

Infection Rate of *Trichomonas vaginalis* Among Women In Baqubah City

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Abstract: Background: Trichomoniasis is the most common sexually transmitted parasites in the world. The infection rate is differ from one area to another due to several factors such as age of patients, educational level, host immune response and others. Objectives: To determine the infection rate of *Trichomonas vaginalis* in women admitted to Al-Batool Teaching Hospital for Maternity and Children in Baqubah city. Patients and methods: Cross-sectional study consist of 1192 women admitted to Gynecological Outpatient Clinics in Al-Batool Teaching Hospital for Maternity and Children in Baqubah city during the period from 1st January 2016 till 31st December 2016. Full information had been taken directly from all women complains of symptoms such as vaginal itching, burning, a foul-smelling vaginal discharge. Females subjected to this study were classified into different groups, pregnant and non-pregnant women and all of them were screened for *Trichomonas vaginalis* by wet mount examination and other microorganisms by different stain. Result: Laboratory examination results showed that 148(12.41%) specimens from 1192 were positive for *Trichomonas vaginalis*, it was found that the highest rate of infection was recorded in non-pregnant women (75.67%) compared to pregnant women (24.32%) also there was significant difference between both of them. Assessment of infection rate among different age groups demonstrated that the highest infection rate was in the ages of greatest sexual activities from 26-35 years old. As for the infection status, it was found that the higher proportion of single infection 28(77.78%) and 60(53.58%) were recorded among pregnant women and non-pregnant women respectively than double infection, co-infection status revealed that bacterial infection 5(62.50%) was more than *Candida albicans* 3(37.50%) in pregnant women, while *Candida albicans* showed high frequency 36(69.23%) than bacterial infection in non-pregnant women, there was no significant differences noticed between trichomoniasis and history of abortion. Conclusion: Infection rate of *Trichomonas vaginalis* is intermediate among females in Baqubah city; single infection has a higher rate compare with co-infection with bacteria and *Candida albicans*.

Keywords: Trichomoniasis, pregnancy status, sexual activities, co- infection

1. Introduction

Trichomoniasis is a sexually transmitted infection (STI) caused by the motile parasitic protozoan *Trichomonas vaginalis*. It is one of the most common STIs [1]. *Trichomonas vaginalis* is a flagellated parasitic protozoan, typically pyriform but occasionally amoeboid in shape, extracellular to genitourinary track epithelium with a primarily anerobic lifestyle [2].

Trichomonas vaginalis resides in the female lower genital tract and the male urethra and prostate, where it replicates by binary fission. *Trichomonas vaginalis* is transmitted among humans, its only known host, primarily by sexual intercourse. Infection may persist for long periods, possibly months or even years, in women but generally persists less than 10 days in males [3].

Infection with *T. vaginalis* can be a marker for high-risk sexual behavior, and frequently occurs concomitantly with other sexual transmitted infection, including gonorrhea and *Chlamydia*[4].

Trichomonas vaginalis is more prevalent than *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and syphilis combined. The global prevalence of *Trichomonas vaginalis* has been estimated at 8.1 % for women and 1.0 % for men [5].

The infection produce wide range of clinical symptoms varying from a symptomatic to sever inflammatory manifestations, around 25%-50% of infected females are a symptomatic that characterized by vulvovaginitis, cervicitis, and urethritis [6]. Signs of infection include vaginal

discharge (42%), offensive odor(50%), and edema or erythema (22 to 37%). The discharge is classically described as frothy, but it is actually frothy in only about 10% of the patients [7].

High *Trichomonas vaginalis* rates ranging from 21 % in pregnant women to 42.6 % in the general population [8]. Trichomoniasis is also associated with adverse pregnancy outcomes, infertility, postoperative infections, and cervical neoplasia [9].

Prevalence of *T. vaginalis* has been found to vary according to: geographical location, study setting, for example sexual health clinic or community setting; age and gender and type of diagnostic techniques [10][11][12].

Estimates of the worldwide incidence of trichomoniasis to be 174 million new cases annually [13]. So the present study was design to update the reader on the infection rate of *Trichomonas vaginalis* and compare it with other vaginal infection in Baqubah city.

