Prevalence of the Bacterial Vaginosis and Group B Streptococcus in Term and Pre-term Pregnancies

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Several studies have been conducted about Bacterial Vaginosis and its relation with preterm labor that was accompanied with controversial results. The aim of this study was to compare the frequency of Bacterial Vaginosis and common genitourinary infections between term and pre-term pregnancies.

Abstract

**Background and objective:**
Several studies have been conducted about Bacterial Vaginosis and its relation with preterm labor that was accompanied with controversial results. The aim of this study was to compare the frequency of Bacterial Vaginosis and common genitourinary infections between term and pre-term pregnancies.

**Methods:**
In a case-control study, 249 pregnant women admitted to Shohadyae Tajrish Hospital in 2004-2006 were studied. The cases (n=125) were chosen from pregnant women with pre-term labor and the controls (n=124) were chosen from women who had term labor. All the patients underwent Bacterial Vaginosis investigation (Amsel criteria) and group B streptococcus, Trichomonas, Candida Albicans and E.coli with smear and culture (from cervix).

**Results:**
Bacterial Vaginosis was significantly higher in patients with rupture of membranes compared with patients with intact membranes (64.29% vs. 35.71%). The means of age, number of pregnancies, deliveries, living children, history of abortion, infection with B streptococcus, Trichomonas, Gardnerella vaginalis, and Candida Albicans showed no significant difference between two groups and only infection with E.coli in the pre-term group was significantly higher (11.20% vs. 1.61%). Also history of preterm labor (16.98% vs. 6.42%) and rupture of membranes (40% vs. 12.38%) was significantly higher in preterm group.

**Conclusions:**
No significant relation was found between Bacterial Vaginosis and preterm labor, only infection with E.coli was significantly higher in the pre-term group in comparison with term pregnancies.

**Introduction**

There are several factors which predispose to preterm delivery. It seems that activation of hypothalamus-pituitary-adrenal axis of mother or the fetus, decidual hemorrhage, pathologic uterine distension and infection are influencing factors (1). Epidemiologic studies have shown that stress and infection of maternal genitourinary system independently and significantly increase the risk of preterm labor (2).

Theoretically, pathogenic organisms ascend via lower genital organs to uterine and may cause fetal membrane inflammation which leads to preterm rupture of membranes and labor (3). Maternal genitourinary infection can initiate the process of labor and cause preterm labor via different mechanisms including activation of cytokine cycle and acceleration of labor process. Vaginal infection or colonization increases the risk of fetal membrane infection and inflammatory cytokines affect the process of labor (4). Different studies have suggested a wide range of microorganisms including group B streptococcus, Trichomonas, Nisseria Gonorrhea, E.coli, Bacterial Vaginosis, and Candida Albicans as the predisposing factors of preterm labor (5-7). Various studies about Bacterial Vaginosis have ended up in controversial results. There have been several studies showing a significant relationship between Bacterial Vaginosis and preterm labor (8-13) while some other studies have denied this relationship (14-18) and even some of them have indicated a reverse relationship (19, 20). Moreover, the prevalence of Bacterial Vaginosis are widely different in vaginal smears of asymptomatic women in different countries (21). Therefore, the prevalence of Bacterial Vaginosis may vary among different populations.
Vaginosis and its relationship with preterm labor has to be separately investigated in each nation (14).

The purpose of this study was to evaluate the prevalence of Bacterial Vaginosis and other common vaginal infections in pregnant women with term or preterm labor in Shohada Tajrish Hospital from 2005 to 2007. Our study included 249 patients in two groups of term (124 patients) and preterm (125 patients) labor.

**Materials & Methods**

We enrolled 249 patients who referred to Shohada Tajrish Hospital from 2005 to 2007 for delivery in a case-control study after approval of ethics committee of Research Deputy of Shahid Beheshti University of Medical Sciences. The cases included 125 women who experienced preterm labor and the controls were 124 women with term delivery.

After obtaining the data related to demographic variables by a questionnaire, the patients underwent microbiological studies to evaluate infection or colonization with Bacterial Vaginosis (KOH smear and wet smear for clue cells and PH evaluation by Amsel method), Group B Streptococcus (Blood Agar media), Trichomonas (vaginal wet smear), Candida Albicans (visualizing hyphae after adding KOH to simple smear) and E.Coli (EMB media). The smear and culture samples were taken from the cervix with a sterilized swab prior to the first vaginal examination by the chief resident or the senior residents in charge in the primary visit. The samples of the cultures were taken immediately to the laboratory of the hospital to be cultured in the mentioned media. The smears were all reported by the chief resident and the results of the cultures were confirmed by the Pathology Department of the hospital.

