

Epidemiological study of the infection with *Trichomonas vaginalis* and associated microorganisms in women of Beje & Tikrit cities

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Abstract

The research included a study of (100) cases of married women, consulting medical clinics in Beje and Tikrit cities. These women had been examined by taking vaginal smears to specify the infection with *Trichomonas vaginalis* and associated microorganisms. A questionnaire paper was used to collect information concerning the consulted patients like: age, number of parturitions, signs and symptoms. The results indicated occurrence of 63 infections, 11 of them were diagnosed with *Trichomonas vaginalis*, which is with rate %17.46 and 52 infections associated with *T. vaginalis* and various microorganisms that is % 82.53. The results also showed that the most microorganisms existence was *Neisseria gonorrhoeae*, as it was found in 28 infected women, followed by *Monilia fungi* in 15 infected women, that is with rate %44.44, %23.80 respectively. The results also indicated that the rate of infection with *T. vaginalis* and associated microorganisms increases directly with increasing the family members (parturitions). The results showed that the vaginal secretions were forming the higher rate of symptoms and signs, as it was recorded in 18 infected women, that is with rate %85.71, besides, a counting had been executed for enumeration the purulent (pus cells) and epithelial cells in the vaginal smears taken for test.

Introduction

T. vaginalis, is an anaerobic, parasitic flagellated protozoan, 10-30 μ m in diameter, is the causative agent of the most widespread sexually transmitted diseases (STD) worldwide, and it is the most common pathogenic protozoan infection of humans in industrialized countries.(1) The WHO has estimated that 180 million infections are acquired annually worldwide. The estimates for North America alone are between 5 and 8 million new infections each year, with an estimated rate of asymptomatic cases as high as 50%.(2) While *T. vaginalis* does not have a cyst form, organisms can survive for up to 24 hours in urine, semen, or even water samples. Combined with an ability to persist on fomites with a moist surface for 1 to 2 hours, *T. vaginalis* is among the most durable protozoan trophozoites.(3)

Trichomoniasis can occur in women (men rarely exhibit symptoms of a *T. vaginalis* infection) if the normal acidity of the vagina is shifted from a healthy, semi-acidic pH (3.8 – 4.2) to a much more basic one (5 – 6) that is conducive to *T. vaginalis* growth.(4) The infection is usually transmitted by sexual intercourse and continual re-infection of one sexual partner

by the others common. Newborn girls can acquire the infection from their infected mothers during passage through the birth canal. In such cases, the infection tends to remain asymptomatic until puberty.(5) Some of the symptoms of Trichomoniasis include: vaginitis and a cute inflammatory disease of the genital mucosa, is also associated with preterm delivery, low birth weight (is less than 5.5 pounds), and increased infant mortality. Infection also pre-disposes individuals to HIV/AIDS and cervical cancer.(6)

Other symptoms in women include inflammation with increasing number of organisms, greenish-yellow frothy vaginal secretions with a strong odor, the infection also may cause discomfort during intercourse and urination, as well as irritation and itching of the female genital area.(7) In rare cases, lower abdominal pain can occur. While most men with trichomoniasis do not have signs or symptoms; however, some men may temporarily have an irritation inside the penis, mild discharge, or slight burning after urination or ejaculation.(4)

The surest way to avoid transmission of sexually transmitted diseases is to abstain from sexual contact, or to be in a long-term mutually monogamous relationship with a

partner who has been tested and is known to be uninfected. Latex male condoms, when used consistently and correctly, can reduce the risk of transmission of trichomoniasis.(8) Metronidazole or tinidazole can treat an infection in progress, and should be prescribed to sexual partners as well.(9)

Diagnosis depends on finding trophozoites in secretions of the genital tract from men or women. In cases where the numbers of organisms are very low, the trophozoites can be cultured to increase their numbers.(10) A number of studies on the prevalence of *T. vaginalis* have been conducted in various parts of the world, and limited number of them have been executed in Iraq.(11,12)

Patients and Methods

The research included a study of 100 cases of married women, consulting medical clinics in Beje and Tikrit cities for the period from 1st January to end of July 2007. The age-range of consulted infected women is between (16 – 44) years old, which they have genital problems. A questionnaire form was filled for each woman by direct interview, the data requested include: age, number of parturitions, signs and symptoms.

