50.4% followed by OCP users 21.6%, IUCD users 18.4% and tubal ligation 9.7%, using as contraception.

In present study, all three Gram positive organisms were sensitive to vancomycin (100%). *S.aureus* were most sensitive to linezolid (83.3%), followed by levofloxacin (66.6%) and least sensitive to clindamycin (50%). CONS were most sensitive to linezolid (100%), teicoplanin (100%) and totally resistant to ceftioxin and erythromycin. *Enterococcus spp.* were most sensitive to Gentamicin (100%) followed by ampicillin/sulbactam(AS), levofloxacin (87.5%) and totally resistant to erythromycin 0%. Table 1 shows antibiotic susceptibility pattern of gram positive organisms.

In present study, *Pseudomonas sp.* were most sensitive to imipenem (100%) followed by PT, gentamicin (87.5%) and least sensitive to ciprofloxacin (25%). *E.coli* were most sensitive to imipenem (97.5%) followed by amikacin (82.3%) but least sensitive to trimethoprim- sulfamethoxazole (32.2%). *Klebsiella spp.* were most sensitive PT(100%) followed by imipenem (93.3%), amikacin (46.67%) and least

sensitive to trimethoprim-sulfomethoxazole (33.3%). Table 2 shows antibiotic susceptibility pattern of gram negative organisms.

In present study, *C. albicans* was sensitive to voriconazole (90.3%) followed by fluconazole (87.9%). *C. krusei* showed totally resistance to fluconazole and 70% were sensitive to voriconazole. *C. tropicalis* and *C. glabrata* showed higher sensitivity to voriconazole as compared to fluconazole, as shown in Table 3 and Chart 2.

In present study, all isolates of *E.coli*, *Klebsiella sp.* were tested for ESBL production. From these isolates 4 (26.6%) *Klebsiella sp* and 16 (47%) *E.coli* were ESBL producer as shown in Chart 3

In present study, all 10 isolates of *S.aureus* and 3 CONS isolates were tested for Methicillin resistance. Out of 10, 3 (30%) were MRSA and out of 5 CONS all were MRCONS as shown in Chart 4.

Table 1: Antibiotic susceptibility pattern of Gram positive isolates

Organisms	Ampicillin/sulbactam	Trimethoprim-sulfamethoxazole	Ciprofloxacin	Gentamicin	Vancomycin	Clindamycin	Erythromycin	Linezolid	Levofloxacin	Teicoplanin	Ceftioxin
<i>S. aureus</i> (N= 6)	4 (66.6%)	4 (66.6%)	5 (83.3%)	3 (50%)	6 (100%)	3 (50%)	4 (66.6%)	5 (83.3%)	4 (66.6%)	3 (50%)	3 (50%)
CONS (N= 6)	2 (33.3%)	0	4 (66.6%)	6 (100%)	6 (100%)	0	6 (100%)	6 (100%)	6 (100%)	6 (100%)	1 (16.66%)
<i>Enterococcus spp.</i> (N=8)	7 (87.5%)	1 (12.5%)	3 (37.5%)	8 (100%)	8 (100%)	6 (75%)	0	5 (62.5%)	7 (87.5%)	4 (50%)	3 (37.5%)

Table 2: Antibiotic susceptibility pattern of Gram negative isolates

Organisms	Ampicillin/sulbactam	Trimethoprim-Sulfamethoxazole	Ciprofloxacin	Gentamicin	Ceftriaxone	Imipenem	Piperacillin-Tazobactam	Amikacin	Tetracycline
<i>Pseudomonas sp.</i> (N=8)	3 (37.5%)	3 (37.5%)	2 (25%)	7 (87.5%)	5 (62.5%)	8 (100%)	7 (87.5%)	7 (87.5%)	4 (50%)
<i>E. coli</i> (N=34)	24 (70.5%)	11 (32.3%)	14 (41.2%)	25 (73.5%)	23 (67.6%)	33 (97.5%)	25 (73.5%)	28 (82.3%)	20 (58.8%)
<i>Klebsiella spp.</i> (N=15)	5 (33.3%)	3 (20%)	12 (80%)	8 (53.3%)	8 (53.3%)	14 (43.3%)	15 (100%)	10 (66.6%)	9 (60%)

