THE ASSOCIATION BETWEEN COPPER CONTAINING IUCD AND BACTERIAL VAGINOSIS

Şayeste Demirezen[1], Ayşegül Küçük[1], M. Sinan Beksaç[2]

[1]Hacettepe University, Faculty of Science, Department of Biology, 06532, Ankara, Turkey
[2]Hacettepe University, Faculty of Medicine, Department of Gynecology and Obstetrics, Ankara, Turkey

SUMMARY

This study was designed to investigate whether there is an association between bacterial vaginosis (BV) and the use of intrauterine contraceptive device (IUCD). Six hundred Papanicolaou stained cervicovaginal smears were analyzed cytologically. 56 of 600 patients (9.3%) were detected as having IUCD. Four of 56 (7,1%) and 10 of 544 (1.8%) were positive for BV [Bv (+)]. The duration of the use of IUCD was higher than 4 years in 3 of 4 patients who were BV (+). This study showed a significant correlation between the use of IUCD and the presence of BV statistically (p < 0.05). Our findings also suggest that time limited BV infection is associated with long term use of this device. It can be suggested that a periodic microscopic examination and use of IUCD (less than 5 years) are convenient to prevent this kind of anaerobic infection.

Key words: bacterial vaginosis, intrauterine contraceptive device, cervicovaginal smears

Address for correspondence: Ş.Demirezen, Hacettepe University, Faculty of Science, Department of Biology, 06800, Beytepe, Ankara,Turkey.
E-mail: sayeste@hacettepe.edu.tr

INTRODUCTION

Intrauterine devices are one of the most effective, long term methods of contraception. The first modern IUCD was introduced by Lippes in 1961. After that, Tatum and Zipper developed the first medicated devices such as Copper 7 and Copper T. Through these devices the copper is dissoluted in the uterus.The antifertility effect of copper is the result of the dissolution of copper into uterine secretions (1).

BV is usually caused by an overgrowth of anaerobic bacteria which live in the normal vaginal flora. The amount of anaerobic microorganisms is one thousand times greater than in the normal vaginal ecosystem (2). These anaerobic microorganisms are: *Gardnerella vaginalis, Bacterioides, Mycoplasma hominis, Mobiluncus* spp. The most prevalent agent of BV is *Gardnerella vaginalis* (2, 3, 4).

The clinical diagnostic criteria for BV are: vaginal pH greater than 4.5, positive amine test, homogenous gray vaginal discharge (3, 5). The observation of clue cells, free cocci and absence of polymorphonuclear leucocytes (PMNLs) and *Lactobacilli* in Papanicolaou-stained cervico-vaginal smears are very important cytologic criteria to detect BV (6,7). Several studies indicated that this infection could lead to diverse upper genital tract infections. According to the literature data, women with BV have an increased relative risk of *post partum* endometritis, post cesarean wound infection, premature rupture of membranes, premature labor, intra-amniotic infection and pelvic inflammatory disease (PID) (8, 9, 10, 11, 12). In the literature, the relation between several infections such as actinomycosis, trichomoniasis and IUCD was reported (13, 14). But, only few studies dealt with the association between IUCD and BV. For this purpose we would like to study this association based on our cytologic examination and the literature data.

MATERIAL AND METHODS

Six hundred women aged 18-70 years, went through the routine gynecologic examination at Hacettepe University, Department of Gynecology and Obstetrics, Ankara, Turkey.

Cervicovaginal smears (CVS) were taken from each patient with a wooden spatula and fixed with cell fixative to prevent them from drying in the air. After staining with a routine Papanicolaou stain technique, these smears were examined promptly by an experienced cytologist. Each smear was diagnosed for the presence and/or absence of BV by using three objectives, x10, x40 and the oil objective for detail examination. To detect BV accurately in Papanicolaou stained cervico-vaginal smears (CVS), three cytologic criteria as follows were used: 1. observations of clue cells, 2. profuse free cocci among epithelial cells, and 3. the absence of PMNLs and *Lactobacilli* (6, 7).

The type of IUCD was a copper T, model T Cu 386. Each unit of copper was wound with approximately 176 mg copper wire. Single copper sleeve is placed on each of the two transverse arms. Each sleeve contains approximetly 68.7 mg of copper. The total surface area of copper on the device is 380 ± 23 mm^2. Statistical analysis was performed using the χ^2 test.

RESULTS

To detect whether there is an association between the presence of copper IUCD and BV, 600 cervicovaginal smears were analyzed cytologically. According to the cytologic findings, these patients were classified into four groups according to the presence or absence of copper IUCD and BV.

