Vol. 05, No. 02, pp. 48 – 52 (2024)
ISSN: 2708-1818

JOURNAL OF LIFE AND BIO-SCIENCES RESEARCH

www.jlbsr.org

The Frequency of *Trichomonas vaginalis* Infection in Married Women in Al-Khums City, Libya

Rowida S. Alagme[1], Layla O. Elmajdoub[2,*], Khdjia S. M.[3], Fatma M. Abushiba[2], Sara E. Elzwawy[2], Mabrooka M. Abusaha[2], Kholoud A. Emshiheet[2], Hana M. Shaklawoon[2]

[1] *Department of Biology, Science School, Libyan Academic in Misurata, Libya (rowidasalem59@gmail.com)*
[2] *Zoology Department, Science College, Misurata University, Misurata, Libya (elmajdoublayla@sci.misuratau.edu.ly, f.abushiba@sci.misuratau.edu.ly, s.elzwawy@sci.misuratau.edu.ly, mabrookamouda@gmail.com, kwjopran@gmail.com, han.92.ash@gmail.com)*
[3] *Department of Zoology, College of Science, Aljufra University, Aljufra, Libya (khdija1000@gmail.com)*
*Correspondence: *elmajdoublayla@sci.misuratau.edu.ly*

Abstract

***Trichomonas vaginalis* is a parasitic protozoan that infects the urogenital tract of individuals globally, affecting both women and men. There are various methods to detect *T. vaginalis*, including clinical diagnosis and laboratory examination. "The purpose of this study was to determine the prevalence of *T. vaginalis* among married women in Al-Khums, Libya. The comparison between four different diagnostic methods to detect *T. vaginalis*, vaginal swab samples from women who visited Souq Al-Kamlesh Hospital during the period from February 2022 to July 2022 from different regions of the city (Al-Khums, Lebdah, Seline, Souq AlKhamees, Kaam and Caucasus) and collected 350 samples and analyzed them. The highest infection rate is recorded at pH < 7 in 68.75% of cases. The Whiff test resulted in 13 positive samples (3.71%), the culture medium method Cystine-Peptone-Liver infusion- Maltose (CPLM) recorded 16 positive samples (4.57%), and the Giemsa dye staining method recorded 16 positive samples (4.57%). The age groups were more affected by women aged 45 years (28.5%), followed by the age groups between 35 and 45 years at a rate of 4.59%. The lowest infection rate was in the 15-25 (1.90%) age group, with significant differences ($P \leq 0.05$). Furthermore, the most common injuries among women were from Al-Khums region (7.76%), followed by Souq Al-Khamees region (3.94%) and finally Kaam region (2.94%). Cases of miscarriage (10.15%) are found more frequently in this study. The culture and staining methods were used to detect the highest infection rate of *Trichomonas* vaginal and achieve better results than other methods.**

Keywords: *Trichomonas vaginalis, Prevalence, Women, Al-khums, Libya*

Received: October 14th, 2024/ Accepted: December 27th, 2024/Online: December 29th, 2024.

I. INTRODUCTION

Trichomonas vaginalis is a protozoan flagellate parasite responsible for trichomoniasis infection, chiefly transmitted through sexual contact (Rowley *et al*., 2019). Trichomoniasis stands as one of the most prevalent sexually transmitted infections globally, with an estimated yearly incidence of 3-5 million cases in the United States alone. *T. vaginalis* infection, a common protozoal affliction, can lead to severe health implications, including preterm birth, low birth weight, and an elevated risk of Human Immunodeficiency Virus (HIV) transmission. Typically, it results in a genitourinary infection, often asymptomatic in 10–50% of cases (Mielczarek and Blaszkowska, 2016).

Trichomoniasis is an infection that predominantly affects women. Common symptoms encompass a yellowish-green frothy discharge, vaginal odor, discomfort during intercourse and urination, as well as vulvovaginal soreness and itching. Complications in pregnant individuals may involve post-abortion infections, preterm birth, low birth weight infants, and preterm labor leading to premature membrane rupture. *T. vaginalis* infection has been implicated as a risk factor for cervical neoplasia development, alongside other complications like pelvic inflammatory disease, tubal infertility, vaginitis, and urethritis (Domeika *et al*., 2010; Chalechale and Karimi, 2010).

