Prevalence of bacterial vaginosis and vaginal candidiasis in women presenting to healthcare centers of Hamadan City, West of Iran, 2014

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Abstract

Introduction:
Species of Candida, Trichomonas vaginalis and different bacteria such as Gardnerella vaginalis are the most important causes of vaginitis. This study aimed to investigate the frequency of bacterial vaginosis and vaginal candidiasis in women presenting to healthcare centers in Hamadan city, west of Iran.

Material and Methods:
The cross-sectional study recruited 862 women presenting to healthcare centers of Hamadan. During vaginal examination, the posterior vaginal fornix and vaginal wall were sampled by two sterile cotton swabs. One swab sample was placed in a tube containing Ringer serum for wet mount preparation to search for yeasts, mycelium and clue cells. The other swab sample was used for preparing Gram-stained vaginal smear. Candidiasis was diagnosed by observing pseudohyphae and blastospores. Bacterial agents were diagnosed by observing clue cells, and according to Hay-Ison criteria. The data were analyzed by Chi-square test in SPSS (version 16).

Results:
Vaginitis caused by bacterial agents and Candida species was identified in 104 (12.1%) and 73 (8.5%) of the 862 participants, respectively. Vaginitis was not significantly related with age, marital status, occupation, husband’s occupation. However, a statistically significant difference was reported between education and bacterial vaginitis (P=0.01).

Conclusion:
A significant relationship was observed between education and bacterial vaginosis; therefore, enhancing knowledge can play a key role in the prevention of women’s sexually transmitted diseases.

Keywords: Vaginitis, Gardnerella, Candidiasis, Bacterial Vaginosis

Introduction
The genital tract infection is one of the most common problems among women, with more than 10 million annual cases among women in the United States (1). According to WHO, three candidal, trichomonal and bacterial factors are the main causes of vaginitis and account for about 90% of vaginal area infections (2). Various studies have been conducted on the prevalence of various types of vaginitis. In a study by Ziaei Hezarjaribi et al. in Sari, 10.42% of women referring to health centers had...
vaginitis, of whom 46.7% had candida albicans and 46.1% had bacterial vaginosis. In recent years, the prevalence of common vaginitis causes has changed, so that the most common causes of vaginitis are bacteria and fungi, and trichomonas infection is much reduced (4). Candida albicans is part of the natural flora of the vagina, found in 20% of women (5). Candidal vaginitis occurs when a candida grows with vaginal bacterial flora. This condition can be due to the use of broad-spectrum antibiotics, increased glycogen in the vaginal epithelium (due to pregnancy or lack of diabetes mellitus control), heat and moisture caused by non-cotton underwear, and HIV (5). Candida albicans accounts for 20% to 80% of candidal vaginitis, but nowadays, its other species, such as candida glabrata, are the main cause in 15% of cases. In most cases, candidal vaginitis is diagnosed routinely without microscopic or culturing diagnosis, and half of the women treated with this method may not be properly diagnosed. Bacterial vaginosis is one of the most common types of vaginitis in women of reproductive age. The prevalence of this type of vaginitis is very diverse and has been reported from 5% to 51% in various populations. Vagina naturally contains a combination of different bacteria, and bacterial vaginosis is actually a change in the natural flora of the vagina, which results in loss of lactobacilli and an increase in anaerobic bacteria. The result is an increase in the prevalence and density of gardnerella vaginalis, Mobiluncus species, and Mycoplasma hominis. Such vaginal environmental conditions are sometimes referred to in some studies as intermediate flora, which will lead to complications and illnesses in case of changes in the conditions (6).

Vaginitis was thought to be a safe disease in the past, which did not need treatment in the asymptomatic cases, but nowadays evidence suggests that in case of progression and severity of the disease, it may lead to severe complications in women. Although the disease is rarely life-threatening, it is associated with high treatment costs and sometimes infertility (7). Premature labor, tubal infertility, pelvic inflammatory disease, postoperative endometritis, premature rupture of fetal membrane, and post-cesarean surgical site infections are more common in women with vaginosis (8). Providing, maintaining and promoting women's health is very important in health care services due to their reproductive role. According to studies conducted in Iran and other parts of the world about the increase of vaginal infections, the present study was conducted to determine the prevalence of candidal vaginitis and bacterial vaginosis in women referred to Hamedan health centers in order to take a step towards proper treatment and reduction of the course of illness and the cost of treatment for these patients.

