A Retrospective Evaluation of Vaginitis in Women of Reproductive Age Group in a Tertiary Care Hospital in Solapur, India

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A B S T R A C T

Vaginitis in women can be caused by aerobic bacteria, Trichomonas vaginalis, yeast or it can be bacterial vaginosis which can lead to various gynaecological and obstetrical complications. This is a retrospective study aimed at determining the prevalence of vaginitis due to various microorganisms. A total of 500 women in the reproductive age group attending the tertiary care hospital over the last 2 years were included in the study. The vaginal swabs of these patients were subjected to Gram’s staining & wet mount to identify T. vaginalis, budding yeast and clue cells. All vaginal specimens were cultured for aerobic bacteria and fungi and identified according to standard microbiological techniques. Out of 500 women, 185 (37%) had vaginal infection. The most common identified vaginal infections were aerobic bacteria i.e. E. coli (36.8%), Klebsiella spp. (13.05%), Acinetobacter spp. (8.65%), Staph. Aureus (6.49%), Citrobacter spp. (4.32%), Pseudomonas spp (3.8%) and Group B Streptococci (3.24%) followed by Candidiasis (21.62%), Trichomoniasis (9.73%) and Bacterial vaginosis (6.49%). Gram negative bacteria revealed high level of sensitivity to Meropenem (93%), Amikacin (81.9%) and Ciprofloxacin (61.7%) and were found resistant to Ceftriaxone, Ceftazidime, Cotrimoxazole and Ampicillin. Thus the study reveals that vaginal infections by E. coli and Klebsiella followed by Candida spp., Trichomoniasis and bacterial vaginosis are common problems in women of reproductive age group. The treatment option varies according to the aetiology. Therefore, diagnosis of vaginal infections in women of reproductive age group should be done to prevent the injudicious use of chemotherapeutic agents to avoid further complications.

Keywords Vaginitis, Bacteria vaginosis, Aerobic bacteria, Yeast, Trichomonas vaginalis, Reproductive age group, Gram stain, Wet mount

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Introduction

The complaint of vaginal discharge is very common, particularly in south East Asia where about a quarter of all adult women report this complaint. (Chaudhary et al., 2012) Symptomatic vaginal discharge in the women of reproductive age group is responsible for 5-10 million OPD visits per year throughout the world (Masand et al., 2015). The prevalence of vaginal discharge in India is estimated to be 30% (Masand et al., 2015).

Abnormal vaginal discharge also predisposes to significant morbidity in the form of pelvic inflammatory diseases, infertility, endometriosis, cuff cellulitis, urethral syndrome, pregnancy loss, preterm labour, increase susceptibility to sexually transmitted infections (STI), including HIV and to be
associated with low birth weight and preterm birth (Masand et al., 2015).

Females are more prone to urinary and vaginal infections because of the anatomical and functional proximity to the anal canal and due to the short urethra (Swamy et al., 2015). The vagina could be infected by a variety of pathogens including bacteria, fungi, viruses, and parasites (Abdelaziz et al., 2014). The causative organisms can be endogenous, iatrogenic or sexually transmitted (Swamy et al., 2015). But, many women believe that such infections are normal and part of the female experience and do not seek care due to shame or lack of information (Swamy et al., 2015).

These gynaecological disorders have substantial impact on female reproductive health, mental health, and ability to work and to perform routine physical activities (Chaudhary et al., 2012). Vaginal complaints such as Bacterial Vaginosis, candidiasis, trichomoniasis, and Chlamydia trachomatis infections are common among women of reproductive age, with high incidences during pregnancy (Abdelaziz et al., 2014) / Approximately 75 % of adult women will have at least one episode of vaginitis by candida spp. during their life time (Mulu et al., 2015). Unfortunately, about 40 – 50 % of women who had a first episode are likely to present a recurrence and 5 % may present a form of “recurring” characterized by at least three or more episodes of infection per year (Mulu et al., 2015).

Aerobic vaginitis has been identified for a smaller proportion of women whose microbiota (lactobacilli) is replaced by facultative anaerobic or aerobic bacteria especially Staph. aureus, Group B streptococci, E. coli and Klebsiella spp (Bhat et al., 2012) / In pregnant women, Group B Streptococci (GBS) is a cause of cystitis, amnionitis, endometritis, and stillbirth (Bhat et al., 2012). Intrapartum colonisation of the mother’s vagina with coliforms, enterococci is also associated with neonatal sepsis and meningitis in the newborn (Bhat et al., 2012).