2. Patients and methods

Cross-sectional study consist of 1192 women admitted to Gynecological Outpatient Clinics in Al-Batool Teaching Hospital for Maternity and Children in Baqubah city during the period from 1st January 2016 till 31st December 2016.

Full information had been taken directly from all women complains of symptoms such as vaginal itching, burning, a foul-smelling vaginal discharge and the information was

arranged in an informative formula sheet which includes: age, pregnancy status and history of abortion.

All participant were submitted to swab analysis to perform the wet preparation by used normal saline for *Trichomonas vaginalis* [14]. And other swab placing on a clean slide mounted with a drop of KOH 10%, covered with cover-slip for *Candida albicans*, while in the third swab was covered with gram stain, then all slides were examined promptly under the microscope.

Statistical analysis

All date were analyzed with the statistical package for the social sciences (SPSS), version 13, we performed the Chi-square analysis and p-value < 0.05 was considered statistically significant.

3. Result

A total 1192 women and 148 were positive to *Trichomonas vaginalis*, the infection rate was 12.41% among studied groups, the results found that a large number of infection were recorded among non-pregnant women 112(75.67%) than pregnant women 36(24.32%) and statistically significant shown in table (1)

Table 1: Infection rate among studied groups according pregnancy status

Pregnancy	No. (%)	P value
Pregnant women	36(24.32%)	0.00
Non-pregnant women	112(75.67%)	
Total number	148(99.99%)	

Significant at p < 0.05

Table (2) summarizes the infection related with age, the mean age of 148 female infected with *Trichomonas vaginalis* was 30.916 year in non-pregnant women and 28.071 year in pregnant women (range 15-66). Most of the them were in age group 26-35 year, but statistical analysis not revealed significant differences.

Table 2: Distribution of studied group according to age

Age groups	Pregnant women No. (%)	Non-pregnant women No. (%)	P value
15-25 year	14(38.88%)	37(33.03%)	0.244*
26-35 year	17(47.22%)	44(39.28%)	
36-45 year	5(13.88%)	20(17.85%)	
≥ 46 year	-	11(9.82%)	

*Non-significant at p < 0.05

There was a higher proportion of single infection 28(77.78%) and 60(53.58%) were recorded among pregnant women and non-pregnant women respectively compare to double infection and statistically significant as shown in table 3.

Table 3: Distribution of studied group according to type of infection

Type of infection	Pregnant women No. (%)	Non-pregnant women No. (%)	P value
Single infection	28(77.78%)	60(53.58%)	0.010
Double infection	8(22.22%)	52(46.42%)	
Total	36(100%)	112(100%)	

Significant at p < 0.05

Regarding the co-infection with *Trichomonas* infection the result demonstrated that the bacterial infection 5(62.50%) was more than *Candida albicans* 3(37.50%) in pregnant women, while *Candida albicans* showed high frequency 36(69.23%) than bacterial infection in non-pregnant women as shown in table 4.

Table 4: Rate of microorganisms in double infection

Type of infection	Pregnant women No. (%)	Non-pregnant women No. (%)	P value
Bacterial infection	5(62.50%)	16(30.76%)	0.079*
<i>Candida albicans</i>	3(37.50%)	36(69.23%)	
Total	8(100%)	52(99.99%)	

*Non-significant at p < 0.05

Regarding number of abortion, 27 patients (75.00%) within pregnant women and 82 patients (73.22%) within non-pregnant women no had history of abortion, 4 patients (11.15%) and 17 patients (15.18%) respectively had first time abortion, 4(11.15%) and 7(6.25%) respectively had second time abortion while third time abortion showed low frequency than other. Significant difference were noticed with history of abortion shown in table 5.

