

Bacterial Vaginosis in Pregnant Women Receiving Care at Maxixe Health Centre

Izaidino Muchanga^{1*}, Célio Alfredo¹, Guido Nchowela¹, Rey Candido¹, Baivo Neves¹, Arnaldo Cumbane² and Hilário Massango³

¹Faculty of Health Sciences of the Pedagogical University of Mozambique

²Inhambane Secondary School February 3

³Secondary School of Pande of Guvuro District, Inhambane

*Corresponding author

Izaidino Muchanga, Faculty of Health Sciences of the Pedagogical University of Mozambique, Portuguese, E-mail: izaidino@yahoo.com

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Abstract

Bacterial Vaginosis is a vaginal infection that occurs when there is a change in the balance of the vaginal flora with vaginal discharge, which may or may not have a characteristic smell, a decrease in vaginal pH, and it is one of the most common public health problems in Sub-Saharan African countries in women in reproductive age. Premature birth, underweight newborns and increased risk of HIV infection are some of its consequences. In Sub-Saharan countries like Mozambique, the real prevalence of this infection is almost unknown.

Thus, this study was developed with the aim of analyzing the prevalence of bacterial vaginosis in pregnant women receiving care in the Maxixe City Health Centre (CSM) and identifying the risk factors associated with it. 253 samples of pregnant women attending prenatal external consultations at CSM were used in this study. Samples of vaginal exudate were obtained, stained by the Gram method and observed microscopically using the Nugent method to identify the bacterial vaginosis.

The prevalence of bacterial vaginosis was 12, 3%, and the highest prevalence was recorded in the age group of 15-24. In this population, the inconsistent use of condom in sexual intercourse and multiple partners may be the risk factors in acquiring this infection. Therefore, it is concluded that the knowledge of etiology, correct diagnosis and appropriate treatment of bacterial vaginosis may contribute to a more comprehensive prenatal examination, aiming to reduce the rates of bacterial vaginosis and its consequences in pregnancy.

Keywords: Bacterial Vaginosis, Prevalence, Pregnant Women.

Introduction

Bacterial Vaginosis is a syndrome characterized by the decrease of vaginal pH, vaginal discharge, and may or may not have a characteristic smell and is one of the most common public health problems in sub-Saharan African countries in women in reproductive age [1-4]. Microbiologically, bacterial vaginosis is characterized by a decrease in *Lactobacillus spp* which make part of the normal microbial population of the female genital tract and an increase in *Gardnerella vaginalis*, *Bacteroides spp.*, *Mobiluncus spp.* e *Mycoplasma hominis* [5,6].

Usually, the diagnosis of bacterial Vaginosis in women in many sub-Saharan countries is based on the presence of vaginal discharge, the most common symptom in the syndromic approach (i.e. treatment of signs and symptoms of diseases based on common microorganisms responsible for vaginal discharge) [3,7].

Bacterial vaginosis although may arise and disappear naturally, it is sometimes associated with the frequent sexual activity, and it is not considered a sexually transmitted infection [8]. Excessive use of vaginal washing, with elimination of vaginal lactobacillus, is

another risk factor associated with this pathology [1,6]. Although this infection usually presents higher prevalence in women with multiple sexual partners, and in those with a new sexual partner (if condom is not used). However, women who have never been sexually active can also be infected [9,10].

The interest on early diagnosis and treatment of bacterial vaginosis is not only due to the fact that it is an infection caused by pathological agents but also in its possible correlation with increased transition and acquisition of HIV infection [11-13]. Bacterial vaginosis, apart from being co-factor for the acquisition of HIV infection it may also be associated with the acquisition of other STIs [14,15].

Information on the prevalence of bacterial vaginosis in pregnant as well as non-pregnant women in Mozambique is scarce and it is known that, as with the other STIs, these are co-factors of HIV infection [16,17]. Bacterial vaginosis during pregnancy may have drastic consequences such as considerable discomfort, which can lead to termination of pregnancy, low birth weight and increased child mortality [9,13]. A study aiming to determine the prevalence of STIs in women attending family planning clinics in Mozambique was carried out in 2003, detected 64% of cases of bacterial vaginosis [16].

A study conducted in 2011 in Maputo aiming to determine the etiology of STIs had a prevalence of 45% of bacterial vaginosis and the other one also carried out in Maputo in 2008 with the objective of determining the prevalence of sexually transmitted infections (STIs) in a group of young women attending the *Service Amigável de Adolescentes e Jovens* (Friendly Service of Adolescents and Young People) was 12.9% [18,19].