Bacterial vaginosis (BV), an alteration of vaginal flora involving a decrease in Lactobacilli and predominance of anaerobic bacteria, is among the most common cause of vaginal complaints for women of childbearing age (Bhat et al., 2012). It has been shown to increase the risk of obstetric and gynaecologic complications such as preterm labour and delivery, chorioamnionitis, post-caesarean endometritis, post-abortion pelvic inflammatory disease, and cervicitis (Bhat et al., 2012).

Bacterial vaginal infections are often least understood and empirical antifungal therapy for any vaginal infection without high vaginal swab culture is still in practice. Thus this study was carried out to determine the microbiological profile of symptomatic vaginal discharge in our hospital and antimicrobial susceptibility profiles of aerobic bacterial isolate and its utility in the parasitic protozoan Trichomonas vaginalis (Deivam et al., 2014; Mulu et al., 2015). Negative outcomes of this infection are especially significant during pregnancy (Deivam et al., 2014).

In the majority of women, a diagnosis of Vulvovaginal candidiasis is made at least once during their childbearing years. Among the many causes of vaginitis, VVC is the second most common after bacterial vaginosis and is diagnosed in up to40% of women with vaginal complaints in the primary care setting (Bhat et al., 2012)/ Approximately 75 % of adult women will have at least one episode of vaginitis by candida spp. during their life time (Mulu et al., 2015). Unfortunately, about 40 – 50 % of women who had a first episode are likely to present a recurrence and 5 % may present a form of “recurring” characterized by at least three or more episodes of infection per year (Mulu et al., 2015).
management of genital tract infection in women of reproductive age group.

**Materials and Methods**

This is a retrospective study done at a tertiary care centre in Solapur over a period of last two years. Two high vaginal swabs were collected from 500 women suspected of vaginitis taking all aseptic precautions.

Direct saline wet mount, Gram staining and bacteriological cultures were carried out for all specimens. One drop of a vaginal swab suspension with physiological saline were placed on a slide and covered with a cover slip. The wet film were examined under bright field microscopy at 40× objective for the presence of motile *Trichomonas vaginalis*, pseudo hyphae and/or budding yeast cells indicative of *Candida* spp., granulocytes and clue cells.

Gram stained smears were prepared from vaginal swab and examined under oil immersion at × 1000 magnification to look for clue cells, budding yeast cells, granulocytes and Gram negative diplococci.

*Candida* spp. was identified by the presence of yeast cells in wet mount as well as identification of Gram positive budding yeast cells per oil immersion field. *T. vaginalis* was identified by its pear shaped morphology with characteristic jerky motility on wet mount of vaginal specimen.

BV was identified by the presence of ‘Clue cells’ which are nothing but the vaginal epithelial cells with a granular surface and blurred margins(because of attached bacteria) on a physiological saline (0.85 %) wet mount and in Gram’s stain can be seen as Gram negative cocco-bacilli studded vaginal epithelial cells instead of normally predominant Gram positive *Lactobacilli*.

All vaginal specimens were plated on to 5 % sheep blood agar, MacConkey agar to isolate aerobic bacteria. The inoculated media incubated at 37 °C aerobically for 24-72 hours. Identification of the cultured isolate was done by conventional phenotypic and biochemical methods.

Antimicrobial susceptibility testing was performed by Kirby-Bauer disc diffusion method. The following antimicrobial agents were employed: Amikacin (30μg), Meropenem (10μg), Ciprofloxacin (5 μg), cotrimoxazole (25 μg), Ampicillin (10μg), Ceftriaxone (30μg), Ceftazidime (30μg), Piperacillin (100μg), Erythromycin (15 μg) and clindamycin (2 μg), Linezolid (30μg) and Vancomycin (30μg). Antibiotic susceptibility was interpreted according to Clinical and Laboratory Standards Institute (CLSI, 2015) Guidelines.

Reference strain of *E. coli* ATCC 25922, *Staph. aureus* ATCC 25923 and *Pseudomonas aeruginosa* ATCC27853were used for quality control for antimicrobial susceptibility test.

**Results and Discussion**

A total of 500 women in the reproductive age group (15-50 years) are included in the study in which 185 (37%) had vaginal infection among which 33 (31.42%) women were pregnant (Table 1).

