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# A Study on Microbial Flora in Women Presenting With Abnormal Vaginal Discharge.

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***Abstract:***
***Introduction****: Vaginal discharge is a commonest complaint among women in reproductive age group. Infective vaginal discharge can be broadly categorized into vaginitis or mucopurulent cervicitis. Vaginitis is caused by Bacterial Vaginosis, Vaginal Candidiasis, Vaginal Trichomoniasis etc. Mucopurulent cervicitis is due to Chlamydia or Gonococcal infection. Trichomoniasis caused by Trichomonas Vaginalis, diagnosis is confirmed by demonstration of actively motile organism with jerky movements on wet mount. Mucopurulent cervicitis caused by C. Trachomatis or N. Gonorrhoeae which typically produces yellowish discharge. The presence of gram-negative intracellular diplococci on gram stain gives a presumptive diagnosis of gonorrhoeae. On Pap smear Bacterial Vaginosis is diagnosed by identifying coccobacilli or clue cells, Trichomonas Vaginalis by trophozite and Candidiasis by fungal hyphae or budding yeasts.*
***Aims & Objectives:*** *To study the microbial flora of women presenting with abnormal vaginal discharge and to identify clear cut role of vaginal pH in the presence of infection.*
***Method:*** *The study is a randomized control trial conducted at tertiary health care on 100 women who presented with abnormal vaginal discharge, were underwent detailed history and laboratory investigations.*
***Results:*** *The prevalence of various organisms in vaginal discharge was as Candidiasis 39%, Bacterial Vaginosis 28%, Trichomoniasis 5%, N.Gonorrhoeae 5% and Chlamydia 2% among the 100 women. Most common complaint along with vaginal discharge was itching (79%) and dysuria (71%). Maximum number of women had white discharge (50%) followed by grayish white discharge (20%). Majority of women presented with foul smelling discharge (79%). The consistency of vaginal discharge was thick creamy in majority of women (76% ) followed by frothy discharge (4%). 71% of women with abnormal vaginal discharge had pH of more than 4.5 and 29% of women had pH of less than 4.5. Out of 79 women with infection 51 (64.5%) had pH>4.5 and out of 21 women without infection, 20(98%) had pH>4.5.*
***Conclusion:*** *Laboratory facilities are available they should be used to confirm the diagnosis for targeted management for better outcome. Vaginal pH is not very specific for the presence of infection.*
***Key words:*** *Abnormal Vaginal discharge, Microbial flora; Targeted management.*

## I. Introduction

Vaginal discharge is a commonest complaint among women in reproductive age group. Normal vaginal flora mostly consists of aerobic organisms, most common of which is hydrogen peroxide producing lactobacilli. Abnormal vaginal discharge may be of non-infective or infective origin. Non-infective vaginal discharge may be associated with endocervical polyps, tumors, vesicovaginal or uterovaginal fistulae, chemical irritants and medications and infective vaginal discharge can be broadly categorized into vaginitis or mucopurulent cervicitis. Vaginitis is predominantly caused by Bacterial Vaginosis, Vaginal Candidiasis, Vaginal Trichomoniasis and sometimes due to bacterial infection. Mucopurulent cervicitis is caused by Chlamydia or Gonococcal infection. Vaginal discharge is considered to be abnormal if it is yellowish, greenish or curdy white in color, mixed with blood and is malodorous. It may be associated with pruritis, vulvar pain or pelvic discomfort, soreness, swelling, dyspareunia & dysuria[1]. Bacterial vaginosis characterized by the replacement of normal hydrogen peroxide producing lactobacilli with anaerobic bacteria like GardnerellaVaginalis, MobiluncusHominis, Bacteroides, Peptostreptococcus etc. For diagnosis at least 3 out of 4 Amsel criteria[2] should be present for diagnosis which includes: (i) Homogenous gray or white adherent discharge on the vaginal wall. (ii) vaginal pH>4.5 (iii) Positive whiff test (iv) Presence of clue cells on microscopic examination of saline wet mount or gram stain of vaginal discharge[3]. Vaginal candidiasis caused by Candida Albicans, Candida Parapsilosis, Candida Tropicalis

or Candida Glabrata[4]. Vaginal Trichomoniasis caused by Trichomonas Vaginalis. Diagnosis is confirmed by demonstration of actively motile organism with jerky movements on wet mount[5]. Mucopurulent cervicitis caused by C. Trachomatis or N. Gonorrhoeae which typically produces yellowish discharge. The presence of gram-negative intracellular diplococci on gram stain gives a presumptive diagnosis of gonorrhoeae.

