

The Relationship Between Contraceptive Methods and Common Vaginal Infections

Sholeh Shahinfar,^{1,*} and Bizhan Nemanpour²

¹Lecturer, Department of Midwifery, School of Nursing and Midwifery, Kerman Branch, Islamic Azad University, Kerman, Iran

²Assistant Professor, Department of Microbiology, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran

*Corresponding author: Sholeh Shahinfar, Department of Midwifery, School of Nursing and Midwifery, Kerman Branch, Islamic Azad University, Kerman, Iran. Tel: +034-33210043-49, Fax: +034-33210051, E-mail: shahinfar_sh@yahoo.com

Received 2016 July 14; Revised 2016 October 17; Accepted 2016 November 08.

Abstract

Background: Vaginitis is a common medical problem in females. Bacterial vaginosis, vulvovaginal candidiasis and trichomoniasis are the main etiologies of infectious vaginitis.

Objectives: This study was designed to assess the relationship between contraceptive methods and common vaginal infections.

Methods: In this cross-sectional study, 250 females were evaluated from December 2012 to February 2013. The researcher-made questionnaire included questions about individual characteristics and contraceptive methods. The participants underwent a gynecological exam. Specimens were collected from posterior fornix of the subjects and polymerase chain reaction assay was done to diagnose vaginitis. Data were analyzed using SPSS statistical software (version 17) and also descriptive and analytical statistics (chi-square, t test and fisher's exact test). P values of < 0.05 were considered statistically significant.

Results: On the basis of the findings, 43.6% of females suffered from vaginitis. Overall, 65.56% of participants used contraceptive methods. Condom use was the most prevalent method of contraception. A significant relationship was found between suffering from different types of common vaginal infections and using contraceptive methods ($P = 0.017$). The percentage of females with candidiasis amongst hormonal contraceptive users, and the percentage of individuals amongst non-hormonal contraceptive users were higher than the others.

Conclusions: Contraceptives can increase the risk of vaginitis. Hence, health care providers should consider the probability of vaginitis in addition to the indications and contraindications of contraceptive methods and should guide couples in taking a step forward for improving their sexual and reproductive health.

Keywords: Contraceptive Methods, Polymerase Chain Reaction, Vulvovaginal Candidiasis, Trichomoniasis, Bacterial Vaginosis

1. Background

Vaginitis is responsible for 10 million office visits per year and is the most common gynecologic problem, for which females seek medical treatment (1). The most common causes of vaginal infection include bacterial vaginosis, vulvovaginal candidiasis and trichomoniasis (2). Bacterial vaginosis, trichomoniasis and vulvovaginal candidiasis are seen in 40% - 50%, 15% - 20% and 20% - 25% of cases, respectively (3).

Bacterial vaginosis, as the most common vaginal syndrome, affects females at childbearing age and before menopause and pregnancy with an incidence rate ranging from 20 to 50% (4). Females with bacterial vaginosis are at higher risk of preterm delivery, pelvic inflammatory disease and infertility (5-7). Several epidemiological studies have shown that bacterial vaginosis is related to the increase in susceptibility to infection of human immunodeficiency virus (8).

Vulvovaginal candidiasis is the second most common cause of vaginitis and *Candida albicans* is responsible for

the bulk of the symptomatic patient (9). About 150 million people worldwide suffer from recurrent vulvovaginal candidiasis, which leads to chronic episodes of vaginal irritation (10). This infection has a significant direct and indirect relationship with economic costs (11).

Trichomonas vaginalis is a sexually transmitted infection, found particularly in pregnant females, and is associated with significant side effects. In addition to preterm labor and other adverse birth outcomes, the infection is related to vaginitis, cervicitis, pelvic inflammatory disease and urethritis (12, 13). Trichomoniasis increases vaginal release of human immunodeficiency virus and is associated with increasing susceptibility and higher rates of transmission of this infection (14, 15).

Considering the known side effects of vaginal infection, several studies have been performed to identify factors associated with the infection. The use of contraceptive methods is considered as one of these factors. Around the world, 45% of married females at the reproductive age have used contraceptive methods (16). In addition to the role of

these methods in achieving the general objectives of fertility, they have health benefits unrelated to pregnancy (17). These methods are divided to two groups, including hormonal and non-hormonal. Hormonal methods include female sexual steroids, estrogen and synthetic progestin or progesterone without estrogen prescribed in the form of oral contraceptives, patches, implants or injectable drugs. Non-hormonal methods include the withdrawal method, spermicides, intrauterine devices (IUD), barrier methods, fertility awareness-based methods, breastfeeding and sterilization (18).