According to Jatau *et al*. (2006), it typically affects the prostate, epididymis, or urethra in men, resulting in prostatitis and urethritis. Historically, the main method of diagnosing *T. vaginalis* has been to examine a wet sample of vaginal fluid under a microscope to look for motile trichomonads (Muzny, 2018). In comparison to culture, it is 44-68% accurate, quick, and low sensitive.

doi: 10.38094/jlbsr502127

The culture method was the gold standard for diagnosis of *T. vaginalis* with a sensitivity of 81-94%. Diamonds medium is the traditional culture method for the vaginal isolation of *T.* vaginalis (Nathan *et al*., 2015).

Trichomoniasis, one of the most common diseases in the world, is found in all tropical and non-tropical environments. According to World Health Organization (WHO, 2011) estimates for trichomoniasis is the most common sexually transmitted infections, with millions of new cases occurring each year because of infection with this parasite (Masha, 2018). Several studies have been conducted in Libya to investigate the prevalence of *T. vaginalis* infection among married women exhibiting symptoms of reproductive system infections. It is known that Libya is one of the countries where this infection is more prevalent. The research revealed different levels of prevalence in different regions of the country. For example, in Misurata, the infection rate was 3.2% (Fatatit, 2017), while in Alzawia, it was 22.4% (Gehan and Gammo, 2012). In Benghazi, the rate was 24.5% (Younis and Elamami, 2016), in Aubari, it was 1.84% (Algazaui *et al*., 2008), and in Al-Batnan, it was 26.8% (Khamees, 2012). In Brazil, the infection rate was 3.2% (Luppi *et al*., 2011). The current study aimed to investigate the prevalence of *Trichomonas vaginalis* among married women in Al-Khums City, determine the optimal diagnostic methods, and assess the relationship between the parasite's prevalence and women's age.

II. Materials And Methods

The study was conducted from February 2022 to July 2022 from different regions (Al-Khums, Lebdah, Seline, Souq AlKhamees, Kaam and Caucasus), collected 350 samples, and analyzed.

A. Study population

All married women from the study area attended Al-khums Hospital, Libya.

B. Sample collection

A sterile, labeled swab collected the samples after obtaining consent from the patient (Briselden and Hillier, 1994). The swab was then examined in 2 ml of sterile physiological saline.

C. Morphology Examination

The samples we collected were examined for color and smell. We measured the pH of the vagina using special papers (Himedia, India) that were placed in contact with the vagina. We noted the color and matched it with the standard colors on the box (Valadkhani, 2004).

D. Whiff's Test

The whiff test was carried out using 10% KOH in the vaginal samples (Briselden and Hillier, 1994).

E. Microscopic Examination

The method used in this study (Matini *et al*., 2012) involved direct microscopy. When using this method, many polymorphonuclear leukocytes are typically seen. Even if only a few leukocytes are observed, it does not rule out the presence of *T. vaginalis*. The detection of the *T. vaginalis* parasite is confirmed by observing its characteristic undulating movement.

F. Culture method

The samples were cultured using a modified CLM medium for the *T. vaginalis* parasite (Himedia, India).

G. Staining method

The vaginal samples were stained using Giemsa stain.

H. Statistical analysis

The relationship between the infection rates of infected women and women ages was applied as defined by Margolis *et al*. (1982). Student t- All tests were performed using the SPSS computer software.

III. Results

Trichomonas vaginalis is a common and curable infection that significantly affects women's health. A study in the city of Al-Khums aimed to assess the prevalence of *T. vaginalis* infection among 350 married women. The study found 16 positive samples, representing 4.57% of the total samples (Table 1).

Table 1. Prevalence rate of *T. vaginalis* in Al-Khums city

	Number of samples	%
Positive samples	16	4.57*
Negative samples	334	95.42
The total	350	100

*High significant differences

Table 2 illustrates the prevalence of *T. vaginalis* by age group, showing a higher number of positive cases in individuals aged 25 to 35. This age range correlates with that of active married women, who are more likely to contract infections from public restrooms. The 35-45 years age group and those above 45 years followed this, but without any significant differences (P>0.05).

Table 2. Prevalence of *T. vaginalis* by age

Age groups (years)	Number of samples tested	Positive samples	%
15-25	105	2	1.90
25-35	144	6	4.16
35-45	87	4	4.59
>45	14	4	28.57
Total	350	16	4.57

The study found variations in infection rates among different regions based on patients' residential areas. The Al-Khums area had the highest infection rate, with 8 positive samples (50%), followed by the Souk Al-Khamees region with 6 positive cases (37.5%), and the Kaam region with the lowest number of parasite infections (2 cases). No infections were

reported in the remaining areas (Libdeh, Silene, and Caucasus) as shown in Table 3. Significant differences existed between infection rates and infected regions (P≤0.05).

