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Infection among Women Using Intra-uterine Contraceptive Devices

A.O. Adejuwon and [1]C.A. Adejuwon

In the present study endocervical swabs from women classified in three groups were taken. The groups were women who had been on intra-uterine contraceptive devices for at least two months and experiencing vaginal discharge noticed visibly or through the use of speculum (n=16); first control subjects which were women who had been on intra-uterine contraceptive devices for at least two months but not experiencing vaginal discharges (n=14) and a second control subjects which were women who had never been on contraception (n=2). *Candida albicans*, *Neisseria gonorrhea*, *Klebsiella* species and *Escherichia coli* were pathogens isolated within the experimental group (n=16). *Lactobacilli* and *Candida albicans* were isolated in the first control subjects (n=14). No microbial growth was observed within subjects of the second control group (n=2). Statistical analysis indicated that only 25% of the experimental subjects showed evidence of infection while 14.3% of women within the first control subjects (n=14) were infected. Since the establishment that infection occurring in less than one month of intra-uterine contraceptive device implant can be meaningfully ascribed to the presence of the intra-uterine contraceptive device, it is recommended that cases of women implanted with intra-uterine contraceptive devices, experiencing vaginal discharges and irritation should be thoroughly investigated before prescription of drugs by physicians.

Key words: Endocervical, intra-uterine contraceptive device, infection, irritation, vaginal discharge, endometrium, myometrium

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For further information about this article or if you need reprints, please contact:

Adekunle Odunayo Adejuwon
Department of Microbiology
Obafemi Awolowo University
Ile-Ife, Osun state, Nigeria

E-mail:
adejuwon_ao@yahoo.com
adejuwonkunle@yahoo.co.uk

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Department of Microbiology, Obafemi Awolowo University, Ile-Ife, Nigeria
[1]Department of Chemical Pathology, College of Medicine,
University College Hospital, Ibadan, Nigeria

INTRODUCTION

Intra-uterine contraceptive devices are recognized for their superior effectiveness over other contraceptive methods. However, they are associated with more side effects than the barrier methods (condoms, foam and diaphragm). Risk of mortality from intra-uterine contraceptive devices is less than that of the oral contraceptive.

The rare deaths caused by the oral contraceptive device have been associated with infections usually related to spontaneous abortion or undiagnosed ectopic pregnancy[1].

Morbidity (disease requiring hospitalization) appears to be high in intra-uterine contraceptive device users mainly because of the risk of uterine perforation and pelvic infection[2]. Studies show that the insertion of intra-uterine contraceptive device causes persistent inflammatory reaction evident from an increase in vascular dilation and permeability of intra-uterine contraceptive device-exposed endometrium. Induced inflammatory changes can be checked by using anti-inflammatory drugs[3].

De Castro and Contreras[4] carried out a comparative study on four intra-uterine contraceptive devices, namely; the Nova T, MLCu 250 short, MLCu 375 and the GyneT. After two years of use, no inflammatory changes were demonstrated with MLCu 375. It was concluded that histological responses of the endometrium to the intra uterine contraceptive device depend on the amount of copper in the intra-uterine, device[4]. Studies on the suitability of intra-uterine contraceptive devices in women revealed that complications such as hemorrhage, pain, infection or pregnancy do occur. Higher frequencies of complications are experienced in the younger age groups and in nulliparous women[5]. Due to the risk of long term adverse effects, intra-uterine contraceptive devices should not be the first choice of contraception in nulliparous women[6].

It has been established that bacteria are frequently introduced into the uterine cavity at the time of intra-uterine contraceptive device insertion[7]. Fortunately the endometrium has a remarkable self-cleaning property and cultures from the uterus have been found to become devoid of bacteria within thirty days of insertion. There have been postulations that causative organisms of infection may gain entry into the uterus cavity during menstruation or intercourse. During these periods, they penetrate the normally protective cervical mucus by way of the intra-uterine contraceptive device string. If such intra-uterine contraceptive device was embedded in the myometrium, this may provide a site for bacteria invasion[7].

Pelvic infection is the most common complication of intra-uterine device use. Recent reports suggest a relationship between intra-uterine device use and colonization or infection of the genital tract by Actinomyces (a group of bacteria found hanging between the true bacteria and the fungi)[8]. A species within this genus most frequently identified in studies is *Actinomyces isreali*, a gram positive, anaerobic, non-acid fast obligate parasite. This organism, a commensal of the colon, is found in tonsillar cryts and associated with dental carries[9]. Studies reveal that Actinomyces cannot invade intact mucus membrane but depend on pre-existing perforation of the tissue surface to initiate infection[10]. Some anaerobic bacteria almost invariably associated with Actinomyces may be essential for initiating of infection. Such infection has classically been described as occurring in three regions, namely: cervicofacial, thoraxic and abdominal regions[11]. A study revealed that vaginal infection with chlamydia is higher in intra-uterine contraceptive users than in oral contraceptive users[12]. Candidiasis seems to predominate in women using oral contraception[7].

