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Trichomonas Vaginalis: Its Morphology, Taxonomy and Transmission Mode: A Descriptive Review

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Abstract: Trichomonas vaginalis is a protozoan parasite and a sexually transmitted disease (STD) of global significance, responsible for trichomonosis. This parasite can infect the urogenital tract of both females and males globally. T. vaginalis is a flagellated, anaerobic protozoan parasite. The primary objective of the present investigation is to acquire a sufficient amount of information regarding Trichomonas vaginalis, including transmission, taxonomy, morphology, and diagnosis.

Key word: Trichomonas vaginalis, Morphology, Taxonomy, Transmission, Parasitic infections, Protozoa.

1. Introduction:

Trichomonas vaginalis is an obligated parasite transmission from person to person through sexual way. In the life cycle the only host to this parasite is the human body (Riestra et al., 2019). Is infrequently exposed to many pathogens which can infect different organs and tissues Also the human reproductive system is one of these system that may be infected with many pathogens like T. vaginalis that causing STD (Brunham and Paavonen, 2020). T. vaginalis is flagellated protozoan extracellular parasites that lives in anaerobic conditions, T. vaginalis caused a vaginal infection or trichomonasis (Hinderfeld and Simoes-Barbosa, 2020). Females are usually affected more than males. It was first discovered by Donne in 1836 from the purulent genital excretion of female (Bhat, 2014). T. vaginalis has an incubation period that can last anywhere from four days to four weeks. It is most commonly found in the squamous epithelium, as opposed to the columnar epithelium. This causes the production of acetic acid, lactic acid, and cystine proteases, all of which have the effect of lowering the pH of vaginal fluid, lowering glycogen levels, and compromising the innate immune system's ability to fight against infection (Paniker, 2013). Vaginal discharge is the most commonly observed symptom in women with candidiasis and in women with trichomoniasis (Lipsky, 2000; Ismail et al., 2024).

2. Transmission of T. vaginalis

This parasite spread among woman and man by vaginal sexually contact and sometimes by using comminuted fomites (Ferré et al., 2019). Infants may acquire infections during parturition. Fomites, including towels, have been associated with transmission (Squire et al., 2019).

3. Taxonomy of T. vaginalis

Trichomonas vaginalis is classified under the Kingdom Protista and belongs to the Phylum Metamonda, within the Subphylum Trichozoa. It is further categorized under the Class Parabasalia, Order Trichomonadida, and Family Trichomonadidae. The genus is Trichomonas, and the species is Trichomonas vaginalis. This taxonomic classification is based on the work of De Aquino et al. (2020).

4. Morphlogy

T. vaginalis has only trophozoites stage , a pear shape and has five Paris of flagella ,four Paris are anterior and one Paris flagella are posterior or called free flagellum, a short undulating membrane that stretches just over half the length of the cell.(Pitt .SJ,2012). Trophozoites appear in ovoid, round, or pear shape. The average length of trophozoites ranges from 8 to 15 um can reach 30 um in length.(Zeibig,2013). T. vaginalis assumes an oval or pear form and occasionally resembles an amoeba while adhering to the epithelial cells of the vagina (Mahmud et al.: 2017). T. vaginalis has Axostyle is very pure and its length is about 3-14µm also has undulating membrane ,the axostyle is used by the parasite to penetrate the host cells and damage of the host's tissues. In acute trichomoniasis infections, the flagella and axostyle are the main features of diagnosis T. vaginalis (Owino, 2020). Also have other internal organelles such as nucleus, costa, pelta ,cytoskeleton and hydrogenosome (Arbabi et al., 2018).

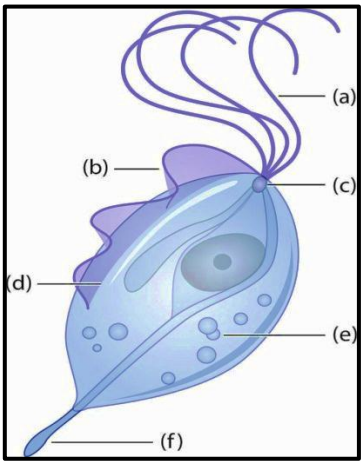

Figure 1: Schematic drawing of T. vaginalis. (a) Anterior flagellum; (b) undulating membrane; (c) pelto; (d) costa; (e) hydrogenosomes; (f) axostyle. (Source: Bouchemal K, et al; 2017).