The data was analyzed by t-test, chi-square or Fischer’s exact test in SPSS ver. 12.0. P values below 0.05 were assumed significant.

**Results**

There were no significant differences in the mean age, number of previous pregnancies, deliveries and live births, and also in the history of abortion between two groups. However, history of preterm labor (16.98% vs. 6.42%) and rupture of membranes (40% vs. 12.38%) were significantly higher in patients with preterm labor (Table 1). Although no difference was found between the prevalence of Bacterial Vaginosis, group B streptococcus, Trichomonas and Candida Albicans among two groups, our results revealed that only E. coli infection was significantly higher in cases than controls (11.20% vs. 1.61%), (Table 2). Our study indicated that the frequency of Bacterial Vaginosis was significantly higher (64.29% vs. 35.71% with P=0.001) in patients with ruptured membranes in comparison with patients with intact membranes (Table 3).

**Discussion**

A lot of studies have shown a significant relationship between Bacterial Vaginosis and preterm labor. For example, Azargoon et al. (8) have demonstrated the significant relationship of Bacterial Vaginosis in gestational weeks of 16-36 with preterm labor and rupture of the membranes. Other studies have verified this relationship (9-13) and reported relative risks of 1.1 (9) to 1.86 (10).

However, there have been other studies overruling this correlation (14-18). Furthermore, Oakeshott et al. (19) showed a significant reverse relationship between Bacterial Vaginosis and preterm labor. Our results also revealed no significant relationship between Bacterial Vaginosis and other genitourinary infections like group B streptococcus, Trichomonas, and Candida Albicans in two groups of term and preterm labor.

This diversity of results might be caused by different factors. One of the most important one can be the effects of confounding factors, though our results reveal no significant difference in mean ages of mothers, and frequency of gravity, parity, history of abortion and the number of living children in 2 groups. It has been shown in a study that occurrence of Bacterial Vaginosis in earlier weeks of pregnancy was associated with a higher rate of preterm labor (9). A meta-analysis has also showed that Bacterial Vaginosis in early stages of pregnancy is an important risk factor of preterm delivery and spontaneous abortion (22). We also should consider the role of microorganisms that cannot be cultured in routine media and detected by routine testing. For example, it has been shown that colonization of cervix with Ureaplasma Urealyticum is related with preterm deliveries (23, 24) and its relative risk can be as high as 3.34 (23). It has also been indicated that anaerobes are the most common etiologic factor of Bacterial Vaginosis and have the highest prevalence in women experiencing preterm labor (25). But these bacteria could not be evaluated in our study and a lot of other studies. Some other studies mention organism load as a predictive factor of preterm labor (14,26,27). Of note, higher organism load can cause a more severe inflammation that can more intensely affect the course of the pregnancy and delivery. This variable could not be evaluated in our study either.
Moreover, the prevalence of Bacterial Vaginosis has shown to be widely different in different countries (21) and this warrants an individual study to evaluate the prevalence of Bacterial Vaginosis and its relationship with preterm labor in each nation (14). It has also been shown that preterm labor is a possibility in any pregnant woman who undergoes stress or infection. There are many unknown factors influencing this process and the endocrine and immune systems of pregnant women are involved (2, 29). Thus, even though we have applied the greatest possible effort to diminish the role of confounding factors, they cannot be totally eliminated. For example, the rates of membrane rupture (40% vs. 12.38% with \( P=0.009 \)) and history of preterm labor (16.98% vs. 6.42% with \( P=0.016 \)) were significantly higher in our cases in comparison with our controls.

Our results even become more remarkable in comparison with previous studies in Iran (8) that did verify the significance of the relationship between Bacterial Vaginosis and preterm labor. This incongruence may be due to the different methods of the studies or different populations which were studied. This difference warrants more extensive studies with larger sample sizes. This finding can also be important in deciding about the screening of pregnant women for abnormal vaginal discharge and administration of antibiotics in these patients. Several studies have showed that treatment of asymptomatic bacteriuria or genital infections including Bacterial Vaginosis, trichomoniasis, gonorrhea, and chlamydial infection can decrease the risk of preterm labor (3). Paige et al. (11) indicated that antibiotic therapy in this group of pregnant women can be beneficial and prevents preterm delivery and low birth weight. The important issue is that these women are mostly asymptomatic (11). Therefore, it is recommended that pregnant women with abnormal vaginal discharge should be evaluated for infection with Bacterial Vaginosis, Trichomoniasis, Gonorrhea, and Chlamydial infection and treated accordingly (3). Some studies suggest that all pregnant women be screened for Bacterial Vaginosis and treated accordingly in the early phases of pregnancy (28).