Some studies have not shown a significant relationship between the use of different methods of contraception and common vaginal infections (19, 20), yet the findings of other studies have revealed the effects of these methods on reducing or increasing the incidence of the above-mentioned infections (21-23). In this regard, different or even contradictory results were reported, one of the reasons of which could be due to different diagnostic tests used (19, 21, 24). For instance, the results of some researches indicate the effects of oral contraceptive pills on increasing the incidence of *Trichomonas vaginalis* and decreasing bacterial vaginosis (21, 22). On the other hand, in many scientific writing, it has been stated that the oral contraceptive combined pills are considered among the predisposing factors of fungal infections (1, 25).

2. Objectives

Considering the use of various contraception methods and serious complications of vaginitis, it seems necessary to examine the relationship between the two mentioned variables. In the present study, the use of the sensitive diagnostic technique of polymerase chain reaction (PCR) (26) played an important role in increasing the accuracy of the findings.

3. Methods

This cross-sectional study aimed to assess the relationship between use of contraceptive methods (hormonal and non-hormonal) and common vaginal infections (candidiasis, trichomoniasis and bacterial vaginosis). The research sample consisted of 250 females, who had referred to Payambar Azam clinic in Kerman city and had various gynecological and pregnancy problems from December 2012 to February 2013. The reason for choosing this clinic was the high number of patients.

The sampling method in this research was random sampling. Exclusion criteria were vaginal bleeding, pregnancy and menopause, diseases like diabetes mellitus and

immunosuppressive diseases, using broad-spectrum antibiotics for two weeks, vaginal douches for two days, vaginal medications for one week prior to sampling, and also hormone therapy during the last three months. Being married and sexually activity were adopted as inclusion criteria.

After gaining the consent of the subjects and assuring them that the collected data would remain confidential during and after the study, the researcher-made questionnaire containing some questions about individual characteristics and contraceptive methods was completed. The participants underwent a gynecological exam. Then specimens were collected from posterior fornix of the subjects and were placed into a micro-tube containing 1 mL of sterile saline. The samples were kept in a freezer at -70°C, until they were sent to the laboratory for the polymerase chain reaction.

3.1. Polymerase Chain Reaction Test

All frozen samples after melting were extracted using the enzymatic method and high pure DNA isolation kit (Roche). Quality and concentration of extracted DNA were examined using agarose gel electrophoresis and spectrophotometric methods. Polymerase chain reaction test was performed using master mix of fermentas company containing taq polymerase, MgCl₂, dNTP mix consisting of four nucleotides (TTP, ATP, CTP, GTP), and 10x PCR reaction buffer, according to the study conducted by Fredricks DN, et al. (2005).

3.2. Statistical Analysis

Data were analyzed using SPSS (version 17) statistical software. T-test for the analysis of quantitative variables and also Chi-square and fisher's exact tests for the analysis of categorical variables were used. P values of < 0.05 were considered statistically significant.

The study was approved by the ethics committee of Kerman University of Medical Sciences, Kerman, Iran.

4. Results

A total of 250 married females, aged 18 to 52 years, were studied. The mean (\pm standard deviation) age of participants was 32.92 (\pm 8.57), household size 3.9 (\pm 1.46), duration of marriage 139.8 (\pm 102) and number of deliveries 1.97 (\pm 1.47).

Based on the results of the polymerase chain reaction test, 109 people (43.6%) were diagnosed positive for vaginitis. The infection of candidiasis and bacterial vaginosis were 15.2% for each one. Trichomoniasis infection was 11.2%. In addition, mixed infections were found in 2%. There was

no significant difference between females with and without vaginitis based on age, household size, duration of marriage and number of deliveries (Table 1).

Regarding the use of contraceptive methods, 24.4% of females used no contraceptive method at the time of the data collection. The highest frequency was related to condom use and withdrawal method. The lowest frequency was related to combined injection and vasectomy (Table 2).

