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Prevalence of Trichomoniasis among Reproductive-aged Women in Taiz city, Yemen

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Abstract:

Trichomoniasis is an extremely common infection worldwide. This sexually transmitted disease results from infection with flagellated protozoa named Trichomonas vaginalis. It is principally infects the squamous epithelium in the urogenital tract. The present study aimed to determine the prevalence of trichomoniasis, symptoms and signs that associated with T. vaginalis infection among reproductive-age women in Taiz City. 400 samples of vagina swabs from married women in their childbearing period (15-45) years old were examined to investigate the status of trichomoniasis. The vaginal swab containing vaginal fluids was kept in tube containing 3 ml sterile Phosphate Buffered Saline (PBS), pH: 7.2, for testing by wet mount microscopy and Giemsa staining to diagnose T. vaginalis. Laboratory examination results showed that the prevalence of trichomoniasis was 7 (1.75%) specimens from 400 were positive for T. vaginalis, it was found that the rate of infection was recorded in non-pregnant women (2.73%) compared to no infection in the pregnant women. Assessment of infection rate among different age groups demonstrated that the higher infection rate was in the ages of 35-45 years old. Regarding to the residency, the prevalence rate of trichomoniasis was equal in both women inhabit urban areas and those inhabit rural areas (2.04%). Infection rate of trichomoniasis is low among reproductive-aged women in Taiz City; non-pregnant women were the most affected group than pregnant women.

Keywords: Trichomoniasis; vaginitis; reproductive-aged women; Taiz city; Yemen.

1. Introduction

Trichomoniasis is a non-viral sexually transmitted disease (STD) that results from infection with flagellated protozoa named as *Trichomonas vaginalis*, which principally infects the squamous epithelium in the urogenital tract: vagina, urethra, and paraurethral glands [1]. It is the commonest curable STD [2,3]. The disease is characterized in female patients by frothy-greenish yellow foul smelling vaginal discharge accompanied with vulvovaginal irritation, dysuria and lower abdominal pains [4]. Several risk factors associated with TV infection have been reported including older age, co-infection with other STIs [1,5], phase of menstrual cycle [5], low socioeconomic status, low educational level, douching and poverty [6]. *T. vaginalis* infection continues to be relatively common, especially in women, smokers, non-Hispanic blacks, and in groups of lower socioeconomic status [7]. Women infected with *T. vaginalis* are more likely to acquire human immunodeficiency virus (HIV) [8] and herpes simplex virus type 2 [9]. *T. vaginalis* infection also doubles the risk of persistent human papillomavirus infection in women [10].

Studies show associations between *T. vaginalis* and vaginitis, cervicitis, urethritis, bacterial vaginosis, candidiasis, herpes simplex virus 1 and 2, chlamydia, gonorrhea, and syphilis [11]. Complications of *T. vaginalis* infection were reported in pregnant women include: premature rupture of membrane, premature labour, slow labour, low birth weight infant, post abortion infectors and neonatal death [12,13]. It has been reported that 2 to 17% of female infants acquire TV infection through direct Volvo-vaginal infection during delivery through passage in an infected birth canal [14, 15]. TV infection can cause respiratory and vaginal infections in newborns [1]. Trichomoniasis infection is usually transmitted by sexual contact, but contaminated formites such as inner clothes and towels have been implicated in the transmission [16]. Trichomoniasis is one of the most neglected diseases in Yemen, where there is the knowledge of the population about its transmission, prevention and control is still poor. In addition, there is a lack of the estimates of the infection rate and its possible risk factors [17].

In 2017, the first study in Sana'a explored the prevalence and the risk factors associated with *T. vaginalis* among pregnant women. The results showed that TV has been reported among 11.1% of pregnant women seeking primary healthcare (PHC) in Sana'a city [18]. After two years in 2019, TV was the least frequent vaginal infection, where only three (0.9%) women were found to be positive, mixed infection with TV and VVC was observed among 0.3% of women [19]. However, there are no data on the prevalence of trichomoniasis among reproductive-age women in Taiz Governorate. Therefore, this study aimed to investigate the status of trichomoniasis in Taiz city.