5. Life cycle of T. vaginalis

This parasite has a simple life cycle, residing in the female lower vaginal tract and the male urethra and prostate, where it replicates through binary fission. The parasite is unlikely to survive in exterior environments due to its lack of a cyst form. T. vaginalis is transmitted exclusively among humans, its sole known host, predominantly through sexual intercourse. The T. vaginalis trophozoite, which is the diagnostic stage, is present in vaginal and prostatic secretions as well as urine. It does it by a process known as longitudinal binary fission. In the course of sexual activity, the trophozoite that is situated in the vaginal or urethral opening undergoes a transformation into an infectious stage(CDC, 2022). The life cycle of this parasite is missing the reservoir and vectors hosts, despite it is the process of cell division was clearly described by using the microscopic method, the life cycle of this parasite is still not well defined, same as many other protozoa because it lacks the cyst stage and has only the trophozoite stage (Kusdian, and Gould, 2014). This species lives in the urinary tract and prostate in males and in the) lower genital tract in females and is the most common in terms of injuries where bilateral longitudinal fission is a method of sexual reproduction and thus transmitted from the affected person to the healthy person through sexual coitus (D'Ancona et al.; 2019; Mustafa et al., 2024).

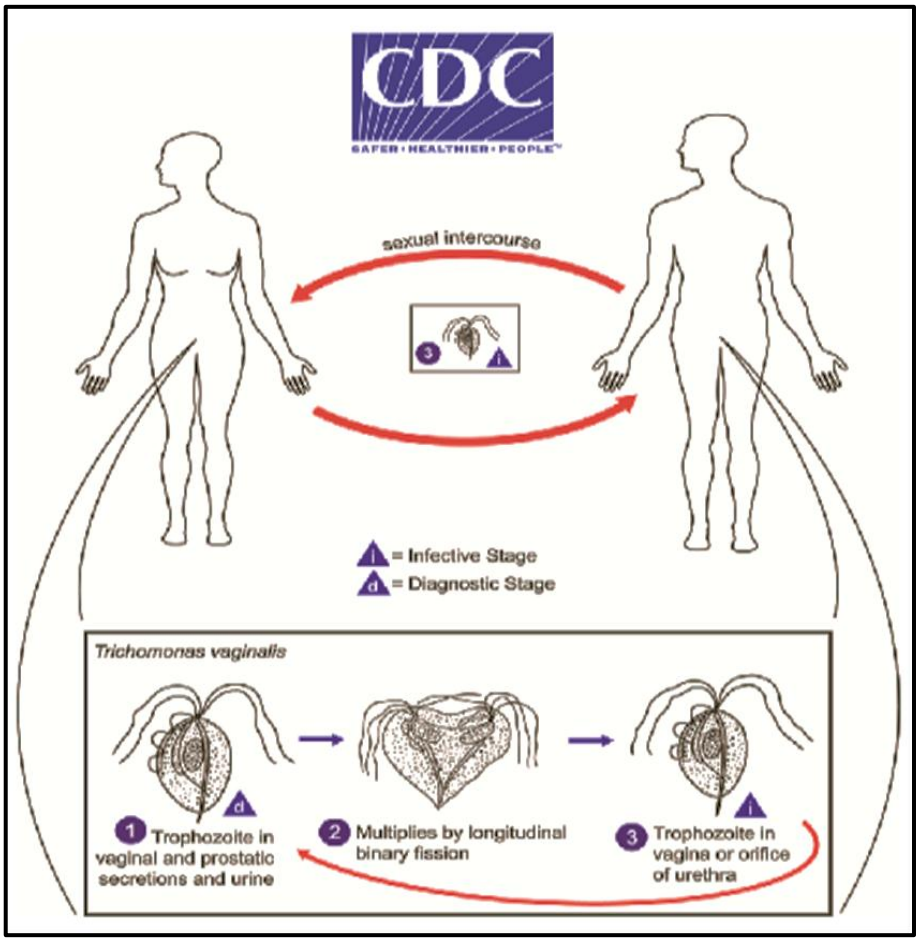

Figure 2: Life cycle of *T. vaginalis*

6. Pathogenesis of Trichomonas vaginalis

In the trophozoite stage, Trichomonas vaginalis attaches to the mucosal surfaces of the urogenital canal and then proliferates via longitudinal binary fission. There are a number of pathogenic mechanisms that contribute to the colonization of the host mucosa. These mechanisms include adhesion, the formation of cytotoxic chemicals and soluble factors, interaction with vaginal microbiome components, evasion of the host immune system, and alteration of the immune response. The colonization and development of infection by T. vaginalis are contingent upon the attachment to epithelial cells, which is a critical preliminary phase.A prominent lipid-anchored phosphosaccharide known as lipophosphoglycan (LPG) significantly enhances the attachment to host cells (Fiori PL,et al;2007). In a carbohydrate-dependent manner, the lipophosphoglycan of T. vaginalis interacts with the mammalian protein galectin-1. The sole recognized human receptor for T. vaginalis is galectin-1. The inflammatory responses of macrophages and epithelial cells are influenced by the presence of several domains with pro-inflammatory characteristics in LPG, as indicated by analyses of the pathogen's composition and structure (Okumura and Johnson ,2008, Hirt, RP,2013). There is another part that has a role in the adhesion process of the T. vaginalis called Fibronectin which is a glycoprotein matrix extracellular adhesion which is used for feeding and adhesion and these last molecules have a role in hemolysis of red blood cells as surface sugars (Gavinho et al.; 2019).

7. Symptoms of T.vaginalis