Many women using intra-uterine contraceptive devices often experience purulent vaginal discharges and irritation which could be mistaken for infection. At times matrimonial problems arise, with couples mutually suspicious of each other. Such occurrences often cause broken marriages even among elites. Scientifically, there may be no basis for such reactions. It is a biological principle that when a foreign body is introduced into the human body, cellular and biochemical reactions take place to dispose of the foreign body. The presence of intra-uterine contraceptive devices within the endometrial cavity cause mobilization of polymorphonuclear leucocytes which occur to a lesser extent in the endometrium and myometrium[13,14].

Possibly, the uterus may merely be reacting to the presence of foreign matter that is the intra-uterine contraceptive device in evidence of such discharge[3]. This study is designed to investigate the biological nature of whatever is stimulating such vaginal discharge.

MATERIALS AND METHODS

Subjects: Participants in this study were divided into three groups of patients. Women using intra-uterine contraceptive devices for at least two months and were experiencing irritation and vaginal discharge either visibly or noticeably through the use of speculum (n=16). These were the experimental subjects. Another group were women who had used intra-uterine contraceptive devices for at least two months without experiencing vaginal

discharge (n=14) these were control subjects. A subgroup of control subjects were women who were not on contraception (n=2).

Histories of onset of symptoms were taken from patients presenting vaginal discharge. Some presented only abdominal pain but further examination of vaginal with speculum revealed presence of milky discharges.

Specimen collection: Endocervical swabs (using sterile swabs) were obtained from the 32 patients of the family planning unit, University College Hospital, Ibadan. The specimens were immediately brought to the Medical Microbiology and Parasitology Laboratory of the Hospital for analysis.

Wet mounts of each specimen were prepared by emulsifying with a drop of saline and transferring to slides with cover slips. Those were observed under microscope for presence of yeast cells and parasites[15].

Culture conditions: Three types of media used for primary isolation were blood agar, chocolate agar and MacConkey. The agar plates were inoculated. The inoculated chocolate agar and blood agar plates were incubated aerobically with 5-10% carbon dioxide at 37°C for 24 h. The plates were examined for growth. Plates showing no growth were further incubated for another 24 h. Inoculated MacConkey plates were incubated aerobically at 37°C for 24 h[16].

Blood agar supported growth of most organisms while MacConkey was specific for the gram-ve bacilli especially the *Entero bacteriacea* (coliforms)[17].

Gram stains of smears of each specimen were done after inoculation on plates. Morphologies of these isolates were studied[18].

Biochemical tests: Studies on the colonial appearance and morphology of each isolate were done after gram staining. All gram positive cocci were tested for catalase. Catalase positive organisms like *Staphylococcus* were further tested for presence of coagulase. Catalase negative organisms were classified into groups of Streptococci. Streptococci growing on MacConkey were classified as *Streptococcus feacalis*. Coliforms were further tested for sugar fermentation, oxidase, catalase, indole, citrate and motility[19,20].

RESULTS

The results showed that of the total sixteen patients in the experimental group, one patient showed evidence of *Candida albicans* infection. Of the first control group also, one patient showed evidence of infection with *Candida albicans*. Of the second control group (patients who had never used any form of contraceptive), no patient showed evidence of infection with Candida *albicans*. None of the patients within the experimental and the two control groups showed evidence of infection with *Trichomonas vaginalis* (Table 1).

Microscopic and culture reports reveal that of the first fourteen patients control group (women using intra-uterine contraceptive devices, not experiencing vaginal discharge), seven patients showed evidence of growth with gram +ve cocci while five patients showed evidence of growth with gram +ve bacilli. Of the lot, a total of four patients showed evidence of mixed growth with both gram +ve bacilli and gram +ve cocci.

The organisms isolated within this group were identified as *Lactobacilli*, *Candida albicans*, *Streptococcus feacalis* and *Staphylococcus albus* (Table 2). Of the second control group (patients who had never used any form of contraceptive), there was evidence of gram +ve cocci in one patient and gram +ve bacilli in the other. There were no growth in culture samples of either patients (Table 2).

In the experimental set of sixteen patients (women using intra-uterine contraceptive devices, experiencing irritation and vaginal discharges) gram +ve cocci was

Table 1: Analysis for presence of *Trichomonas vaginalis* and *Candida albicans* in intra-uterine contraceptive device users with or without vaginal discharge as well as non users

		No. of subjects	*T. vaginalis*		*C. albicans*	
Subjects		(n)	+ve	-ve	+ve	-ve
Experiments		16	0	16	1	15
Controls	(1st)	14	0	14	1	13
	(2nd)	2	0	2	0	0

Table 2: Analysis of microorganisms (gram bacilli and gram cocci) present in endocervical swabs of intra-uterine contraceptive device users without vaginal discharge as well as non-users

