Frequency and Antimicrobial Susceptibility of Microorganisms Isolated from High Vaginal Swab

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Abstract:

Vaginitis is a common gynecological problem. It is predominantly caused by bacteria and fungus followed by parasites. Its management includes therapy based on susceptibility pattern. This study was aimed to elucidate the frequency of various microorganisms in high vaginal swabs and their sensitivity pattern of antibiotics that are currently used. This cross-sectional study was carried from July 2016 to July 2017 in the department of Microbiology, International Medical College. A total 60 HVS samples were taken from the registration record of Microbiology laboratory. Patients' age range was 15-84 years. Specimens were identified using Gram staining method and different culture media. All isolates were identified by using standard biochemical kit. Antibiotic susceptibility testing was performed mainly by using the disc diffusion method on Mueller-Hinton agar media. Most frequent women were found 21 (35%) in the age group 25-34 yrs. No growth was found in 14 (23.33%) and normal flora was found in 14(23.33%). The microorganism with the highest frequency of infection was Staphylococcus *which was found in 07(11.66%). The sensitivity patterns of the microorganisms: 92.85% to Ciprofloxacin/Doxycycline, 85.71% to Gentamicin/Imipenem and 51.14% to Methicillin/Cephalexin. The resistance patterns of the microorganisms: 71.43% to Levofloxacin and 64.29% to Azithromycin. In conclusion, our present study provides information about the common different microorganisms present in the symptomatic women obtained by high vaginal swab culture. The practice of treating women with leucorrhoea, with an antifungal agent empirically without taking a HVS has to be changed and appropriate treatment should be given after proper identification of the causative organism followed by antimicrobial susceptibility test to ensure effective treatment and to avoid antibiotic resistance.*

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Introduction:

Naturally the vagina is a complex system which contain a mixture of microorganisms particularly in the lower one third[1, 2]. The vagina of a healthy premenopausal woman is occupied by Lactobacillus spp[3]. Lactobacilli are Gram positive rods which are vaginal normal flora that produce secretions in vitro having antimicrobial properties, and it produce H_2O_2 which play a major role in maintaining the microenvironment of the vagina and in the inhibition of overgrowth of potentially pathogenic organisms[4, 5].

This distinctive environment undergoes various changes in all stages of life, leading to infections like bacterial vaginitis and vaginosis[4]. Many women of our country believe that such infections are normal and part of the female experience and do not seek care due to shame or lack of information[5]. Throughout the world bacterial vaginosis is the most prevalent lower genital tract infection in women of reproductive age[6].

Infection or inflammation of the vagina is called vaginitis. Vaginitis predominantly caused by bacteria and fungus followed by parasites[7]. The causative organisms may be sexually transmitted, endogenous or iatrogenic. Abnormal vaginal discharge may be the only symptom of bacterial vaginitis while many affected women may remain asymptomatic[2, 5].

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In a study done in Pakistan it was reported that in symptomatic women, the most common vaginal infections are bacterial vaginosis (40-45%), vaginal candidiasis (20-25%) and trichomoniasis (15-20%), while 7-72% of women with vaginal infections remain undiagnosed[4]. If vaginitis left untreated it may cause PID, infertility, especially in pregnant women it may cause premature delivery etc. Treating patient with vaginal discharge empirically with antifungal therapy or metronidazole assuming that the causative organism is Candida or bacterial vaginosis respectively without taking a high vaginal swab culture and sensitivity is still in practice leads to high failure rates with recurrence of symptoms in 54% of women within three months of antibiotic treatment[2,8].

These infections can be easily detected by simple tests such as a high vaginal swab for Gram stain, culture and antimicrobial susceptibility test. As per the Centre for Disease Control and Prevention (CDC) guidelines, the management includes therapy based on susceptibility pattern, partner notification, follow-up and health promotion[5].

This study was aimed to elucidate the frequency of various microorganisms in high vaginal swabs and their sensitivity pattern of antibiotics that are currently used. By studying the anti-biogram a better and appropriate therapy protocol may be established.

Materials and methods:

This cross-sectional study was carried from July 2016 to July 2017 in the department of Microbiology, International Medical College. A total 60 HVS samples were taken from the registration record of Microbiology laboratory. Patient's samples were included in this study age ranging from 15 to 84 years with vaginal discharge. Specimens were identified using Gram staining method and different media like Sheep blood agar media, Chocolate agar media, MacConkey's agar media and further isolation done by biochemical test. All isolates were identified by using standard biochemical kits, API 20E (Analytical Profile Index System, La Blame Les Grottes, France). Antibiotic susceptibility testing was performed mainly by using the disc diffusion method on Muellerhinton agar media. The bacterial suspension that was prepared for antibiotic susceptibility testing was adjusted to the recommended turbidities for all specimens. The clinical laboratory standard institute (CLSI) break points were used for interpretation of susceptibility patterns as sensitive and resistant.

Result:

Table 1 shows the frequency and percentage of symptomatic women in the different age groups in the study. Most frequent women were found 21 (35%) in the age group 25-34 yrs and 1(1.66%) woman came in the age group ≥65 yrs.

Table 2 shows the distribution of the different organism with respect to age. The microorganism with the highest frequency of infection was found in 10 women (16.66%) of 25-34 age group.

Table 3 shows thefrequency of the different microorganisms. The microorganism with the highest frequency of infection was *Staphylococcus* which was found in 07 women (11.66%). No growth was found in 14 women (23.33%) and normal flora was found in 14 women (23.33%).