In prenatal consultations in the Maxixe Health Centre, the diagnosis of bacterial vaginosis, candidiasis, trichomoniasis, among others, is based on the syndromic approach; medical therapy is performed when there are symptoms and signs of these infections, according to the scheme of that approach [16,20]. In the world, the most common cause of vaginal infection in women of childbearing age is bacterial vaginosis, being bacterial vaginosis (BV), candidiasis and trichomoniasis responsible for 90% of cases of vaginitis [5,21]. Vaginitis can cause different types of morbidity in women, especially during reproductive age, particularly during pregnancy, such as abortion and stillbirths [21,22].

Throughout the history of public health, maternal and child care is considered as a priority area and remains a field of special and intense concern, with emphasis on increasing care during pregnancy [23].

In pregnancy there is an increase in the incidence of pathologies, since the woman's organism is adapting to the new changes coming from the fetus, being one of the most common complaints, vulvovaginitis, highlighting bacterial vaginosis. Several authors point to this infection as the main cause of complications in pregnancy, such as: prematurity of the fetus, low birth weight, premature rupture of membranes and puerperal infection [24].

The only strategy to avoid all complications mentioned above is care during pregnancy, that is, in prenatal consultations [25,26]. Prenatal care is the systematic and careful evaluation and follow-up of the pregnant patient, in order to ensure the best possible health conditions for the mother and the fetus.

Since this problem is the main cause of complications such as premature childbirth, permanent rupture of the membranes, prematurity and low birth weight, it was necessary to develop this study in order to contribute to the health promotion of women and children.

The study was developed with the aim of analyzing the prevalence of bacterial vaginosis, risk behaviours associated with this infection in pregnant women receiving care in the Maxixe City Health Centre.

Material and Methods

This study was transversal and the populations included were pregnant women attending prenatal external consultations at Maxixe Health Centre, located in Maxixe City, Inhume Province, Southern region of Mozambique, from January to April 2016. The Protocol of the research was approved by the National Bioethics Committee for Health of the Ministry of Health of Mozambique (CNBS) on November 26, 2015.

At the place of study, in accordance with the approved protocol, and prior to the application of the questionnaire, the interviewer explained to each of the participants the objectives of the study, mentioning the confidentiality principles and reassuring them about

any apprehensions regarding the dissemination of their answers. Each participant was informed that her identity would not be related to the information provided and that it would be only used for the purpose of the study, and that they would give up answering the questionnaire or asks to be withdrawn from the study at any time with no reprisal for the attitude they would take. In order to preserve the privacy of the participants, the questionnaire and the samples collected were coded and the key of correspondence code given to the nurse responsible for the maternal and child health centre sector. Participants who did not speak Portuguese were also explained about the objectives of the study, and explained the whole process and informed consent in their local language by the principal investigator, since he speaks local languages.

The inclusion criteria for the study were as follow: pregnant women attending prenatal consultations at Maxixe Health Centre, who, after being clarified the objectives of the study, voluntarily adhered to, i.e. they agreed to participate in the study and signed freely informed consent.

The exclusion criteria were met by participants who did not meet the inclusion criteria, suffer from psychiatric disorders that implied the impossibility of responding the interview and who did not have a legal representative for cases of participants under the age of 18.

Women who took part in the study had a Semi-structured interview to obtain sociodemographic data on knowledge of bacterial vaginosis and risk behaviors in relation to this infection.

There was carried out the vaginal exudate to all pregnant women included in the study, this was done by the pregnant women themselves (pick-your-own), using a simple Swabs, following the explanation of the principal investigator.

From the vaginal exudate collected with a simple swab was performed a smear on a blade to stain using the Gram's technique. The collection of vaginal exudate was aimed to the diagnosis of bacterial vaginosis in the laboratory of Maxixe Health Centre.

The laboratory results obtained in the tests were sent to the head of Maternal and Child Health Centre, after the identification of the participant being added to her clinical record, the necessary subsequent legal procedures were carried out.

Bacterial Vaginosis

The laboratory diagnosis of bacterial vaginosis was performed by the Nugent method, from the blade containing the vaginal smear, stained by the Gram technique and observed under an optical microscope with a 100X immersion objective.