Most of the females i.e. 157 (84.86%) of 185 women were infected with only one microorganism whereas rest of the women, 28 (15.13%) were infected with more than one microorganism.

The most common vaginal infections were due to aerobic bacteria i.e. 66.48% among which *E. coli* was the predominant microorganism causing vaginitis accounting for 36.8% cases.
which is followed by infections with *Klebsiella* spp. (14.05%), *Acinetobacter* spp. (8.65%), *Staphylococcus aureus* (6.49%), *Citrobacter* spp. (4.32%), *Pseudomonas* spp. (3.78%) and very few women were infected with *Group B Streptococci* i.e. in 3.24% cases (Table 2).

Moreover, significant number of women was infected with *Candida* spp. (21.62%) followed by *Trichomonas vaginalis* (9.73%) and few women were reported to have Bacterial vaginosis (6.49%) (Table 2).

Among the analysed samples, co-infection occurred in 28 of 185 positive cases i.e. in 5.6% cases. Co-infection of bacteria/bacteria and bacterial/candida spp. were most commonly seen. This accounted for more than 96% of co-infection cases. Co-infections of bacteria & bacteria, bacteria & candida and bacteria & *T. vaginalis* were 19(67.8%), 8(28.57%) and 1(3.57%) respectively (Table 3).

The most common aerobic bacterial isolates were Gram negative bacteria which showed high level of susceptibility to Meropenem (92.8%), Amikacin (80.8%) and Ciprofloxacin (60.8%) whereas very less sensitivity was observed for Ceftriaxone (22.4%), Ceftazidime (22.45%) and Co-trimoxazole (14.4%) (Table 4).

Overall, very few Gram positive aerobic bacteria were isolated in the present study and it is observed that all those organisms were sensitive to Vancomycin (100%) and Linezolid (100%) whereas most of them were sensitive to Erythromycin (83.3%), Clindamycin (77.7%) and Ciprofloxacin (66.6%) (Table 5). This study was undertaken to assess the prevalence of microorganisms isolated from vaginal secretions in a tertiary care centre in Solapur, Maharashtra. It shows that prevalence of vaginitis is 37% which is very similar to the studies done by Mathew *et al.*, and Bhargava *et al.*, (2016) whereas Mulu *et al.*, (2015) showed very less cases of vaginitis which may be due to better hygienic conditions of the patients.

Enterobacteriaceae were the most common cause of vaginitis in women of reproductive age group in the present study among which *E. coli* was the predominant bacteria responsible for it. Comparable results were obtained in the studies of Zarbo *et al.*, (2013), Mohamed *et al.*, (2015), Swamy *et al.*, (2015) and Kumar *et al.*, (2015) where they concluded *E. coli* to be the leading cause of vaginitis. This may be related to the poor hygiene of the patient as the Enterobacteriaceae are a part of normal flora of human gastrointestinal tract and close proximity to anal canal in females which contributes to the entry of gut flora into the genital tract causing vaginal infection.

5.6% of women in the present study were infected with more than one microorganism. Co-infection of bacteria/bacteria and bacteria/candida accounted for maximum co-infection cases which is similar to the findings of Karou *et al.*, (2012).

Vaginal candidiasis in the present study was responsible for 21.62% cases of vaginal infection which is comparable with the results of Abdelaziz *et al.*, (2014), Zarbo *et al.*, (2013) and Bhargava *et al.*, (2016). Pregnancy related emotional stress, hormonal changes and suppression of immune system steps up the candida species overgrowth and infection. This is evident in the study done by Nelson *et al.*, (2013) where he encountered 90.38% cases of vaginal candidiasis as he included only pregnant women in his study.

The present study encountered 9.73% women with *Trichomonas vaginalis* infection.
Table 1: Showing frequency of vaginitis in pregnant and non-pregnant women

| Pregnancy status | Total (n=500) | Vaginitis(n=185) | Percentage |
|------------------|--------------|------------------|------------|
| Pregnant         | 105          | 33               | 31.42%     |
| Non-pregnant     | 395          | 152              | 38.48%     |

