

CONFLICT OF INTEREST: NONE DECLARED

ORIGINAL PAPER

# Association Between Aerobic Vaginitis, Bacterial Vaginosis and Squamous Intraepithelial Lesion of Low Grade

Mahira Jahic<sup>1</sup>, Mirsada Mulavdic<sup>2</sup>, Azra Hadzimehmedovic<sup>3</sup>, Elmir Jahic<sup>4</sup>Gynecology Clinic „Dr Mahira Jahic“ Tuzla, Tuzla, Bosnia and Herzegovina<sup>1</sup>Department of Microbiology, Polyclinic for Laboratory Diagnostics, University Clinical Center Tuzla, Tuzla, Bosnia and Herzegovina<sup>2</sup>Department of Gynecology and Obstetrics, University Clinical Center Tuzla, Tuzla, Bosnia and Herzegovina<sup>3</sup>Clinic for Cardiovascular Disease, Department of Interventional Cardiology, University Clinical Center Tuzla, Tuzla, B&H<sup>4</sup>

**G**oal: To determine frequency of HPV infection, aerobic vaginitis and bacterial vaginosis in respondents with squamous intraepithelial lesion of lower grade comparing to respondents with normal PAP test results. **Material and methods:** Prospective research of 100 respondents has been conducted at University-Clinic Center Tuzla and Gynecology and Obstetrics Department at Primary Health Care Center Tuzla in period from May 2011 until January 2012. Examination program included: anamnesis, clinical gynecological examination, HPV typization, microbiological examination of vaginal and cervical smear and PAP test. **Results:** High risk HPV group has been found more frequently among the respondents with LG SIL 46% (23) than in those with normal PAP result 14% (7)  $p < 0.05$ . Aerobic vaginitis has been found in the respondents with LG SIL in 28% (14) and there is statistically significant difference of this vaginitis comparing to the respondents with normal PAP result ( $p < 0.05$ ). Bacterial vaginosis has been found in 12% (6) of the respondents with LG SIL and in 4% (2) of those with normal PAP result which is not statistically significant. In women with LG SIL and aerobic vaginitis in 9 cases *E. coli* has been isolated, in 4 *E. faecalis* and in 1 *Staphylococcus aureus*, while in women with normal PAP test results 3 cases of *E. coli* have been isolated. Examining changes in pH value of vaginal environment, higher measured values have been found in the respondents with LG SIL- 5.26 while in the respondents with normal PAP test result was 4.94 ( $p < 0.05$ ). There is also statistically significant increase in the number of leukocytes in the respondents with LG SIL in relation to those with normal result. **Conclusion:** In women with LG SIL aerobic vaginitis is very common but is not an indicator of HPV infection. An adequate treatment of aerobic vaginitis would decrease the frequency of LG SIL and number of precancerous lesions which may progress to carcinoma. **Key words:** PAP test, HPV, aerobic vaginitis.

Corresponding author: Mahira Jahic, MD. E-mail: [mahira.j@bih.net.ba](mailto:mahira.j@bih.net.ba)

## 1. INTRODUCTION

There are number of risk factors in the genesis of squamous intraepithelial lesion and cervical cancer such as early age of first sexual intercourse (before the age of 16), large number of sexual partners, smoking, multiple deliveries and low socioeconomic status. Recently, the infection with Human papilloma virus (HPV) is considered to be a cause of

cervical dysplasia (1). However, a large number of women are infected with HPV yet small number of them develops cancer (2). This indicates that some of the co-factors play certain part in the genesis of a cancer. Factors which could influence this can be: smoking, contraception, nutrition and infection with some sexually transmitted diseases. Non-specific genital infections can be

connected to precancerous lesions (3). Conditions like bacterial vaginosis have been frequently found in squamous intraepithelial lesions of low degree (LG SIL) while aerobic vaginitis in LG SIL has been less frequent (4).

An aerobic vaginitis is amended vaginal flora that differentiates from bacterial vaginosis (5, 6). Changes on cells such as inflammation, metaplasia, reparation and atrophy can cause cytological changes on cervical epithelia. LG SIL is predominantly a disease of reproductive age women with risk factors that are characteristic for sexually transmitted diseases. The increase of this disease among young girls has been noticed. Lately, signs of heavy dysplasia can be found cytologically in girls under the age of 15 (7). The frequency of infection with HPV among women between 14 and 59 years of age in Europe is 26.8% and is highest in women aged between 20 and 24 years (33.8%) while it lessens after the age of 30 (8,9).