Table 5: Distribution of studied group according to history of abortion

Number of abortion	Pregnant women No. (%)	Non-pregnant women No. (%)	P value
0	27(75.00%)	82(73.22%)	0.664*
1	4(11.15%)	17(15.18%)	
2	4(11.15%)	7(6.25%)	
≥ 3	1(2.78%)	6(5.37%)	
Total	36(100%)	112(100%)	

*Non-significant at p < 0.05

4. Discussion

In the present study, the infection rate of *Trichomonas vaginalis* was 12.41% among women in Baqubah city. Prevalence of *T. vaginalis* infection at STI clinics ranges from 15% to 54% [15]. The infection rate was comparable with result of study done by Mahdi *et al.*, (2001) in Basra city with the (13.0 %) and Kadir and Fattah (2010) in Sulaimania 10.2% and lower than study done Salman and Esraa (2013) in Kirkuk and by Al-Hussuny (2015) in Baqubah and with Saheb *et al.*,(2016) in Baghdad they showed 20.49%, 41.6% and 85.5% respectively, this may be related with high sexual activity among high infection rate. The rate of trichomoniasis in present study was higher than (1.33%), (5.18%) (7.5%) were recorded in Tikrit, Najaf and Mosul city due to frequent visit to health care and finish course of treatment during the infection as well as hygiene knowledge.

The rate was 75.67% in non-pregnant women with vaginal discharge compare pregnant 24.32%, this result agree with other studies they found infection was less common in pregnant than non-pregnant women [19][24][25]. This finding may be explained by the fact lack of menstrual cycle

during gestation which has negative impact on the growth and maintenance of *Trichomonas vaginalis* trophozoites exceeded level of iron during menstruation increases growth of trichomonads and synthesis and surface placement of adhesins that bind to specific receptors on vaginal epithelial cells [26]. Furthermore, a unique feature of *T. vaginalis* genome is the duplicity for the majority of genes, of which 117 are up regulated in iron-rich environments, and 78 in iron-restricted environments. This feature may facilitate survival of the parasite in iron-rich environments and adherence of *T. vaginalis* to the genital tract epithelium, like the vagina in menstruating women, where haeme from the breakdown of menstrual blood provides an abundant supply of iron [27].

Trichomoniasis according to age groups: In this study, 148 women between the age group of 15 and 66 years were evaluated. The range of ages was classified into four categories. Most patients suffered from trichomoniasis within the age group 26-35 than others also there were a high significant, this result agreement with several studies done in different areas and countries [19][25][28][29]. Study done by Sutton *et al.*, (2007) in United States who showed that a prevalence of 3.1% in females aged 14-49 years was observed based on a nationally representative sample of women in the National Health and Nutrition Examination Survey (NHANES) 2001-2004 study [30]. This may be related with fact this age group active sexually also these findings are disagreement with those of Salman and Esraa (2013) in Kirkuk city who showed 28.57 % was found among women aging from 51 to 60 years. low incidence of infection at the older ages related with variations in the level of estrogen production as well as an imbalance in level of the pH [31]. This related to reduced production of B and T cells in bone marrow and thymus and diminished function of mature lymphocytes in secondary lymphoid tissues in elderly individuals do not respond to immune challenge as robustly as the young [32].

According to type of infection, the present study showed that co-infection with trichomoniasis was more common. In general *T. vaginalis* infection is strongly associated with the presence of other STIs (gonorrhea, chlamydia, and sexually transmitted viruses such as HIV) [33]. In present study co-infection with *Candida albicans* was more than bacterial infection in non-pregnant women, this may be related with none programmed checking of the intra-uterine device, abuse of antibiotics which rises the proliferation of *Candida albicans* in addition to an frequent sexual activity by woman or their husband. This result disagree with study done by Saheb *et al.*, (2016) who showed 82 (13.36%) of the females were infected with bacteria (including *Haemophilus vaginalis*, *Escherichia coli* and *Pseudomonas*); 7 (1.14%) of females was infected with Monilia. Also with Salman and Esraa (2013) who mentioned that equal number 33(20.49) between *Candida albicans* and *Gardnerella vaginalis*. The variation may be related to limited sample size obtained during the present study or due to age studied group and type of test used in diagnosis.

History of abortion and relation with trichomoniasis were also included in the present study and the result showed that

high frequency of studied groups no had history of abortion but statistically non-significant, this due to most infection is asymptomatic and 5% may be complicated as well as related with fact metronidazole treatment is generally efficient in eliminating *T. vaginalis* infection and has a low risk of serious side effects also 5% of clinical cases of trichomoniasis are caused by parasites resistant to the drug [34]. This result agreement with several studies [35][36].