The structures visualized were quantified (Table 1) from 1 to 4+, and being evaluated the reduction of lactobacillus, and the predominance of coccus bacillus of variable Gram staining type *Gardnerella vaginalis* and or curved bacillus type *Mobiluncus* spp. For each morph type, the corresponding value was verified in Table 2 [6]. The individual score for each of the four morph types was added, obtaining the total score with the following interpretation: normal flora (0-3), intermediate flora (4-6), and bacterial vaginosis (7-10). For the Nugent Method, the morphotypes are classified as to 0 to 4+, depending on the number observed by the optical field, which is then converted to score:

- 0: no morphotypes;
- 1+: < A morphotype;
- 2+: 1 to 4 morphotypes;
- 3+: 5 to 30 morphotypes;
- 4+: 30 morphotypes.

Table 1: Modified Nugent’s Criteria for Diagnosis of Bacterial Vaginosis

| Lactobacillus sp. | SCORE parcial | G. vaginalis ou Bacteroides sp. | SCORE parcial | Mobiluncus sp | SCORE parcial |
|-------------------|---------------|---------------------------------|---------------|---------------|---------------|
| 4+ | 0 | 0 | 0 | 0 | 0 |
| 3+ | 1 | 1+ | 1 | 1+ ou 2+ | 1 |
| 2+ | 2 | 2+ | 2 | 3+ou 4+ | 2 |
| 1+ | 3 | 3+ | 3 | | |
| 0 | 4 | 4+ | 4 | | |

- 0-3: Normal Flora
- 4-6: Intermediate Flora
- 7-10: Bacterial Vaginosis

Data analysis

The data were analyzed using statistical package SPSS (Statistical Package for the Social Sciences) version 22 and the excel program 2010 was also used.

Results

In this study, 303 users of Maxixe Health Centre were invited to participate. However, only 253 were included because 36 were under the age of 18 and were not accompanied by someone who would sign the informed consent and 14 did not agree to participate, claiming that they were not authorized by their partners to do so. Altogether, 50 users were excluded from the study.

Regarding age, all the participants answered that question, being their ages between 17 and 41 years. The mean age was 24,8, with a standard deviation of 5,4, median of 24 and mode of 18 years. However, considering all the participants, even those not included in the study, it was observed that 69/303 (22.8%) of users were aged 18 or under.

A total of 253 samples of pregnant women were analyzed, of which 120/253 (47, 4%) had normal flora, 102/253 (40, 3%) had intermediate flora and 31/253 (12, 3%) were described with bacterial Vaginosis (Chart 1).

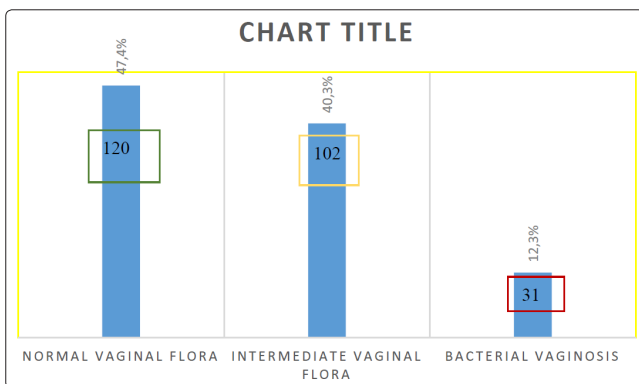


Chart 1: Classification of Bacterial Vaginosis according to Nugent method

Data on the age of the participants were grouped into three groups, according to the classification of the National Institute of Statistics, 15-24, 25-34 e 35-44 (Table 2) [17,27]. The age group corresponding to the majority of cases of Bacterial vaginosis was 15-24 years, followed by 25-34, with 18/31 (58, 1%), 11/31 (26, 7%), respectively. In another age group of 35-44, 2/31 (6, 4%) cases of Bacterial Vaginosis were observed.

Table 1: Prevalence of Bacterial Vaginosis by age groups

| Age group (years) | Total Number | Number of participants with Bacterial Vaginosis | Prevalence (%) |
|-------------------|--------------|---|----------------|
| 15-24 | 152 | 18 | 58,1% |
| 25-34 | 63 | 11 | 35,5% |
| 35-44 | 10 | 2 | 6,4% |
| Total | 253 | 31 | 100% |

From the analyzed samples, the largest number of participants was in the third trimester of pregnancy, although the majority of the cases of bacterial vaginosis occurred in the second trimester of pregnancy with a higher prevalence of 17/31 (54.8%), followed by the third trimester (31.5%) and first trimester (3/3) (9.7%), respectively (Table 2).