These women had been examined and the samples were collected via:

- taken vaginal smear using sterile cotton swab.(13)
- using direct smear urine sediment.(14)

Vaginal smear were tested first in a direct examination of the parasite and investigate other existing cells, then this smear were stained by gram stain to investigate bacteria and fungi associated with the infection. Then the urine also been examined in a direct examination for the detection of inflammatory cells associated with infection.

Results

The age-range of consulted infected women is between (16 – 44) years old. They are divided into 6 groups: (<20, 20-24, 25-29, 30-34, 35-39, >40) years. The results demonstrated that the rate of infection with *T. vaginalis* and associated with various microorganisms was %63, as illustrated in Table 1 which clarifies the number of consulted women within the specified age

groups, as well as the rates of positive cases. It shows that the highest rate of infection is %72.72 within the two age groups 20-24 and 25-29, followed by the rate %64.70 within the two age groups <20 and 30-34, then the rate %53.84 within the age group 35-39 and the rate %22.22 within the age group >40.

By using X², significance differences of rates of infection with *T. vaginalis* and associated with various microorganisms, didn't occur with respect to the age groups of infected women.

Table 2 clarifies an increase in percentages of infection with *T. vaginalis* and associated microorganisms, along with increasing the number of family's members, as it amounted %76.74 in infected women who have more than two parturitions, followed by the rate %59.09 for infected women who have two parturitions then the rate %50 for infected women who have one parturition, whereas the rate amounted %47.05 for infected women who do not have any parturition. By using X² test, significance differences of rate of infection with *T. vaginalis* and associated microorganisms didn't occur with respect to the number of parturitions.

As to table 3, it clarifies the percentages of infection with *T. vaginalis* whether it was alone or associated with other microorganisms. The number of infected women with *T. vaginalis* solely was 11, that is with rate %17.46, and *N. gonorrhoeae* was the most associated microorganisms, as it had been diagnosed in 28 infected women, that is with rate %44.44, followed by *Monilia* fungi in 15 infected women, that is with rate %23.80, the Syphilis bacteria in 4 infected women with rate %6.34, then Herpes simplex virus in 2 infected women with rate %3.17, followed by *Escherichia coli*, *Gardnerella vaginalis*, and (*N. gonorrhoeae* + *Monilia* fungi) with rate %1.58 for each.

Be performance a comparison between the specified age groups in the recent study in terms of infection with *T. vaginalis* solely or accompanied with other microorganisms, it was appeared that the higher age group in infection with *T. vaginalis* solely was 25-29 years, as it had been diagnosed in 5 cases, that is with rate amounted %45.45, followed by the age group 20-24 years in 3 cases with rate %27.27, then the age groups 30-34 and <20 years in 2 cases with rate %18.18, and in 1

case with rate %9.09 respectively. Whereas the higher age groups infected with *T. vaginalis* accompanied with *N. gonorrhoeae* bacteria were 25-29 and <20 years in 6 cases for each, that is with rate %21.42, followed by the two age groups 20-24 and 30-34 years in 5 cases for each, that is with rate %17.85, then the age group 35-39 years in 4 cases, that is with rate %14.28. As for the age group >40, it was appeared in 2 cases with rate %7.14.