On Pap smear Bacterial Vaginosis is diagnosed by identifying coccobacilli or clue cells. Trichomonas Vaginalis is identified by the presence of trophozite on Pap smears and Candidiasis is diagnosed by fungal hyphae or budding yeasts present on Pap smears.

## II. Material And Method

This randomized control trial was conducted at tertiary care hospital over 12 months on 100 women after fulfilling the inclusion and exclusion criteria. After obtaining written consent, detailed history and examinations were taken. Cases were subjected to OPD procedures ( pH of vagina using standard pH paper; wet saline mount for trichomonas, KOH mount for budding hyphae and laboratory procedures which includes gram staining, cultures (Candida and N. Gonorrhoeae), Antigen detection test for Chlamydia& Pap smear by conventional method.

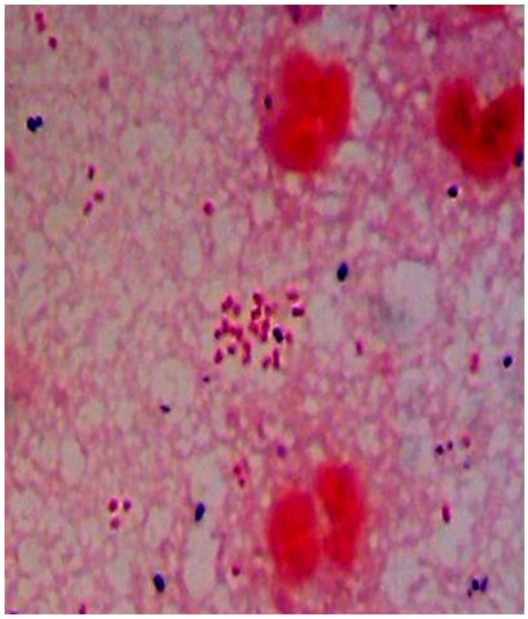

Figure 1: Showing Gram negative diplococci on gram staining.