In conclusion, infection rate of *Trichomonas vaginalis* is intermediate among females in Baqubah city; single infection has a higher rate compare to co-infection with bacteria and *Candida albicans*.

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References

- [1] Van der Pol B. *Trichomonas vaginalis* infection, the most prevalent non-viral sexually transmitted infection receives the least public health attention. Clin Infect Dis. 2007; 44(1): 23-5.
- [2] Harp DF, Chowdhury I. Trichomoniasis: evaluation to execution. Eur J Obstet Gynecol Reprod Biol. 2011;157(1):3-9.
- [3] Krieger JN. Trichomoniasis in men: old issues and new data. Sex Transm Dis. 1995; 22(2): 83-96.
- [4] Jawetz E, Melnick G, Adel bery E. Medical Microbiology. 22nd ed. LANGE, Geo. F. Brooks 2001. P: 563-566.
- [5] World Health Organization. Global prevalence and incidence of selected curable sexually transmitted infections: overviews and estimates. In: WHO/ HIV-AIDS. Edited by Organization WH. Geneva; 2001.
- [6] Simernjeet K, Sumeeta K, Rashmi B, Ajaiy W, Malla N. Trichomoniasis among women in North India: A hospital based study. Indian J Sex Transm Dis and AIDS. 2008; 29(2): 76-81.
- [7] Nizami D, Gülnaz Ç, Ali U, Arif G. The Investigation of the Association Between the Frequency of *Trichomonas Vaginalis* and Using Intrauterine Contraceptive Device. Trakya Univ Tip Fak Derg. 2009; 26(3):197-202.
- [8] Wangnapi RA, Soso S, Unger HW, Sawera C, Ome M, Umbers AJ, *et al.* Prevalence and risk factors for *Chlamydia trachomatis*, *Neisseria gonorrhoeae* and *Trichomonas vaginalis* infection in pregnant women in Papua New Guinea. Sex Transm Infect. 2015;91(3):194-200.
- [9] Soper D. Trichomoniasis: under control or undercontrolled? Am J Obstet Gynecol. 2004; 190(1): 281-90.
- [10] Workowski KA, Berman SM. Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines. Morb Mortal Wkly Rep. 2006; 55(RR-11) :52-54.
- [11] Van Der Pol B, Williams JA, Orr DP, Batteiger BE, Fortenberry JD. Prevalence, incidence, natural history, and response to treatment of *Trichomonas vaginalis*