Concerning the higher age group infected with *T. vaginalis* accompanied with *Monilia* fungi, was 25-29 years in 5 cases with rate %33.33, followed by the age group 20-24 years in 4 cases with rate %26.66, then the age groups 30-34, 35-39 and <20 years in 2 cases, that is with rate %13.33 for each. As for the higher age group infected with *T. vaginalis* accompanied with VDR syphilis bacteria, was <20, 20-24, 30-34, 35-39 years, as it was distributed in the amount of 1 case, that is with rate %25 for each. In respect to the higher age group infected with *T. vaginalis* accompanied with Herpes simplex virus, was <20, 20-24 years in the amount of 1 case with rate %50 for each. Regarding the infection with *T. vaginalis* accompanied with *E. coli*, and infection with *T. vaginalis* accompanied with *G. vaginalis*, 20-24 years represents the higher age group in infection in the amount of 1 case, that is with rate %100, while the age group 30-34 years indicates the higher infection with *T. vaginalis* + *N. gonorrhoeae* bacteria + *Monilia* fungi in 1 case, that is with rate %100.

The infection with *T. vaginalis* and associated microorganisms, was accompanied with a clear inflammation which was appeared through testing the vaginal smears of infected women. It showed up that vaginal secretions were the most common symptoms, as it had been diagnosed, through a microscopic test for the smears, many of *T. vaginalis*, purulent cells and epithelial cells. Table 4 indicates the percentages of symptoms and signs for the positive cases, as the vaginal secretions rate amounted %85.71 in 18 infected women, followed by symptoms of feeling by the vulva itching + the vaginal secretions with rate %82.35 in 14 infected women, then the feeling of vulva itching only with rate %80 in 12 infected women, followed by

symptoms of pus + vaginal secretions with rate %70 in 7 infected women, then the rate %57.14 of granular areas occurrence in 4 infected women, and signs of granular areas + vulva itching with rate %40 in 2 infected women ... followed by solitary symptoms and signs or accompanying one another, as shown in the above table with rate %25 for each.

As to the comparison executed for the aforesaid age groups in terms of the most common signs and symptoms, the age groups <20 and 25-29 years had the highest rate in showing symptoms of vaginal secretions in the amount of 5 cases, that is with rate %27.77 for each, followed by the two groups 20-24 and 30-34 years in 3 cases with rate %16.66 for each, then the groups 35-39 and >40 years in 1 case with rate %5.55 for each. Whereas the age group 25-29 years had the highest rate in occurring the vulva itching, as it had been diagnosed in 5 cases with rate %41.66, followed by the age group 20-24 years in 3 cases with rate %25, then the groups 35-39, 30-34, <20 in the amount of 2, 1, 1 case, that is with rate amounted %16.66, %8.33 and %8.33 respectively. Regarding the occurrence of granular areas signs, the age groups <20, 20-24, 25-29 and 35-39 years had the highest common rate in these signs in the amount of 1 case, that is with rate %25 for each. Concerning the symptoms of ulceration, vaginal excrescences and malodor (offensive smell), these were common within the age group 20-24 years in the amount of 1 case for each, that is with rate %100.

With regard to enumeration of purulent cells and epithelial cells of vaginal smears, they had been showed in Table 5, as they were divided into groups in terms of number of purulent or epithelial cells in the one slides. It had been noticed that the highest rate of occurring the purulent cells was 1 cell in the one slides %85.71, followed by 2 cells in the one slides %78.26, while the highest rate of epithelial cells occurrence was 1 cell in the one slides %90.47 followed by 2 cells in the one slides %78.94. By using X2, it had not been noticed any significance differences between percentages of occurring the purulent cells or epithelial cells, with numbers of theses cells in the one column.

The comparison which had been executed to the higher age groups in

diagnosis the purulent cells in the one slides, showed that the group 20-24 years represents the higher rate in occurring one cell in the one slides, as it was diagnosed in 9 cases with rate %30, followed by 25-29 years in 8 cases with rate %26.66, then the groups <20, 30-34, 35-39 and >40 in 6, 5, 1 and 1 case with rate %20, %16.66, %3.33 and %3.33 respectively. Whereas the age group 25-29 years represents the higher rate in occurring two purulent cells in the one slides in the amount of 6 cases with rate %33.33, followed by the group 35-39 years in 5 cases with rate %27.77, then the two groups 30-34 and 20-24 years in 4 cases and 3 cases with rate %22.22 and %16.66 respectively.