Table 3. Distribution of *T. vaginalis* positive cases by regions in different age groups

Age groups (years)	Al-Khums		Souk AL-Khamees		Kaam	
	No.	%	No.	%	No.	%
15-25	1	6.25%	0	0	1	6.25%
25- 35	3	18.75%	3	18.75%	0	0
35- 45	3	18.75%	0	0	1	6.25%
>45	1	6.25%	3	18.75%	0	0
Total	8	50%*	6	37.5%*	2	12.5%*

*High significant differences

The findings from Table 4 show that the percentage of *T. vaginalis* infection in pregnant women (62.5%) is higher than in non-pregnant women (37.5%), with statistically significant variations (P≤0.05).

Table 4. Prevalence of *T. vaginalis* in pregnant and non-pregnant women

Cases	Samples tested	%	Positive	%
Pregnant	228	65.14	10	62.5*
Non pregnant	122	34.85	6	37.5
Total	350	100	16	

*High significant differences

In this study, it was found that more women who had a miscarriage tested positive compared to those who did not. Specifically, 13 out of the positive samples (81.75%) were from women who had a miscarriage (Table 5). These differences were highly significant (P≤0.05).

Table 5. Distribution of cases according to the presence of abortion and its absence

Cases	**Samples tested**	**%**	**Positive**	**%**
Abortion	128	36.57	13	81.25*
Non- Abortion	222	63.42	3	18.75
Total	350	100	16	**%**

*High significant differences

In this study, it was found that pH levels could be classified into three types: acidic, neutral, and alkaline. The highest infection rate, 68.75%, was observed in the acidic medium, followed by 31.25% in the alkaline medium. No infections were recorded in the neutral medium. These differences were highly significant (P≤0.05), according to the results in Table 6.

Table 6. Distribution of samples according to the pH

pH	Samples	%	Positive	%
Acidic	280	80	11	68.75*
Neutral	10	2.85	0	0
Basic	60	17.14	5	31.25*
Total	350	100	16	

* High significant differences

The results indicated the presence of 5 positive samples through direct examination (1.42%), as shown in Table 7. The decrease in positive samples in the direct examination can be attributed to the experience of the person conducting the assessment and the speed at which the sample is transferred and examined.

Table 7. Cases according to the results of the direct examination

Age groups (years)	Samples	Direct examination	%
15 – 25	105	2	1.90
25 – 35	144	2	1.38
35 – 45	87	1	1.14
45<	14	0	0
Total	350		1.42

The distribution of cases based on the results of Whiff's test is outlined in Table 8. In the age groups, the 25-35-year-old category had the highest number of positive cases (5 cases) in Whiff's test results with 10% KOH. Conversely, the lowest number of cases was observed in individuals over 45 years old and those under 25 years old.

Table 8. Distribution of Cases according to the results of the Whiffs test

Age groups (years)	Samples	Positive KOH	%
15 – 25	105	2	1.90
25 – 35	144	5	3.47
35 – 45	87	4	4.59
45<	14	2	14.28
Total	350	13	3.71

In Table 9, the distribution of samples is shown based on the results of cultivation and staining methods. When Giesma dye was used for staining and a specific nutrition medium (Figure 1), there were 16 positive samples (4.57%), which represented the highest percentage among all methods used to detect the *Trichomonas vaginalis* parasite in the study. According to the statistical analysis, there were significant differences between the method of parasite detection and age groups (P≤0.05).

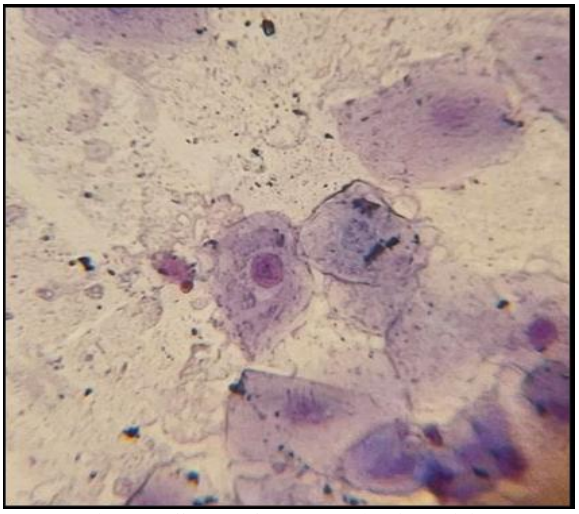

Figure 1. Illustrate the *T. vaginalis* after staining

Table 9. Distribution of samples according to the results of the methods of cultivation and staining

