Frequency of *Neisseria gonorrhoeae* and *Trichomonas vaginalis* in women with vaginal discharge referring to the gynecology clinic of Vali-e-Asr Hospital in Birjand in 2018

Nahid Ghanbarzade[1], Marzie Moghanni[2], Negar Goljahani[2], Mehdi Karamian[3], Majid Zare_Bidaki[3*]

1. Department of Gynecology, Faculty of Medicine, Birjand University of Medical Sciences
2. Faculty of Health, Birjand University of Medical Sciences, Birjand, Iran
3. Infectious Disease Research Center, Medical Microbiology Department, Birjand University of Medical Sciences, Birjand, Iran

***Corresponding author:**Tel: +98 5632381616; Fax: +98 5631631600
Address: Faculty of Paramedical Sciences, Birjand University of Medical Sciences, Ghaffari Street, Birjand, Iran
E-mail: marziehmoghanni@gmail.com
Received; 2019/07/2 revised; 2019/07/30 accepted; 2019/08/4

Abstract

Introduction: *Neisseria gonorrhoeae (N. gonorrhoeae)* and *Trichomonas vaginalis (T. vaginalis)* are the most common sexually transmitted microorganisms. Contamination with these microorganisms is a global problem, such that *T. vaginalis* causes complications in pregnancy and increases the risk of HIV transmission. *N. gonorrhoeae* causes pelvic infections and can result in complications such as infertility, chronic pelvic pain, ectopic pregnancy, and preterm delivery. In this study, the frequency of these two microorganisms and their related factors was investigated.

Materials and methods: This descriptive-analytic study was performed in the gynecology clinic affiliated with Vali-e-Asr Hospital of Birjand during a one-year period (2018). A total of 400 women with abnormal vaginal discharge were included. Sterile swabs were used to take samples from the vaginal area, and the specimens were mounted on four microscope slides. One of the slides was used to detect vaginal Trichomoniasis by wet mount, and three other slides were stained via Giemsa (for diagnosis of vaginal discharge), Gram, and methylene blue staining methods (for detection of *N. gonorrhoeae*). Data analysis was performed in SPSS software, using Chi-square and Fisher's exact tests.

Results: The mean age of the patients was 32.67 ± 8.24 years. The percentage of infliction with *N. gonorrhoeae* and *T. vaginalis* were 1.75% and 6.75%, respectively. Statistical analysis did not show a significant difference between the prevalence of *T. vaginalis* infection and different factors such as age, education level, place of residence, marital status, and contraceptive method ($P < 0.05$).

Conclusion: The relative frequency of infection with *N. gonorrhoeae* in Birjand appears to be within the predicted global range, while the frequency of *T. vaginalis* is more than the expected range. It is recommended that healthcare professionals be trained for timely prevention and treatment of people with signs, notification, education, and screening.

Keywords: *Neisseria gonorrhoeae*, *Trichomonas vaginalis*, Microscopic observation, Genitourinary infection

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Introduction

According to the World Health Organization (WHO), 340 million adults worldwide are inflicted with sexually transmitted infections annually (1). Risk factors for these infections include high population growth (especially young populations), village-to-town migration, war, and poverty, all of which can cause diseases that lead to high-risk sexual behaviors (2).

Gonorrhea is one of the most common sexually transmitted diseases, which is caused by a gram-negative diplococcus called *N. gonorrhoeae* (3). According to the WHO, out of a total of 333 million people with a sexually transmitted disease, 62 million suffer from gonorrhea (4). The clinical presentation varies from uncomplicated to acute problems. Approximately 50 percent of the cases in women are asymptomatic. Symptomatic cases are often associated with vaginal discharge, frequent urination, and dysuria, as well as abdominal pain in the event of organism extension to fallopian tubes and abdomen. Complications of the disease in the absence of timely treatment include salpingitis, arthritis, pharyngitis, gonococcal conjunctivitis, infertility, painful intercourse, ectopic pregnancy, and involvement of the brain or heart valves. Preterm labor, rupture of the amniotic sac, and transmission to the fetus during labor, and infant's ocular gonorrhea are among complications of this diplococcus during pregnancy (5).

The prevalence of gonococcal infection is declining in developed countries as a result of screening programs (6). However, the prevalence of gonococcus has been reported as higher in developing countries and those with low economic and educational status (7). Most inflicted women do not seek medical treatment and care, which is why they become the primary source of gonorrhea transmission, and most importantly, they become susceptible to HIV infection and its transmission to the spouse and child due to the damage to the cylindrical tissue of cervix (8).