**Materials and Methods**

This was a descriptive cross-sectional study that was performed on 862 women referring to Hamedan's clinics from September 2014 to March 2015. The study population included women with different age groups and social and economic status, referring to these centers with complaints related to genital tract infection. In this study, after a complete description of the purpose of the research project, a written consent was obtained from patients who referred to obstetricians with genital infection symptoms including itching and burning of the genital area; increased vaginal discharge; vaginal odor; and change in the
vaginal discharge, including yellow, green or yellowish green discharge. Patients were asked to provide the researcher with information about their age, education, place of residence, occupation, husband's occupation, marital status, pregnancy status and vaginal douches use within 48 hours prior to sampling through a questionnaire. Volunteers were excluded in the event of bleeding, consuming antibiotics, or using vaginal cream or suppository, vaginal douches or betadine within the last 48 hours. Simultaneous to physical examination with a sterile and wet speculum, samples were taken from cervical mucous of vaginal discharge, especially posterior fornix area and exocervix by two sterile swabs. One of the swabs was placed in a test tube containing 1 ml of Ringer's solution for the wet mount, and the second swab was used for Gram staining. After collection, samples were transferred to the Research Laboratory of Parasitology and Mycology Department of Hamedan University of Medical Sciences, Hamadan, Iran. Direct development in order to observe yeast and mycelium of fungus was quickly prepared and examined microscopically. In the microscopic examination of stained developments, candida detection was performed by observing pseudohypha and blastospore, and bacterial agents were detected by observing the clue cell, as well as checking the bacterial flora status of the samples according to the Hay/Isom criterion. Data were analyzed by SPSS-16 using Chi-square test. The significance level in this study was P-value less than 0.05.

This study was approved by the Ethics Committee of Hamadan University of Medical Sciences under the code REF5459, and all ethical requirements, including preserving the confidentiality of patients’ information, were met.

Results
The results of vaginal examination with microscopic method (Figure 1) showed that of 862 subjects, 73 (8.5%) had fungal vaginitis and 104 (12.1%) had bacterial vaginosis. The highest percentage of infected subjects was in the 30-39 age group (38.3%) and the lowest was in the <20 age group (3.4%). The highest bacterial infection was in the ≥40 age group (16.2%), and the lowest was in the <20 age group (34.4%). The highest fungal infection was in the ≥40 age group (8.9%), and the lowest was in the <20-29 age group (0.34%). There was no statistically significant difference between age and disease (P≥0.05). The highest percentage of bacterial vaginosis was observed in subjects with secondary school educational level (18.7%) and the highest percentage of fungal vaginitis was observed among the illiterate subjects (9%). Among the subjects, 84.6% were housewives. There was no significant relationship between occupation, marital status and husband's occupation with vaginitis (P≥0.05). Subjects with bacterial infection mostly complained about vaginal discharge (15.4%) and the most common symptom in those with fungal infection was painful intercourse (10.96%) (Table 2).
Prevalence of bacterial vaginosis and vaginal symptoms

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Figure 1: Stained development; A: Candida species, B: The clue cell, covered with gram-variable bacteria such as gardnerella vaginalis, and mobiluncus species

Table 1: Frequency distribution of vaginitis by age and education variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bacterial vaginosis</th>
<th>Candida vaginitis</th>
<th>Total subjects</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N (%)</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Age (year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20</td>
<td>3 (10.3%)</td>
<td>3 (10.3%)</td>
<td>29 (3.4%)</td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>18 (7.4%)</td>
<td>23 (9.4%)</td>
<td>244 (28.3%)</td>
<td>≤0.05</td>
</tr>
<tr>
<td>30-39</td>
<td>29 (8.8%)</td>
<td>36 (10.9%)</td>
<td>330 (38.3%)</td>
<td></td>
</tr>
<tr>
<td>≥40</td>
<td>23 (8.9%)</td>
<td>42 (16.2%)</td>
<td>259 (30)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>12 (9)</td>
<td>20 (15)</td>
<td>133 (15.4%)</td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>17 (9.8%)</td>
<td>38 (21.8%)</td>
<td>174 (20.2%)</td>
<td>=0.01</td>
</tr>
<tr>
<td>Secondary school</td>
<td>13 (7.2%)</td>
<td>34 (18.7%)</td>
<td>182 (21.1%)</td>
<td></td>
</tr>
<tr>
<td>High school</td>
<td>27 (8.4%)</td>
<td>7 (2.2%)</td>
<td>321 (37.2%)</td>
<td></td>
</tr>
<tr>
<td>Academic</td>
<td>4 (7.7%)</td>
<td>5 (9.6%)</td>
<td>52 (6.1%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Clinical symptoms reported in subjects with vaginitis