2. Materials & Methods

2.1. Study population and collection of samples

From February 2019 to February 2020, 400 samples of vagina swaps from married women in their childbearing period [15-45] years were collected for examining. The vaginal swab containing vaginal fluids was kept in tube containing 3 ml sterile Phosphate Buffered Saline (PBS), pH: 7.2, for testing by wet mount microscopy and Giemsa staining to diagnose *T. vaginalis.*

2.2. Data collection

Data about (name, age, pregnancy, place of residence, and the patient's complaint), were collected from participated women through face-to-face interview.

2.2.1. Vaginal examination

After filling preformat, the vagina of each woman was examined by a gynecologist for the characteristics of vaginal discharge (color, consistency and odor) using a dry sterile speculum. The sterile cotton wool swab specimen was obtained from the posterior vaginal fornix of all patients. The swab was inserted into the pooled vaginal secretions touching both fornixes and the middle third of the vaginal wall.

2.2.2. Laboratory investigations

The vaginal swab was then put into a tube containing approximately 2 ml of 0.85% physiological saline and transported to the Microbiology Laboratory. A wet mount was taken for diagnosis of *T. vaginalis*. It was prepared using 0.85% physiological saline and examined with a light microscope at X10 and X40 magnification [20]. The trichomonads were identified by their size (10-20 μm), round or oval shape, and characteristic quivering or twitching motility [21].

Giemsa staining was also used for the diagnosis of *T. vaginalis* according to [22]. The prepared vaginal discharge smear was fixed by immersion in methanol for one minute and allowed to dry. It was then stained with giemsa stain for 10 min and scanned for *T. vaginalis* at X100 magnification [22].

2.2.3. The statistical analysis

The statistical analysis of the data was carried out using a statistical package for social sciences (SPSS/PC). Frequencies were computed for all variables and Chi-Square was used, while tabulations and figures were carried out by Microsoft Excel. The level of significance was taken as 0.05.

3. Results & discussion

3.1. Prevalence of trichomoniasis infection among a reproductive aged woman

A total of 400 women aged between 15-45 years were examined and 7 cases (1.75%) were infected with trichomoniasis who were complained from yellow, offensive and purulent vaginal discharge. Fig (1) showed the trophozoites of *Trichomonas vaginalis* in vaginal wet smear stained with Giemsa stain.

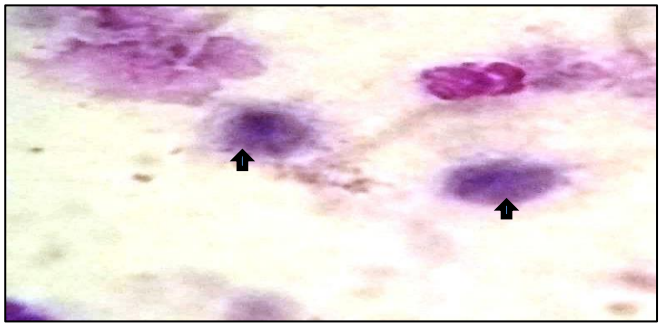

Fig. (1): Photomicrograph of Trichomonas vaginalis showing Trophozoites in vaginal smear stained with Giemsa stain (x100).

Table (1) showed that the highest prevalence rate of trichomoniasis infection was (5.61%) in the age group [35-45]. In addition, it showed that the prevalence rate of trichomoniasis infection increased with age; there was high significant correlation (χ^2 = 12.772, P = 0.002) **(Table 1)**.

Table 1. Prevalence of trichomoniasis infection among a reproductive aged woman attended to gynecological clinics in Taiz city, according to age.

Age group (years)	No. examined	Infected		Uninfected		χ^2	P. value
		No.	%	No.	%		
15-24	116	-	-	116	100		
25-34	177	1	0.56	176	99.44		
35-45	107	6	5.61	101	94.39	12.772	0.002
Total	400	7	1.75	393	98.25		

As shown in table (2), the rate of infection was equal in both, urban and rural areas (2.04%); there were no statistical differences (χ^2 = 1.184, P = 0.553) **(Table 2)**.

