



Prevalence, Risk Factors, and Clinical Findings of Candidiasis and Trichomoniasis in Women Supported by Selected Health Centers of Tabriz, Iran

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Abstract

Objective: Vulvovaginitis candidiasis and trichomoniasis constitute at least 50% of infectious vaginitis cases. The aim of this study was to determine the prevalence, risk factors, and clinical findings of candidiasis and trichomoniasis in women supported by selected health centers of Tabriz, Iran.

Materials and Methods: This was a cross-sectional study, in which 1000 women who had the study criteria were selected by random sampling. In addition, 12 health centers of Tabriz were selected for this study. A questionnaire was used to obtain their personal and reproductive information, checklist for clinical observations, and culture methods (sabouraud dextrose agar and diamond) for diagnose vaginal infections.

Results: The prevalence of candidiasis and trichomoniasis were 25.2 and 9.2%, respectively. Findings showed that candidiasis infection, history of diseases, vaginal pH, number of coitus, number of delivery, and number of vaginal delivery, breast feeding status, method of last delivery, and contraceptive methods are risk factors for candidacies. Moreover, age at marriage, personal health, sexual hygiene, and vaginal pH are risk factors for trichomoniasis. A statistically significant relationship was observed between candidiasis and clinical findings, such as pruritus, pruritus during coitus, burning sensation with coitus, dysuria in woman and her husband, dyspareunia, low abdominal pain, urinal symptoms, vaginal status, amount of discharge, consistency appearance, and color of discharges. Furthermore, a significant relationship was observed between trichomoniasis and dysuria, and appearance and color of vaginal discharge.

Conclusion: Due to the high prevalence of candidiasis, trichomoniasis infections, and infected women as asymptomatic carriers, it seems necessary to pay more attention to these infections and make efforts for their prevention.

Keywords: Candidiasis, Prevalence, Risk factors, Trichomoniasis

Introduction

Vaginitis is one of the most common clinical problems in women in the United States, and it constitutes 10 million medical consultations annually (1). These infections have different causes, about 90% of which are caused by *Candida albicans*, Bacterial vaginosis, and *Trichomonas vaginalis* (2). Vulvovaginitis candidiasis is the second most common cause of vaginitis (3). In 2002, women in

the United States spent more than half a billion dollars on the treatment of Vulvovaginitis candidiasis (4). The prevalence of this disease has unfortunately increased day by day and risks associated with it seriously threaten women (4,5). The main risk factors identified for the incidence of candidiasis are pregnancy, diabetes, immunosuppressive drugs, and broad spectrum antibiotics (6,7). In addition, oral contraceptives,

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history of sexually transmitted diseases, pregnancy and childbirth, emotional distress, and some common diseases in the body have been considered as predisposing factors for fungal diseases (5,6). The third most common cause of vaginitis is *Trichomonas vaginalis* that causes trichomoniasis and is the most common non-viral sexually transmitted disease (8). The World Health Organization estimated that this disease constitutes nearly half of all cases of sexually transmitted infections in the world (9). *Trichomonas vaginalis* is an important stimulating factor in the creation, transmission, and spreading of immunodeficiency viruses (10,11). Moreover, having this infection, leads to an increased risk of other sexually transmitted diseases (11). Lack of reproductive health, age at first intercourse, history of sexually transmitted diseases, number of pregnancies and deliveries, and personal hygiene are the most important factors that contribute to the development of vaginal trichomoniasis (8,12). The disease can be suspected based on clinical symptoms (itchiness, irritation with yellowish, smelly, and carbonated discharge), but for final diagnosis it is necessary to distinguish single protozoan with *in vitro* methods (13).

The incidence of this disease varies widely in different countries and various factors such as economic, social, cultural, and hygienic factors affect the development or cessation of the release of these contaminants to varying degrees. A survey conducted by Parhisgar in Sanandaj showed that 32.8% of women had *Candida* infection and 12% of them had *Trichomonas vaginalis* (14). Midwives have an important role in vaginal health and hygiene, and evaluation and diagnosis of vaginal diseases and their prevention. Therefore, the researchers conducted this study in order to determine the prevalence, risk factors, and clinical findings of candidiasis and trichomoniasis in women supported by selected health centers of Tabriz, Iran.

