

Bacterial vaginosis, candidiasis vaginalis and trichomoniasis vaginalis among pregnant women seeking routine care in Tirana, Albania

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Abstract

Aim: Our aim was to determine the prevalence of bacterial vaginosis (BV), candidiasis vaginalis (CV) and trichomoniasis vaginalis (TV), and their associated factors in Albania.

Methods: This was a cross-sectional study involving 390 pregnant women showing up for routine care at the premises of Woman’s Center of University Obstetric-Gynecologic Hospital “Koço Gliozeni” during 2012-2015 in Tirana, Albania. Basic socio-demographic variables, number of sexual partners, history of abortion, personal hygiene status and vaginal douches data were retrieved for each participant. Vaginal secretions were collected and analyzed for the detection of BV, CV and TV. Prevalence rates were calculated. The association of BV, CV and TV with independent factors was evaluated using binary logistic regression, simultaneously adjusting for basic socio-demographic factors.

Results: The average age of participants was 26.6 years. The overall prevalence of BC, CV and TV was 21.8%, 37.7% and 1.5%, respectively. Upon adjustment for confounding effects, the prevalence of BV significantly increased with older age, lower education, unemployment, rural residence, a higher number of sexual partners, history of abortion and low personal hygiene. Conversely, CV significantly increased with older age, higher education and being employed, whereas TV significantly increased with increasing number of sexual partners, history of abortion and use of vaginal douche.

Conclusion: Basic socio-demographic factors, past sexual and reproductive history and personal hygienic practices of pregnant women might increase the likelihood of BV, CV and TV infection. Specific interventions targeting such high-risk groups could improve earlier detection and treatment of these infections.

Keywords: bacterial vaginosis, candidiasis vaginalis, prevalence, trichomoniasis vaginalis.

Introduction

The inflammation of vagina (vaginitis), usually accompanied by vaginal discharge, is common among women. Bacterial vaginosis (BV), candidiasis vaginalis (CV) and trichomoniasis vaginalis (TV) are amongst the most frequent causes of diseases characterized by vulvovaginal discharge (1-3).

Large studies among women suspected of suffering from vaginitis detected BV in about 40% (4,5) of them whereas TV and CV were detected in about a quarter of participants, each (4). Therefore, these etiologic factors account for up to 90% of vaginal discharge diseases among women (2-4).

Information about BV prevalence varies greatly, according to the population group studied, and is often not accurate as up to two-thirds of affected subjects are asymptomatic (6). BV has been diagnosed in up to one-fifth of ambulatory primary care gynecologic patients, up to one-third of pregnant women, up to 60% of STD clinics' patients, and approximately one third of females being treated for infertility (3,7). Different prevalence is reported from population based studies. For example, the National Health and Nutrition Examination Survey 2001-2004 among women aged 14-49 years old reported the prevalence of BV to 29.2% (8). Even though BV is associated with the acquisition of some sexually transmitted diseases (8,9), it is not considered a STD: treatment of sexual partners of females affected by BV does not yield additional benefits and even sexually inactive women may acquire it (10).

Candida species often colonize the lower genital tract in females (1,11). Almost every woman will develop at least one episode of vaginal yeast infection during their lifetime. The prevalence of CV also varies greatly, ranging from about 20% among asymptomatic students to about 40% of women with vulvovaginal symptoms (12) and up to 45% of women seeking medical care for genital infections in developing countries (13). However, data about CV prevalence are hard to be correctly interpreted due to the insecurities related to its

pathogenesis (14). Nevertheless, the factors that increase the risk of developing CV include: oral contraceptive use, early sexual activity, past gonococcus infection, presence of BV, diabetes, obesity, antibiotic use, use of immunosuppressive drugs and the like (15,16).

Trichomonas species represent the third most common cause of vaginitis (1). Trichomonas vaginalis is transmitted sexually and it might be isolated up to 80% of sexual partners of infected women (17). TV is associated an increased risk of acquiring other sexually transmitted diseases, including HIV infection (18). The prevalence of Trichomonas vaginalis varies from 3% to 5% in population based surveys (19,20) but it peaks to about 60% among women being treated for STDs (19). The prevalence of TV among women aged 14-49 years old in USA in 2001-2004 was 3.2% (20). In general, the prevalence of TV has been declining in developed countries. The factors that increase the risk of acquiring T. vaginalis infection include multiple sex partners, older age, low education level and vaginal douching (20).

BV, CV and TV are associated with various adverse health and pregnancy outcomes, when not timely detected and appropriately treated, ranging from spontaneous abortion, premature rupture of membranes, low birth weight, increased risk of acquiring other STDs, to increased frequency of abnormal Pap test results (21,22).