Table 3: Antifungal susceptibility pattern of Candida species isolates

Organisms	C. albicans (N= 83)	C. krusei (N= 17)	C. tropicalis (N= 7)	C. glabrata (N=5)
Fluconazole	73 (87.9%)	0 -	5 (71.4%)	4 (80%)
Voriconazole	75 (90.3%)	12 (70%)	6 (85.7%)	5 (100%)

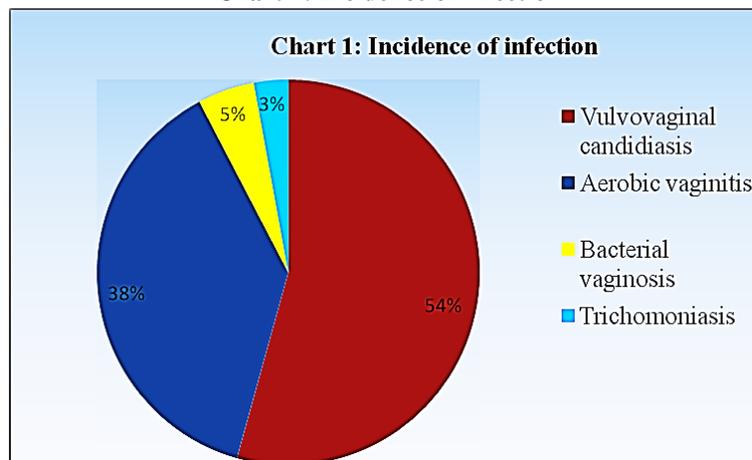
Table 4: Incidence of vaginal discharge in various studies

Volvovaginal candidiasis			
Author	City/Country	Year	
Chaudhary V et al ⁽⁶⁾	Chhattisgarh/India	2002	32.6%
Mahakal N et al ⁽²⁶⁾	Ahmedabad/India	2013	46%
Afroze N et al ⁽³⁰⁾	Hyderabad/India	2013	24%
Panda S et al	Andhra Pradesh/India	2013	60%
Present study*	S'nagar/India	2014	54.3%
Aerobic Vaginitis			
Chaudhary V et al ⁽⁶⁾	Chhattisgarh/India	2002	33.6%
Mahakal N et al ⁽²⁶⁾	Ahmedabad/India	2013	5%
Mumtaz S et al ⁽³⁾	Rawalpindi/ Pakistan	2008	76%
Present study*	S'nagar/India	2014	37.9%
Bacterial Vaginosis			
Chaudhary V et al ⁽⁶⁾	Chhattisgarh/India	2002	36.68%
Mahakal N et al ⁽²⁶⁾	Ahmedabad/India	2013	13%
Afroze N et al ⁽³⁰⁾	Hyderabad/India	2013	24%
Present study*	S'nagar/India	2013	4.80%
Trichomonas Vaginalis			
Chaudhary V et al ⁽⁶⁾	Chhattisgarh/India	2002	2.01%
Mahakal N et al ⁽²⁶⁾	Ahmedabad/India	2013	31%
Afroze N et al ⁽³⁰⁾	Hyderabad/India	2013	12%
Present study*	S'nagar/India	2014	2.88%

Table 5: Distribution of organisms

Author	City/Country	Year	S. aureus	Pseudomonas sp.	CONS	E. coli	Klebsiella sp.	Enterococcus sp.	Candidiasis	Trichomonas vaginalis	Bacterial vaginosis
Chaudhary V et al ⁽⁶⁾	Chhattisgarh/India	2002	-	31.6%	-	-	2.01%	-	32.66%	2.01%	36.68%
Mumtaz S et al ⁽³⁾	Rawalpindi/Pakistan	2008	41.6%	6.18%	-	18.9%	10%	10.7%	-	-	-
Afroze N et al ⁽³⁰⁾	Hyderabad/India	2013	22%	-	-	-	-	-	24%	12%	24%
Duggal S et al ⁽²⁵⁾	Amritsar/Punjab	1992	11.5%	9%	13.5%	20%	13%	-	-	-	36.5%
Mahakal N et al ⁽²⁶⁾	Ahmedabad/India	2013	-	-	-	5%	-	-	46%	31%	13%
Panda S et al ⁽²⁹⁾	Andhra Pradesh/India	2013	-	-	-	-	-	-	52%	6%	-
Sangheeta et al ⁽²⁸⁾	Bangalore/India	2011	13.33%	5%	13.33%	23.33%	8.33%	30%	-	-	-
Present study*	S'nagar/India	2014	44.16%	16.24%	13.19%	8.6%	7.61%	6.09%	54.3%	2.88%	4.80%