Materials and Methods

This was a cross-sectional study. The research environment consisted of selected health centers in Tabriz. 12 health centers were randomly chosen from among the centers affiliated to Tabriz University of Medical Sciences. The health centers were selected using a table of random numbers. Subjects were selected from each center based on

the proportion of women covered by the center. Thus, 1000 women covered by health centers in Tabriz were selected.

In order to achieve the goals of this study, a questionnaire was developed based on books and scientific articles, including questions about demographic and fertility characteristics, contraceptive method used, symptoms of the illness, history of these symptoms, treatment in the past year, and personal and sexual hygiene. For laboratory studies, using a sterile cotton swab, three samples of vaginal secretions, wall, and posterior fornix were collected. A sample of this discharge was used for examination under a microscope. Two other samples for culture were placed in specific medium of diamond and agar sabra. Finally, a checklist, including researchers' observation of the examinations, was completed. To analyze the data, descriptive and inferential statistics were used. Therefore, in order to categorize and summarize the results, descriptive statistics including frequency tables were used. Inferential statistics, such as chi-square and Student's t-test, were used to compare and find the relationship between the two variables.

Results

The highest frequency distribution of the subjects (44.9%) was observed in the age range of 20-29 years. Moreover, 35.2% had primary education, and 96.2% were housewives. Spouse's education of most of the subjects (30.7%) was at a primary level, and most of them were self-employed (38.3%). The findings regarding the distribution of contraceptive methods showed that 23.6% of the subjects used combined pills. The most common symptoms reported by the subjects were malodorous discharge (52.2%), abdominal pain (45.8%), pain during intercourse (27.6%), and burning during intercourse (27.1%).

The clinical observations results showed that, most of the subjects had an inflamed cervix (42.1%), inflamed vagina (84.1%), abnormal amount of discharge (71.4%), and non-uniform consistency of discharge (65.7%), gray discharge (49.5%), turbid appearing discharge (71.6%), and odorless discharge (72.8%). Subjects who had symptoms of clinical candidiasis, and these symptoms were confirmed through direct observation or cultured yeast cells were considered as candidiasis. Therefore, candidiasis cultures were positive in 25.2% of subjects with clinical signs of infection (Table 1).

Table 1. The frequency distribution of clinical results of the culture of the discharge (n = 1000)

Clinical results	Frequency	Number	Percentage
Diamond culture results	Positive	92	9.2
	Negative	908	90.8
Candida culture results	Positive	341	34.1
	Negative	659	65.9
Candidiasis	Positive	252	40.0
	Negative	378	60.0
Direct observation of trichomoniasis	Positive	31	3.1
	Negative	969	96.9
Direct observation of candida	Positive	352	35.2
	Negative	646	64.6

Table 2. Frequency distribution of the subjects based on clinical observation (n = 1000)

Clinical results	Frequency	Number	Percentage
Appearance of the cervix	Normal	387	38.7
	Inflamed	421	42.1
	Wounded	192	19.2
Inflammation of the vagina	Has	841	84.1
	Does not have	159	15.9
Amount of discharge	Normal	286	28.6
	Abnormal	714	71.4
Consistency of discharge	Even	343	34.3
	Uneven	657	65.7
	Gray	495	49.5
Color of discharge	No color	154	15.4
	Cheesy white	177	17.7
	Yellow-green	174	17.4
	Turbid	716	71.6
Appearance of discharge	Clear	147	14.7
	Bubble	137	13.7
	Has	272	27.2
Odor of discharge	Has	272	27.2
	Does not have	728	72.8

The results showed that *Trichomonas vaginalis* was present in the wet samples of 3.1% of the subjects, while 9.2% of the subjects were reported positive for diamond culture (Table 2). Among the individual variables, history of systemic disease and among the reproductive variables, number of pregnancies, number of vaginal deliveries, lactation status, and type of last delivery were identified as risk factors for candidiasis infections using chi-square test. In addition, variables such as vaginal pH and frequency of intercourse were identified as risk factors for candidiasis infections using Student's t-test ($P < 0.05$). However, other individual and reproductive variables and personal and sexual healthcare factors were not significantly associated with candidiasis. Moreover, in this study, chi-square test showed a significant correlation between contraceptive method used and the duration of its usage and candidiasis ($P = 0.001$).

