

**Bacterial Vaginosis among Pregnant Women in
Hadhramout-Yemen**

**التهاب المهبل البكتيري بين النساء الحوامل في
حضرمت-اليمن**

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Abstract :

Bacterial vaginosis (BV) is a common cause of abnormal or altered vaginal discharge in women of childbearing age. Its association is with obstetric and gynecologic complications. The aim of this study was to examine the prevalence of BV among pregnant women in Hadhramout-Yemen. The diagnosis of BV is usually based on clinical criteria including homogeneous vaginal discharge, an elevated vaginal pH, the presence of clue cells, and an amine odor. In this cross-sectional study we have evaluated the vaginal flora and clinical signs for 950 pregnant women. Three-hundred and seventy two (39.2%) of 950 pregnant women with abnormal vaginal

discharge were positive for bacterial BV.

The high rate of BV among pregnant women attending private and public obstetrics and gynecology clinics demands adequate attention to prevent BV-associated complications during pregnancy and to reduce referrals that may ensue from such complications. Our recommendation is routinely screening for BV among pregnant women to avoid infection sequelae. Adequate laboratory facilities should be provided and laboratory personnel should be trained for the diagnosis of BV.

Key words: Bacterial vaginosis, pregnant women, Al-Mukalla, Hadhramout, Yemen.

الملخص العربي:

التهاب المهبل البكتيري هو السبب الأكثر شيوعاً للعدوى المهبليّة لدى النساء في سن الإنجاب. أهميته هي مضاعفات التوليد وأمراض النساء. وكان الهدف من هذه الدراسة هو دراسة انتشار معدل التهاب المهبل البكتيري بين النساء الحوامل في حضرموت- اليمن. يتم التشخيص عادة على أساس المعايير السريرية بما في ذلك أخذ عينة من الإفرازات المهبليّة، قياس درجة الحموضة المهبليّة، والبحث عن وجود الخلايا الدليلية (Clue Cells)، والرائحة. خلال هذه الدراسة تم دراسة البكتريا المهبليّة والعلامات السريرية لـ ٩٥٠ امرأة حامل. ثلاثمئة واثان وسبعون (٣٩.٢٪) منهن كانت لديهن الإفرازات المهبليّة غير طبيعيّة وكانت إيجابية لالتهاب المهبل البكتيري. إن ارتفاع معدل الالتهاب المهبلي البكتيري بين النساء الحوامل اللاتي يترددن على عيادات أمراض النساء والتوليد الخاصة والعامّة يتطلب الاهتمام الكافي لمنع المضاعفات المرتبطة بذلك الالتهاب أثناء فترة الحمل والحد من المضاعفات التي قد تترتب على ذلك. إننا نوصي من خلال هذه الدراسة بعمل الفحص روتيني لالتهاب المهبل البكتيري بين النساء الحوامل لتجنب الإصابة كما ينبغي توفير الفحوصات اللازمة وتدريب العاملين في المختبرات لتشخيص هذا الالتهاب.

مفاتيح الكلمات: التهاب المهبل البكتيري، النساء الحوامل، المكلا، حضرموت، اليمن

التهاب المهبل البكتيري هو السبب الأكثر شيوعاً للعدوى المهبليّة لدى النساء في سن الإنجاب. أهميته هي مضاعفات التوليد وأمراض النساء. وكان الهدف من هذه الدراسة هو دراسة انتشار معدل التهاب المهبل البكتيري بين النساء الحوامل في حضرموت- اليمن. يتم التشخيص عادة على أساس المعايير السريرية بما في ذلك أخذ عينة من الإفرازات المهبليّة، قياس درجة الحموضة المهبليّة، والبحث عن وجود الخلايا الدليلية (Clue Cells)، والرائحة. خلال هذه الدراسة تم دراسة البكتريا المهبليّة والعلامات السريرية لـ ٩٥٠ امرأة حامل. ثلاثمئة واثان وسبعون (٣٩.٢٪) منهن كانت لديهن الإفرازات المهبليّة غير طبيعيّة وكانت إيجابية لالتهاب المهبل

Introduction :

Bacterial vaginosis (BV) is a major public-health problem among pregnant women due to its sequelae and adverse effects on pregnancy and pregnancy outcomes. BV is a change in vaginal ecosystem, where the normally dominant Lactobacilli are greatly reduced and replaced with a number of other microorganisms, predominantly anaerobic flora, such as *Gardnerella vaginalis* , *Mycoplasma hominis*, *Mobiluncus* spp., *Bacteroides* spp. and *Peptostreptococcus* spp. Both anaerobes and *G. vaginalis* are normal inhabitants of the vagina, but overgrowth of the normal lactobacillus-dominant flora by these bacteria results in BV (1).