<table>
<thead>
<tr>
<th>Clinical signs</th>
<th>Bacterial vaginosis</th>
<th>Total N(%)</th>
<th>Candida vaginitis</th>
<th>Total N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Symptomatic</td>
<td>Asymptomatic</td>
<td>Symptomatic</td>
<td>Asymptomatic</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>16 (15.4%)</td>
<td>88 (84.6%)</td>
<td>104 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Vaginal itching</td>
<td>12 (11.5%)</td>
<td>92 (88.5%)</td>
<td>104 (100%)</td>
<td>4 (5.5%)</td>
</tr>
<tr>
<td>Burning urination</td>
<td>10 (9.6%)</td>
<td>94 (90.4%)</td>
<td>104 (100%)</td>
<td>6 (8.2%)</td>
</tr>
<tr>
<td>Frequent urination</td>
<td>11 (10.6%)</td>
<td>93 (89.4%)</td>
<td>104 (100%)</td>
<td>5 (6.8%)</td>
</tr>
<tr>
<td>Painful intercourse</td>
<td>8 (7.7%)</td>
<td>96 (92.3%)</td>
<td>104 (100%)</td>
<td>8 (10.96%)</td>
</tr>
</tbody>
</table>
Discussion
Vaginitis is a female genital tract disorder that is commonly seen in gynecology clinics. The disorder makes more than 10 million people visit a doctor every year. It is estimated that more than 1% of all antibiotics are used to treat women who have been diagnosed with vaginitis (5). The results of this study showed that the prevalence of candidal vaginitis and bacterial vaginosis was 8.5% and 12.1%, respectively. The higher prevalence of bacterial factors in this study suggests that bacteria are the main cause of vaginitis. Several studies have been conducted on the prevalence of vaginitis in Iran and other countries. In 2016, bacterial vaginosis accounted for the most cases of vaginitis (8.2%), followed by candidal infection (6.5%) in Zanjan, Iran (10). In 2015 the prevalence of bacterial vaginosis (36.26%) and candidiasis (36.29%) was approximately equal in Kerman, Iran (11). In 2013, the prevalence of Candida in Tehran was 13.4% (7). In 2012 the prevalence of candidal vaginitis and bacterial vaginosis in Babol was 6.7% and 0.6% respectively (12). Also, the prevalence of candidal vaginitis and bacterial vaginosis in Brazil in 2012 was 5.8% and 21.8%, respectively. It was 9.8% and 0.7% in Netherlands in 2010, respectively (14). In 2006, the prevalence of candidal and bacterial infection was 17.2% and 28.5% in Hamadan, respectively (15). Since the frequency distribution of this disease is subject to health, cultural and social factors, it is naturally different in various areas. Also, the difference in the method of examining the samples as well as the number of samples examined can be another reason for this difference. In the present study, the highest incidence of candidal vaginitis and bacterial vaginosis was in the ≥40 age group. In a study by Nozhat et al. in 2016, the highest incidence of candidal infection was reported in the 15-24 age group (16). In a study by Kalantari et al. in 2014, the highest percentage of bacterial vaginosis was reported in women aged 20-30, the main reason being the sexual activity of women in this age group. Also, the highest spectrum of Candida infection was observed in the 30-40 age group (12). In 2001, Adad conducted a study on vaginitis prevalence in Brazil and found no statistically significant relationships between age groups and vaginitis, which is similar to the results of the present study (2). Also, in a study by Moallaei et al. in 2007, there was no statistical relationship between vaginitis and age (17).

In the present study, there was a significant relationship between educational level and bacterial vaginosis, which indicates the effect of education and social awareness on health. The studies by Shahinfar in 2015 in Kerman and Ramezani Tehrani in 2012 examined the frequency of vaginitis in four points in Iran and were consistent with the present study (11, 18). There was no significant relationship between occupation of women and vaginitis. Whereas Ramezani Tehrani showed that employed women were less likely to have bacterial vaginosis than non-employed women (18). However, it should be noted that 84.6% of the participants in this study were housewives, and this could explain the nonsignificance of the relationship in the present study. Most studies have shown that women's social activity and income can play a role in awareness of health issues and the prevention of such diseases. The results of this study showed that there was no significant relationship between husband's occupation and vaginitis, which
is consistent with Shahinfar (2015) (11), but not with Tafazoli 2015 (19) and Bulbul Haghighi in 2008 (20). Tafazoli showed that there was a significant relationship between the recurrence of bacterial vaginosis in women and their husband's occupation. That is, women who were in poor economic conditions were more likely to face a recurrence of bacterial vaginosis due to being in poor health conditions, having trouble paying for medical treatment, and not having insurance (19). Bulbul Haghighi et al. also found that women whose spouses were self-employed were more likely to suffer from vaginitis (20).

In this study, subjects with bacterial infection mostly complained about vaginal discharge and the most common symptom in those with fungal infection was painful intercourse. In a study by Nozhat et al., people with candidal infection mostly complained about genital itching (16). While in a study by Ahmadnia and Tafazoli (19), patients with bacterial vaginal infections have indicated vaginal discharge as the most clinical manifestation. The differences in the clinical symptoms reported in patients in various studies suggest that definitive diagnosis is not possible only by relying on clinical symptoms.

**Conclusions**

This study found that bacterial infections play an important role in women's vaginitis. Increasing the awareness of people about the risks and consequences of vaginitis, its transmission, and prevention of sexually transmitted diseases can play an important role in reducing the cost of treatment and community health. It is suggested that women's treatment staff, especially physicians and obstetricians, do not treat the disease just based on clinical observations and use laboratory methods for diagnosis.

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**Conflict of interest**

There was no conflict of interest between the authors.

**References:**