It is estimated that 50 million cases of LG SIL are being discovered each year worldwide. According to some data, squamous intraepithelial lesion is cytologically discovered in 2.3% of patients out of which 2.2% is LG SIL. Infections such as aerobic vaginitis and bacterial vaginosis can be marks of risky sexual behaviour and exposure

to HPV (10). The question remains, can changes in vaginal flora indicate the presence of HPV infection of high risk and are aerobic vaginitis and bacterial vaginosis connected to squamous intraepithelial lesion of low degree.

## 2. GOAL

To determine frequency of HPV infection, aerobic vaginitis and bacterial vaginosis in the respondents with squamous intraepithelial lesion of low grade comparing to the respondents with normal PAP test results.

## 3. MATERIAL AND METHODS

Prospective research of 100 respondents has been conducted at University Clinical Center Tuzla, Department for microbiology and pathology, and also at Polyclinic for laboratory diagnostic and Gynecology and Obstetrics Department at Primary Health Care Center Tuzla in period from May 2011 until January 2012. Examination program included: anamnesis, clinical gynecological examination, HPV typization and microbiological examination of vaginal and cervical smear. All of the respondents had PAP test results not older than 6 months. Gynecological examination was performed with speculum, bimanually while color and appearance of the secretion were analyzed. In the examination with speculum, vaginal smear for native preparation was taken as well as cervical smear for microbiological analysis and cervical smear for HPV typization, pH value of vaginal environment was measured and amino acid odor test was determined. Smear that was taken for the microbiological analysis has been examined with standard microbiological methods: examination of the preparation colored by Gram and cultivated on standard microbiological bases such as blood and endo agar by identification of multiplication with biochemical methods. Detection of HPV was performed by chemiluminescent detection and the analysis of HPV DNA of low and high risk group in cervical material with Digene HPV test, Hybrid capture II, non-invasive and sensitive method. Diagnosis of aerobic vaginitis was determined based on Donder's criterion (11): enhanced yellow secretion, pH value of vaginal environment  $>5$ , negative amino

acid odor test, increased number of leukocytes  $>10$  determined by microscopic examination, absence of lactobacilli and microbiologically isolated microorganisms: *Escherichia coli* (*E. coli*), *Staphylococcus aureus*, group B streptococcus and enterococci (*Enterococcus faecalis*).

Bacterial vaginosis was diagnosed based on Amsel: grey secretion on the walls of vagina, pH value of vaginal environment  $>4.5$  presence of indicative cells determined by microscopic examination and positive amino acid odor test. Preparations were examined with microscope Olympus CX 400 by cytologists and microbiologists. Respondents were divided into two groups: the examined group of 50 respondents with PAP results of low grade squamous intraepithelial lesion (LG SIL) and the control group of 50 respondents with normal PAP test result (benign cellular changes). Data were processed with standard methods of descriptive statistics. The difference between results was considered significant if it was  $p < 0.05$ .

## 4. RESULTS

With the prospective study, 100 respondents aged between 21 and 46 years, with the average age of 36.52 were examined. Respondents with LG SIL were somewhat older than those with the normal PAP result but without any statistically significant difference. Marital status, number of deliveries and miscarriages among the respondents in both groups didn't substantially differentiate (table 1). High risk HPV group has been found more in the respondents with LG SIL 46% (23) than in those with normal PAP result 14% (7)  $p < 0,05$ .

Aerobic vaginitis has been found in the respondents with LG SIL in 28% (14) and there is statistically significant difference of this vaginitis presence compared to the respondents with normal PAP test result ( $p < 0.05$ ). Bacterial vaginosis has been found

in 12% (6) of the respondents with LG SIL and in 4% (2) of those with normal PAP test result which is not statistically significant. In 4% (2) of women with LG SIL, HPV and bacterial vaginosis were associated. Aerobic vaginitis and HPV were associated in 12% (6) of the respondents with LG SIL while in normal results this association hasn't been found.

In women with LG SIL and aerobic vaginitis in 9 cases *E. coli* has been isolated, in 4 *E. faecalis* and in 1 *Staphylococcus aureus*, while in women with normal PAP test results 3 cases of *E. coli* have been isolated. Examining changes in pH value of vaginal environment, higher measured values have been found in the respondents with LG SIL- 5.26 while in the respondents with normal PAP test the result was 4.94 ( $p < 0.05$ ). There is also statistically significant increase in the number of leukocytes in the respondents with LG SIL in relation to those with normal result. Findings of lactobacilli were similar in both groups.