Trichomoniasis is the most common sexually transmitted disease in the genitourinary tract. Over 200 million people worldwide become infected with this parasite every year. The infection rate varies in different parts of the world, ranging from 2 to 9 percent, and only one in seven people complain about the complications of the disease (9). The range varies from a mild infection to chronic and inflammatory disease in the genitourinary tract. In women, the condition has a wide range of clinical symptoms, from asymptomatic infection to severe vaginitis with vaginal discharge, cervicitis, ulcers, and cervical cancer. Specific symptoms of this disease entail abundant yellowish-greenish secretions with a foamy and stinging appearance and the presence of microscopic bleedings in the cervix, known as strawberry cervix (10).

Various factors, including high-risk sexual behaviors, having multiple sexual partners, lack of health care, non-use of condoms, etc., provide for the development of sexually transmitted infections. In general, the high prevalence and the numerous and severe complications of these infections highlight the importance of screening. Therefore, this study aimed to determine the frequency of *N. gonorrhoeae* and *Trichomonas vaginalis (T. vaginalis)* in Birjand city so that the complications and severe therapies can be prevented upon timely and correct diagnosis, especially in women of reproductive age.

Materials and methods

The present survey is a cross-sectional (descriptive-analytic) study. Patients referring to Vali-e-Asr Hospital in Birjand for suspected vaginal involuntary discharge were examined during a one-year period. The criteria for diagnosis was vaginal secretion and discharge as determined by the gynecologist using a speculum.

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Pregnant women, virgins, and women who had bleeding were excluded from the study. *N. gonorrhoeae* was diagnosed using Gram and methylene blue staining methods, while *T. vaginalis* was diagnosed by wet mount and Giemsa staining. After sufficient explanation was given to the participants, they signed informed consent forms. Subsequently, samples of vaginal discharge were prepared using sterile swabs and mounted onto four slides. Two slides were used to prepare wet mount and Giemsa staining for the detection of *T. vaginalis*, and two other slides were employed for methylene blue and Gram's staining to detect *N. gonorrhoeae*. Data were analyzed in SPSS software using descriptive and analytical statistics and analyzed by Chi-square and Fisher's exact tests at the significant level of $P < 0.05$.

Results

In this study, 400 women with abnormal vaginal discharge were examined for *N. gonorrhoeae* and *T. vaginalis*. The mean age of the participants was 32.67 ± 8.24 years. They were mostly residing in urban areas (65.5%). From among them, 99.5% were married, and 0.5% had no sexual relationship (Table 1).

The prevalence of *T. vaginalis* was 4.75% in the wet mount and 6.75% in Giemsa staining. The prevalence of *N. gonorrhoeae* was 1.75% in Gram's staining and methylene blue. Also, 6 (1.5%) of the subjects were simultaneously infected with *T. vaginalis* and *N. gonorrhoeae*. The results showed that age, educational level, place of residence, contraceptive method, and marital status were not significantly associated with the frequency of *T. vaginalis* ($P < 0.05$).

Table 1. Relative frequency of demographic characteristics in women and the prevalence of *Trichomonas vaginalis* infection detected by Giemsa staining.

Variable		Frequency of demographic characteristics	Frequency of *Trichomonas vaginalis*
Age (year)	< 30	173 (43.5)	12 (44.5)
	30 – 40	160 (40)	11 (40.7)
	> 40	67 (16.75)	4 (14.8)
Education level	Illiterate	35 (8.8)	1 (3.7)
	Primary school	93 23.5)	7 (25.9)
	Junior high school	56 (14)	5 (18.5)
	High school diploma	110 (27.5)	9 (33.3)
	Associate	17 (4.3)	0
	Bachelor or above	89 (22.3)	5 (18.5)
Residence	Urban	262 (65.5)	15 (55.6)
	Rural	138 (34.5)	12 (44.4)
Marital status	Married	398 (99.5)	27 (100)
	Single	2 (0.5)	0
Contraception method	Natural	188 (47.5)	12 (44.4)
	Tablet	42 (10.5)	4 (14.8)
	Condom	66 (16.5)	3 (11.1)
	Ampoule	5 (1.2)	1 (3.7)
	IUD	11 (2.8)	2 (7.4)
	No contraception	88 (22)	5 (18.5)

Data presented as number (percent).