Table 2: Types of vaginitis among females of reproductive age group

| Sr. No | Causative organism       | Number | Percentage |
|--------|--------------------------|--------|------------|
| 1      | *E. coli*                | 68     | 36.8%      |
| 2      | *Klebsiella spp.*        | 26     | 14.05%     |
| 3      | *Acinetobacter spp.*     | 16     | 8.65%      |
| 4      | *Staph. aureus*          | 12     | 6.49%      |
| 5      | *Citrobacter spp.*       | 08     | 4.32%      |
| 6      | *Pseudomonas spp.*       | 07     | 3.78%      |
| 7      | Group B Streptococci     | 06     | 3.24%      |
| 8      | Candidiasis              | 40     | 21.62%     |
| 9      | *Trichomoniasis*         | 18     | 9.73%      |
| 10     | Bacterial vaginosis      | 12     | 6.49%      |

Table 3: Showing types of co-infection

| Sr. No | Type of vaginal infection         | Total = 28 | Percentage |
|--------|-----------------------------------|------------|------------|
| 1      | E.coli + *Klebsiella*             | 13         | 7.02 %     |
| 2      | E.coli + Candidiasis              | 8          | 4.32 %     |
| 3      | E.coli + *Acinetobacter spp.*    | 3          | 1.62 %     |
| 4      | E.coli + Pseudomonas spp.        | 2          | 1.08 %     |
| 5      | E.coli + *Trichomoniasis*        | 1          | 0.54 %     |
| 6      | E.coli + Group B Streptococcus   | 1          | 0.54 %     |

Table 4: Showing % sensitivity of Gram negative aerobic bacteria to various antibiotics

| Antibiotics      | E.coli (n=68) | Klebsiella (n=26) | Acinetobacter (n=16) | Citrobacter (n=8) | Pseudomonas (n=7) | Overall Sensitivity |
|------------------|---------------|-------------------|----------------------|-------------------|-------------------|--------------------|
| Meropenem        | S 100%       | S 100%            | S 43.7%              | S 100%            | S 100%            | 92.8%              |
| Amikacin         | 88.2%         | 88.4%             | 31.2%                | 87.5%             | 85.7%             | 80.8%              |
| Ciprofloxacine   | 75%           | 23.5%             | 18.7%                | 50%               | 28.5%             | 60.8%              |
| Ceftriaxone      | 10.2%         | 23.07%            | 37.5%                | 37.5%             | 85.7%             | 22.4%              |
| Ceftazidine      | 8.82%         | 26.9%             | 37.5%                | 37.5%             | 85.7%             | 22.4%              |
| Cotrimoxazole    | 8.82%         | 30.7%             | 12.5%                | 12.5%             | -                 | 14.4%              |
| Ampicillin       | 11.7%         | -                 | 12.5%                | 25%               | -                 | -                  |
| Piperacillin     | -             | -                 | -                    | -                 | 100%              | -                  |
Table 5 Showing % sensitivity of Gram positive aerobic bacteria to various antibiotics

|                | Staph. aureus (n=12) | Group B Streptococcus (n=6) | Overall Sensitivity |
|----------------|-----------------------|-----------------------------|---------------------|
| Erythromycin   | 75%                   | 100%                        | 83.3%               |
| Ciprofloxacin  | 66.6%                 | 66.6%                       | 66.6%               |
| Clindamycin    | 75%                   | 83.3%                       | 77.7%               |
| Linezolid      | 100%                  | 100%                        | 100%                |
| Cotrimoxazole  | 66.6%                 | -                           | -                   |
| Ampicillin     | 91.6%                 | 100%                        | 94.4%               |
| Vancomycin     | 100%                  | 100%                        | 100%                |

This can be correlated with studies done by Deivam et al., (2014), Masand et al., (2015) and Zarbo et al., (2013). Bacterial vaginosis was responsible for 6.49% of vaginitis cases which is coherent with the findings of Zarbo et al., (2013) and Mohamed et al., (2015).

Susceptibility testing of aerobic bacteria in the present study reveals that Meropenem, Amikacin & Ciprofloxacin are the antibiotics of choice which act against the Gram negative aerobic bacteria encountered in most of the vaginal infections. These results can be compared with study of Swamy et al., (2015) this study reveals that vaginitis is caused more frequently by aerobic bacteria than candida. Hence the practice of empirical antifungal therapy without investigating high vaginal swab needs to be revised to prevent its unnecessary use.

