J Med Microbiol Infect Dis, 2019, 7 (1-2): 29-31
DOI: 10.29252/JoMMID.7.1.2.29

Original Article

Causative Agents of Vaginitis in Women of Kerman Province, Iran

Mehdi Borhani Zarandi[1], Saeid Reza Nourollahi Fard[2], Karim Parastouei[3], Amin Ahmadi[4*]

[1]Veterinary Reference Laboratory Kerman, Iran; [2]Department of Parasitology, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran; [3]Department of Nutrition, Baqiyatallah University of Medical Sciences, Tehran, Iran; [4]School of Nursing, Islamic Azad University, Dehaghan Branch, Dehaghan, Iran

Received Mar. 25, 2019; Accepted Jul. 15, 2019

Introduction: Trichomoniasis is a protozoan infection of women that is transmitted via sexual intercourse. The present study was carried out to detect the prevalence of *Trichomonas vaginalis* and other vaginitis agents in women referred to Kerman health care centers. **Methods**: The vaginal discharges of 3988 females were examined by microscopy for *T. vaginalis* infection as well as bacterial and fungal infections from April 2016 to March 2017. **Results**: The prevalence rates of *T. vaginalis*, bacteria, and yeast were 0.2%, 27.3%, and 9.2% respectively. The highest rate of *T. vaginalis* infection among women belonged to the age group 41-50 ($P<0.05$). Our results showed *Escherichia coli* and *Klebsiella* in women with bacterial infections. **Conclusion:** The results indicated that the prevalence of *T. vaginalis* in patients of this area was low, and other causes of vaginitis such as bacterial and fungal infections should be more considered. *J Med Microbiol Infec Dis, 2019, 7 (1-2): 29-31.*

Keywords: *Trichomonas vaginalis,* Kerman, Vaginitis.

INTRODUCTION

Vaginitis is a leading clinical problem for which women seek an obstetrician or gynecologist. The most common vaginal infections include trichomoniasis and other bacterial and fungal infections. Some agents are merely transmitted via sexual contact, while some others, such as yeasts and bacteria occur in warm, moist parts of the body, such as the vagina, and only multiply when conditions like stress, pregnancy, and illnesses affect the immune system [1]. *Trichomonas vaginalis* is a single cell flagellated parasite that resides in the lower genital tract of females and the male's urethra, particularly among sexually active age groups. It is the most common sexually transmitted diseases (STDs) that infect the genitourinary tract in women of all age groups [2]. Bacterial vaginosis occurs by the replacement of the vaginal flora, generally dominated by lactobacilli, by a complex and abundant flora of strictly or optionally anaerobic bacteria. It can be asymptomatic or can cause vaginal inflammation and lead to a vaginal discharge [3].

Prevalence of infection with *T. vaginalis* in non-selected populations of women is 5-20%. Among women, *T. vaginalis* infection is strongly associated with an increased risk of HIV acquisition and transmission [4, 5]. Moreover; researchers have reported an epidemiologic association between trichomoniasis and subsequent cervical neoplasia and carcinoma [6]. Worldwide, about 180 million women are infected by *T. vaginalis* annually. In Iran, the prevalence of trichomoniasis is between 2% to 8%, and in some cultural and social status may reach as high as 30% [7].

In this study, we aimed to determine the prevalence of *T. vaginalis*, and bacterial, and fungal infections among women that referred to the different laboratories in Kerman city of Iran.

MATERIAL AND METHODS

Study population and preparation method. The study was conducted in Kerman (30°17′13″N and 57°04′09″E), southeast of Iran from April 2016 to March 2017. In the present study, the vaginal discharges of 3988 women were examined by direct smear for *T. vaginalis* infection and other pathogens causing vaginitis. Physicians introduced all women to different diagnostic laboratories in Kerman**.** Demographic information was recorded in questionnaires, and patients were divided into 5 age groups and examined simultaneously for the presence of parasitic, bacterial, and fungal infections. Standard and routine microbiological tests were performed for the detection of each microorganism.

The urine samples, following collection, were centrifuged at 1500 g for 10 min to separate the liquid from solid components that may be present, such as blood cells, mineral crystals, or microorganisms. The resulting pellet was examined under a microscope with a magnification of 400X.