Among the individual and fertility variables, only personal hygiene and sexual hygiene variables were identified using chi-square test, and age at marriage and PH variables were identified using Student's t-test as risk factors for Trichomoniasis infection ($P < 0.05$). Nevertheless, other individual and fertility variables examined in this study were not identified as risk factors for this infection. Chi-square test showed no significant relationship between contraceptive method used and trichomoniasis infection ($P = 0.29$).

The results showed that symptoms about which the majority of patients with candidiasis complained were burning sensation during intercourse (42.7%), itchiness (45.8%), itchiness during intercourse (51.5%), urinary symptoms (42.8%), spouse's urethral discharge (40.7%), and dysuria (42.2%). Chi-square test showed a significant relationship between the symptoms of burning sensation during intercourse, itchiness, itchiness during intercourse, abdominal pain, urinary symptoms, pain during intercourse, burning sensation during urination, and spouse's dysuria in patients with candidiasis infections ($P < 0.05$).

Regarding clinical observations, chi-square test

showed a statistically significant correlation between the vaginal condition variables, and amount, texture, and color of the discharge, pH, and candidiasis ($P < 0.5$) (Table 3). The results showed that symptoms with the highest frequency listed in patients with trichomoniasis were abdominal pain (10.3%), spouse's dysuria (15.2%), spouse's itching spouse (17.2%), spouse's itching during intercourse (10.5%), and dysuria (13.5%). Chi-square test only showed a significant relationship between signs of dysuria and trichomoniasis infection ($P < 0.05$). Regarding clinical observations, chi-square test indicated a significant relationship between appearance and color of vaginal discharge and prevalence of trichomoniasis (Table 3). There was no statistical relationship between other clinical observations and trichomoniasis infection.

Discussion

The study by Parhisgar, on 375 patients with symptoms of vaginitis in Sanandaj, showed that 33.8% of the patients had *Candida* vaginitis (14). Behets et al, in a study in Madagascar on 1066 women, reported a 28.5% incidence of candidiasis in women in the general population (15). In the study by Yazar et al. in Turkey, the prevalence of trichomoniasis was reported as 13.14% using wet sampling method and about 15.37% using cysteine-peptone-liver-maltose (CPLM) culture method (16). In the study by Mahdi et al. in Basra, Iraq, 46 (13%) of the 325 women studied were infected with *Trichomonas vaginalis* (17).

The prevalence of this disease differs due to health, social, and cultural differences; therefore, there is a difference between the prevalence reported in different areas. In a survey conducted by Fallah et al. on patients with leukorrhea in Hamadan, the main complaint in 65% of the patients was regarding discharge, 23% itchiness, 9% burning sensation, and 3% pain during intercourse (18). In studies conducted by Torabi and Amini (19) and Fallah et al. (18) on women with vaginitis, a significant relationship was found between the number of pregnancies and

Table 3. Frequency distribution of patients with trichomoniasis and candidiasis infections based on clinical observation (n = 1000)