## 5. DISCUSSION

It is known that the genesis of LG SIL is connected to early age of first sexual intercourse, numerous sexual part-

Characteristics	Normal findings	LG SIL	Statistical significance
Age	35.70 $\pm$ 2.1	37.34 $\pm$ 2.8	p-0.15 NS
Married	45	47	p-0.10 NS
Single	5	3	p-0.74 NS
Number of deliveries	1.88 $\pm$ 0.2	1.68 $\pm$ 0.4	p-0.94 NS
Number of miscarriages	1.0 $\pm$ 0.6	1.36 $\pm$ 0.7	p-0.09 NS
HPV positive	7/50 14%	23/50 46%	p<0.05

Table 1. Characteristics of the respondents with normal PAP result and LG SIL

Causes of infection	Normal findings No %	LG SIL No %	Statistical significance
Bacterial vaginosis	2 4	6 12	NS
Aerobic vaginitis	3 6	14 28	p< 0.05
Other vaginitis	12 24	20 40	NS
Causes not found	33 66	10 20	p< 0.05

Table 2. Causes of infection found in women with normal PAP results and LG SIL

Characteristics	Normal findings No %	LG SIL No %	Statistical significance
Leukocytes $> 10$	15 30	36 72	p< 0.001
Lactobacilli	21 42	16 32	NS

Table 3. Presence of leukocytes and lactobacilli in the respondents with normal PAP result and LG SIL

ners, smoking cigarettes, race, higher number of deliveries and low socioeconomic status. LG SIL can be found in 1.7% to 7% of adolescent girls and young women (2). Many of these factors are related to sexual activity and exposure to sexually transmitted diseases (1). HPV infection in high risk groups is well-known factor associated with LG SIL and with possible progression of change in the higher grade. HPV typization showed positive findings on high-risk groups in 46% (23) of the respondents with LG SIL. Connection between HPV high-risk groups and different microorganisms in cervical dysplasia has been found in 32% for LG SIL and 33% for ASCUS (12).

HPV high-risk groups has been found in normal results in 14% (7) which corresponds to data from the literature which states that HPV high-risk groups is found in 5% to 27% of women with normal result (13,14).

Bacterial vaginosis is a factor often associated with changes that precede cervical cancer (15). It has been found in 4% (2) of the respondents with normal PAP test result, while in women with LG SIL it has been found in 12% (6), which indicates higher frequency but not statistically significant. Ka finds that 10.98% of the respondents have bacterial vaginosis in cervical intraepithelial neoplasia which coincides with our results like Boyle and ass. that LG SIL is not more frequent in the respondents with bacterial vaginosis. Aerobic vaginitis has been found in women with LG SIL in 28% (14) and in normal results in 6% (3) which showed statistically significant difference. Considering that 46% (23) of the respondents with LG SIL are HPV positive and 54% (27) are HPV negative to high-risk groups it is possible that aerobic vaginitis and bacterial vaginosis give cytological image that can be associated with the diagnosis of LG SIL. Examining changes of vaginal biocenosis in cervical dysplastic lesions, Bernad finds infective factor in vaginal secretion in 14 out of 22 patients with HG SIL and in 29 out of 74 patients with LG SIL and quotes that infective factor plays a significant role in development of LG SIL (3,16). Their research showed that the culture most frequently contains *Staphylococcus au-*

*reus*, *E. coli* i *E. faecalis* (3) while in our research it was *E. coli* and *E. faecalis*.

Aerobic vaginitis is significantly more often associated with LG SIL findings than with normal PAP test result, while bacterial vaginosis is not significantly associated but has a tendency of increase with LG SIL in relation to normal result. Women with LG SIL had increased number of leukocytes 72% (36) comparing to normal PAP test result where leukocytes were elevated in 30% (15) as well as higher pH values of vaginal environment of 5.26 which indicates inflammatory change and its important role in development of LG SIL. The absence of lactobacilli that indicates abnormal vaginal flora has been found in both group of the respondents and is not statistically significant (17,18).

## 6. CONCLUSION

Aerobic vaginitis is not the indicator of HPV infection but it is significantly more often present in women with LG SIL than in women with normal PAP test results. It is necessary to recommend microbiological analysis of cervical smear for the diagnosis of aerobic vaginitis in women with LG SIL and conduct an adequate treatment before the next PAP test and HPV typization. Adequate treatment of infection could decrease the frequency of LG SIL and by that the number of precancerous lesions which may progress to cancer.

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