A significant relationship was found between different types of common vaginal infections and the use of contraceptive methods ($\alpha = 0.017$). In addition, the percentage of subjects with vaginal candidiasis among females using hormonal contraceptive methods and percentage of subjects with Gardnerella vaginitis among females using non-hormonal contraceptive methods was higher than the others (Table 3).

5. Discussion

In a recent study, based on the results of polymerase chain reaction test among females with one of three types of most common vaginal infections (candidiasis, trichomoniasis and bacterial vaginosis), the percentage of those with candidiasis and bacterial vaginosis infection was similar (15.2%). Also similar to many other studies, the percentage of *Trichomonas vaginalis* was lower than the two other infections (11.2%) (19, 27). Other studies have reported different prevalence rates of these infections, but the variation could be due to factors like characteristics of the participants and methods of diagnosis.

According to the obtained results, there was no significant difference between females with and without vaginitis based on age, household size, duration of marriage and number of deliveries. In this regard, various studies have reported different findings. For example, in some studies, the highest infection rate of vaginitis was attributed to certain age groups (20, 28). In a study conducted by Mulu et al. (2015) in Bahir Dar city, the highest percentage of vaginal candidiasis infection was observed in 30 to 39-year olds and it was concluded that females at this age are more prone to vaginitis related to frequent sexual activities with husbands, pregnancy, weakening of immunity and oral contraceptive use (29). On the other hand, the results of the study conducted by Namazi (2007) in Tabriz showed that there was no significant relationship between age at marriage and incidence of vaginal candidiasis (22). Moreover, Amini et al. (2009) in their study in Zanjan, reported no significant relationship between bacterial vaginosis and age, and stated that the causes for the age distribution patterns of BV are difficult to disentangle, as probably various behavioral, physiological and immunological variables are involved (30).

Rathod et al. (2012) in their study on the epidemiological characteristics of vulvovaginal candidiasis, found that the age of onset of sexual activity was associated with the prevalence of this infection, but noted that the number of years that females lived with a partner was not associated with the risk of candida infection (11). Besides, Valiani et al. reported in their study in 2011, that there was no relationship between marriage duration average and the frequency of vaginitis (19). Our findings are in agreement with the results of the above-mentioned studies.

Based on the results of the researches conducted by Yang et al. (2009), the incidence of bacterial vaginosis is not influenced by factors such as vaginal delivery, episiotomy and methods of breastfeeding (31). In the present study, no statistically significant relationship was observed between vaginitis and the number of deliveries and household size.

About a quarter of females (24.4%) participating in the research did not use any method of contraception. Among contraceptive methods, the highest and the lowest frequency were related to condoms (23.6%) and combined injection (1.2%), respectively. Given that the services of gynecology clinics (the research) is somewhat different from other health centers, the findings regarding the frequency of different contraceptive methods are only comparable to similar centers.

According to the findings of a study done in Isfahan (2011), no statistically significant relationship was found between different methods of pregnancy prevention and common vaginal infections, but it was reported that 50% of pregnancy-prevention pill consumers had candidiasis infection, 55.6% of individuals who had been tubectomized had gardnerella vaginitis and 44.4% of individuals who used condoms had candidiasis infection (19). The results of the present research reveal that contraceptive use can cause different types of common vaginal infections. It has been stated that the IUD can increase the incidence of bacterial vaginosis and candidiasis (21-23, 32, 33). Also, Calzolari et al. reported a significant positive association between bacterial vaginosis and IUD use and recommended a systematic microscopic evaluation for identifying this vaginal infection in IUD users. Besides, their study showed a significant negative association between bacterial vaginosis and condom use (23). In this regard, Ma et al. (2013) noted that consistent condom use increases colonization of *Lactobacillus crispatus* in the vagina, which may protect against bacterial vaginosis (34). According to the findings of a study conducted by Wang et al. (2016), female sterilization and withdrawal method were associated with trichomoniasis, and rhythm method was a risk factor for endocervicitis (35).