Chart 1: Incidence of infection



Discussion

Gynecological infections, if not diagnosed and treated in time may lead to severe or irreversible complications. Due to changing microbiological profile of infection and sensitivity of microorganisms and emergence of β -lactamase and methicillin resistant pathogen and resistance to Azole group of drugs in non-albicans is a major problem throughout the world in various clinical infections including Gynecological infections. Early microbiological diagnosis will help to plan accurate, appropriate and effective therapy. In present study an attempt is made to know the Microbiological profile of abnormal vaginal discharge and its antimicrobial susceptibility pattern. The results are compared with other studies and discussed.

Chart 2: Sensitivity pattern of Candida species

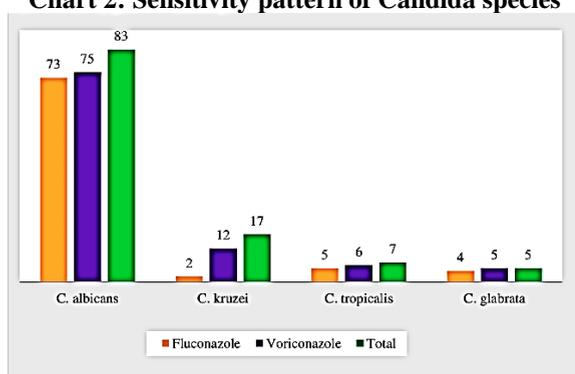


Chart 3: Prevalance of ESBL positive organisms

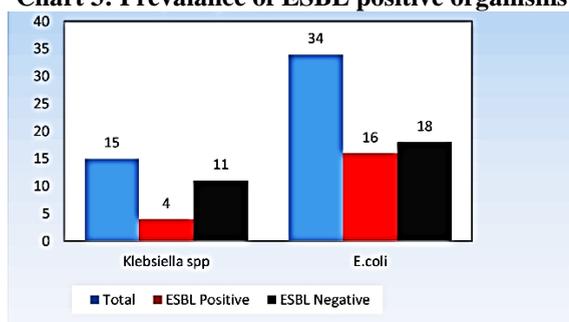
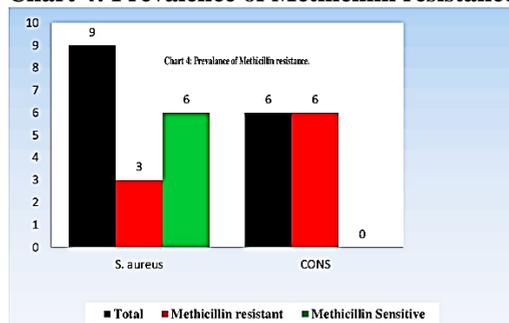


Chart 4: Prevalence of Methicillin resistance



Distribution according to Age and marital status: In present study majority (52.5%) of people were in the age group of 22-28 years followed by 27% in the age

group of 29-35 years, similar results were reported by Mumtaz S et al⁽³⁾ Chaudhary V et al,⁽⁶⁾ Afroze et al⁽³⁰⁾ and Mahakal N et al.⁽²⁶⁾ Also In present study it was found that incidence of infection was higher in married women (94.7%) as compared to unmarried (5.3%) women. Chaudhary V et al⁽⁶⁾ reported that the incidence of infection in pregnant women 97.98% followed by 2.01% in non pregnant women. Ghotbi S et al⁽⁷⁾ have also reported the higher incidence 95% in married women. Microbial infections of vagina are very common especially in reproductive (15-45) years and married age group due to increase in sexual activity.⁽⁹⁾ The menstrual cycle may also alter the normal flora, transient changes are observed presumed to be associated with hormonal changes.⁽⁹⁾ Also sexual customs and other STI are also common causes of infections in married women.⁽⁵¹⁾