Table 2: Prevalence of trichomoniasis infection among a reproductive aged woman attended to gynecological clinics in Taiz city, according to women's residency.

Residency	No. Examined	Infected		Uninfected		χ^2	P. value
		No.	%	No.	%		
Urban	294	6	2.04	288	97.96		
Rural	49	1	2.04	48	97.96		
Unmentioned	57	0	0	57	0	1.184	0.553
Total	400	7	1.75	393	98.25		

The prevalence rate of infection showed a high percentage in non-pregnant women (2.73%) and there was a statistical difference (χ^2 = 4.008, P = 0.045), **(Table 3).**

Table 3. Prevalence of trichomoniasis infection among a reproductive aged woman attended to gynecological clinics in Taiz city, according to pregnancy.

Pregnancy	No. Examined	Infected		Uninfected		χ^2	P. value
		No.	%	No.	%		
Non-pregnant	256	7	2.73	249	97.27		
Pregnant	144	0	0	144	100	4.008	0.045
Total	400	7	1.75	393	98.25		

In relation to trichomoniasis and the symptoms or signs, the statistical analysis in this study showed a high significant associations between *T. vaginalis* infection of the vagina and offensive vaginal discharge (38.89%), purulent vaginal discharge (100%), bleeding vaginal after intercourse (100%) and yellow vaginal discharge (3.83%), (P < 0.05), (**Table 4**).

Table 4. Association of clinical features with trichomonal vaginitis (TV) among reproductive aged women attending some family healthcare centers in Taiz city.

Clinical features	No. examine	Positive No.	Positive %	Negative No.	Negative %	OR	CI 95%	χ^2	P. value
Vaginal itching Yes / No	75/325	0/7	0.00/2.15	75/318	100/97.85	0.978	0.963-0.994	1.644	0.200
Dysuria Yes / No	46/354	0/7	0.00/1.98	46 /347	100/ 98.02	0.980	0.966-0.995	0.926	0.336
Lower abdominal pain Yes / No	100/300	0/7	0.00/2.33	100/293	100/97.67	0.977	0.960-0.994	2.375	0.123
Burning Yes / No	9/ 391	0/7	0.00/1.79	9/384	100/89.21	0.982	0.969-0.995	0.164	0.686
Offensive vaginal discharge Yes / No	18/382	7/0	38.89/0	11/382	61.11/100	1.636	1.132-2.366	151.202	0.00
Fish odor Yes /No	11/ 389	0/7	0/1.80	11/382	100/98.20	0.982	0.969-0.995	0.201	0.654
Curdle vaginal discharge Yes / No	66/ 334	0/ 7	0/ 2.10	66 /327	100/97.90	0.979	0.964-995	1.408	0.235
White vaginal discharge Yes / No	111/ 289	0/7	0/2.42	111/282	100/97.58	0.976	0.958-0.994	2.736	0.098
Grey discharge Yes / No	11/389	0/7	0/1.80	11/382	100/98.20	0.982	0.969-0.995	0.201	0.654
Yellowish to white vaginal discharge Yes / No	4/ 396	0 /7	0/ 1.77	4/389	100.98.23	0.982	0.969-0.995	0.072	0.788
Bleeding after sex Yes / No	5/ 395	5/2	100/0.51	0/393	0/99.49	0.005	0.001-0.020	284.268	0.000
Purulent vaginal discharge Yes / No	7/ 393	7/0	100/0	0/ 393	0/ 100	Can't computed		400.000	0.000
Dyspareunia Yes / No	5/395	0/7	0/1.77	5/388	100/98.23	0.982	0.969-0.995	0.090	0.764
Vaginal swelling Yes / No	72/328	0/7	0/2.13	72/321	100/97.87	0.979	0.963-0.994	1.564	0.211
Yellow vaginal discharge Yes /No	183/217	7/0	3.83/0	176/217	96.17/100	1.040	1.010-1.070	8.448	0.004