In Albania there is no information specifically about vulvo-vaginal infections characterized mainly by vaginal discharge. In the best of cases, various microorganisms colonizing the lower female genital tract have been studied but these studies have not addressed specifically diseases characterized by vaginal discharge and they have been conducted following different aims and objectives (23-26). Therefore, there is very limited information about the prevalence of BV, CV and TV. In addition, there is also scarce information about the factors associated with vulvo-vaginal discharge infections among pregnant women in Albania. In this context,

the aim of this study was to determine the prevalence of BV, CV and TV and factors associated with them among pregnant women attending routine care in Albania.

Methods

Study design, study population and sampling

A cross-sectional study was carried out among pregnant women showing up for routine care in the premises of Woman's Center of the University Obstetric-Gynecologic Hospital "Koço Gliozheni", in Tirana, Albania, during the period 2012-2015. Participating women were at different stages (trimesters) of their pregnancy.

Pregnant women of any age and at any stage of pregnancy were allowed to participate in the survey as long as they showed up for routine check-ups in the Woman's Center during the specified period of time (inclusion criteria). Those women under antibiotic treatment at the time of the survey as well as those having been engaged in sexual relations at least three days before the interview and taking of vaginal samples (exclusion criteria), were excluded from the survey.

In total, 390 women fulfilling the aforementioned inclusion and exclusion criteria were included in the survey.

Sample size was calculated using the WinPepi statistical software. Statistical significance was set at 5%, power of the study at 80%, and the acceptable difference was set at 5%. Using the above parameters and conservative assumptions regarding the prevalence of BV, CV and TV, produced a minimal sample size of 383 subjects. We decided to interview 390 subjects in order to increase the power of the study.

Consecutively, all women fulfilling the study participation criteria and willing to participate, were invited to join the study. During the study period, 47 women refused to participate. They were slightly older compared to participants. In these cases, we recruited the next appropriate candidate until we reached the target of 390 women.

Data collection

Data collection was carried out using a face-to-face questionnaire, regarding basic socio-demographic and other variables. On the other hand, vaginal samples were taken in order to study the presence of BV, Candida and Trichomonas species.

Basic socio-demographic factors included age, education, place of residence (urban, rural), employment status, trimester of pregnancy, number of previous sexual partners, history of abortions, personal hygiene status and history of vaginal douching.

Regarding the examination of vaginal secretions for the identification bacterial vaginosis, candidiasis vaginalis and trichomoniasis vaginalis, the procedures were as follows: from each woman two vaginal tampons were taken by medical staff specializing in the fornix, after explaining the details of the study and receiving the informed consent by them. A swab was used for the native examination of Trichomonas vaginalis secretion as well as filaments and mold cells, whereas the other swab was put into "trichomonas broth" (*T. vaginalis* specific terrain) and incubated at 37 degrees Celsius in microaerophilic jar.

For diagnosis of BV the microscopic bacterial lama was left to dry at ambient temperature, it was fixed in the alcohol lamp and stained by Gram. For determining the presence of BV the Nugent scoring system was used. In this system, a score of 7 to 10 was considered as bacterial vaginosis.

Statistical analysis

The absolute number and respective percentages were calculated and reported. Comparison of continuous variables was done using the student "t" test. Categorical variables were compared using the chi square test.

The association of various independent factors with the presence of BV, CV and TV was evaluated through the use of Binary Logistic Regression procedure, while controlling for confounding effects

of various independent variables.

Statistical Package for Social Sciences (SPSS), version 20, was used for analysis of the data.

Results

In total, 390 women fulfilling the participation criteria were included in the study. Mean age of study participants was $26.57 \text{ years} \pm 4.63 \text{ years}$ (Table 1). About 42% of participants had 8-years

and high school education, each. At the time of the survey around 48% of participants were unemployed and 45% resided in rural areas (Table 1). More than half of pregnant women under study declared to have had at least two sexual partners and 22% of them had a history of previous abortions (Table 1). Approximately one quarter of participants did not have good personal hygiene or had a history of using vaginal douches (Table 1).

Table 1. Characteristics of study participants

Variable	Absolute number	Percentage
Age (years) [mean\pmSD]	26.57 ± 4.63	
Age-group		
18-23 years	128	32.8
24-28 years	135	34.6
29-36 years	127	32.6
Education level		
8-years	164	42.1
High school	166	42.6
University	60	15.4
Employment status		
Employed	203	52.1
Unemployed	187	47.9
Residence		
Urban	213	54.6
Rural	177	45.4
Pregnancy trimester		
Trimester I	139	35.6
Trimester II	139	35.6
Trimester III	112	28.7
Previous sexual partners		
One	190	48.7
≥ 2	200	51.3
History of abortions		
No	305	78.2
Yes	85	21.8
Personal hygiene		
Good	205	74.2
Not good	185	25.8
Vaginal douche		
No	290	74.4
Yes	100	25.6
Total	390	100.0

The overall prevalence of BV, CV and TV was 21.8%, 37.7% and 1.5%, respectively (Table 2).

