

# Methods of contraception and rates of genital infections

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*Summary:* Bacterial vaginosis, trichomoniasis and candidiasis are the most common genital infection. The aim of this study was to evaluate the various methods of contraception with regard to the prevalence of bacterial vaginosis and vulvo-vaginitis over a period of four years. We also evaluated in the same period the rates of trichomoniasis, candidiasis, bacterial vaginosis and vulvo-vaginitis between users and non users of contraceptive methods and the relationship between ages of patients and types of contraceptives. Finally we considered the change of contraceptive use with regard to age among two different periods. The IUD users showed a significant increase of B.V., *T.v.* and other bacteria and a decrease of the negatives compared to OC users. Barrier contraceptive users had a reduction ( $0.01 > p > 0.001$ ) of B.V. and an increase ( $p < 0.001$ ) of the negatives compared to IUD users. OC users had a significant ( $p < 0.05$ ) increase in candidiasis, B.V. together with a reduction of the negatives compared to non users group. IUD users had a significant ( $p < 0.001$ ) increase of B.V. and vulvo-vaginitis from other bacteria, and the reduction of the negatives. Teenagers use OC much more than adults, but less IUD ( $p < 0.001$ ). The use of OC has increased and the use of IUD decreased among adults ( $p < 0.001$ ). The barrier methods were seen to be statistically reduced.

## INTRODUCTION

Bacterial vaginosis (B.V.) trichomoniasis, candidiasis, are the most common genital infections. Sexual transmission is the major means causing trichomoniasis and probably is involved in most cases of B.V. and candidiasis (<sup>1</sup>).

Oral contraception versus other methods of contraception is associated with a greater frequency of candidiasis, an in-

creased incidence of *Chlamydia trachomatis* (*C.t.*) and a reduced frequency of B.V. and trichomoniasis. The impact of contraceptive steroids on cellular and humoral immunologic factors may explain these observations. IUD use is reported to be associated with an increased rate of B.V. (<sup>2</sup>).

However, Osborne in a study of 1982, did not find any relationship between non-barrier contraceptives and B.V. (<sup>3</sup>).

Many studies suggest the relationship between oral contraceptives and candidiasis (<sup>4-6</sup>), even if other reports do not show this relationship (<sup>7</sup>).

The incidence of B.V. has increased among IUD users compared with oral contraceptive users: the IUD users would

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only have an increase of symptomatic B.V., while asymptomatic B.V. would be associated with promiscuity. The incidence of Pelvic Inflammatory Disease (PID) among IUD users would also be significantly increased in the early six months, but it would not be any more, if we consider a period of twenty-four months, suggesting that the critical moment for the infection is the inserting of intrauterine device not the IUD (6).

Trichomoniasis is considered less frequent among oral contraceptive users, according to certain Authors (6, 8).

The aim of our study was to compare types of contraceptive methods in relation to prevalence of the most common genital infections over a period of four years. We also evaluated in the same period the rates of trichomoniasis, candidiasis, B.V. and vulvo-vaginitis among users and non-users of contraceptive methods and the relationship between age of patients and methods of contraception.

Finally we considered the variability of methods of contraception with regard to age during two different periods.

## MATERIALS AND METHODS

The study subjects were recruited from the Centre of Sexually Transmitted Diseases in our Department of Obstetrics and Gynecology at the University of Parma, and included patients with symptoms of vulvo-vaginitis during two different periods: from 1985 to 1986 and from 1991 to 1992. All patients were first examined by one clinician and were afterwards evaluated at the Centre for the suspected microorganism. The patients were evaluated by a standardized interview with questions concerning demographic characteristics, previous contraceptive use and sexually infectious disease history. Each patient was scheduled with regard to: age, family situation, occupation, parity, yearly Pap-test smear, history for PID or vaginitis and urinary tract infections, method of contraception, latest menstruation and possible DTC of the portio.

Urogenital symptoms, such as leucorrhoea, xanthorrhoea, malodorous leucorrhoea, smart, itch, urinary symptoms, pelvic pain and their duration were also recorded. Furthermore we

considered possible symptoms of partners and the latest vaginal specimens. A standardized pelvic examination was performed, with attention to the appearance of the vulva, vagina and cervix (erythema, friability of the cervix, colour of the cervical mucus, ectropion), characteristics of the vaginal discharge (amount, colour and specially for the thick, liquid, foamy, malodorous leucorrhoea), cervical, uterine and adnexal tenderness.