Distribution according to pregnant status: During pregnancy, the vagina shows an increase in susceptibility to infection by candida. It is thought that during pregnancy high level of hormone by providing higher glycogen content in the vaginal tissue, provide an excellent carbon source for candida and oestrogen enhances adherence of candida cells to vaginal mucosa.⁽⁹⁾

In the present study the Incidence of Vulvovaginal Candidiasis is higher in pregnant women 27.44%. Similar results 38.9% and 51% were reported by Kikani et al.⁽⁴⁾ and Mahakal N et al.⁽²⁶⁾

Distribution according to incidence of various disease: The prevalence of various disease varies considerably from place to place which could be attributable to the changes in environmental condition and socioeconomic habits of people in developing countries.⁽²⁷⁾

Organisms wise distribution: The distribution of organisms vary from place to place. The organisms localize where their survival needs are met and have exemption from the infection preventing destructive capacity of host.⁽⁹⁾ In present study, *Candida albicans* (73.4%) was the most common isolate. Chaudhary V et al⁽⁶⁾ Panda S et al⁽²⁹⁾ and Afroze N et al⁽³⁰⁾ has also reported the same as shown in Table 5.

Species wise distribution of Candida: It is thought that during pregnancy high level of hormone by providing higher glycogen content in the vaginal tissue, provide an excellent carbon source for candida and oestrogen enhances adherence of candida cells to vaginal mucosa.⁽⁹⁾ In present study among all cases of VVC *C. albicans* (73.4%) is the most common isolate. Among non albicans *C. krusei*, *C. tropicalis*, *C. glabrata* accounts for 15.9%, 6.19% and 4.4% respectively. Similar findings were reported by Kikani et al.⁽⁴⁾

Distribution according to infection associated with contraceptive method usage: It has been suggested that oestrogen in OCP increase the epithelial cells respectively and the glycogen content of epithelial cells,

promoting the growth of microorganisms.⁽²⁵⁾ Some workers state that IUCD tail might be responsible for the passage of bacteria from lower genital tract to uterus to tube.⁽³¹⁾ In present study OCP users have higher incidence of infection 45.2%, followed by IUCD users 38.4%, barrier method users (14.68%) and tubal ligation (1.92%) respectively. Kikani et al⁽⁴⁾ and Ghotbi SH et al⁽⁷⁾ have also reported higher incidence of infection associated with OCP users.

Antibiotic susceptibility pattern of isolates:

1. **S. aureus:** Treatment of staphylococcal infection has been problematic because of the development of resistance to different antimicrobial medications by production of either plasmid encoded beta-lactamase, modification of penicillin binding proteins.⁽³²⁾ In present study, *S.aureus* were most sensitive to Vancomycin (100%) followed by Linezolid (83.3%), Levofloxacin, Ampicillin/sulbactam(AS) and Trimethoprim sulfamethoxazole 66.6%. *S.aureus* shows least sensitivity to Clindamycin and Gentamicin (50%). Mumtaz S et al⁽³⁾ has reported sensitivity of *S.aureus* to Vancomycin, Trimethoprim sulfamethoxazole and Gentamicin 93.6%, 23.6% and 67.6% respectively.
2. ***Pseudomonas sp:*** *Pseudomonas* is potentially an opportunistic pathogen in vagina. Emergence of resistance in it has necessitated the need of antibiotic susceptibility testing.⁽²⁷⁾ In present study, *Pseudomonas sp.* were most sensitive to Imipenem (100%), Piperacillin/ Tazobactam (PT) and Gentamicin (87.5%). It shows least sensitivity to Ciprofloxacin (25%). Mumtaz S et al⁽³⁾ has shown 90.7%, 94.4%, 78.7% and 36.7% sensitivity to Imipenem, PT, Ciprofloxacin and Gentamicin for *Pseudomonas sp.* Sangheeta et al⁽²⁸⁾ have reported 100% sensitivity of PT and Meropenem followed by 66.67% sensitivity of Gentamicin and Ciprofloxacin.
3. **CONS:** CONS are now a major cause of nosocomial infections; mainly because of increasing use of invasive procedures in hospitals. The widespread use of antibiotics for prophylaxis or therapy has provided a reservoir of antibiotic-resistant strains in hospitals, which show wide variability in their pattern of resistance to antimicrobial agents.⁽³²⁾ In present study, Coagulase negative Staphylococci were most sensitive to Vancomycin (100%) followed by Ciprofloxacin (66.6%) and AS (33.3%) and least sensitive to Cefoxitin (16.66%). Mumtaz S et al⁽³⁾ has shown 90.7%, 94.4%, 78.7% and 36.7% sensitivity to Vancomycin, PT, Ciprofloxacin and Gentamicin for CONS.
4. ***E.coli:*** *E.coli* is a normal flora of gut, lack of perineal hygiene and false sample collection technique can lead to false positive results. Also emergence of resistance like ESBL production, is