Tabela 2. Overall prevalence of bacterial vaginosis, candidiasis vaginalis and trichomoniasis vaginalis among study participants

Variable	Absolute number	Percentage
Bacterial vaginosis		
No	305	78.2
Yes	85	21.8
Candidiasis vaginalis		
No	243	62.3
Yes	147	37.7
Trichomonas vaginalis		
No	384	98.5
Yes	6	1.5

The association of BV, CV and TV with independent factors under study is presented in Table 3. After controlling for confounding effects of age, education, employment status and place of residence, the presence of BV is significantly higher among older women under study, those with lower education level, the unemployed, residing in rural areas, having two or more sexual partners in the past, having an abortion history and having not good personal hygiene, compared to respective counterparts (Table 3). The association of BV with age was positive and very strong (pregnant women aged 29-36 years are 9 times more likely to have BV compared to 18-23 years old women) and the association of education level was negative and strong as well (pregnant women with 8-years education are 6 times more likely to have BV compared to university education women) (Table 3).

Factors significantly associated with increased likelihood of CV presence are older age, higher education level and being employed, compared to respective counterparts. Older age was also strongly related with the presence of CV as pregnant women aged 29-36 years old were almost five times more likely to have CV compared to women aged 18-23 years old (Table 3).

The likelihood of TV is significantly higher only among those having two or more sexual partners

in the past (OR=11.9), having a history for abortion (OR=17.5) and using vaginal douches (12.2), compared to respective counterparts (Table 3).

Discussion

Our main objective was to determine the prevalence of bacterial vaginosis, candidiasis vaginalis and trichomoniasis vaginalis, and the factors associated with them, in a sample of pregnant women showing up for routine care in the Woman's Center of the University Obstetric-Gynecologic Hospital "Koço Gliozheni", in Tirana, the capital of Albania, during 2012-2015.

Our results indicated that the overall prevalence of BV, CV and TV in this sample of pregnant women was 21.8%, 37.7% and 1.5%, respectively. The prevalence of BV was significantly associated with almost all independent factors under study (except for the association with vaginal douche history); CV was significantly associated only with age, education and employment status and TV was significantly associated with the number of sexual partners, history of previous abortion and vaginal douches.

Compared to other local surveys, there are some differences which derive mainly due to the differences in study aims and population groups included, as explained in the introduction section. A study among 90 women in risk of premature

Table 3. Association of BV, CV and TV with independent factors under study; odds ratios (OR) from binary logistic regression

Variable	Presence of BV		Presence of CV		Presence of TV	
	OR* (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Age-group	<0.001		<0.001		0.721	
18-23 years	1.0 (reference)	(2) [†]	1.0 (reference)	(2)	1.0 (reference)	(2)
24-28 years	-	-	-	-	-	-
29-36 years	2.0 (0.9-4.0)	0.065	3.4 (1.8-6.2)	<0.001	2.6 (0.3-25.8)	0.421
	9.3 (3.9-22.1)	<0.001	4.9 (2.6-8.9)	<0.001	1.9 (0.2-22.3)	0.623
Education level	<0.001 (2)		0.002 (2)		0.891	
University	1.0 (reference)	-	1.0 (reference)	-	1.0 (reference)	(2)
High school	-	0.346	-	0.417	-	-
8-years	1.7 (0.5-5.3)	<0.001	0.8 (0.4-1.5)	0.003	0.6 (0.5-8.1)	0.733
	6.3 (2.1-19.3)	-	0.4 (0.2-0.7)	-	0.9 (0.1-10.3)	0.991
Employment status	1.0 (reference)	<0.001	1.0 (reference)	0.004	1.0 (reference)	0.253
Employed	-	-	-	-	-	-
Unemployed	5.1 (2.5-10.4)	-	0.5 (0.3-0.8)	-	0.4 (0.1-2.1)	-
Residence	0.001		0.556		1.0 (reference)	0.073
Urban	1.0 (reference)	<0.001	1.0 (reference)	-	-	-
Rural	-	-	0.9 (0.5-1.4)	-	7.8 (0.8-74.5)	-
Previous sexual partners	0.001		0.251		1.0 (reference)	0.036
One	1.0 (reference)	-	1.0 (reference)	-	-	-
≥2	3.2 (1.6-6.2)	-	0.7 (0.4-1.2)	-	11.9 (1.2-119)	-
History of abortions	1.0 (reference)	<0.001	1.0 (reference)	0.117	1.0 (reference)	0.019
No	-	-	-	-	-	-
Yes	12.6 (5.9-26.8)	-	1.5 (0.9-2.5)	-	17.5 (1.6-190)	-
Personal hygiene	<0.001		0.117		1.0 (reference)	0.841
Good	1.0 (reference)	-	1.0 (reference)	-	-	-
Not good	3.7 (1.9-7.2)	-	1.6 (0.9-2.7)	-	0.8 (0.1-6.2)	-
Vaginal douche	0.648		0.059		1.0 (reference)	0.001
No	1.0 (reference)	-	1.0 (reference)	-	-	-
Yes	1.2 (0.6-2.5)	-	1.7 (1.0-2.9)	-	12.2 (1.7-158)	-