***Correspondence:** Amin Ahmadi
School of Nursing, Islamic Azad University, Dehaghan Branch, Dehaghan, Iran, 8641687511.
Email: ahmadi.a63@gmail.com
Tel/Fax: +98 (31) 53337926

Also, a vaginal discharge was obtained from the posterior cervix or the vaginal wall using a sterile and transferred to a tube containing sterile normal saline. Wet mounts from all normal saline suspensions were prepared on clean slides and examined for typical yeast cells and *T. vaginalis* under a microscope with a magnification of 400X. Also, Gram-stained smears from swabs were examined with 1000X magnification under oil immersion for gram-negative diplococci. For further studies of the bacteria, the swab specimens were inoculated onto blood agar and EMB agar.

Informed consent was obtained from all participants or their guardians, and the ethical committee of Kerman University of medical sciences approved the study (No. 1396/137). This study was also carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki).

Statistical analysis. The SPSS software (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. To compare the relative frequency of infection between different factors, Chi-square tests were used. *P* values below 0.05 were considered significant.

RESULTS

The prevalence rate of *T. vaginalis*, bacteria, and yeast among women were 0.2%, 27.3%, and 9.2%, respectively (Table 1). In women with bacterial infections, the species *Escherichia coli and Klebsiella* spp. were detected in vaginal specimens.

The highest rate of *T. vaginalis* infection (0.31%) was in the age group 41-50 years old ($P<0.05$), and the lowest rates (0.025%) in the age groups 30-40 and <20 years of age. Also, a significant difference was seen in the bacterial and fungal infection in different ages groups ($P<0.05$), *i.e.*, the infections in the older age groups were higher than young ones (Table 2).

Table 1. The prevalence rate of *T. vginalis*, bacteria and yeast infection among women with vaginitis in Kerman Province, Iran

Positive and negative cases	No. of *T. vaginalis*	Bacteria	yeast
No. of +	9 (0.2%)	1088 (27.3%)	365 (9.2%)
No. of -	3979 (99.7%)	2898 (72.6%)	3621 (90.7%)

Table 2. The percentage of *T. vaginalis*, bacteria and yeast infections among different age groups women with vaginitis in Kerman Province, Iran

Age groups (years)			bacteria	*T. Vaginalis*	Yeast
<20	N	+	8	0	4
		-	75	83	79
20- 30	N	+	61	1	20
		-	246	306	287
30-40	N	+	223	0	102
		-	870	1093	991
40-50	N	+	172	2	66
		-	473	643	579
>50	N	+	624	6	173
		-	1234	1852	1685

DISCUSSION

In this study, the prevalence of trichomoniasis among women of Kerman city with vaginitis was 0.2% by direct smear method. Various studies in different provinces of Iran has shown various prevalence rates ranging from 0.5% to 42%**.** This variation, to some extent, can be attributed to different detection methods [8]. The *T. vaginalis* infection is mainly transmitted through sexual activity [1]. In Iran, almost 2-17% of newborns girls acquire infection from their mothers [9]. In the United States, the prevalence of trichomoniasis is around 25% in women referred to STDs clinics, and the rate is higher in specific population groups such as Africans of the United States [2].

Our results showed that only 0.2% (n=9) had *T. vaginalis* infection, with the highest rate among the age group ≤50 years of age ($p<0.05$).

The prevalence rate of bacteria and yeast among women were 27.3% (n=1088) and 9.2% (n=365), respectively. In comparison with other similar studies [3-10], using the same diagnostic method, the prevalence rate of bacterial infection from this study appeared to be slightly higher [3]. In a study conducted in the rural area of Northeast Brazil, 20% of women had BV and 12.5% candidiasis [1]. Our findings and similar studies indicate that bacterial reproductive tract infection (RTI) is one of the most common vaginal infections among women with various prevalence rates among different communities resulting from factors, such as hygiene behaviors and socio-demographic characteristics. Bacterial vaginitis (BV) is caused by an imbalance between the "good" and "bad" bacteria that generally live in the vagina. Also, there is a relationship between BV and low birth-weight babies. The bacteria that cause vaginosis sometimes occur in the uterus and tubes of women with pelvic inflammatory disease (PID), but it is not known if vaginosis is a cause of PID [4].

Some studies have shown a significant correlation between BV and different age groups [11-12], while some others have not [13]. The causes for the age distribution patterns of BV are difficult to disentangle, as various behavioral, physiological, and immunological variables interact.

In our study, women aged ≥50 years were more likely to

be infected with yeast, but some studies have reported the infection more in the women of childbearing age [14, 15]. In this study, we did not determine the causative fungal agents, but small numbers of yeasts were persistently present in the vagina, and symptoms only appeared with their overgrowth. Several factors are associated with increased symptomatic fungal infections in women, including pregnancy, uncontrolled diabetes mellitus, and the use of oral contraceptives or antibiotics [12]. Other factors that may increase the incidence of yeast infections include using douches, perfumed hygiene sprays, topical antimicrobial agents, and wearing tight and poorly ventilated clothing or underwear [16]. Further studies in different population groups are needed to determine other aspects of the epidemiology of these vaginal infections in Iran.

