

ORIGINAL PAPER

Clinical Characteristics of Aerobic Vaginitis and Its Association to Vaginal Candidiasis, Trichomonas Vaginitis and Bacterial Vaginosis

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Aim of the work: Examine clinical characteristics of aerobic vaginitis and mixed infection for the purpose of better diagnostic accuracy and treatment efficiency. **Materials and methods:** Prospective research has been conducted at Clinic for Gynecology and Obstetrics, Department for Microbiology and Pathology at Polyclinic for laboratory diagnostic and Gynecology and Obstetrics Department at Health Center Sapna. Examination included 100 examinees with the signs of vaginitis. Examination consisted of: anamnesis, clinical, gynecological and microbiological examination of vaginal smear. **Results:** The average age of the examinees was 32,62±2,6. Examining vaginal smears of the examinees with signs of vaginitis in 96% (N-96) different microorganisms have been isolated, while in 4% (N-4) findings were normal. AV has been found in 51% (N-51) of the examinees, *Candida albicans* in 17% (N-17), BV in 15% (N-15), *Trichomonas vaginalis* in 13% (N-13). In 21% (N-21) AV was diagnosed alone while associated with other agents in 30% (N-30). Most common causes of AV are *E. coli* (N-55) and *E. faecalis* (N-52). AV and *Candida albicans* have been found in (13/30, 43%), *Trichomonas vaginalis* in (9/30, 30%) and BV (8/30, 26%). Vaginal secretion is in 70,05% (N-36) yellow coloured, red vagina wall is recorded in 31,13% (N-16) and pruritus in 72,54% (N-37). Increased pH value of vagina found in 94,10% (N-48). The average pH value of vaginal environment was 5,15±0,54 and in associated presence of AV and VVC, TV and BV was 5,29±0,56 which is higher value considering presence of AV alone but that is not statistically significant difference ($p>0,05$). Amino-odor test was positive in 29,94% (N-15) of associated infections. Lactobacilli are absent, while leukocytes are increased in 100% (N-51) of the examinees with AV. **Conclusion:** AV is vaginal infection similar to other vaginal infections. It is important to be careful while diagnosing because the treatment of AV differentiates from treatment of other vaginitis. **Key words:** Aerobic vaginitis, vaginal infections, diagnosis.

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1. INTRODUCTION

Ecosystem of vagina is a complex and dynamic system of flora of various microorganisms in different quantity and ratio. Clinical future and treatment of some of the vaginitis, such as trichomonas vaginitis (TV), vulvovaginal candidiasis (VVC) and bacterial

vaginosis (BV) are well defined, while other abnormal vaginal conditions are yet to be defined. In 2002, Donders and ass. (1) suggested term aerobic vaginitis (AV) based on bacteriological, immunological and clinical characteristics. This study has been conducted for better understanding of frequency and clinical

characteristics of AV, where symptoms, signs and laboratory tests (pH and amino-odor test) have been analyzed in patients diagnosed with one or mixed infections. These results should help in clinical determination of the causes for vaginal symptoms and more accurate diagnosis and treatment of AV.

2. AIM OF THE WORK

Examine clinical characteristics of aerobic vaginitis and mixed infection for the purpose of better diagnostic accuracy and treatment efficiency.

3. MATERIALS AND METHODS

Prospective research has been conducted at Clinic for Gynecology and Obstetrics, Department for microbiology and pathology at Polyclinic for laboratory diagnostic and Gynecology and Obstetrics Department at Health Center Sapna in period from May 2007 till January 2008. The study included 100 examinees aged 18 to 45.

The examinees with clinical signs of vaginitis had some of the stated symptoms (increased vaginal secretion, changed colour of secretion, changed colour of vaginal walls, subjective problems, changed pH value of vaginal environment and positive amino-odor test).

Examination programme consisted of three parts:

- taking anamnesis data (interview)
- clinical gynecological examination
- microbiological examination of vaginal and cervical smear

Interview consisted of the following data: age of the examinee, marital status, number of deliveries, number of miscarriages and symptoms which indicated presence or absence of vaginitis.

Gynecological examination was performed by gynecologist in gynecological clinic. Gynecological examination was performed with speculum and bimanually. Speculum examination showed clinical characteristics of vaginal wall: redness, presence of vaginal secretion and change in its quality. Presence of 3 or more clinical characteristics are considered to be positive for diagnosis of vaginitis.