- infection among adolescent females. *J Infect Dis.* 2005; 192: 2039-2044.
- [12] Sena AC, Miller WC, Hobbs MM, Schwebke JR, Leone PA, Swygard H, Atashili J, Cohen MS. *Trichomonas vaginalis* infection in male sexual partners: implications for diagnosis, treatment, and prevention. *Clin Infect Dis.* 2007; 44:13-22.
- [13] World Health Organization. Prevalence and incidence of selected sexually transmitted infections, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Syphilis*, and *Trichomonas vaginalis*: methods and results used by the WHO to generate 2005 estimates. Geneva, Switzerland: World Health Organization.2010.
- [14] Sharma P, Malla N, Gupta I, Ganguly NK, Mahajan RC. A comparison of wet mount, culture and enzyme-linked immunosorbent assay for the diagnosis of trichomoniasis in women. *Trop Geogr Med.* 1991; 43: 257-260.
- [15] Sobel JD. What's new in bacterial vaginosis and trichomoniasis?. *Infect Dis Clin North Am.* 2005; 19(2):387-406.
- [16] Mahdi NK, Gany ZH, Sharief M. Risk factor for vaginal trichomoniasis among women in Basra. *Iraqi Med. Health J.* 2001;7(6): 918-924.
- [17] Kadir MA, Fattah COD. *Trichomonas vaginalis* Among Women in Sulaimania Governorate, Iraq. *Tikrit Journal of Pharmaceutical Sciences.* 2010; 6(1): 1-9.
- [18] Salman YJ, Esraa AK. Detection of *Trichomonas vaginalis* among females attending Private Gynaecological clinics in Kirkuk province using different laboratory methods. *Journal of Kirkuk Medical College.* 2013; 1(2): 1-8.
- [19] Al-Hussuny EM. An epidemiological study of *Trichomonas vaginalis* in among women living in Baquba City, Diyala Province, Iraq. *Diyala Journal for Pure Science.* 2015; 11(3): 13-25.
- [20] Saheb EJ, Rash HK, Khawla HZ, Israa SM. A comparison between trichomoniasis Infection and other vaginal infection among females in Baghdad governorate- Iraq. *Iraqi Journal of Science.* 2016; 57(1): 545-551.
- [21] Al-Somaeyday EG. Prevalence of *Trichomonas vaginalis* among women in Tikrit city and the effect of some herbal extract on the parasite. MSc. Thesis. College of Education of Girl- Tikrit University. 2006.
- [22] Taher JH. Epidemiological and Biological Variability in Clinical Isolates of *Trichomonas vaginalis* among Women in Najaf/ Iraq. *Karbala Journal of Pharmaceutical Sciences.* 2012; 3: 23-33.
- [23] Kharofa WA. An epidemiological study and cultivation of *Trichomonas vaginalis* in Mosul city. MSc. Thesis. Mosul University- College of Sciences. 1999.
- [24] Al-Kubassi WA, Al-Rubaey MG, Dawood AKN. Epidermiological study of trichomoniasis among Iraq women. *Iraqi J Comm Med.* 2002; 15 (2): 12-14.
- [25] Al-habib HM, Nawfal YA, Ghada AA. The prevalence of *Trichomonas vaginalis* in association with other microorganisms among women with vaginal discharge in Mosul. *Annals of the college of medicine of medicine.* 2005; 31(1): 37-44.
- [26] Ardalan S, Lee BC, Garber GE. *Trichomonas vaginalis*: the adhesins AP51 and AP65 bind heme and hemoglobin. *Exp Parasitol.* 2009; 121: 300-306.
- [27] Poole DN, McClelland RS. Global epidemiology of *Trichomonas vaginalis*. *Sex Transm Infect.* 2013; 89: 418-422.
- [28] Nicol R. Sexually transmitted disease. *International Medicine.* 1981; 1(5): 196-207.
- [29] Belase R, Warren JW, Mobley H. Urinary and sexual function after radical prostatectomy. 2000: 283-357.
- [30] Sutton M, Sternberg M, Koumans EH, McQuillan G, Berman S, Markowitz L. The prevalence of *Trichomonas vaginalis* infection among reproductive age women in United States. 2001-2004. *Clin Infect Dis.* 2007; 45(10):1319-26.
- [31] Vliet EL. Menopause and perimenopause: The role of ovarian hormones in common neuroendocrine syndromes in primary care. *Primary Care Clinics in Office Practice.* 2002; 29: 43-67.
- [32] Montecino-Rodriguez E, Beata BM, Kenneth D. Causes, consequences, and reversal of immune system aging. *J Clin Invest.* 2013; 123(3): 958-965.
- [33] Wolnwe-Hanssen P, Krieger JN, Stevens CE, Kivitz NB, Koutsky L, Critchlow *et al.*, clinical manifestations of vaginal trichomoniasis. *JAMA.* 1989; 261(4): 571-6.
- [34] Cudmore SL, Kiera LD, Shannon FH, Dino PP, Gary EG. Treatment of Infections Caused by Metronidazole-Resistant *Trichomonas vaginalis*. *Clin Microbiol Rev.* 2004; 17(4): 783-793.
- [35] Mazloumi A, Namazi A, Ghazanchaei A, Alizadeh S, Sehhati F, Rostamzadeh S, *et al.* 2008. Prevalence and risk factors of trichomoniasis among women in Tabriz. *Iranian Journal of Clinical Infectious Disease.* 2008; 3: 67-71.
- [36] Khalil HI, Al-Kuraishi AH, Al-Naimi UAM, Al-Naimi SA. *Trichomoniasis vaginalis* in women attending planning unit in Al-Liqa'a hospital. *Iraqi Journal of Science.* 2012; 53: 746-753.