Some studies have assessed all pathogenic factors individually. Our study also revealed that the only influential microorganism was E.coli which was significantly higher (11.20% vs. 1.61% with \( P=0.002 \)) in patients who experienced preterm labor. Although previous studies have mostly shown that infection with group B streptococcus is a risk factor of preterm labor, one single study indicated that infection with group B streptococcus in the second trimester has a negative correlation with preterm labor (20) which was in congruence with our results.

It has been proposed that pathogen organisms ascend via lower genital organs to uterine and the resultant inflammation causes preterm rupture of membranes and labor. There have been increasing studies indicating that preterm labor and rupture of membranes are initiated by colonization of lower genital tract with microorganisms and the inflammatory response (activation of cytokines and proteolytic enzymes) of the host (28). The results of our study showed that the frequency of preterm rupture of membranes was significantly higher (64.29% vs. 35.71% with \( P=0.001 \)) in patients with Bacterial Vaginosis. Puwar et al. (13) and Azargoon et al. (8) achieved the same results while the results of Ziaei et al. (30) were on the contrary.

**Conclusion**

In conclusion, we found no significant relationship between Bacteria Vaginosis and preterm labor. However, infection with E.Coli was significantly higher in the pre-term group. We also found that the prevalence of preterm rupture of membranes was significantly higher in patients with Bacterial Vaginosis. We suggest that more extensive studies with larger sample sizes and considering the confounding factors that had not been regarded in this study can be performed.

**Table 1:**
The comparison of demographic variables in cases and controls (The values are presented as mean ± standard deviation or percent).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>26.01±5.566</td>
</tr>
<tr>
<td>G1</td>
<td>( %39.52 )</td>
</tr>
<tr>
<td>Gravidity</td>
<td></td>
</tr>
<tr>
<td>&gt;G1</td>
<td>( %60.48 )</td>
</tr>
<tr>
<td>P0</td>
<td>( %45.16 )</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>&gt;P0</td>
<td>( %54.84 )</td>
</tr>
<tr>
<td>Live Births (1 or more)</td>
<td>( %54.70 )</td>
</tr>
<tr>
<td>History of Abortion</td>
<td>( %17.74 )</td>
</tr>
</tbody>
</table>
Prevalence of the Bacterial Vaginosis and Group B Streptococcus in Term and Pre-term Pregnancies

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Table 2:
The comparison of different genitourinary infections in cases and controls.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Term Percentage</th>
<th>Preterm Percentage</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Vaginosis</td>
<td>%5.56</td>
<td>%8.80</td>
<td>0.336</td>
</tr>
<tr>
<td>Group B Streptococcus</td>
<td>%4.84</td>
<td>%8.80</td>
<td>0.215</td>
</tr>
<tr>
<td>Trichomonas</td>
<td>%6.45</td>
<td>%8.80</td>
<td></td>
</tr>
<tr>
<td>E.coli*</td>
<td>%1.61</td>
<td>%11.20</td>
<td></td>
</tr>
<tr>
<td>Candida Albicans</td>
<td>%12.10</td>
<td>%9.60</td>
<td></td>
</tr>
</tbody>
</table>

* Significantly different based on Fischer’s exact test (P<0.05)

Table 3:
The comparison of different genitourinary infections in patients with ruptured and intact membranes.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ruptured Membrane Percentage</th>
<th>Intact Membrane Percentage</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Vaginosis*</td>
<td>%64.29</td>
<td>%35.71</td>
<td>0.001</td>
</tr>
<tr>
<td>Group B Streptococcus</td>
<td>%38.46</td>
<td>%61.54</td>
<td>0.28</td>
</tr>
<tr>
<td>Trichomonas</td>
<td>%37.50</td>
<td>%62.50</td>
<td></td>
</tr>
<tr>
<td>E.coli</td>
<td>%46.67</td>
<td>%53.33</td>
<td>0.056</td>
</tr>
<tr>
<td>Candida Albicans</td>
<td>%29.17</td>
<td>%70.83</td>
<td></td>
</tr>
</tbody>
</table>

* Significantly different based on Fischer’s exact test (P<0.05)

References:


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