Vaginal secretions appear greenish-yellow (Schwebke et al.; 2020).This infection leads to serious complications such as cervicitis, premature birth of fetuses and infertility in women as well as men. Recent studies have shown that there is a link with this parasite and increased infection with HIV and genital epithelium ulcers and may develop into bleeding or necrosis as well as acute prostate cancer and cervical cancer uterus (Shaw et al.; 2019; Qassim et al., 2024). In pregnant women the infection with T. vaginalis leads to more serious complications, including low fetal weight at birth,

rupture of the membranes in the uterus prematurely and premature births (Thompson et al.; 2020). In men T. vaginalis infection causes urethritis without other causes and it is mostly without symptoms. If the patient does not make an attempt to receive treatment, they run the risk of developing consequences such as urethritis, chronic prostatitis, epididymitis, infertility, and prostate cancer. These issues can be avoided by having the patient receive treatment(Schwebke et al.; 2018).

8. Diagnosis methods of T. vaginalis

There are many methods for diagnosis of T. vaginalis such as direct method (microscopic examination) of a vaginal discharge (Hobbs and Seña,2013; Mustafa et al., 2024). Also another methods for example culture, PCR , ELISA and staining), The majority of the Iraqi studies in the wet mount preparation and culture (Poole and Clelland ,2013; Abdoli,et al.;2014). The samples used to diagnose T. vaginalis such as urine, semen, vaginal fluid and a vaginal swab from the cervix with special method for diagnosing trichomoniasis by a physician (Bruni et al., 2019). T. vaginalis can be grown in liquid, solid egg and tissue media, and the usual medium for use is cysteine Peptose liver maltose (CPLM) as well as plastic envelope medium (PEM). After the completion of the culture process, the shocked media are transferred with the samples to the incubator and then the results are read after five days using microscopic examination (Hassan et al.; 2019).

9. Stduies in Iraq about T. vaginalis

According to study of T. vaginalis (by Hansh,2024),the prevalence in Dohok was 23(5.4%) in 2006-2008 (Al-Saeed,2011).In Sulaimania was 10(1.66%) in 2007 (Kadir,2010).While in Thi-Qar 34(5.23%) in 2012-2013by (Al-Abady and Al- Khazrajee,2014).In Erbil was14(3.18%) in2012-2013by(Nouraddin and Alsakee ,2019). Al - Najaf was 24 (27.90%) in 2018 by (Al-Abbas,3019). In Kut 12(20%) in 2013-2014 (Kadhim and Sajad,2014). Also in Diyala(12.41%) in2016 by (Hussein and Shaker,2017). Besides in Al-Muthana was 39 (26%)in 2018 by Al-Abodi,et al.;2019).While in Basrah (1.6%) in 2019 by(Kadhum,et al.;2020). In Maysan 170(75.22%) in 2019-2020 by (AL-Majidii and ALSaady,2020).In Karbala the prevalence was 20(8.62%) in 2020-2021 by (Alhusseini and Alquraishi,2021). Baghdad 6(5.5%)in 2020-2021 by (Ali and Ghaima,2022).Also in Mosul city 4(3.3%)in 2022 .Moreover in Maysan city there is study by (AL-Majidii,2020). About epidemiological and molecular Study of Trichomonas vaginalis Parasite among Women. Another study in Iraq about this parasite by (Al-Ataby,et al.;2022) in Thi-Qar province around Knowledge of doctors and nurses about Tichmonus Vaginalis.