BV is the most prevalent form of vaginal disturbances in women of childbearing age (2). It is an extremely prevalent vaginal condition and the first cause of vaginitis among both pregnant and nonpregnant women (3). It is a polymicrobial, superficial vaginal infection involving a reduction in the amount of hydrogen-peroxide producing Lactobacilli and an overgrowth of anaerobic and facultative anaerobic organisms (4, 5) .

There are no population-based surveys of BV have been conducted in Yemen. The present study was the first in Yemen to determine the prevalence of BV and to identify the possible risk factors associated among pregnant women attending to private and public clinics in Hadhramout Governorate-Yemen.

Materials and Methods :

This was a cross-sectional study; it was conducted in private and public obstetrics and gynecology clinics in Hadhramout Governorate in the period from May to November 2016. Nine hundred and fifty pregnant women were examined for BV.

Patients, who presented with a complaint of vaginal discharge, were made a pelvic examination and vaginal specimens were collected for laboratory testing. Three vaginal swabs were taken from each patient.

The first swab was used for direct wet mount microscopy for presence of clue cells (vaginal epithelial cells heavily coated with bacilli), detection of fishy odour (whiff test) when mixed with 10% potassium hydroxide preparation, and vaginal pH determination by placing the vaginal discharge on indicator paper for pH range 4.0 to 6.0.

The second swab was rolled onto a slide for Gram staining; The Gram stain was counter stained with safranin and evaluated by the method of Spiegel et al. (7). A vaginal swab is obtained, spread on a glass slide, air dried, and later Gram stained examined for vaginal flora categories using the Nugent's method (8). The amount of three different bacterial morphotypes (i) large Gram-positive rods (indicative of *Lactobacillus* spp), (ii) small Gram-negative or variable rods (indicative of *Gardnerella*, *Bacteroides* and other anaerobic bacteria), and (iii) curved, Gram-variable rods (indicative of *Mobiluncus* spp). Scores between 0 and 3 represent normal vaginal flora, between 4 and 6 intermediate vaginal flora, and scores between 7 and over indicating a case of BV

The third vaginal swabs were cultured onto chocolate agar, and blood agar, *G. vaginalis* cultures recovered from the third and fourth streak zones on an agar plate were considered significant (9).

Ureaplasma(U.) *urealyticum* and *Mycoplasma hominis* were cultivated in urea broth and arginine broth and incubated at 35°C in 5% CO₂ atmosphere until growth. *U. urealyticum* cultures were considered as significant when the colony count was more than 10⁴ ccu/ml. All smears were interpreted by microbiologists without knowledge of the clinical examination or of the bacterial isolation.

The history, clinical data recorded included: age, educational level, parity and obstetric history .

Diagnosis :

In clinical practice BV is diagnosed using the Amsel criteria (6). At least three of the four criteria are present for the diagnosis to be confirmed. (a) Thin, white, homogeneous discharge. (b) Clue cells (vaginal epithelial cells heavily coated with bacilli) on microscopy. (c)

pH of vaginal fluid >4.5 . (d) Release of a fishy odor on adding alkali (10% potassium hydroxide).

Data were analyzed using SPSS statistical software. All statistical tests were 2-sided and a P value < 0.05 was considered as significant.

Results :

Three-hundred and seventy two (39.2%) of nine hundred and fifty pregnant women with abnormal vaginal discharge were positive for bacterial BV (Table 1). Table 2 showed that, the most common isolated microorganism was Ureaplasma urealyticum and Gardnerella vaginalis, which represented 96% and 59.4% in all BV cases, respectively .

However, it was most prevalent among pregnant women within the age group 31-40 years and this constitutes 41.9% of the total 372 patients positive for BV. The highest infected women were from the primary school (55.6%) and in 78% in woman who has never borne a child (Table 3).

Three-hundred and twenty six of the three-hundred and seventy two in the first trimester had BV (87.6%) while less observation was made with 11.3% and 1.1% of the women in second and third trimesters respectively (Table 4).