Vaginal infections caused by aerobic bacteria, *Candida* spp., Trichomoniasis and bacterial vaginosis are common problems in women of reproductive age group. Detection of vaginal infection during pregnancy by Group B *Streptococci, E. coli* and coliforms in pregnant women is of significance as it can get transmitted to the neonate during delivery & can cause sepsis. The management of vaginal discharge is dependent on the correct microbiological diagnosis of pathogen which can help clinicians to institute appropriate antimicrobial therapy which will prevent the obstetrical & gynaecological sequel of vaginitis. And this in turn will help to prevent the injudicial use of antibiotics and development of antibiotic resistance.

Moreover, Ciprofloxacin, Amikacin and Meropenem are the recommended drugs for empirical therapy for Gram negative organisms. For Gram positive organisms, Ampicillin, Erythromycin and Clindamycin are the recommended drugs.

References

Abdelaziz Z, Ibrahim M, Bilal N, Hamid M. Vaginal infections among pregnant women at Omdurman Maternity Hospital in Khartoum, Sudan. *J Infect Dev Ctries* 2014; 8(4): 490-497.

Bhargava D, Kar S, Saha A, Saha M. Prevalence of vaginitis in females attending National medical college and teaching hospital, Birgunj, Nepal. *Indian Journal of Medical Research and Pharmaceutical Sciences*. July 2016; 3(7).

Bhat S, Devi N, Shenoy S. Microbiological Profile of vaginal swabs. *Journal of Evolution of Medical and Dental Sciences/Volume1/ Issue4/ October - 2012 Page 509-513*
Chaudhary V, Prakash V, Agarwal K, Kumar V Agrawal, Singh A, Pandey S. Clinico-Microbiological Profile of Women with Vaginal Discharge in a Tertiary Care Hospital of Northern India. International Journal of Medical Science and Public Health. 2012 Vol 1 Issue 2.

Deivam S, Rajalakshmi R, Priyadharshini S, Seethalaksmi RS, Balasubramanian N, Brindha T, Lakshmi Priya P, Prabhu N. Prevalence of Trichomonas vaginalis Infection Among Patients that presented to Rural Tertiary Care Hospital in Tiruchirapalli, India in 2011 and 2013. Volume 2(3), 2014, Page 255-260

Kumar G, Singh K. Microbial Profile of High Vaginal Swab From Symptomatic Women of Reproductive Age Group: Data from Tertiary Care Hospital. International Journal of Science and Research (IJSR). Volume 4 Issue 7, July 2015

Masand D, Patel J, Gupta S. Utility of Microbiological Profile of Symptomatic Vaginal Discharge in Rural Women of Reproductive Age Group. Journal of Clinical and Diagnostic Research. 2015 Mar, Vol-9(3): QC04-QC07

Mathew R, Sudhakshina R, Kalyani M, Jayakumar S, Lal B, Banu S. Microbiological Profile of Vaginosis among Women of the Reproductive Age Group, Who Attended a Tertiary Care Hospital. Journal of Clinical and Diagnostic Research: 2011 December; 5: 1548-1551.

Mohamed H, Shalaby N, El-Maraghy N and Baraia Z. Prevalence of Vaginal Infection and Associated Risk Health Behaviours Among Married Women in Ismailia City. Int.J.Curr.Microbiol. App.Sci (2015), 4(5): 555-567

Mulu W, Mulat Y, Yohannes Z, Bayeh A. Common causes of vaginal infections and antibiotic susceptibility of aerobic bacterial isolates in women of reproductive age attending at Felegehiwot referral Hospital, Ethiopia: a cross sectional study. BMC Women's Health. 2015; 15:42

Nelson M, Wanjiru W, Muturi W., Margaret. Prevalence of Vaginal Candidiasis and Determination of the Occurrence of Candida Species in Pregnant Women Attending the Antenatal Clinic of Thika District Hospital, Kenya. Open Journal of Medical Microbiology, 2013, 3, 264-272

Swamy N, Ramalingappa P, Bhatara U. Antimicrobial Sensitivity Pattern of Microorganisms Isolated from Vaginal Infections at a Tertiary Hospital in Bangalore, India. International Journal of Medical Students, Vol 3, No 1 (2015)

Zarbo G, Coco L, Leanza V, Genovese F, Leanza G, D’Agati A, Giannone TT, Giunta MR, Palumbo M A, Carbonaro A, Pafumi C. Aerobic Vaginitis during Pregnancy. Research in Obstetrics and Gynecology 2013, 2(2): 7-11

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