also a common problem.⁽²⁷⁾ In present study, *E.coli* were most sensitive to Imipenem (97.5%) followed by Amikacin (82.3%), PT (73.5%) but least sensitive to Cotrimoxazole (32.3%). Which is comparable with Mumtaz S et al.⁽³⁾

5. ***Klebsiella sp:*** Emergence of ESBL production is also very common in *Klebsiella sp.* therefore combination of penicillin/ β lactamsae inhibitor combination and carbapenems are drug of choice for treatment.⁽²²⁾ In present study, *Klebsiella spp.* were most sensitive to PT (100%) followed by Imipenem (93.3%), Ciprofloxacin (80%) and least sensitive to Cotrimoxazole (20%). Mumtaz S et al⁽³⁾ has shown 100%, 95.8%, 80.2% and 61.8% sensitivity to PT, Imipenem, Ciprofloxacin and Cotrimoxazole for *Klebsiella sp.* respectively. Sangheeta et al⁽²⁸⁾ have reported 100% sensitivity towards Meropenem and 60% to Ciprofloxacin and Cotrimoxazole too.
6. **Enterococcus Sp:** *Enterococci sp.* are the important human pathogen which have gained resistance to commonly use antibiotics but can be best treat with vancomycin.⁽³³⁾ However, emergence of high level aminoglycoside resistance and acquired glycopeptides resistance (vancomycin resistant *Enterococci sp.* VRE) has necessitated the need of sensitivity.⁽²²⁾ In present study, *Enterococcus sp.* were most sensitive to Vancomycin and Gentamicin (100%) and least sensitive to Cotrimoxazole (12.5%) which is comparable with Mumtaz et al.⁽³⁾
7. ***Candida Sp:*** *Candida sp.* is a normal flora of vagina but in adverse condition it can become pathogenic and leads to resistance.⁽¹⁶⁾ Emergence of resistance is very common in *C. krusei* as it is inherently resistance to fluconazole.⁽⁴⁾ Emergence of resistance in non albicans has necessitated the need of antifungal sensitivity testing. In present study, *C. albicans* showed higher sensitivity to Fluconazole. Whereas non albicans showed higher resistance. For Fluconazole sensitivity of *C. albicans* is 87.9% followed by *C. glabrata* (80%), *C. tropicalis* (71.4%) and *C. krusei* is totally resistant to it. For Voriconazole sensitivity of *C. albicans* is 90.3% followed by *C. glabrata* (100%), *C. tropicalis* (85.7%) and *C. krusei* (70%). *Candida krusei* showed higher resistance rate to Fluconazole as compared to Voriconazole. Similar findings were reported by Kikani et al.⁽⁴⁾

Conclusion

Abnormal vaginal discharge is associated with adverse pregnancy outcomes, increase morbidity and mortality. The etiological pattern has been changed in past few years. With emergence of widespread resistance to antimicrobials, the control of infections becomes more challenging. The knowledge of the causative agents of abnormal vaginal discharge will be

therefore helpful in the selection of empiric antimicrobial therapy. The study of microbiological profile of vaginal discharge conducted in the Department of Microbiology, C. U. Shah Medical College and Hospital, Surendranagar gives some indication of the likely burden of the disease in the population studied and highlights some associated factor and also emphasizes more on early detection and treatment of such infections to prevent morbidity and infection related complications in these patients during reproductive period. The study also emphasis that there is a need for creating community awareness about health care facilities and instills self concern in women for their own health needs.

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