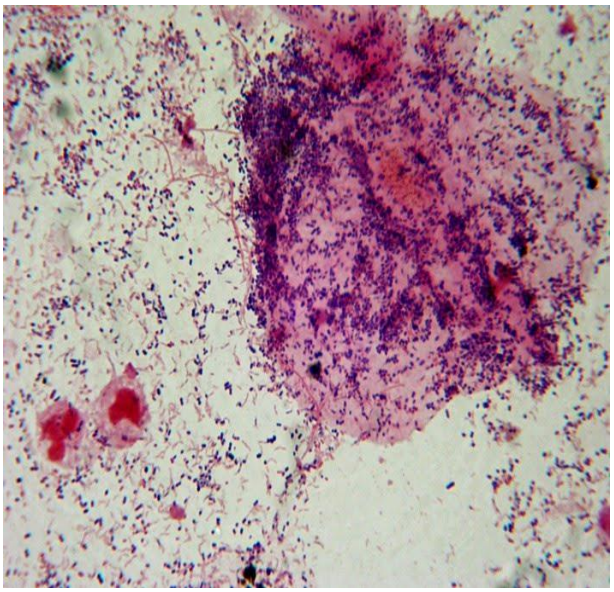

**Figure 2: Showing clue cell in Bacterial Vaginosis.**

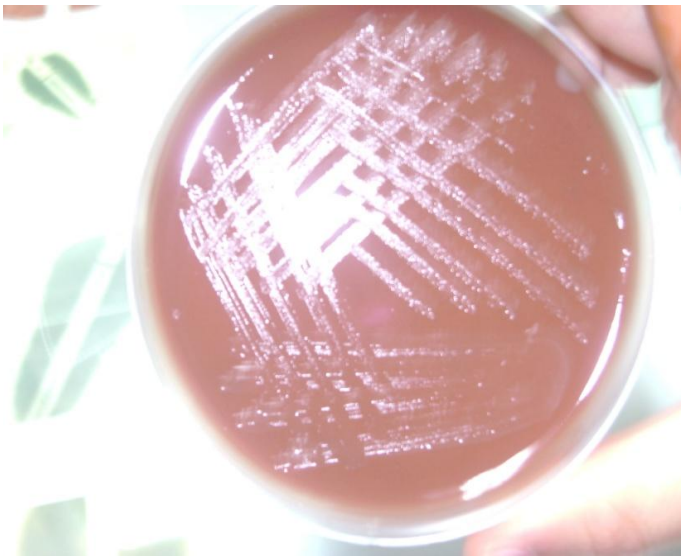

Figure 3: N. Gonorrhoeae on chocolate agar culture media


Figure 4: Chlamydia antigen test kit

Treatment initiated according to the organism detected on investigation. For Bacterial Vaginosis, tab Tinidazole 2gm single dose was given, for Candidiasis, tab Fluconazole 150mg single dose was given and for Trichomoniasis, tab Tinidazole 2gm single dose was given. For Gonorrhoea and Chlamydia, Tab Azithromycin 2 gm single dose was given. They were followed after 2 week and a repeat per speculum examination was done for the presence of same type of discharge.

## III. Main outcome measures & Results:

This randomized controlled trial were done on 100 women, were subjected to detailed clinical and laboratory procedures and treatment initiated based on the organism detected on investigation. All the outcome parameters were expressed as number and percentages or mean ± standard deviation by computer based Statistical Product and Service Solutions (SPSS) latest version. Age group ranged from 18 years to 45 years with maximum patients in age group 20-29 years.

Table 1: Color of discharge, odor, associated symptoms and respond to treatment.

| | Bacterial vaginosis | Candidiasis | Gonorrhoea | Trichom-oniasis | Chlamydia | No organism |
|---|---|---|---|---|---|---|
| Number (N=100) | 28 | 39 | 5 | 5 | 2 | 21 |
| Percentage (%) | 28 | 39 | 5 | 5 | 2 | 21 |
| **Color of discharge** | | | | | | |
| White (%) | 13 (26) | 26 (52) | 0 | 0 | 0 | 11 (22) |
| Grayish-white | 12 (60) | 3 (15) | 2 (10) | 0 | 0 | 11 (22) |
| Yellowish (%) | 0 | 6 (43) | 1 (7.1) | 2 (14.2) | 2(14.2) | 3 (2.1) |
| Greenish (%) | 3 (12.5) | 4 (25) | 2 (12.5) | 3 (19) | 0 | 4 (25) |
| **Odor** | | | | | | |
| Fishy (%) | 19 (79.2) | 2 (8.3) | 1 (4.2) | 1 (4.2) | 0 | 1 (4.2) |
| Non specific (%) | 3 (5.4) | 26 (47.3) | 3 (5.4) | 4 (7.3) | 2 (3.6) | 17 (31) |
| Non foul smelling (%) | 6 (28.6) | 8 (38) | 0 | 0 | 0 | 7 (33) |
| **Symptoms** | | | | | | |
| Ithcing | 22(78.6) | 30 (76.9) | 4 (80) | 5 (100) | 1 (50) | |
| Dysuria N (%) | 22 (78.6) | 23 (59) | 4 (80) | 5 (100) | 0 | |
| Dyapareunia N (%) | 7 (25) | 9 (23.1) | 4 (80) | 3 (60) | 0 | |
| Pelvic discomfort N (%) | 6 (21.4) | 3 (7.7) | 3 (60) | 2 (40) | 0 | |
| **Respond to treatment** | | | | | | |
| Cured N (%) | 22 (78) | 31 (79) | 3(60) | 3 (60) | 2 (100) | |
| Not cured N (%) | 4 (14) | 7 (18) | 2 (40) | 2 (40) | 0 | |
| Lost to follow up N (%) | 2 (7) | 1 (3) | 0 | 0 | 0 | |