Gynecological examination also determined pH value of vaginal environment in all of the examinees. Determination of pH value of vaginal environment was performed with indicator tape with span from 0 to 14. Colour indicator tape was put on lateral arch of vagina and results showed on the tape within 30-60 seconds. pH value above 4,0 was considered significant in vaginitis diagnosis. After determining pH value of vaginal environment, all the examinees had amino-odor test. Test included putting vaginal secretion on the glass and pouring 2-3 drops of 10% KOH. Release of fish-like smell was recorded as positive result. After that, vaginal and cervical smears were taken for microbiological analysis of aerobic and anaerobic microorganisms and antibiogram. Smear that was taken for the microbiological analysis has been examined with standard microbiological methods: examination of the preparation coloured by Gram and cultivated on standard microbiological bases such as blood and endo agar and identification of increase with biochemical methods. Examination to resistance has been done by disc-diffuse method on Müller-Hinton base.

Analysis of vaginal flora was performed under the microscope with 400 times magnification where presence and absence of lactobacilli, change

of flora considering presence of coccus bacterial flora or short curved sticks and combinations, presence of clue cells and presence of parasites and fungi were recorded. Leukocyte finding was graded by number of leukocytes found under the 400 times magnification in the field of view: result with less than 10 leukocytes in the field of view and result with more than 10 leukocytes in the field of view.

BV is defined with findings that have 3 out of 4 possible criterion: liquid homogenous grey secretion, presence of clue cells, pH value higher than 4,0 and positive aminoodor test.

AV was determined based on criterion by Donders: enhanced yellow secretion, pH value ≥ 5 , negative aminoodor test, increased number of leukocytes >10 , absence of lactobacilli and microbologically isolated microorganisms: *Escherichia coli* (*E. coli*), *Staphylococcus aureus*, group B streptococcus and enterococci.

Findings were processed by methods of descriptive statistics, student t-test, X^2 test. Differences for values $p < 0,05$ were considered statistically significant and differences for values $p < 0,01$ statistically highly significant.

4. RESULTS

The examined group of women N-100 were in reproductive period with average age of $32,62 \pm 2,6$, and married in 85% (N-85). Examining vaginal smears of the examinees with signs of vaginitis in 96% (N-96) different microorganisms which belong to aerobic and anaerobic bacteria, protozoa and fungi have been isolated, while in 4% (N-4) findings were normal. AV has been found in 51% (N-51) of the examinees, *Candida albicans* in 17% (N-17), BV in 15% (N-15), *Trichomonas vaginalis* in 13% (N-13) and 4% (N-4) of the examinees didn't have microbiological cause of vaginitis.

Characteristics	Value
Age	32,62 \pm 2,6a
Married (N)	85
Single(N)	15
Number of deliveries	3,53 \pm 0,5a
Number of miscarriages	2,40 \pm 0,2a

Table 1. Characteristics of the examinees with the signs of vaginitis. Legend: a-arithmetic mean + standard tolerance

Characteristics of vaginal secretion	AV (N-51)	AV+TV+BV (N-30)	%
Colour			
Yellow	16	20	70,05
White	2	5	13,72
Grey white	1	3	7,84
Green	2	2	7,84
Consistency			
Rare	7	13	40,38
Thick	14	17	61,53
Smell			
Unpleasant	2	13	29,94
Without smell	19	17	70,58
Colour of vagina wall			
Red	7	9	31,13
Normal	18	17	68,62
Pruritis			
Present	15	20	72,54
Absent	4	10	27,45
pH value of vaginal environment			
4	1	2	5,88
5	13	24	72,54
6	7	4	21,56
Amino-odor test			
Positive	1	15	29,94
Negative	20	15	68,62

Table 2. Traits of vaginal secretion, clinical and biochemical characteristics of the examinees with signs of AV

In 21% (N-21) of the examinees AV was diagnosed alone while associated with other agents in 30% (N-30). Most common causes of AV are *E. coli* (N-55) and *E. faecalis* (N-52). AV and *Candida albicans* have been found in (13/30, 43%), *Trichomonas vaginalis* in (9/30, 30%) and BV (8/30, 26%). Examining clinical characteristics of AV and associated infections of AV and VVC, TV and BV, enhanced secretion has been recorded in 100% (N-51) of the examinees with different characteristics of vaginal secretion (Table 1.) Vaginal secretion is in 70,05% (N-36) yellow co-

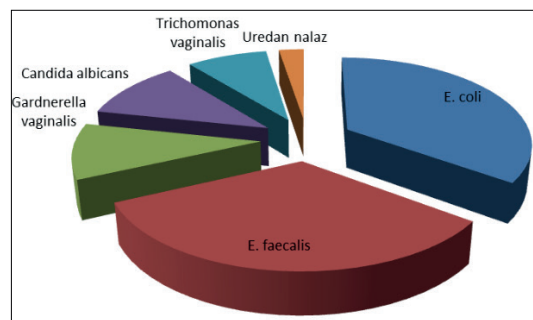


Figure 1. Results of microbiological examination of the examinees with signs of vaginitis

loured, secretion of thick consistency is in 61,53% (N-31) and changed smell of secretion is in 29,94% (N-15) of the examinees with AV. Colour of vagina wall changed into red is recorded in 31,13% (N-16) and pruritis or itching in genital area had 72,54% (N-37) of the examinees with AV. Increased pH value of vagina has been found in 94,10% (N-48) and normal in 5,88% (N-3). pH value 5 in 72,54% (N-37) and pH value 6 in 21,56% (N-11).