Trichomonas vaginalis is a protozoan parasite inhabits urogenital tracts of human. It is the main cause of vaginitis. The prevalence of TV infection among reproductive-aged women in the current study (1.75%) was slightly higher than that of (0.9%) recorded by Abdul-Aziz *et al*. (2019) among reproductive-aged women seeking primary healthcare in Sana'a city [19]. On the other hand, the highest rate of infection was documented among the pregnant women attending PHC centers in Sana'a city [18]. In the other countries, the prevalence rate of trichomoniasis was different from one country to another, such as in Jimma, Ethiopia (4.98 %) [23], Brazil (4.1 %) [24], India (18.8 %) [25], Sudan (0.5 %) [26], Vietnam (0.4 %) [27]. The prevalence of TV infection varies greatly depending on the study population, type of sample collected, laboratory diagnostic techniques used [28].

The very low prevalence of TV (1.75%) in the present study could be attributed to the low sensitivity of microscopic examination of wet mount preparations and Giemsa-stained smears in detecting all infections with TV [29, 30]. A conducted study by [31] concluded that wet mount method had very low sensitivity in detecting TV and using (PCR) is the gold standard in detecting TV. However, some studies had a high prevalence of TV using the wet mount method [32].

The present study showed that the prevalence of TV was common in the age group 35-45 years (5.61%) and there was a statistically significant association between the age and TV infection. This finding was comparable to a study done in Palestine, which reported that the high prevalence of TV was in the age group of 30-43 years [33] and similar to several previous studies in which the majority of infected women were between the ages of 35–40 years [13]. Unlike other nonviral STIs, trichomoniasis does not primarily reach young women (15–25 years old). It affects women during their reproductive years, and high rates of infection are found in women between the ages of 35 and 40 [13].

In this study, the rate of TV infection was equal in urban women and rural women (2.04) and there was no statistically significant association between the residence of women and the disease of trichomoniasis, which is in disagreement with study in India; [34& 35] found that there was a difference in trichomoniasis prevalence in the urban population against the rural population. The differences in the results of the present study and these previous studies might be due to the number of samples being studied and community conclusions. In our study, we found that the vaginitis infection with *T. vaginalis* was higher in non-pregnant women (2.73%) than pregnant women (0.00%), there was a significant difference between the infection in pregnant and non-pregnant women. It is in agreement with study in Libya, which showed that *T. vaginalis* infection was higher in non-pregnant women than pregnant women [36]. Also, this is consistent with some other studies in which reported that *T. vaginalis causes* delayed pregnancy or infertility in women [37, 38, 39].

The present study also, showed that there were significant associations between *T. vaginalis* (TV) infection of the vagina and symptoms of offensive vaginal discharge (100.00%), purulent vaginal discharge (98.61%), bleeding

vaginal after intercourse (94.67%) and yellow vaginal discharge. These findings were corresponding with previous study in America, which showed that *T. vaginalis* was remained significantly associated with symptoms of yellow vaginal discharge, abnormal vaginal odor and purulent vaginal discharge [40], and the other study in Trinidad, which found that the odor of discharge was described as "foul" in a majority of patients with trichomoniasis [41].

Furthermore, the current study showed that the bleeding after intercourse was significant with trichomoniasis infection, which consistent with [4] who reported that the bleeding after intercourse was a sign of trichomoniasis infection. In addition, they reported that the cervicitis due to trichomoniasis is characterized by purulent discharges in the endocervical canal and induces early endocervical bleeding. On the other hand, the bleeding after intercourse can be also attributed to cervicitis which caused by *Chlamydia trachomatis* because one of the classic symptoms described is postcoital bleeding caused by cervicitis due to *Chlamydia trachomatis* [43]**.**

4. Conclusion

Infection rate of trichomoniasis is low among reproductive-aged women in Taiz City; non-pregnant women were the most affected group than pregnant women.

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