The first group is BV (+) and copper IUCD (+) = (n = 4)
The second group is BV (-) and copper IUCD (+) = (n = 52)

Table 1. *Number of women according to the presence and absence of copper IUCD and BV*

BV		Absent	Present	Total
IUCD	Absent	534 (98%)	10 (1.8%)	544 (90%)
	Present	52 (92%)	4 (7.1)	56 (9.3%)
Total		586 (97%)	14 (2.3%)	600

BV: bacterial vaginosis, IUCD: intrauterine contraceptive device

Table 2. *The mean age and the age ranges of four groups of patients*

The groups of patients ranges	Mean age	Age
BV (+) copper IUCD (+)	27.5±3.5	23 – 38
BV (-) copper IUCD (+)	35±0.9	22 – 47
BV (+) copper IUCD (-)	35.6±0.9	22 – 54
BV (-) copper IUCD (-)	40±0.4	18 – 70

The third group is BV (+) and copper IUCD (-) = (n = 10)
The fourth group is BV (-) and copper IUCD (-) = (n = 534)
These data with their prevalence rates are shown in Table 1.

We compared only the two groups, wearing and not wearing IUCD. *Lactobacilli* and PMNL were not observed in BV(+) cases. Clue cells and free cocci were also observed in these cases. A significant correlation between the use of IUCD (copper-T) and the presence of BV was found as $p < 0.05$. The age ranges and the mean ages of four groups are presented in Table 2.

The association of the duration of copper IUCD with the presence of BV was also evaluated. These data are given in Table 3. According to these data, it can be suggested that the long term use of IUCD might cause the BV infection.

DISCUSSION

The use of IUCD, especially the tail of the device, may change the normal vaginal flora from aerobic to anaerobic which favors the growth of BV-associated bacteria. Several studies suggest that the tail of the device might facilitate the ascent of cervicovaginal microorganisms into the uterus (4, 8, 11, 15). Therefore, pathogenic microorganisms can be transferred into the uterine cavity by the tail of IUCD. For this reason the tail of IUCD makes the way of transportation for pathogenic microorganisms such as BV- related microorganisms. The insertion of such a device may promote the colonization of some anaerobic microorganisms like *Gardnerella vaginalis, Mobiluncus sp., Mycoplasma hominis, Ureaplasma urealyticum* both on the tail of IUCD and the mucousa of the uterus. After this inoculation, these microorganisms may carry out the development of PID (8, 11). According to this opinion, the tail of copper device plays a crucial role for genital infections. In this study, BV was detected in 4 of 56 (7.1 %)

Table 3. *The duration of copper IUCD usage and the number of women with BV (+) and BV (-)*

Duration of IUCD usage	Number of women BV (+)	Percentage %	Number of women (-)	Percentage %
< 1 year	-	0	8	15.38
1–4 years	1	25.00	21	40.38
> 4 years	3	75.00	23	44.23
Total	4	100	52	100

women wearing copper IUCD. Among 544 non-users 10 patients (1.8 %) were diagnosed as having BV. According to Table 1, the prevalence rate of BV in copper containing IUCD users (n = 4) (7.1%) is higher than in that of non-users (n = 10) (1.8%). We also found a significant correlation between the use of IUCD and the presence of BV ($p < 0.05$).

It is indicated that an alteration in vaginal pH and the depletion of *Lactobacilli* can be the cause of several vaginal infections such as bacterial vaginosis, cytolytic vaginosis and trichomoniasis (2, 6, 16, 17). Normally, the predominant flora is formed by *Lactobacilli* which provide vaginal homeostasis through hydrogen peroxide production (4). *Lactobacilli* were not observed in BV(+) cases in our study. It is probable that the depletion of *Lactobacilli* in these patients might affect the vaginal pH and protective mechanism of vaginal environment against anaerobic cocci. Because of altered vaginal milieu, the bacteria associated with BV could overgrow in this milieu.

It is indicated that the long time use of IUCD can be the cause of BV infection. Forgotten IUCD is thought to cause some serious infections such as actinomycosis and BV (13, 14). As seen in Table 3, three of BV(+) patients (75%) used copper IUCD more than 4 years. Only one of them (25%) used the device between 1-4 years. In BV(-) patients, 23 of 52 (44.23%) used copper IUCD more than 4 years. According to these data, the percentage of the patients wearing copper IUCD more than 4 years was higher (75%) in BV(+) than in the BV(-) cases. These findings might suggest that the long term use of copper IUCD can be the cause of overgrowth of BV-associated bacteria. The decreasing rate of copper release with increasing time may reduce the protectiveness of the vaginal environment against growing pathogenic organisms (18, 19). According to our observations, 3 patients BV(+) had worn IUCD for more than 4 years. It is probable that the vaginal environment of these patients may have changed in favour of the anaerobic microorganisms because of the prolonged usage of the device.

According to the literature, BV is the most common vaginal infection among reproductive age of women and IUCD is used for contraception in women of childbearing age (10, 20). As seen in Table 2, the mean age of the first group [BV(+) IUCD(+)] was lower than in other three groups. Also the age range was more narrow compared to other three groups. Our findings are in accordance with results of other authors (20, 21).

In conclusion, we observed a significant association between IUCD usage and BV ($p < 0.05$). The long term use of copper IUCD may increase the risk of BV infection. We can suggest that microscopic examination should be done in women who wear IUCD at least once a year to detect and prevent BV infection.

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