Exclusion criterion of patients from the study was an antimicrobial treatment within ten days prior to vaginal specimens. The bacteriologist was not informed whether or not a patient was symptomatic.

Three vaginal specimens were obtained from the posterior vaginal vault for each patient: first was examined microscopically for bacterial morphologic types, clue cells, yeast and trichomonads. Second swab was performed for bacteriologic cultures including aerobic Gram<sup>+</sup> and Gram<sup>-</sup> bacteria, *Gardnerella vaginalis* (G.v.), *Candida albicans* (C.a.) and other mycetes. Third specimen was collected for the detection of *Trichomonas vaginalis* (T.v.) with Trichosel®. All vaginal specimens were sent to the laboratory of Microbiology of the University of Parma and underwent bacteriologic processing, according to the criteria of the Manual of Clinical Microbiology (9). Statistical analysis was carried out with Student's t test and Chi-square for the determination of the significance of comparing types of contraception among one another with regard to the prevalence of trichomoniasis, candidiasis, B.V. and vulvo-vaginitis over a period of four years (1985-86 and 1991-92). We also evaluated, over the same period, the prevalence of B.V. and vulvo-vaginitis between users and non-users of methods of contraception, and the relationship between the ages of patients and methods of contraception. Finally the variability of methods of contraception with regard to age among two periods (1985-86 and 1991-92) was considered.

The subjects of our study were 2387 patients with symptoms of genital infections.

## RESULTS

In table 1 each method of contraception can be seen compared with others, with regard to prevalence of vulvo-vaginitis over a period of four years (1985-86 / 1991-92): the IUD users had a significant ( $p < 0.05$ ) increase of B.V., T.v., and other bacteria and a decrease of the negatives compared those who were using oral contraceptives. These data concur

Table 1. — Prevalence of vulvo-vaginitis with regard to methods of contraception used (4 years).

	OC n = 413 %	IUD n = 117 %	p
C.a.	19.6	17.9	N.S.
T.v.	1.3	1.7	N.S.
B.V.	15.7	24.9	<0.05
Others	20.0	31.6	<0.05
Neg.	43.4	23.9	<0.001

  

	OC n = 413 %	Cond./Diaph. n = 139 %	p
C.a.	19.6	15.1	N.S.
T.v.	1.3	1.4	N.S.
B.V.	15.7	11.5	N.S.
Others	20.0	22.4	N.S.
Neg.	43.4	49.6	N.S.

  

	IUD n = 117 %	Cond./Diaph. n = 139 %	p
C.a.	17.9	15.1	N.S.
T.v.	1.7	1.4	N.S.
B.V.	24.9	11.5	0.01 > p P > 0.001
Others	31.6	22.4	N.S.
Neg.	23.9	49.6	<0.001

with many other reports. No statistical differences were detected between OC users and Condom-Diaphragm users. On the other hand Condom-Diaphragm users had a significant reduction ( $0.01 > p > 0.001$ ) of BV. and an increase ( $p < 0.001$ ) of the negatives compared to IUD users.

As shown in table 2 OC users had a significant ( $p < 0.05$ ) increase of candidiasis compared to non users group, as expected. In OC users we found a remarkable ( $p < 0.05$ ) increase of B.V., together with a reduction in the vaginal swab negatives: this evidence was probably related to the major sexual activity of OC users in relation to the non user group. The study also showed, in IUD

users, a significant ( $p < 0.01$ ) increase of B.V. and vulvo-vaginitis from other bacteria and the reduction of negatives. No significant differences were seen between the barrier contraceptive and non-user group as expected: the explanation might be that, except for trichomoniasis, today very much reduced, other bacterial infections are often not sexually transmitted disease (STD).

Table 3 considers the use of contraception related to age (teenagers  $\leq 20$  years and adults  $> 20$  years): we note that teenagers use OC much more than adults, but less IUD ( $p < 0.001$ ). Moreover adults (73.5%) do not use any one method of contraception more than teenagers (62.2%) ( $p < 0.001$ ).