Age groups (years)	Samples	Positive (Culture and Staining)	%
15 – 25	105	2	1.90
25 – 35	144	6	4.16
35 – 45	87	4	4.59
45<	14	4	*28.57
Total	350	16	4.57

*High significant differences

IV. Discussion

Trichomonas vaginalis is recognized as a frequent parasite linked to treatable sexually transmitted infections (WHO, 2011). This study assessed the prevalence of *T. vaginalis* infections in Misurata City. The results seek to improve the understanding of infection rates and guide public health initiatives in the area. The research identified 16 positive samples, accounting for 4.57% of all samples; this aligns with Fatatit's findings (Fatatit, 2017) in Misurata City.

Based on the age groups, the age group of 35-45 years and individuals over 45 years exhibited similar prevalence rates, although the differences were not statistically significant ($P > 0.05$). These findings align with the study conducted by Lewis *et al*. (2021).

The results indicate that the prevalence of *Trichomonas vaginalis* infection is significantly higher in pregnant women (62.5%) compared to non-pregnant women (37.5%). This difference may be linked to changes in the vaginal environment during pregnancy. The rise in vaginal pH during pregnancy creates a more conducive environment for infections, including *T. vaginalis* (Pastorek *et al*., 1996).

In this study, 13 out of the positive samples (81.75%) were from women who had experienced a miscarriage. Salomon *et al*. (2011) support these findings. The study also revealed that pH levels varied between acidic, neutral, and alkaline conditions. The highest infection rate of 68.75% was observed in the acidic medium, while 31.25% was noted in the alkaline medium. These results align with those of Fatatit (2017), indicating that pH levels tend to decrease with age in infected women. Additionally, Jawetz *et al*. (2001) observed a correlation between pH levels and *Trichomonas vaginalis* infection.

In diagnosing *Trichomonas vaginalis*, maintaining quality is crucial. This requires conducting microscopic examinations promptly after specimen collection to ensure the vitality of the parasite, which is sensitive to external conditions. Timely analysis helps in accurately identifying the presence of the parasite and improving diagnostic reliability.

The research indicated that the high prices of the Trichomonas Rapid Test, PCR, and ELISA immunoassays make it challenging to bring them to laboratories for parasite detection.

Alternatively, the use of culture and staining methods for parasite detection is feasible. These methods are effective for examining large numbers of samples over an extended period, and they provide reliable results regarding the presence or absence of the parasite. Therefore, culture and staining methods are considered effective for parasite detection.

V. Conclusion

Trichomonas vaginalis (*T. vaginalis*) affects 85% of women without showing any symptoms. It primarily affects the vulva, vagina, and cervix. In the Al-khums area, 350 cases have been observed, resulting in a prevalence rate of 4.57%. The age group most affected is women between 25 and 35 years old. Al-khums has the highest prevalence at 7.76%. Among the observed cases, 16 (4.57%) are in both pregnant and non-pregnant women, with 13 cases resulting in abortion. Additionally, 11 cases show acidity and 13 cases test positive for potassium hydroxide (KOH). The culture and staining method yielded 16 positive results. Proper diagnosis is essential for effective treatment.

COMPETING INTERESTS

The authors stated that they do not have any competing interests.

Acknowledgements

The authors are grateful to the Dean of the Zoology department, Misurata University, for providing the facilities for carrying out the research.

References

Algazaui, A., Khan, A.H., Kubti, Y. (2008). Incidence of *Trichomonas vaginilis* among pregnant women in Obari Libya. *Sebha Medical Journal*, 76(2),34-35.

Briselden, A., Hillier, S. (1994). Evaluation of affirm VP microbiol identification test for *Gardnerella* and *Trichomonas vaginalis*. *Journal of Clin Microbiol*,32,148-152.

Chalechale, A., Karimi, I. (2010). The prevalence of *Trichomonas vaginalis* infection among patients that presented to hospitals in the Kermanshah district of Iran in 2006 and 2007. *Turkey Journal of Medical Science*, 40(6):971-975.

Domeika, M., Zhurauskaya, L., Savicheva, A., Frigo, N., Sokolovskiy, E., Hallen, A., Unemo, M., Ballard, R.C., S.R.H, Networka, E.E. (2010). Guidelines for the laboratory diagnosis of trichomoniasis in East European countries. *JEADV*, 24,1125-1134.