Table 2: Prevalence of vaginitis, vaginitis plus cervicitis, and cervicitis based on per speculum examination

| Diagnosis | n | Percentage |
|---|---|---|
| Vaginitis | 72 | 72% |
| Vaginitis and Cervicitis | 17 | 17% |
| Cervicitis alone | 11 | 11% |
| Total | 100 | 100% |

Maximum number of women presented with moderate amount of vaginal discharge. The most common complaint along with vaginal discharge was itching (79%) and dysuria (71%) as compared to other complaints. Vaginitis were diagnosed on per speculum examination in 72% of women. The prevalence of infection based on laboratory tests was as follows: Candidias is 39%, Bacterial Vaginosis 28%, N.gonorrhoeae and Trichomoniasis 5% each and Chlamydia in 2% of women. 52% of women with candidiasis had white colour of discharge. 89.2% women with Bacterial Vaginosis had whitish or grayish white colour discharge. 40% women with Gonorrheae and 60% with Trichomoniasis had greenish discharge whereas all women with Chlamydial infection had yellowish discharge. Bacterial Vaginosis was diagnosed in 79.2% of women who had fishy odor of vaginal discharge. 21women had non-foul smelling discharge out of which 28.6% had Bacterial Vaginosis, 38% had Candidiasis and 33% did not have any organism. 79 out of 100 women had organism detected on laboratory tests. On comparison with per speculum diagnosis of vaginitis ,vaginitis plus cervicitis and cervicitis alone it was found that out of 72 women with vaginitis on per speculum 57(77.1%) were vaginitis on lab laboratory test,14 (19.4%%) were physiological and 1(1.3%) was cervicitis. 72% of women were diagnosed with vaginitis on per speculum examination out of which 57 were confirmed as vaginitis on laboratory test and out of which 62.5% (45 out of 72 women) were cured. In addition 14 women who were diagnosed as vaginitis plus cervicitis on per speculum had vaginitis only on laboratory evaluation and were treated accordingly and 10 from them cured, hence in total 55 (76.3%) women with vaginitis diagnosed on laboratory test were cured. 11 cases were diagnosed as cervicitis on per speculum and 7 women were confirmed to have cervicitis on laboratory test. 71.4% (5 out of 7) were cured. On the basis of laboratory investigation, 78% of women with Bacterial Vaginosis were cured, 79% of women with Candidiasis were cured and 60% women with Trichomoniasis and Gonorrhoea were cured and all patients with Chlamydia were cured.

## IV. Discussion:

The pattern of distribution and follow up of enrolled cases in this study was similar to the study done by Chandeying Vet al[6]. Enrolled cases had their age ranging between 18-45 years and maximum numbers of women were in the age range of 20-29 years (reproductive age group). This finding shows that vaginal infection commonly occurs in reproductive age group which was comparable to that reported by Thulkar J et al[7] , Ryan C