Table 2. — Prevalence of vulvo-vaginitis with regard to use and non use of contraceptive method (4 years).

	OC n = 413 %	N/M n = 1718 %	p
C.a.	19.6	14.8	<0.05
T.v.	1.3	0.9	N.S.
B.V.	15.7	11.0	<0.05
Others	20.0	20.4	N.S.
Neg.	43.4	52.9	<0.001

  

	IUD n = 117 %	N/M n = 1718 %	p
C.a.	17.9	14.8	N.S.
T.v.	1.7	0.9	N.S.
B.V.	24.9	11.0	<0.001
Others	31.6	20.4	<0.05
Neg.	23.9	52.9	<0.001

  

	Cond./Diaph. n = 139 %	N/M n = 1718 %	p
C.a.	15.1	14.8	N.S.
T.v.	1.4	0.9	N.S.
B.V.	11.5	11.0	N.S.
Others	22.4	20.4	N.S.
Neg.	49.6	52.9	N.S.

Table 3. — *Methods of contraception with regard to age (4 years).*

	≤ 20 years n = 304 %	> 20 years n = 2083 %	p
OC	29.3	15.6	<0.001
IUD	0.3	5.5	<0.001
Cond./Diaph.	8.2	5.4	N.S.
N/M	62.2	73.5	<0.001

Table 4. — *Methods of contraception with regard to age: changing between two periods 1985-86 and 1991-92.*

	≤ 20 YEARS		p
	1985-86 n = 204 %	1991-92 n = 100 %	
OC	27.4	33	N.S.
IUD	0.4	0	N.S.
Cond./Diaph.	7.8	9	N.S.
N/M	64.4	58	N.S.
	> 20 YEARS		p
	1985-86 n = 624 %	1991-92 n = 1459 %	
OC	9.9	17.9	<0.001
IUD	8.9	4.1	<0.001
Cond./Diaph.	9.3	3.9	<0.001
N/M	71.9	74.1	N.S.

Finally table 4 summarizes the changing behaviour between the two periods (1985-86 and 1991-92) with regard to the methods of contraception used: the results are the same for teenagers, but the use of OC has increased and the use of IUD decreased among adults ( $p < 0.001$ ). The barrier methods are statistically ( $p < 0.001$ ) reduced, which evidence is noteworthy).

#### COMMENT

In a recent study the women who were using oral contraceptives (OC) had an incidence of trichomoniasis of 44% compared to the women who were using IUD

( $p < 0.002$ ), whereas B.V. in OC users resulted less in comparison to the incidence in non-users, even if not so significantly (<sup>1</sup>).

On the other hand, the OC users showed an insignificant increase in candidiasis compared to non-users. It appeared that the development of mycosis might be related to the immunological status of the host. A lymphocytic growth and a serum-induced gemmation of *C.a.* by estrogens were seen (<sup>10</sup>).

Trichomoniasis was considered a sexually transmitted disease, whereas candidiasis and B.V. are not always considered as such: in fact *C.a.* and B.V. can be found in virgins as well as in sexually active women, even through it is usually considered connected with sexual activity (<sup>11</sup>).

According to Barbone (<sup>1</sup>) on the other hand, the number of sexual partners is considered a risk factor for *T.v.* and B.V. but not for *C.a.* OC seems, however, to be a protective factor for *T.v.*, whereas it is associated only insignificantly with B.V. and *C.a.*

In a recent study receptors for estrogens were found in *T.v.* and it was seen that  $17\beta$ estradiol stimulates its growth (<sup>12</sup>).

Whereas we may conclude that OC competes with  $17\beta$ estradiol for the same receptors, ultimately protecting the woman from the infection, OC however, alters the cervical mucus and reduces the capacity of *T.v.* infecting it (<sup>1</sup>).

With regard to the IUD, a significant increase of anaerobic bacteria and *G.v.* was seen among the IUD users with symptoms of vaginitis, compared to IUD users without symptoms, thus confirming once again the association between B.V. and use of IUD (<sup>13</sup>).

The IUD does not modify the risk of candidiasis but increases the risk of B.V. compared with OC users, even if the association between IUD and PID seems to be in relation to promiscuity (<sup>8</sup>).