Fatatit, N. (2017). *Trichomonas vaginalis* parasite disorder among married women in Misurata city, Master's thesis.

Gehan, S.S., Gammo, M.M. (2012). Studies on trichomoniasis in Libya and comparison between In Pouch TM cultures, wet mount examination and Giemsa Staining for diagnosis of the disease. *J Am Sci,* 8, 983- 995.

Jatau, E.D., Olonitola, O.S., Olayinka, A.T. (2006). Prevalence of *Trichomonas* infection among woman attending antenatal clinics in Zaria, Nigeria. *Ann Afr Med*, 5, 178- 181.

Jawetz, E., Melnick, J.L., Adelberg, E.A. (2001). Medical Microbiology. 22nd edn. McGraw-Hill Company. New York. 693p.

Khamees, S.S. (2012). Prevalence of *Trichomonas vaginalis* among women in Albatnan district. *International Journal of Pharmaceutical & Life Science*, (3),2177-2180.

Lewis, F.M.T., Spicknall, I.H., Flagg, E.W., Papp, J.R., Kreisel, K.M. (2021). Incidence and Prevalence of *Trichomonas vaginalis* Infection Among Persons Aged 15 to 59 Years: United States, 2018. *Sex Transm Dis*, 1,48(4):232-237.

Luppi, C.G., de Oliveira, R.L., Veras, M.A., Lippman, S.A., Jones, H., de Jesus, C.H., Pinho, A.A., Ribeiro, M.C., Caiaffa-Filho, H. (2011). Early diagnosis and correlations of sexually transmitted infections among women in primary care health services. *Rev Bras Epidemiol*, 14(3),467-77.

Margolis, L., Esch, G., Holmes, J., Kuris, A., Schad, G. A. (1982). The use of ecological terms in parasitology (Report of an Ad Hoc Committee of the American Society of Parasitologists). *The Journal of Parasitology*, 68, 131.

Masha, S. (2018). *Trichomonas vaginalis* infection among pregnant women in Kilifi, Kenya: prevalence, risk factors, genotyping, and interaction with the vaginal microbiome and HIV (Doctoral dissertation, Ghent University).

Matini, M., Rezaie, S., Mohebali, M., Maghsood, A.H., Rabiee, S., Fallah, M., Rezacian, M. (2012). Prevalence of *Trichomonas vaginalis* infection in Hamdan city, Western Iran. *Iran J Parasitol*, 7, 67- 72.

Mielczarek, E., Blaszkowska, J. (2016). *Trichomonas vaginalis*: pathogenicity and potential role in human reproductive failure. *Infection*, 44,447-458.

Muzny, C.A. (2018). Why does *Trichomonas vaginals* continue to be a "Neglected" sexuall transmitted infection. *Clinical Infectious Diseases*, 67(2),218-220.

Nathan, B., Appiah, J., Saunders, P., Heron, D., Nichols, T., Brum, R., Alexander, S., Baraitser, P., Ison, C. (2015). Microscopy outperformed in a comparison of five methods for detecting *Trichomonas vaginalis* in symptomatic women. *Int J STD AIDS,* 26,251–256.

Pastorek, J., Cotch, M., Martin, D., Eschenbach, D. (1996). Clinical and microbiological correlates of vaginal trichomoniasis during Pregnancy. *Clin Infect Dis*, 23, 1070-1080.

Rowley J., Vander, H.S., Korenromp, E. (2019). Chlamydia, gonorrhoea, trichomoniasis and syphilis: global prevalence and incidence estimates, 2016. *Bull World Health Organ*, 97,548–562P.

Salomon, M. C., Martinez, N., Delqado, D., Gonzalez, A. C., Bittar, V. and Gonzalez, N. (2011). *Trichomonas vaginalis* prevalence in sex workers. *Med*, 71,429- 431.

Valadkhani Z. (2004). Role of pH on adhesion of and cervical epithelial change. Annals of *Trichomonas vaginalis* isolated from symptomatic and asymptomatic women to vaginal epithelial cells in vitro. *Iran J Med Scie*, 29, 134-139.

World Health Organization. (2011) Prevalence and Incidence of Selected Sexually Transmitted Infections, *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, syphilis and *Trichomonas vaginalis*: 2011/9789241502450_eng.pdf. Accessed February 8, 2013.

Younis, E., Elamami, A.H. (2016). *Trichomonas vaginalis* infection in women with type 2 diabetes mellitus and vaginal discharge in Benghazi, Libya. *Biomedical sciences,* 8(4),109.