Based on the findings, the percentage of females with

Table 1. Comparison of Individual Characteristics of Females on the Basis of Vaginal Infection^a

Characteristics	Vaginitis \pm	Mean	Standard Deviation	P Value
Age (year)	Negative	33.52	8.85	0.21
	Positive	32.15	8.17	
Household size (n)	Negative	3.94	1.46	0.65
	Positive	3.85	1.45	
Duration of marriage (month)	Negative	141.0	105.3	0.83
	Positive	138.2	98.0	
Number of deliveries	Negative	2.01	1.5	0.63
	Positive	1.92	1.4	

^aData are presented as Mean + SD; \pm considered positive if specific PCR was found positive in swab [positive (n = 109), negative (n = 141)]; T-test was used to compare variables between the two groups; P values of < 0.05 were considered significant.

Table 2. Frequency and Distribution of Contraceptive Methods Used in Females^a

	Contraceptive Methods	N	%
Hormonal	Combined pill	20	8
	Combined injection	3	1.2
	Depo medroxyprogesterone acetate injection	12	4.8
	IUD	16	6.4
Non-hormonal	Condom	59	23.6
	Withdrawal	53	21.2
	Tubectomy	20	8
	Vasectomy	6	2.4
No method		61	24.4
Total		250	100

^aData are presented as N (%); Contraceptive methods were divided to two main groups (hormonal and non-hormonal).

vaginal candidiasis was higher in users of hormonal contraceptive methods (20%). In this group, the majority of females used contraceptive pills. These pills increase sex hormones and the formation of glycogen in the epithelium of the vagina and change pH, resulting in vaginal candidiasis (25). Moreover, the frequency of bacterial vaginosis infection was higher in users of non-hormonal contraceptive methods (20.1%). Since there are several contraceptive methods in the group of non-hormonal methods, the accuracy of these findings cannot be supported based on the mechanism of a particular contraceptive method. Regardless of those, who use condoms, and the protective role of condoms against bacterial vaginosis, the possibility of bacterial vaginosis may increase in patients using the withdrawal method due to the discharge of the male sex

gland secretions into the vagina before ejaculation and in other groups (IUD, tubal ligation and vasectomy) after sexual intercourse due to vaginal alkalinity (25, 34). Patel et al. (2006) conducted a study and found that sterilization is associated with a higher risk of sexual transmitted infections. The reason is that the possibility of protected sexual intercourse is low due to lack of unwanted pregnancy (36).

With regards to research findings, it is recommended that, if necessary, the use of contraceptive methods for various reasons would be based on considering the possibility of vaginal infections and adequate training of health care providers, in order to obtain the lowest risk and the highest benefit for the users of these methods. According to the results of the present study, candidiasis infection could be considered in the group of hormonal methods and bacterial vaginosis could be taken into account in the group of non-hormonal methods.

The only notable limitation of this study was collecting samples from a health center due to the larger number of patients. Therefore, it is suggested for a similar research to be done for investigating the relationship between independent and dependent variables separately at different health centers.

5.1. Conclusion

The findings indicated a significant relationship between the use of contraceptive methods and different types of common vaginal infections. Furthermore, the percentage of females with vaginal candidiasis among those using hormonal contraceptive methods and the percentage of bacterial vaginosis among females using non-hormonal contraceptive methods were higher than others.

Table 3. The Relationship Between the Incidence of Vaginitis and the Use of Contraceptive Methods in Different Study Groups^a

Contraceptive Methods	No Method		Hormonal		Non-Hormonal		Total		P Value
	N	%	N	%	N	%	N	%	
Negative	40	65.6	18	51.4	83	53.9	141	56.4	0.017
Candida	8	13.1	7	20	23	14.9	38	15.2	
Trichomonas	6	9.8	5	14.3	17	11.0	28	11.2	
Gardnerella	4	6.6	3	8.6	31	20.1	38	15.2	
Mixed^b	3	4.9	2	5.7	0	0	5	2.0	
Total	61	100	35	100	154	100	250	100	

^aData are presented as No. (%); Fishers exact test was used to compare variables between the study groups; P value of < 0.05 were considered significant.

^bCombination of candida and gardnerella were detected in two subjects; One of the participants was infected with Trichomonas and Gardnerella.

Acknowledgments

The authors of this research would like to extend their sincerest appreciation to the research deputy of Islamic Azad University, Kerman branch, the management of social security organization, and Dr. Vida Modares Nejad (research supervisor). This study was financially supported by the Islamic Azad University, Kerman branch.

Footnote

Conflict of Interest: The authors declare no conflict of interest.

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