Bacilli	Cocci	Microorganisms found
First control group (without discharge)		
0	+ve	*Lactobaccilli*
0	+ve	*Streptococcus feacalis*
+ve	+ve	*Streptococcus feacalis*
0	0	No growth
0	0	No growth
0	0	No growth
0	+ve	No growth
+ve	+ve	*Staphylococcus albus*
+ve	+ve	*Staphylococcus albus*
+ve	0	No growth
0	0	No growth
0	0	No growth
0	0	No growth
+ve	+ve	Normal flora
Second control group (non-users)		
0	+ve	No growth
+ve	0	No growth

+ve = Gram +ve, -ve = Gram -ve, 0 = Organism absent

Table 3: Analysis of microorganisms (gram bacilli and gram cocci) present in endocervical swabs of intra-uterine contraceptive device users with vaginal discharge (Experimentals)

Bacilli	Cocci	Microorganisms found
+ve	0	*Candida albicans*
+ve	+ve	*Staphylococcus albus*
0	0	No growth
0	0	No growth
+ve	+ve	Normal flora
+ve	+ve	Nomal flora
0	+ve	*Staphylococcus aureus*
0	0	No growth
0	-ve	*Neisseria gonorrhea*
+ve	+ve	Normal flora
+ve	+ve	Normal flora
-ve	0	*Klebsiella* sp.
-ve	+ve	*Eschericha coli*
0	0	No growth
0	0	No growth

+ve = Gram +ve, -ve = Gram -ve, 0 = Organism absent

Table 4: Statistical analysis of results within the experimental group (women using intra-uterine contraceptive devices with vaginal discharge)

	Non-pathogenic organisms		Pathogenic organisms	
Total number of patients	Number	Percentage	Number	Percentage
16	12	75	4	25

Table 5: Statistical analysis of results within the first control group (women using intra-uterine contraceptive devices without vaginal discharge)

	Non-pathogenic organisms		Pathogenic organisms	
Total number of patients	Number	Percentage	Number	Percentage
14	12	85.7	2	14.3

observed in eight patients, gram -ve cocci in one patient, gram +ve bacilli in six patients and gram -ve bacilli in two patients.

Neisseria gonorrhea was identified as the gram -ve cocci, *klebsiella* sp. and *Escherichia coli* were identified as the two gram -ve bacilli. In two of the cultures, a heavy growth of *Staphylococcus aureus* was observed while in another a light growth of *Candida albicans*. Growth of *Staphylococcus albus* was observed in the culture of one of the patients.

No growth was observed in the culture of five patients (Table 3). Statistical analysis of the study show that 25% of the women, using intra-uterine contraceptive devices and experiencing irritation and vaginal discharges were infected (Table 4). 14.3% of the women subjects using intra-uterine contraceptive devices and not experiencing vaginal discharges were infected (Table 5).

DISCUSSION

Candida albicans was detected in one patient within the sixteen experimental group and one within the first fourteen control group. This result is in accordance with work carried out by Blum *et al.*[12] who claimed that candidiasis is not common among women who use intra-uterine contraceptive devices but that bacteria infection of the vagina is significant[7,12].

Within the second control group (women who had never used any form of contraception, no bacteria pathogen was identified. The presence of *Streptococcus feacalis* and *Candida albicans* within the first control group are evidences of infection.

Presence of both gram positive +ve bacilli and gram positive cocci in some of the patients within the first control group and the experimental group signify normal flora of the vagina[11,21]. With the occurrence of both gram negative bacilli and gram negative cocci in samples within the experimental group, infection is evident. *Neisseria gonorrhea* was identified as the gram negative cocci while *Klebsiella* sp. and *Escherichia coli* were the gram negative bacilli. Presence of *Neisseria gonorrhea* indicates gonoccocal pelvic infection. *Klebsiella species* and *Escherichia coli* which normally inhabit distal colon and rectum suggest transmittion through oral intercourse[8].

Within the sixteen experimental groups, two patients had been on antibiotic therapy. One had been treated with ampiclox, flagyl and buscopan and some vitamic C on few occasions yet without relieve. Her intra-uterine contraceptive device had therefore been removed while the other patient took paracetamol (analgesic) with ampicillin the day before reporting to the clinic. No growth was observed in cultures of either patient due to suppressiopn of growth of organisms by the antibiotics.

Patients sampled generally presented symptoms of infection within two months to two years of insertion. The endometrial cavities become sterile after one month of insertion of intra-uterine contraceptive device[21]. Therefore, the subjects could have contacted infection through unrelated sources such as coital infection[2,21,22]. With the fact that infection occurring less than one month of intra-uterine insertion can be ascribed to the presence of the intra-uterine device, it may not be justifiable to relate 25% incidence of infection among women using intra-uterine device to the intra-uterine device. As advice physicans should thoroughly investigate cases of intra-uterine device use accompanied with vaginal discharge and irritation before recommending drugs.

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