

# Vaginal microflora: a determinant of women's health and disease

## Abstract

Vaginal Candidiasis or Vulvovaginal Candidiasis the most prevalent infection found in women of reproductive age and is caused by *Candida* spp. It is characterized by soreness, pruritis, itching, dyspareunia and vaginal discharge. The infection takes place when the physiological balance of vaginal microflora is disturbed. Major risk factors associated with disease are high estrogen contraceptive use, antibiotic usage, hormone replacement therapy and uncontrolled diabetes mellitus. This study describes the physiological significance of vaginal microflora and vaginal infections.

**Keywords:** candida, albicans, lactobacillus, vulvovaginal, symptomatic, vaginal, infection, reproductive, diseases

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**Abbreviations:** VC, vaginal candidiasis; VVC, vulvovaginal candidiasis; CA, candida albicans

## Introduction

*Candida albicans* is an opportunistic fungi which grows asymptotically on mucosal cells as a normal microflora but a disturbance in this microflora permits *C. albicans* to enter in to host cells resulting in several diseases such as oropharyngeal candidiasis and vaginal candidiasis (VC). Vaginal candidiasis often referred as vulvovaginal candidiasis (VVC) is one of the most prevalent infection found in women of reproductive age infact 3 out of 4 women experience this episode once in their life time. A significant number of women are likely to experience the recurrent infection i.e. 3-4 episodes in a year (RVVC).<sup>1,2</sup> In a survey it is found that in US women spend I million dollar on medication of VVC.<sup>3,4</sup> VVC is a second most prevalent vaginal infection after bacterial vaginitis and is caused by a pathogenic fungus *C. albicans*. In VVC *C. albicans* is the most prevalent and dominant species playing a role to great extent and is associated with dyspareunia, pruritis, itching, soreness and vaginal discharge. The major risk factors associated with vaginitis are high estrogen contraceptive use, antibiotic usage, hormone replacement therapy and uncontrolled diabetes mellitus.<sup>1-5</sup>

## Vaginal physiology

A healthy vagina determines a woman's health. In healthy vagina a balance exists between *Candida* spp. and *Lactobacillus* spp. and the composition of vaginal microflora varies with menstrual cycle, gestation, use of contraceptives, frequency of sexual intercourse etc. *Lactobacillus crispus*, *Lactobacillus jensenii* and *Lactobacillus iners* are the most common spp. of *Lactobacillus* found in premenopausal women.<sup>1-4</sup> In normal healthy women *Lactobacillus* produce lactic acid, bacteriocins and hydrogen peroxide where lactic acid acts as buffer and maintain the pH (between 4-5) which varies with age while bacteriocins and hydrogen peroxide inhibit the growth of pathogenic microbes. A disturbance in this physiological balance leads to depletion of *Lactobacillus* spp. and overgrowth of *Candida* spp. following which the physiological state changes from asymptomatic to symptomatic.<sup>1,4</sup> In VVC *C. albicans* is the most prevalent and dominant species playing a role to great extent and is found in maximum number of cases but other non albicans species of *Candida* contributing to VVC are also found. *Candida glabrata* is one such species of *Candida* which is found in women having oral

contraceptives, spermicides and diabetes mellitus. *C. glabrata* is also found in vaginal microflora of elderly women as with increase in age non albicans spp. like *C. glabrata* are found to dominate the microflora. *C. glabrata* is also found in elderly diabetic patients as continuous use of azoles leads to resistance to *C. glabrata* resulting in its dominance in vaginal epithelium.

## Virulent factors in vaginal candidiasis

*C. albicans* is a polymorphic fungus and these morphological alterations are the essential mechanism of pathogenesis in human host. The yeast (blastconidia) form is associated with asymptomatic colonization and blood dissemination while hyphal (mycelia) form is associated with adherence and mucosal invasion characteristic of symptomatic colonization.<sup>5,6</sup> Other virulent factors associated with pathological conditions are biofilm formation and secretion of various proteinases. Secreted Aspartic proteinases (SAP) are important proteinases which are secreted at the site of recognition invade mucosal tissues and maintain the immunopathological response of host cell. *Candida* vaginitis is caused by the immunopathological of host cells and the major immunological response seen in vaginal candidiasis is the recruitment of neutrophils at the site of infection. Another major factor associated with candidiasis is the secretion of candidalysin, a peptide toxin secreted by the hyphal cells which induce epithelial damage during invasion, immune activation and phagocyte maturation.<sup>2,5,7</sup>

## Vaginitis

Vaginitis is a multifactorial disease and in addition to virulent factors there are other several biological criterias for initiating the pathological conditions. Estrogen poses a significant effect on vaginitis and therefore during menstrual cycle when estrogenic activity is high women become more susceptible to vaginitis. Moreover it is also found that in prepubescent girls and post menopausal women when estrogenic activity is low vaginitis susceptibility is highly reduced. In addition to physiological response to host cell estrogen also affects *C. albicans* enhancing its adherence to host cell and increasing hyphal length.<sup>1</sup> Vaginal pH and vaginal microbiota are other physiological factors which are very crucial for pathology of the disease. The acidic pH of adult vagina (4.5) inhibits the microbial growth and yeast to hyphal switch in *C. albicans*. Increase in pH will promote microbial growth and leads to vaginitis. The bacterial microbiota existing at the mucosal surface is also important for maintaining the healthy

vaginal environment. Disruption of normal *Lactobacillus* spp. due to administration of antibiotics will increase the vaginal pH levels resulting in vaginitis.<sup>1,4,6</sup>

### Closing remark

*Candida* vaginitis is not a dangerous disease but it results in discomfort in everyday life in addition to social and sexual dysfunction therefore it becomes necessary to have complete knowledge about the disease and its treatment. It is a complex disease caused by the presence of no of factors to initiate infection. pH, microbiota, estrogen, fungal virulent factors, immunological response are the factors which accumulate and result in symptomatic infection. Based on these virulence factors various antifungal drugs are designed which are recommended to patients but before that it the accurate diagnosis and proper microscopic identification of the pathogen becomes necessary as wrong diagnosis will alter the vaginal microflora and result in Vaginal Candidiasis.

### Acknowledgments

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### Conflicts of interest

Author declares that there are no conflicts of interest.

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