It showed that the highest rate in number of purulent cells occurrence was in the group <20 years in 5 cases with rate %45.45, followed by the group 30-34 years in 2 cases with rate %18.18, then the groups 25-29, 35-39, 20-24 and >40 years in the amount of 1 case for each, that is with rate %9.09. concerning the occurrence of epithelial cells as for the one slides, it appeared that the highest age group rate in occurring one cell was the group <20 years, as it diagnosed in 9 cases with rate %23.68, then the group 25-29 years in 8 cases with rate %21.05, then the two groups 20-24 and 30-34 years in 7 cases for each with rate %18.42, followed by the two groups 35-39 and >40 years in the amount of 6 and 1 case with rate %15.78 and %2.63 respectively.

While the age group 20-24 years had the highest rate in two epithelial cells occurrence in the one slides in the amount of 7 cases, that is with rate %46.66, then the group 25-29 years in 3 cases with rate %20, followed by the groups 30-34, 35-39, >40 and <20 years in 2, 1, 1 and 1 case for each, that is with rate %13.33 and %6.66 respectively.

Discussion

The results of the study showed that the rate of infection with *T. vaginalis* and associated microorganisms at 100 married women, who consulted medical clinics in Beje and Tikrit cities, was %63 which is a close rate to what was reported in a study executed in the United States for 88 consulted women, in which the infection rate was %42. In another study, the infection rate

amounted %44.2 in Maryland American State (15), whereas the infection rate in the recent study did not agree with what was reported from some researches executed in Iraq, in which the infection rate was low.

This is attributed to that these samples were taken from the consulted women to governmental hospitals only, and not to the private clinics where the well-medical care. Also, the reason behind the variation in infection rate may be due to the difference in diagnosis methods, volume of samples, number of samples taken from each age group, number of sexual partners, and some of the social traditions specially the various living circumstances (16). In general, there is an oscillation in infection rate, for they are related to many factors, some are related to the host infection with other microorganisms, and some to environmental factors like temperature and humidity (17).

In spite of that there are no significance differences in the rates of infection with parasite and associated microorganisms, with respect to the age of infected women, however, it had been noticed a decrease in infection rates with age increasing, at which the two groups 20-24 and 25-29 years were the highest rate in infection occurrence, that is amounted %72.72 for each. While in the age group >40 years, the infection rate was %22.22 where women approach to menopause, where there is sexual weakness representing in dropping of glycogen, estrogen hormone, and the natural pH of vagina (18), which are factors that do not encourage the parasite to growth and increase. On the other hand, the infection occurring in aged women with a little rate, may be attributed to decreasing in body resistance and descending in general health (19) that is, the infection rate was generally high at women in procreation age, this agrees with what had been referred by (20, 21) that the most of infection rates are within the age groups 25-29 and 21-25 years respectively.

About the relation extent of infection rates to the number of parturitions, it was showed that the highest infection rate was at women having more than two parturitions, as it amounted %76.74, followed by the infection rate %59.09 at those who have two parturitions, then the rate %50 at who has one parturition. This is agrees with what had been reported in the study of (22, 23) that the

infection rate increases directly with increasing the number of parturitions, this is attributed to littleness of care with cleanness; when the occasions of bathing, washing and changing clothes decrease, it provides the parasite an opportunity to move from one person to another, as well as the economic and cultural situations for the family's members in general.

There are many studies about association of *T. vaginalis* infection with other microorganisms, but the infection rates were different from the recent study, this is attributed to many factors such as the volume of samples, the feminine groups chosen for the study (married, unmarried, pregnant, and not pregnant), variation in diagnosis methods, duration of collecting samples, nature of the social traditions in different world countries. Also, some of the associated organisms (*N. gonorrhoeae*, *E. coli*, and *G. vaginalis*) are vaginal normal bacteria flora, but it can play a disease role in some circumstances (24 - 26).