Current infection based on clinical observations		Trichomoniasis		Candidiasis	
		Number	Percentage	Number	Percentage
Vaginal condition	Inflamed	18	11.3	195	35.80
	Without inflammation	74	8.8	57	23.20
	Result	P = 0.31	$\chi^2 = 1.018$	P = 0.001	$\chi^2 = 11.37$
Amount of discharge	Normal	21	7.3	39	13.60
	Abnormal	71	9.9	213	29.80
	Result	P = 0.19	$\chi^2 = 1.654$	P = 0.001	$\chi^2 = 28.4$
Consistency of discharge	Even	25	7.3	47	13.70
	Uneven	67	10.2	205	31.20
	Result	P = 0.13	$\chi^2 = 0.283$	P = 0.001	$\chi^2 = 36.1$
Appearance of discharge	Turbid	52	7.3	177	24.70
	Clear	8	5.4	23	15.60
	Bubble	32	23.5	52	38.20
	Result	P = 0.001	$\chi^2 = 39.169$	P = 0.001	$\chi^2 = 19.47$
	Gray	35	7.1	92	18.60
Color of discharge	No color	9	5.8	25	16.20
	White	8	4.5	81	45.80
	Yellow-green	40	23	54	31.00
	Result	P = 0.001	$\chi^2 = 49.005$	P = 0.001	$\chi^2 = 60.9$
pH	< 4.5	12	6.3	25	13.20
	≥ 4.5	80	9.9	227	28.00
	Result	P = 0.13	$\chi^2 = 2.267$	P = 0.001	$\chi^2 = 17.7$

vaginal yeast infections. These results were consistent with the results of the present study. Marrazzo also found that the increase in frequency of sexual intercourse was related to increased candida infections (20). This is consistent with the results of the present study. Results of the study by Farajkhoda et al. showed a significant correlation between hygiene and candidiasis (21). The differences in the results of the present study and these studies might be due to the correct responses of the subjects and the number of the subjects being studied.

The results of the study by Torabi and Amini also showed a statistically significant correlation between the incidence of vaginitis and contraceptive methods used (19). However, Safari et al. found no significant correlation between contraceptive methods and vaginal infections (22). The difference between the results of this study and the study by Safari et al. might be due to the differences in the number of subjects and the sampling methods. In the mentioned study, the subjects referred to the clinic had the symptoms of the disease, but in the present study the subjects were selected from among those covered by health centers, most of whom were asymptomatic (22). In the study by Sehhatie et al. the highest rate of infection with *Trichomonas vaginalis* was observed in those who were married before the age of 20 years (23). Statistical analysis showed a significant relationship between these two variables, and the results of this study were consistent with that of the present study.

In a survey conducted by Shobeiri, a significant relationship was observed between personal hygiene and infection (24). This finding was in agreement with

the results of this study. Rashidi and Ziaee did not find a significant relationship between the use of oral contraceptive pills and trichomoniasis infection (25). This was also consistent with the present study results. According to Fallah et al. (18), there was a significant relationship between candida infection and the main complaint and other clinical complaints of patients. The observed complaints in this study were itchiness (23%), burning sensation (9%), and pain during intercourse (3%) (19). In the study by Safari et al. in Yasuj, Iran, the highest prevalence of itchiness and vulvovaginitis (71.8%) was observed in patients with candida infection, and the highest prevalence of urinary disorders, painful intercourse, irritation, and vulvovaginitis was observed in patients with *Trichomonas vaginalis* infection (22). Results of the study by Sehhatie Shafaie et al. showed no significant relationship between painful intercourse, vaginal inflammation, cervicitis, and frequent urination and trichomoniasis infection (26). The study results and the relatively high prevalence of these infections illustrate the need for further follow-up and training of women about the transmission and prevention of these infections. The results of the present study demonstrated that most of the clinical findings were not significantly associated with infection. Considering this finding and the fact that more than half of the trichomoniasis cases, in the present study, were asymptomatic, it can be concluded that the diagnosis of these infections cannot be confirmed based on only clinical symptoms and results. Therefore, in addition to observation, the use of more accurate techniques is recommended for accurate diagnosis of these diseases.

Providing health care, and maintaining and improving the health of women which are a vulnerable group of the society has a special position in health care services. Midwives are the most ideal service providers who promote women's health. Therefore, it is necessary for this group to have appropriate training in connection with the detection of these diseases and appropriate treatments.

Ethical issues

We have no ethical issues to declare.

Conflict of interests

We declare that we have no conflict of interests.

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