* Odds Ratio (OR) and 95% interval confidence CI (in parenthesis). All ORs (and the respective p-values) presented in Table 3 are adjusted (controlled) simultaneously for age, education, employment status and residence.

[†] P-value and degrees of freedom (in parenthesis).

birth, the prevalence of BV according to Nugent score system was 12.2% (23), a figure lower than that reported by our study (21.8%). A case-control study in Fier city comparing premature with normal

labor activity women suggested that the overall prevalence of BV was 23.3% (very similar to that in our study), higher among cases (32%) than controls (15%) and that presence of BV was

associated with a significantly increased likelihood of premature birth (24). The prevalence of BV was reported at 47.5% by another study among 120 reproductive age women with signs and symptoms of lower genital tract infections (25). The much higher prevalence of BV in this case compared to our results is associated with the selection of the study subjects: women with lower genital tract infections (25). This study also detected significant associations of BV with age, socioeconomic status, previous births and non-hygienic practices (25), thus being very similar to our results. However, the estimates reported by our study are adjusted for a number of confounding effects. A large survey among 1482 women aged 18-40 years old reported the prevalence of BV at 38.5% (26). Also, this study detected the presence of *Candida albicans* in 47% of vaginal cultures under study (26). Another survey reported that *Candida albicans* was detected in 21% of 1125 vaginal samples of women suspected of having candidiasis vaginalis (27). The only local reference regarding the prevalence of trichomoniasis vaginalis comes from the study among 1482 women, which detected it in 19.8% of subjects (26), thus marking a formidable difference with our results (1.5%). The reasons of such discrepancy are not clear and need to be carefully addressed through future studies.

Previous studies reporting about BV, CV and TV in Albania have used different population groups and did not adjust for any potentially confounding effects. In this context, our study brings novel evidence about these issues.

On the other hand some of our results mimic those reported by international studies. The prevalence of bacterial vaginosis among pregnant women varies between 6% and 38% (28-30). Therefore the prevalence reported by our study (21.8%) is in accordance with international reports.

Also, the associations of BV with age (31,32) and education level (32), multiple sex partners (33) and previous abortion history (34) were also evidenced

by our survey. The association of BV with personal hygiene is controversial as some studies did not find a significant association (35,36), but other studies suggested a strong negative association with lower socioeconomic level (37) implying an important role of factors associated with personal hygiene as well, similar to our finding regarding this issue.

The prevalence of CV varies between 10% and 50% (28,38-41). In this context, the prevalence of CV found in our study (37.7%) is in concordance with that reported in international literature. As a matter of fact, pregnancy itself is a risk factor for CV due to the increase of glycogen level in vaginal tissues following the high concentration of reproductive hormones and creation of suitable conditions for the growth of *Candida* species (42). The association of CV with socio-demographic factors is controversial (28,40) and, similarly to our results, no significant association was found regarding personal hygiene and vaginal douches (38).

The prevalence of TV in general population ranges from 3% to 52% in developing countries and between 8% and 13% in developed countries (43). A study among pregnant women in Nigeria reported the prevalence of TV at 2% (28), very similar to our finding. Also, the association of TV with the increased number of sexual partners and history of previous abortion is supported by international literature (44-46) but the association with older age and lower education level was not present in our survey.

Conclusion

Bacterial vaginosis, candidiasis vaginalis and trichomoniasis vaginalis are quite common among pregnant women showing up for routine care in Albania, a finding which is similar to other developing countries. Some basic socio-demographic factors as well as the number of sexual partners, history of previous abortion and personal hygiene significantly increase the likelihood for the

presence of one or more of these infections in this population in Albania. Various interventions could target such high-risk groups in order to improve

their early detection and initiate the appropriate treatment to avoid the related adverse health outcomes.

Conflicts of interest: None declared.

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