et al[8] ,Rao P.S et al[9] Sanchez S E et al[10]and Sharma A K et al[11]. Most common complaint along with vaginal discharge was itching (79%) and dysuria (71%) as compared to other complaints. Lower abdominal pain was the most common complaint in a study conducted by Rizvi N et al[12]. Lower abdomen pain is commonly found in patients of pelvic inflammatory disease, however in present study these patients were not included in the study group, this may be the reason for difference between the two studies. Vaginitis was present in 72% cases. Cervicitis alone was present in 11% cases. 71% of women with abnormal vaginal discharge had pH of more than 4.5 and 29% of women had pH of less than 4.5. Out of 79 women with infection 51 (64.5%) had pH>4.5 and out of 21 women without infection, 20(98%) had pH>4.5. Hence pH was not very specific for the presence of infection. In a study conducted by Chandeying V et al[6] 120 women were recruited and 68% of women had pH>4.5 and 32% of women had pH of less than 4.5.This result was in accordance with the present study. Pap smear was done in all women with abnormal vaginal discharge to screen for presence of malignancy and detection of organism. 23% of women had hyphae, 20% of women had clue cells and 1 woman had Trichomoniasis. In addition inflammatory cellular reaction was seen in 56%. This finding was similar to that reported by Barouti E et al[13] who observed pathogenic organisms in Papanicolaou vaginal smears. 17% of women were positive for Bacterial Vaginosis, 10.6% for Candidiasis and only 0.4% for Trichomoniasis. Etiological cause of abnormal vaginal discharge was obtained in 79 (79%) patients and in the remaining 21(21%) of the patients no etiological cause was found. Similarly, in the study of Ryan C A et al[8], Moherdaul F et al[14] and Nugent RP et al[15] same prevalence was observed. Vaginitis was diagnosed in 72% women based on laboratory investigations which corresponded with the per speculum diagnosis of vaginitis. Vaginitis was predominantly due to Candidiasis followed by Bacterial Vaginosis and Trichomoniasis which was 39%, 28% and 5% respectively. This was similar to that reported by Rizvi N et al[12]. In the study done by Chandeying V et al[6] , the prevalence of Bacterial Vaginosis was high as compared to Candidiasis and Trichomoniasis. Prevalence of cervicitis was 7% by laboratory test as compared to 11% on per speculum examination. These results were in accordance to a study by Tann CJ et al[16] who found a prevalence of 4.3% and 5% for N. gonorrhoeae and Chlamydia respectively. In a study conducted by Chandeying Vet al[8] the prevalence of N.gonorrhoeae and Chlamydia (0.4% and 4% respectively) was similar to this study. Vaginitis plus cervicitis was not detected in any women following laboratory evaluation whereas it was detected in 17% women on per speculum examination. This shows a poor correlation between clinical and laboratory findings for diagnosis of cervicitis. The reason behind this could be an over diagnosis on clinical examination due to observer error or an under diagnosis by laboratory test. Further studies are needed to developed recommendations for diagnosis of cervicitis based on clinical and laboratory tests which have high sensitivity, specificity and predictive value similar to that of Amsel's criteria for diagnosis of Bacterial Vaginosis. In women with white discharge 52% of women had Candidiasis, 26% had Bacterial Vaginosis and in 22% of women had no organism detected. In women with grayish white discharge 60% of women had bacterial vaginosis, 15% had Candidiasis and 10% women had Gonorrhoeae. In women with yellowish discharge 43% had Candidiasis, 7.2% had Gonorrhoeae, and 14.2% had Trichomoniasis and Chlamydia. In women with greenish discharge 12.5% each had Bacterial Vaginosis and Gonorrhoeae, 25% had Candidiasis and 19% had Trichomoniasis. 72 women had vaginitis by per speculum examination and by laboratory test also. Out of 72 women with vaginitis on per speculum 57 were confirmed vaginitis on lab laboratory tests, 14 were physiological and 1 had cervicitis. About 62.5% (45 out of 72 women) were cured, 27.7% of women were not cured and 2.7% were lost to follow up. 14 women who were diagnosed as vaginitis plus cervicitis on per speculum had vaginitis only or laboratory evaluation. They were given treatment of vaginitis alone based on laboratory test. 10 out of these 14 women were cured. So in total 76.3% (55 out of 72) women with vaginitis on laboratory test were cured. In the present study, 11 cases were diagnosed as cervicitis by per speculum examination, 6 out of 11 (54.5%) were cervicitis, 4 were physiological (36.3%) and 1 (9%) was vaginitis on laboratory investigation. One woman who was diagnosed as vaginitis on per speculum had cervicitis on laboratory investigation. 71.4% (5 out of 7) women with laboratory diagnosis of cervicitis were cured.

## V. Conclusion:

Thus in clinics where laboratory facilities are available they should be used to confirm the diagnosis for targeted management for better outcome. Vaginal pH is not very specific for the presence of infection.

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***Contribution of author:*** VM: Involved in study design, data collection, data analysis and manuscript writing, she will act as a guarantor for the study.

***Conflict of interest****:* None
***Funding****:* None

**What is already known:** Multiple studies have been done on the microbial flora of patients presenting with abnormal vaginal discharge but there is insufficient data available to show clear cut role of vaginal pH in the presence infection.

**What this study adds:** Vaginal pH is not very specific for the presence of microbial flora.

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