Table 2: Prevalence of Bacterial Vaginosis by gestational age in trimesters

| Gestational age in Trimesters | Total Number | Number of participants with Bacterial Vaginosis | Prevalence (%) |
|-------------------------------|--------------|---|----------------|
| 1 st | 25 | 3 | 9,7% |
| 2 nd | 104 | 17 | 54,8% |
| 3 rd | 124 | 11 | 35,5% |
| Total | 253 | 31 | 100% |

Participants were asked about their educational levels, and it was found that most of the pregnant women who had bacterial vaginosis had secondary education 19/31 (61, 3%), followed by those who had primary education, 8/31 (25, 8%), 3/31 (9, 7%) no education and finally 1/31 (3, 2%) had higher education (Table 3).

In this same group of pregnant women with bacterial vaginosis, it was observed that more than the half 18/31 (58, 1%) sometimes used condoms in their sexual intercourse, 10/31 (32, 2%) had never used a condom in their sexual intercourse and the remaining 3/31 (9, 7%) did not answer this question (Table 3).

Pregnant women were asked about the number of partners their hand in the last six months; on the basis of these data, it was found that from those who had bacterial vaginosis, the majority had only one partner with whom they had sexual intercourse 23/31 (74, 2%), 6/31 (19, 4%) reported having had 2 partners in the referred period and 2/31 (6, 5%) had more than 3 partners (Table 3).

Regarding spontaneous abortion 25/31 (80, 6%) of the participants answered that they have never had it, 5/31 (16, 1%) referred to have had a spontaneous abortion and 1/31 (3, 2%) reported more than two abortions (Table 3).

Table 3: Prevalence of bacterial vaginosis in pregnant women with different educational levels of, condom use, number of partners and spontaneous abortions

| Level of education in Pregnant women with Bacterial vaginosis | | | |
|---|-----|----|--------|
| No education | 11 | 3 | 9,7% |
| Primary education | 77 | 8 | 25,8% |
| Secondary education | 150 | 19 | 61,3% |
| Higher education | 15 | 1 | 3,2% |
| Total | 253 | 31 | 100,0% |
| Use of condoms in Pregnant women with Bacterial vaginosis | | | |
| Sometimes | 146 | 18 | 58,1% |
| Never | 105 | 10 | 32,2% |
| No answer | 2 | 3 | 9,7% |
| Total | 253 | 31 | 100,0% |
| Number of partners in Pregnant women with Bacterial vaginosis | | | |
| One | 208 | 23 | 74,2% |
| Two | 33 | 6 | 19,4% |
| More than two | 12 | 2 | 6,4% |
| Total | 253 | 31 | 100,0% |
| Number of spontaneous abortion in Pregnant women with Bacterial vaginosis | | | |
| Zero | 222 | 25 | |
| one | 21 | 5 | 16,2% |
| Two | 10 | 1 | 3,2% |
| Total | 253 | 31 | 100,0% |

Table 4 lists the symptoms reported by pregnant women with bacterial vaginitis: 12/31 (38, 7%) reported vaginal discharge, 2/31 (6, 5%) vaginal discharge and pruritus, 5/31 (16, 1%) vaginal burning and pruritus, dysuria, 5/31 (16, 1%) all the symptoms, respectively, while 2/31 (6, 5%) reported no symptoms.

Table 4: Association between bacterial vaginosis and symptomatology

| Symptoms | Bacterial Vaginosis | (%) | Total |
|--|---------------------|------|-------|
| Vaginal discharge | 12 | 38,7 | 31 |
| Pruritus and vaginal discharge | 2 | 6,5 | |
| Vaginal burning and pruritus | 5 | 16,1 | |
| Vaginal discharge, pruritus, vaginal burning and dysuria | 5 | 16,1 | |
| Dysuria | 5 | 16,1 | |
| No symptoms | 2 | 6,5 | |

Discussion

Bacterial vaginosis has a direct correlation with premature childbirth, premature membrane rupture, low birth weight, abortions, fetal death, and stillbirths requiring effective preventive and therapeutic strategies to avoid these complications [15]. On the other hand, bacterial vaginosis is associated as co-factor in the acquisition of STI and HIV, being a public health problem like other vaginitis [12,15].