Table 4 shows the sensitivity and resistance patterns of the microorganisms to the common antibiotics used. 92.85% of the microorganisms were sensitive to Ciprofloxacin and Doxycycline, 85.71% of the microorganisms were sensitive to Gentamicin, Imipenem, (51.14%) of the microorganisms were sensitive to Methicillin and Cephalexin. 71.43% of the microorganisms were resistant to Levofloxacin and 64.29% of the microorganisms were resistant to Azithromycin.

Table-I

Age distribution of the study population (n= 60).

Age group (years)	No. of pt (fn)	Percentage
15-24	18	30
25-34	21	35
35-44	14	23.33
45-54	04	6.66
55-64	02	3.33
≥65	01	1.66
Total	60	100

Table-II

Frequency of pathogens causing vaginitis with respect to age (n= 60).

Age	Frequency	Organisms
15-24	3(5%)	Staphylococcus aureus, Enterococci
25-34	10(16.66%)	Staphylococcus aureus, Neisseria, Acinetobacter, Candida, Enterococci
35-44	4(6.66%)	Pseudomonas, Candida, Staphylococcus aureus
45-54	1(1.66%)	Staphylococcus aureus
55-64	1(1.66%)	Candida
≥65	1(1.66%)	Normal flora

Table-III

Frequency of pathogens causing vaginitisamong study population (n=60).

Pathogen	No. of case (fn)
No growth	14 (23.33%)
Normal flora	25(41.66%)
Candida	05(8.33%)
Staphylococcus aureus	07(11.66%)
Pseudomonas	02(3.33%)
Neisseria	01(1.66%)
Enterococci	02(3.33%)
Acinetobacter	01(1.66%)
Mixed growth (E coli, Proteus)	01(1.66%)
Contamination	02(3.33%)
Total	60(100%)

Table-IV

Antibiotic susceptibility pattern of isolates to various antibiotics (n=14).

Antimicrobial agents	Pathogens	
	Sensitive	Resistance
Ciprofloxacin	13(92.85%)	1(7.14%)
Amikacin	7(50%)	7(50%)
Vancomycin	8(51.14%)	6(42.86%)
Azithromycin	5(35.71%)	9(64.29%)
Co-trimoxazole	9(64.29%)	5(35.71%)
Gentamicin	12(85.71%)	2(14.29%)
Doxycycline	13(92.85%)	1(7.14%)
Cephalexin	8(51.14%)	6(42.86%)
Methicillin	8(51.14%)	6(42.86%)
Imipenem	12(85.71%)	2(14.29%)
Meropenem	13(92.85%)	1(7.14%)
Ceftriaxone	8(51.14%)	6(42.86%)
Amoxicillin	7(50%)	7(50%)
Ceftazidime	9(64.29%)	5(35.71%)
Ampicillin	9(64.29%)	5(35.71%)
Cefixime	10(71.43%)	4(28.57%)
Levofloxacin	4(28.57%)	10(71.43%)

Discussion:

Vaginal flora containsa large range of microorganisms naturally, Lactobacillus spp. play fundamental role in maintaining acidic vaginal pH and also preventing the overgrowth of potentially harmful and opportunistic bacteria[9]. Vaginal infections are a great threat for women's health, being the most common gynecological problem[4].

It is essential to know the composition of the vaginal microbial ecosystem for comprehensive understanding of the etiology of vaginal infection and this will be helpful for the prevention and treatment of the disease. Our study demonstrates the prevalence of various pathogenic microorganisms in the vagina in symptomatic women[5].

Several microorganisms were isolated in our study, and those with the highest frequencies were *Staphylococcus aureus, Escherichia coli, Neisseria, Pseudomonas aeruginosa, Proteus vulgaris*, MRSA, Acinetobacter, and *Candida albicans*. Commensal growths were found in 41.66% of cases that need not be treated, but necessary measures such as identification of risk factors (douching, sprays, diabetes) and their prevention have to be carried out.

Our study found infection more common in the age group 25-34 years. A similar high frequency of infection in the age group 26-35 years with a fall in frequency of infection as age advanced was found in a study by Ushadevi Gopalan et al[2] and also found in Shamas Pervaiz et al[4].

The most useful antibiotics against gram negative rods in our study were Ciprofloxacin and Meropenem, Doxycycline (92.85%), Gentamicin and Imipemem(85.71%), Cefixime

(71.43%),antibiotics like imipenem are extremely effective but expensive. Nagalakshmi Narayana-Swamy et al[5]. and Bryan Larsen et al[1]. reported similar findings. Whereas the antimicrobials with least affectivity against gram negative rods were Penicillins (ampicillin, amoxicillin-clavulanic acid), amikacin, azithromycin, levofloxacin due to indiscriminate use of antibiotics Shamas Pervaiz et al[4]. The Levofloxacin and Azithromycin resistance in the present study was comparatively higher (71.43%) and (64.29%) respectively in contrast to other reported study[4,5].

In conclusion, it needs to be appreciated that, one of the most common complaints by women attending Gynecology OPD is vaginitis. The symptomatic patients must be investigated carefully. Our present study provides information about the different microorganisms present in the symptomatic women and high vaginal swab culture provides the identification of causative bacteria, it must be regularly done. The practice of treating women with leucorrhoea, with an antifungal agent empirically without taking a HVS has to be changed and appropriate treatment should be given after proper identification of the causative organism, and antimicrobial susceptibility test to avoid antibiotic resistance. Therefore, easy availability of antibiotics and treatment schedule must be designed subsequent to proper laboratory investigations.

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