Most of the examinees had pH value 5. The average pH value of vaginal environment in the examinees with AV was $5,15 \pm 0,54$ and in associated presence of AV and VVC, TV and BV was $5,29 \pm 0,56$ which is higher value considering presence of AV alone but that is not statistically significant difference ($p > 0,05$). Amino-odor test was negative in the examinees with AV, while with associated infections it was positive in 29,94% (N-15). Microbiological examination hasn't recorded presence of lactobacilli in vaginal secretion while leukocytes have been elevated in all of the examinees with AV in 100% (N-51).

5. DISCUSSION

In 1990 Helen McDonald warned that women with the risk of preterm labor had two types of abnormal vaginal secretion, first is BV and second are other aerobic microorganisms such as E.coli and Klebsiella (2,3). In 80-90% of cases enhanced vaginal secretion is associated with microbiological cause which can be identified and most of the vaginal infections are consequence of the infection with synergistic bacteria (bacterial vaginosis and nonspecific vaginitis), fungi (vulvovaginal candidiasis) and protozoa (trichomoniasis). It is considered that approximately 50% of infections are caused by bacteria and 50% by fungi and parasite (4). In this research aerobic bacteria play significant role in ethiology of vaginitis and they are often associated with two or more causes which indicates to polymicrobe ethiology of vaginitis (5). AV has been found in 51% (N-51), alone in 21% (N-21) and associated in 30% (N-30). It is most commonly associated with *Candida albicans* in (13/30, 43%), *Trichomonas vaginalis* in (9/30, 30%) and BV in (8/30, 26%). In similar studies of AV Fan founds AV as the main cause of vag-

initis in one study in 14,7% and in other in 23,74%. In 58% AV is mixed with another causes such as VVC in 30%, TV in 25% and BV in 45% (6,7). Percentage of representation of AV in our research is higher in relation to the quoted one but the percentage of association with other types is the same. Although many studies state that the frequency of AV is still unknown (8), the frequency in pregnant women is in 25%. AV is mostly caused by E.coli and E.faecalis while other causes haven't been found in this research, although Donders states that causes of AV are: E. coli, enterococi, *Staphylococcus* sp. and group B of streptococcus (9). E.coli is cited as one of the most common causes of this vaginitis and sometimes is isolated alone. The role of E.coli in vaginitis is very controversial and this microorganism is one of the main causes of neonatal sepsis and chorioamnionitis (10). Enhanced and changed vaginal secretion has been found in all of the examinees with AV, that is with yellow coloured secretion in 70,05% (N-36) which is similar to Fan research who found yellow vaginal secretion in 63% of the examinees with AV. Thick consistence of secretion was in 61,53% (N-31). Red colour of vagina walls has been recorded in 31,13% (N-16) and pruritus or itching in 72,54% (N-37) of the examinees with AV. Elevated pH value of vaginal environment has been found in 94,10% (N-48), while in similar study pH higher than 4,5 has been found in 84% of the examinees with AV (10). The absence of lactobacilli (11) is a characteristic of AV and in this study lactobacilli haven't been found in the examinees with AV. Donders also, in several of his studies, records abnormal status of lactobacilli, that is, their absence, which is a negative factor and enables development of infection, especially in pregnancy (11, 12, 13, 14, 15). Enhanced number of leukocytes has been found in 100% (N-51) of the examinees. The other studies also confirm abnormal vaginal flora in women with the risk for preterm labor and presence of E.coli with or without signs of inflammation and increased number of leukocytes in secretion (16, 17, 18). AV is frequent infection of lower genital system and it doesn't differentiate from other vaginal infections by its clinical characteristics. In high percentage it is as-

sociated with other infections. It is very important to pay attention to presence of AV as mixed infection or special entity when diagnosing vaginitis, especially in pregnancy. Therapeutic treatment of AV differentiates from other types of vaginitis and wrong diagnose can lead to wrong treatment and complications.

CONFLICT OF INTEREST: NONE DECLARED

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