However, the risk of infection of the upper genital tract is greater immedia-

tely after the insertion of the IUD; the ultimate risk is only that of infection by a STD (<sup>14</sup>).

However the primary prevention of an STD remains valid. Many studies have shown that the regular use of the condom and spermicides reduces the risk of infection to a significant degree the risk of infection, whereas the act of urinating immediately after sexual intercourse and of washing the genitals do not seem to protect against infection. Primary measures of prevention are still only carried out by a minority of the people at risk (<sup>15</sup>).

In fact in a recent report conducted on 2000 subjects 40% of men and 36% of women have not changed their sexual behaviour since the advent of AIDS. The regular use of the condom is the preferred method of only 17% of men and 12% of women.

The diaphragm with spermicide, the contraceptive sponge with spermicide and spermicide on its own are the preferred alternatives to the condom and spermicide, however, only when the patient has been informed that there is less protection (<sup>16</sup>).

## REFERENCES

- 1) Barbone F., Austin H., Louw W. C., Alexander W. J.: "A follow up study of methods of contraception, sexual activity and rates of trichomoniasis, candidiasis and bacterial vaginosis". *Am. J. Obstet. Gynecol.*, 1990, 163, 510-4.
- 2) Roy S.: "Nonbarrier contraceptives and vaginitis and vaginosis". *Am. J. Obstet. Gynecol.*, 1991, 165, 1240-4.
- 3) Osborne N. G., Grubin L., Pratson L.: "Vaginitis in sexually active women: relationship to nine sexually transmitted organisms". *Obstet. Gynecol.*, 1982, 142, 962-7.
- 4) Jensen H. K., Hansen P. A., Blom J.: "Incidence of 'Candida albicans' in women using oral contraceptives". *Acta Obstet. Gynecol. Scand.*, 1970, 49, 293-6.
- 5) Catterall R. D.: "Influence of gestogenic contraceptive pills on vaginal candidosis". *Br. J. Vener. Dis.*, 1971, 47, 45-7.
- 6) Bramley M., Kinghorn G.: "Do oral contraceptives inhibit 'Trichomonas vaginalis'?" *Sex Transm. Dis.*, 1979, 6, 261-3.
- 7) Davidson F., Oates J. K.: "The pill does not cause 'thrush'". *Br. J. Obstet. Gynaecol.*, 1985, 92, 1265-6.
- 8) Avonts D., Sercu M., Heyrick P.: "Incidence of uncomplicated genital infections in women using oral contraception or an intrauterine device: a prospective study". *Sex. Transm. Dis.*, 1990, 17, 23-9.
- 9) Lennette E. H., Balows S. A., Hausler W. J. Jr, Truant J. P.: "Manual of Clinical Microbiology". Washington D.C., Am Soc. Microbiol. ed., 1980.
- 10) Kalo-Klein A., Witkin S. S.: " 'Candida albicans': cellular immune system interactions during different stages of the menstrual cycle". *Am. J. Obstet. Gynecol.*, 1989, 161, 1132-6.
- 11) Rosenberg M. J., Rojanapithaikorn W., Feldblum P.: "Effect of the contraceptive sponge on chlamydial infection, gonorrhoea and candidiasis. A comparative clinical trial". *JAMA*, 1987, 257, 2308-12.
- 12) Ford L. C., Hammill H. A., De Lange R.: "Determination of estrogen and androgen receptors in *Trichomonas vaginalis* and the effect of antihormones". *Am. J. Obstet. Gynecol.*, 1987, 156, 1119-21.
- 13) Kivijarvi A., Jarvinen H., Gronroos M.: "Microbiology of vaginitis associated with the intrauterine contraceptive device". *Br. J. Obstet. Gynaecol.*, 1984, 91, 917-23.
- 14) Grimes D. A.: "Intrauterine devices and pelvic inflammatory disease: recent developments". *Contraception*, 1987, 36, 97-109.
- 15) Stone K. M., Grimes D. A., Magder L. S.: "Personal protection against sexually transmitted diseases". *Am. J. Obstet. Gynecol.*, 1986, 155 (1), 180-8.
- 16) Kulig J. W.: "Adolescent contraception: non hormonal methods". *Ped. Clin. North. Am.*, 1989, 36 (3), 717-30.

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