Table 1: Clinical sings in the pregnant women with and without bacterial vaginosis

Clinical signs	Bacterial vaginosis				P-value
	Vaginosis (No = 372)		No vaginosis (No = 578)		
	No.	%	No.	%	
Vaginal thin, white, homogeneous discharge	372	100	21	3	< 0.005
Presence of clue cells	198	53	0	0.0	< 0.005
Vaginal fluid pH > 4.5	372	100	578	100	< 0.005
Fishy odor after adding potassium hydroxide	356	96	135	23.4	< 0.005
Three of the above four clinical signs	372	-	21	-	-

Table 2: Microorganisms associated with bacterial vaginosis among pregnant women

Microorganisms	No.(372)	%
Gardnerella vaginalis	355	95.4
Facultative Lactobacillus spp	257	77.2
Coagulase-negative staphylococci	165	44.4
Viridans group streptococci	132	35.5
Bacteroides spp.	288	77.4
Ureaplasma urealyticum	357	96.0
Mycoplasma hominis	286	76.9

Table 3: Analysis of risk factors and its correlation with bacterial vaginosis among pregnant women

Percentage (%)	BV positive N= 372	Variable
Age group (years)		
23.9	89	<20
17.7	66	20-30
41.9	156	30-40
13.2	49	40-50
3.2	12	>50
Education level		
23.9	89	Illiterate
55.6	207	Primary school
20.4	76	Secondary school
Parity		
78.0	290	Nullipara
15.9	59	Unipara
6.2	23	Multipara

Table 4: Distribution of bacterial vaginosis related with period of gestation

Period	No. (372)	%
1 st trimester	326	87.6
2 nd trimester	42	11.3
3 rd trimester	4	1.1

Discussion :

BV is one of the most common genital tract infections among reproductive age group. The prevalence of BV varies from country to country even in the same country it varies among populations of interest. Different social and sexual factors can contribute to the development of this infection (10).

BV was diagnosed in 372 women (39.2%) and other different studies suggest the prevalence of BV among women is 5-30 % (11). This might be due to immunosuppression and microbial colonization of vagina due to increased circulating estrogen and deposited glycogen in the vagina during pregnancy (12).

Our results is similar to the study in Iran, where the BV was diagnosed in 37.7 % among the pregnant women (13), less than that reported from northern Iran (61.7%) (14), but nearly similar to findings of studies in Jordan (15), and in Indonesia (16), where the BV was 29.7 % and 32.5 % respectively. In contrast to the present study, lower prevalence of BV was reported in the United Kingdom (17) 12% of pregnant women, 30% of women undergoing termination of pregnancy (18).

We used diagnostic test involves a Gram stain of vaginal fluid and use of Nugent criteria to identify a case of BV. This method has been shown to have a high sensitivity and specificity compared with Amsel criteria, 89 % and 83 %, respectively (19,20).

BV is mostly present without sign and symptoms. The most common clinical sign and symptoms of BV is thin white or gray homogenous vaginal discharge with or without unpleasant smell. The smell of the discharge mostly noticed after sexual intercourse (21). In the current study, we found that 39.2% of participants who were diagnosed positive for BV by thin, white, homogeneous discharge, Clue cells, pH of vaginal fluid >4.5 and release of a fishy odor on adding alkali (10% potassium hydroxide) (Table 1). This result is consistent with other studies done in different countries (22). Mengistie et al. (10) found that the presence of abnormal vaginal discharge ($p = 0.01$) and unpleasant smell ($p = 0.005$) were reported vaginal symptoms associated with BV.

The Gram stain result of 578 (60.8 %) study participants classified as normal, and 372(39.2%) were diagnosed as positive for BV by Nugent's method (Table 2) and our result showed of all the organisms, *G. vaginalis* as essential markers for the diagnosis of BV. This was in agreement with studies carried out by Burton et al. and O'Brien (23, 24 .(

In our study, BV was most prevalent among the nullipara (78 %) and pregnant women within the age range of 31-40 years (41.9 %). This observation was in line with the findings of Gergova et al. (25) but it differs from Awoniyi et al. (26), who showed the most prevalent among pregnant women within the age group 20-25 years and the mean age of the study by Mengistie et al. participants was 27.6 (± 4.7) years and among (63.9%) multigravida pregnant women (10 .(

The majority of infected women had primary school level (55.6%). Chimbatata (27) showed the majority of the participants 48% (n = 362) had 12 years or more of schooling, followed by those who had less than 12 years of schooling, 43% (n = 320) and then those who did not go to school.

In our study, the high distribution of BV related with the first trimester of gestation (87.6 %) and the low percentage (1.1 %) of the third trimester. On the other hand, similarly observation that high distribution of BV with the first trimester (36.7%) of pregnant women, while it was made with 3.3% of the women in third trimesters (26.(

Conclusion and recommendations:

In conclusion, high rate of BV among pregnant women attending private and public obstetrics and gynecology clinics demands adequate attention to prevent BV-associated complications in pregnancy and also reduce referrals that may ensue from such complications .

Therefore, we recommend as follows: Pregnant women attending obstetrics and gynecology clinics should be screened routinely for BV to avoid infection sequelae. Adequate laboratory facilities should be provided and laboratory personnel should be trained for the diagnosis of BV. This will aid prompt and adequate diagnosis of BV in pregnancy.

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