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Discussion

In this study, the prevalence of *N. gonorrhoeae* was 1.75%. In Ghanbarzadeh *et al*.'s study in 2006 on 199 prisoners in Birjand, the frequency of positive gonorrhea cases was 4.5% using Gram's staining (11). In Mousaviani's study in 2004, no cases of gonorrhea were reported among 151 female prisoners at the Evin Prison (12). Nevertheless, Gouya *et al*.'s 2006 study reported a 2% gonorrhea prevalence rate based on Gram's staining among 150 patients referred to the Vali-e Asr Clinic of Tehran (13). In Newman *et al*.'s review article in 2012, the global prevalence of *N. gonorrhoeae* in women aged 15-49 years was estimated at 0.8% (0.6-1%). It is estimated that there are 78 million people with gonorrhea (53-110 million) globally (14). Many causes, including religious, economic, cultural, and individual factors, can be conducive to contamination and the development of sexually transmitted diseases (12, 14, 15). On the other hand, the type of diagnostic method used is also highly crucial in this regard, so that varying relative frequencies of the infection can be expected in different places.

The results of this study indicated that the relative frequency of *T. vaginalis* was 4.75% in the wet mount, and 6.75% in Giemsa staining. Given that the wet mount is of lower sensitivity and specificity than staining (16), a higher number of cases detected by Giemsa staining was expectable in our study. In a study conducted in Zanjan, the prevalence of Trichomonas infection was 6.4% based on the wet specimen (17). Meanwhile, in a study conducted in Birjand, the prevalence of Trichomonas was 9.5% based on Giemsa staining (11). The prevalence of Trichomonas in other countries, such as the United States, is reported as 3.1% (18). Meanwhile, Trichomonas infection is of a significantly higher prevalence in less developed countries, especially those in Africa (19, 20).

A review study estimated that the prevalence of *T. vaginalis* is about 5% worldwide (14). The relative frequency obtained in this study seems to be higher than the predicted global average, which can be explained by the sociocultural and economic conditions of the region (i.e., economic status, referral to the physician, observance of hygiene practices, etc.).

Also, the results of our study indicated that the relative frequency of concurrent contamination with *N. gonorrhoeae* and *T. vaginalis* is 1.5%. In a study conducted in Australia, the simultaneous incidence of these two infections was 2.4% (21). Another study in the United States showed that the prevalence of Trichomonas and *N. gonorrhoeae* infections was 1.7% in the African-American population and 0.5% in the Caucasian race (16). It seems that the difference in the prevalence of simultaneous infections in racial and regional groups lies largely with individualistic and health conditions as well as access to healthcare providers (16, 18).

The results of our study showed that the majority of people with *T. vaginalis* were younger than 30 years (44.4%) or between 30 and 40 years old (40.71%). However, there was no significant difference between the infection and the age of the patient. Various studies have suggested that, with increasing age, the Trichomonas infection is reduced, where the lowest frequency is among women over 50 years of age (22). Given the significance of age in the prevalence and frequency of Trichomonas infection upon sexual activity, as expected, the highest percentage of Trichomonas infection in our study belonged to women younger than 40 years of age. This finding is consistent with the findings of previous studies (12, 15).

In this study, no association was found between education level and infection with Trichomonas, although most of the individuals with the Trichomonas infection were those with primary or junior high school degrees. Various studies in this area, such as Gouya (13) and Akhlaghi's studies

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(9), have also indicated that there is no relationship between education level and Trichomonas infection. Nonetheless, the infection can have a higher prevalence in individuals with lower levels of education, which may be due to a low level of health knowledge and public health status (19, 20).

Our findings also indicated that the relative frequency of individuals with Trichomonas infection was higher in urban areas, which can be attributed to the larger number of urban residents participating in this study, although there was no significant difference from residents of rural areas. As in another study conducted in Iran, there was no relationship between residence and the prevalence of Trichomonas infection (9).

Statistical analysis of this study showed that, in line with previous studies, all individuals with Trichomonas infection were married (9, 13, 14, 23) and suggested the central role of sex in creating this infection (10, 24). Moreover, people who used natural methods for contraception or did not use any contraceptive methods were more contaminated, although there was no significant relationship between contraceptive method and the prevalence of Trichomonas infection.

Conclusion

The relative frequency of infection with *N. gonorrhoeae* in Birjand is within the predicted global range, while infection with *T. vaginalis* overrides global average. In addition, Giemsa staining has a higher diagnostic sensitivity than wet specimen for the detection of trichomoniasis and therefore is preferable for diagnosis purposes.

Acknowledgments

This article is the result of an approved research thesis (Approval No. 455464; Ethical Code: IR.BUMS.REC.1397.119) by the Deputy of Research and Technology in Birjand University of Medical Sciences. The authors would like to extend their sincere thanks to the staff of Gynecology departments of Val-e-Asr hospital for their sincere cooperation in carrying out this study.

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