In many places in Mozambique bacterial vaginosis is treated

using the syndromic approach [16]. The syndromic diagnosis is advantageous due to the quickness care to a greater coverage of the basic health system, since it does not need laboratory equipment [28]. On the other hand, it is disadvantageous since it is expensive because of the amount of medicine needed to treat all the possible causes of symptoms and signs of vaginal infections and it does not cover asymptomatic women [16]. During pregnancy, the presence of vaginal discharge is common and is mainly due to hypertrophy of the vaginal epithelium with the increase of cells containing glycogen [29].

There is also, without necessarily being an infection, a greater vulnerability to vaginal infections, for example, candidiasis [30].

The syndromic treatment does not differentiate these situations, so whenever possible, the laboratory diagnosis of these infections should be carried out, or if it is not possible, a combination of microscopy and a syndromic approach should be done [3].

In the present study, the mean age was 24.8. Regarding the mean age, this was consistent with the most of the studies that evaluated the prevalence of bacterial vaginosis in pregnant women and its association with sociodemographic factors, in which the mean age ranges from 20 e 30 years [31]. However, a study conducted in Maputo by Melo et al (2008) to investigate HIV infection and other STIs, the mean age of the studied population was 19 years. The study carried out by Melo and his collaborators was done in the health service for adolescents and young people. In this service are attended adolescents of ages that go until 24 years.

The prevalence of bacterial Vaginosis in this study was 12.3%. When comparing the prevalence of this study with those obtained in other investigations carried out in Mozambique, it was observed that it is lower. It is important to emphasize that in this study, the prevalence was lower than that obtained in the study conducted by Kirkcaldy et al, 2011 in Mozambique, yet the same study was performed in pregnant women with symptoms of vaginal discharge [32].

In a study conducted in Mozambique in the cities of Maputo and Xai-Xai by Kirkcaldy et al, 2011, in 106 samples of pregnant women with vaginal discharge was found a prevalence of 64% and 44, 3%, respectively. Other studies conducted in Nigeria by Ekanem et al, 2011, in Tanzania by Msuya et al, 2009 and in Botswana by Romoren et al, 2007, there were found prevalence of 6, 8%, 20, 9 and 38%, respectively [33,34].

A study conducted in Nigeria in 2017 showed a prevalence rate of 40, 1% among 212 pregnant women, which was very high compared to that found in this study. In another study also carried out in Nigeria in 2015, a prevalence of 33, 3% of bacterial vaginosis was reported in a sample of 150 pregnant women, in Mwanza, Tanzania was shown a prevalence of 28, 5% of bacterial vaginitis in 283 women [35-37]. Another study carried out in Zimbabwe had a prevalence of 36, 2% of bacterial vaginitis in 691 pregnant women, in Gaborone, Botswana, there was a prevalence of 38% in 268 pregnant women evaluated [3].

The different levels of education of the participants and their frequencies were analyzed; the largest number of participants had the secondary level, 61, 3%. These observations were similar to those reported in pregnant women in several studies conducted in

Nigeria by Etukumana et al, (2010) and in Botswana by Romoren et al, (2007). However, in another study on prevalence of bacterial vaginosis and factors associated with pregnant women by Shayo et al, (2012), the number of participants with primary level was the majority.

Regarding the number of sexual partners in the last two years, it was observed that the majority (74, 2%) of the participants with bacterial vaginosis reported having had only one sexual partner.

Although the largest number of these participants claimed to having had only one sexual partner, 25, 8% admitted to having had more than one sexual partner in the above mentioned period on which 6, 4% had more than two sexual partners. Yet INSIDA, a study conducted in 2009 in Inhambane province found that 2% of women had multiple partners, although this study did not cover women and men as a whole. In another publication on this subject in pregnant women, most participants reported having had more than one sexual partner.

Concerning the use of condoms in sexual intercourse, the majority of the participants stated that they used it at times, 58, 1% and others never used it, 32, 2%. The greater vulnerability of this gender continues to be more worrying [38]. Although the pointed out cause is often the lack of information, cultural causes, beliefs, customs and rituals which are very difficult to penetrate and influence by several factors, must also be taken in to account [39,40].

The lack of collaboration from partners who do not accept condom use should also be considered [41]. On the other hand, a study by Silva e Andrade (2005) the majority of women are simply waiting for the man to take the indicative to propose condom use, since they feel they do not have the power to do so. Mozambican women have been taught since menarche to obey their partner's wishes and demands and, according to national statistics, the fact that women are the majority among illiterate people, without work and they are poor, increases their vulnerability [3,17,42].