With regard to vaginal secretions, which are the most common symptoms when infected with *T. vaginalis* and associated microorganisms, they are white, little, inhomogeneous, odorless in the normal state (27). When occurring an infection with *T. vaginalis* and associated microorganisms, the secretions will be copious, may take a different color, thick consistency more than the usual or aqueous (28), in which arise many of *T. vaginalis*, leukocytes and epithelial cells causing an intense organic agitation, accompanied with aggravation and vulva itching (29), and this what was noticed in the recent study. The previous researches and studies did not deal with the relation of these signs and symptoms occurrence rates to the infection with parasite and the associated organisms, this is attributed to that these symptoms can occur any time depending on immunity factors, its position and period of infection (30).

As for diagnosis the epithelial cells and its occurrence rates in the one slides, the results referred to an increase in the epithelial cells rate at 1 cell in the one slides, compared with the other groups. Also, diagnosis of the purulent cells gave the same results in increasing the purulent cells rate at 1 cell in the one slides, compared with the other

groups, that gives an indicator to a chronic infection (31).

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Table (1): Age in years

Age	No.	Positive Case	%	P-Value
<20	17	11	64.70	P<0.784
20-24	22	16	72.72	
25-29	22	16	72.72	
30-34	17	11	64.70	
35-39	13	7	53.84	
>40	9	2	22.22	
Total	100	63		

Table (2): Parturitions

Number of parturitions	No.	Positive Case	%	P-Value
0	17	8	47.05	P<0.670
1	18	9	50	
2	22	13	59.09	
>2	43	33	76.74	
Total	100	63		

Table (3): Mixed and Single infection

Microorganisms	No.	% (63)
<i>Trichomonas vaginalis</i>	11	17.46
<i>T. vaginalis</i> + Herpes simplex virus (virus)	2	3.17
<i>T. vaginalis</i> + Monilia (fungi)	15	23.80
<i>T. vaginalis</i> + <i>Neisseria gonorrhoeae</i> (bacteria)	28	44.44
<i>T. vaginalis</i> + <i>Escherichia coli</i> (bacteria)	1	1.58
<i>T. vaginalis</i> + <i>Gardnerella vaginalis</i> (bacteria)	1	1.58
<i>T. vaginalis</i> + Syphilis bacteria (bacteria)	4	6.34
<i>T. vaginalis</i> + Monilia + <i>Neisseria gonorrhoeae</i> (fungi+ bacteria)	1	1.58
Total	63	99.95

Table (4): Signs and Symptoms

Variables	Single or Associated Variables	No.	Positive Case	%
Vulva itching	just vulva itching	15	12	80
	vulva itching + vaginal secretion	17	14	82.35
	vulva itching + granular	5	2	40
	vulva itching + offensive smell	4	1	25
Vaginal secretion	just vaginal secretion	21	18	85.71
	vaginal secretion + pus	10	7	70
	vaginal secretion + offensive smell	4	1	25
Granular	just granular	7	4	57.14
	granular and vaginal secretion	4	1	25
Offensive smell	just offensive smell	4	1	25
Ulceration	just ulceration	5	1	20
Vaginal excrescences	just vaginal excrescences	4	1	25
Total		100	63	

Table (5): Direct smear

	No. of cell	No.	Positive Case	%	P-Value
Purulent (Pus Cells)	0	16	11	68.75	P<0.104
	1	35	30	85.71	
	2	23	18	78.26	
	3	6	1	16.66	
	4	6	1	16.66	
	3-4	7	1	14.28	
	5-6	7	1	14.28	
	Total	100	63		
Epithelial Cells	0	7	2	28.57	
	1	42	38	90.47	
	2	19	15	78.94	
	3	7	3	42.85	
	4	6	1	16.66	
	3-4	7	1	14.28	
	12-13	5	1	20	
	Full field	7	2	28.57	
	Total	100	63		