Our findings could be used in the management and control of the vaginitis agents in the Kerman province, and also as baseline data for futures studies of the prevalence of causative agents of vaginitis and the contributing factors in this province.

The present study highlights the fact that the prevalence of *T. vaginalis* infection in the study population was low, and other pathogens such as bacteria and fungi played a more significant role as the cause of vaginitis.

ACKNOWLEDGMENT

We thank the Kerman health care centers for the encouragement and provision of facilities. We acknowledge Dr. Saeid Fathi and Dr. Majid Ghasemian for their kind assistance.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this manuscript.

REFERENCES

1. Schwebke JR, Burgess D. Trichomoniasis. Clin Microbiol Rev. 2004; 17 (4): 794-803.

2. Cates JW. Estimates of the incidence and prevalence of sexually transmitted diseases in the United States. Sex Transm Infect. 1999; 26 (4): S2-S7.

3. Matini M, Rezaie S, Mohebali M, Maghsood A, Rabiee S, Fallah M, et al. Prevalence of *Trichomonas vaginalis* Infection in Hamadan City, Western Iran. Iran J Parasitol. 2012; 7 (2): 67-72.

4. Swygard H, Seña AC, Hobbs MM, Cohen MS. Trichomoniasis: clinical manifestations, diagnosis and management. Sex Transm Infect. 2004; 80 (2): 91-5.

5. Mayta H, Gilman RH, Calderon MM, Gottlieb A, Soto G, Tuero I, et al. 18S ribosomal DNA-based PCR for diagnosis of *Trichomonas vaginalis*. J Clin Microbiol. 2000; 38 (7): 2683-7.

6. Viikki M, Gynaecological infections as risk determinants of subsequent cervical neoplasia. Acta Oncol. 2000; 39 (1): 71-75.

7. Conrad M, Zubacova Z, Dunn LA, Upcroft J, Sullivan SA, Tachezy J, Carlton JM. Microsatellite polymorphism in the sexually transmitted human pathogen *Trichomonas vaginalis* indicates a genetically diverse parasite. Mol Biochem Parasitol 2011; 175 (1): 30-38.

8. Petrin D, Delgaty K, Bhatt R, Garber G. Clinical and microbiological aspects of *Trichomonas vaginalis.* Clin Microbiol Rev. 1998; 11 (2): 300-317.

9. Chalechale A, Karimi I. The prevalence of *Trichomonas vaginalis* infection among patients that presented to hospitals in the Kermanshah district of Iran in 2006 and 2007. TURK J MED SCI. 2010; 40 (6): 971-975.

10. Gavgani ASM, Namazi A, Ghazanchaei A, Alizadeh S, Sehhati F, Rostamzadeh S, Dolatkhah A. Prevalence and risk factors of trichomoniasis among women in Tabriz. Arch Clin Infect Dis. 2008; 3 (2).

11. Spinillo A, Bernuzzi AM, Cevini C, Gulminetti R, Luzi S, De Santolo A. The relationship of bacterial vaginosis, Candida and Trichomonas infection to symptomatic vaginitis in postmenopausal women attending a vaginitis clinic. Maturitas, 1997; 27 (3): 253-260.

12. Fang XZY, Yang Y, Diao Y, Li H. Prevalence and risk factors of trichomoniasis, bacterial vaginosis, and candidiasis for married women of child-bearing age in rural Shandong. Jpn J Infect Dis 2007; 60 (5): 257-261.

13. Oliveira FA, Pfleger V, Lang K, Heukelbach J, Miralles I, Fraga F, et al. Sexually transmitted infections, bacterial vaginosis, and candidiasis in women of reproductive age in rural Northeast Brazil: a population-based study. Mem Inst Oswaldo Cruz. 2007; 102 (6): 751-756.

14. Lan PT, Lundborg CS, Phuc HD, Sihavong A, Unemo M, Chuc NT, et al. Reproductive tract infections including sexually transmitted infections: a population-based study of women of reproductive age in a rural district of Vietnam. Sex Transm Infect 2008; 84 (2): 126-132.

15. Allsworth JE., Peipert JF. Prevalence of bacterial vaginosis: 2001–2004 national health and nutrition examination survey data. Obstet Gynecol. 2007; 109 (1): 114-120.

16. Mandell GL, Bennett JE, Dolin R. Principles and Practice of infectious diseases, 5th ed. 2000; New York.