In the present study, it was observed, on one hand, that pregnant women with bacterial vaginosis had mostly only one partner with whom they had sex, some of them had more than one partner and, on the other hand most of them had never used a condom in their sexual intercourse and, the minority confirmed the use of condom but occasionally. It is believed that these factors are directly linked to the high prevalence of bacterial vaginosis in pregnant women who participated in the study.

In their study, Marçalo & Beirão (2018) relate bacterial vaginosis to factors often associated with the frequency of sexual activity, since there is a higher prevalence in women with multiple sexual partners and in those who have a new sexual partner (if condom is not used). There is also an increased risk in women who have sex with other women although it is not very explicit. However, women who have never been sexually active may also be infected since bacterial vaginosis may be spontaneous, they still point out the presence of other STIs (trichomoniasis, gonorrhoea, herpes infection or HIV infection) associated with an increased risk of bacterial vaginosis, as well as excessive use of vaginal washing, with the elimination of vaginal lactobacillus [10]. Although sexual intercourse with multiple partners is a risk factor for acquisition in this study the multiple partner relationship was not found, since most pregnant women

with bacterial vaginosis had only one sexual partner.

The vast majority of cases of bacterial vaginitis were associated with various symptoms such as vaginal discharge, vaginal discharge and pruritus, association of all symptoms and dysuria. Only two cases reported no symptoms. In some studies in pregnant women in other countries the correlation between the presence of vaginal discharge and the diagnosis of bacterial vaginosis was low.

In contrast in this study, 38, 7% of the participants diagnosed with bacterial vaginosis mentioned vaginal discharge. Taking into account these results, the syndromic approach would not only detect and treat 6, 5% of the participants without any symptoms.

In this study there was a higher prevalence of bacterial vaginosis in pregnant women in the second and third trimesters of pregnancy, 54, 8% e 35,5% respectively [43]. Cauci et al (2005) report that women in the second and third trimester of pregnancy are at higher risk of developing bacterial vaginosis and possible premature birth due to synergistic interrelationships between the virulence factors produced by the bacteria present in the altered vaginal micro biota, with consequent increase of the risk of adverse gestational outcomes.

There are few studies on the impact of bacterial vaginosis in pregnant women in developing countries. Bacterial vaginosis was associated with premature birth in a prospective study in Indonesia, especially when diagnosed early in the second trimester of pregnancy between 16 and 20 weeks of gestation.

In this study, only 19, 4% of the participants reported that they have already had spontaneous abortions, given that some vaginal infections such as bacterial vaginosis among others, have a direct correlation with spontaneous abortions, if not treated, it will need effective preventive and therapeutic strategies to avoid such complications [15, 40-48].

Conclusion

Bacterial vaginosis stands out among changes in the vaginal microbiota as the main cause of vaginal discharge. The incidence of bacterial vaginosis is high worldwide, both in pregnant and non-pregnant women. The diagnosis of this infection is especially important during pregnancy, since this infection has been associated to the increased rates of pregnancy complications. The number of women with asymptomatic bacterial vaginosis who reported no symptoms was 6, 5%. Taking in to account the WHO recommendation on syndromic approach is followed in Mozambique; all asymptomatic ones would be left untreated. This can lead to serious consequences during pregnancy and for the newborn as well as facilitating the transmission of HIV.

The prevalence of bacterial vaginosis in the population studied was high, but when compared with other parts of Sub-Saharan Africa, this number is reduced and mainly for the most infected group that is between 15-34 years of age. However, this prevalence is considered to be high since bacterial vaginosis has serious consequences in pregnancy. In addition, bacterial vaginosis is directly associated with other factors such as multiple sexual partners and unprotected sex although it may occur in women who do not yet have active sexual life.

The highest number of women of this study had secondary education.

This may be due to the fact that this population lives in an urban area, where the opportunities of education are higher. Their educational level may be the basis of the knowledge demonstrated about the importance of the use of condoms in sexual intercourse. The fact that most of them do not use condoms consistently may be linked to the greater submission to their sexual partners.

The treatment as well as the screening of women with asymptomatic bacterial vaginosis has been a challenge for the national health system, so the best way to diagnose it is the syndromic approach.

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