10. Conclusion

In the present study there are few studies about Tichmonus Vaginalis Whether it is review or practical studies we also conclude the more method uses for diagnostic is wet amount from vagina or semen secretion. According to references the infection with tis parasite was in female more than male. Also the infection is more common among married women because the main factor in transmission by sexual intercourse.

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Declaration of Competing Interest

The authors say they don't have any known personal or financial relationships or financial interests that could have seemed to affect the work in this study.

References

1. Al-Ataby, F. H., Jasim, Z. H., & Jabbar, T. L. (2022). Knowledge of doctors and nurses about *Tichmonus Vaginalis* among pregnant woman in Bent Al-Huda and Al-Rifai Hospital. International Journal of Health Sciences, 6(S4), 6564–6573.
2. Arbabi M, Fakhrieh Z, Delavari M, Abdoli A. (2014): Prevalence of *Trichomonas vaginalis* infection in Kashan city, Iran (2012-2013): Iran J Reproduct Med;12(7):507e12. PMID.25114674.

3. Arbabi, M., Delavari, M., Fakhrieh-Kashan, Z., & Hooshyar, H. (2018). Review of trichomonas vaginalis in Iran, based on epidemiological situation. Journal of reproduction & infertility, 19(2), 82.

4. Al-Saeed WM. (2011). Detection of *Trichomonas vaginalis* by different methods in women from Dohok province, Iraq. East Mediterr Health J;17(9):706e9. https://iris.who.int handle/10665/118144.

5. Al-Abady FA, Al-Khazrajee ZA. (2014). Epidemiology study parasite *Trichomonas vaginalis* at Thi-Qar province. J Thi-Qar Univ,9(1):1-9.

6. Al-Abodi HRJ, Al-Shaibani KTM, Shaker EM. (2019). Molecular investigation of Trichomoniasis in women in Al-Muthana province/Iraq. In: The 1st international scientific conference on pure science.

7. Al-Abbas WDS, Radhi OA. (2019). Incidence of Chlamydia tracho matis and *Trichomonas vaginalis* genital infections among non-pregnant women in Al e Najaf province. Kufa J Nursing Sci;9(1).

8. Ali RB, Ghaima KK.(2022). Molecular detection of some sexually transmitted bacteria and *Trichomonas vaginalis* in Iraqi mar ried couples. Iraqi J Biotechnol;21(2):136e44.

9. AL-Majidii NKS, ALSaady HAM. (2020).The prevalence of *Tricho monas vaginalis* parasite among women in some regions of Maysan province. Periodico Tche Quim;17(36):784e97.

10. Mustafa, Hamssa M., Anas Abdullah Hamad, and Osama A. Mohsein. "Investigating specific calprotectin and immunological markers associated with intestinal infections caused by Entamoeba histolytica." Iranian Journal of Veterinary Medicine 18.4 (2024): 535-544.

11. Alhusseini ZA, Alquraishi MA.(2021). Epidemiological study and detection of *Trichomonas vaginalis* parasite in holy Karbala governorate. Teikyo Medi J;44(6):3297-305.

12. Brunham, R. C., & Paavonen, J. (2020). Reproductive system infections in women lower genital tract syndromes. Pathogens and Disease, 78(5), ftaa022.

13. Bouchemal, K., Bories, C., & Loiseau, P. M. (2017). Strategies for prevention and treatment of *Trichomonas vaginalis* infections. Clinical microbiology reviews, 30(3):811-825.

14. Bruni, M. P., da Silveira, M. F., Stauffer, D., de Oliveira Bicca, G. L., dos Santos C. C., da Rosa Farias, N. A., ... & Unemo, M. (2019). Aptima *Trichomonas vaginalis* assay elucidates significant under diagnosis of trichomoniasis among women in Brazil according to an observational study. Sexually transmitted infections, 95(2), 129-132.

15. CDC. (2022). Trichomoniasis, parasite biology, life cycle. https://www.cdc.gov/dpdx/trichomoniasis/in dex.html.

16. D'Ancona, C., Haylen, B., Oelke, M., Abranches- Monteiro, L., Arnold, E Goldman, H., & Schizas, A. (2019). The International Continence Society (ICS) report on the terminology for adult male lower urinary tract and pelvic floor symptoms and dysfunction. Neurourology and urodynamic, 38(2), 433-477.

17. Ismail, Mona Adel, et al. "Exploring the Genetic Variability of Escherichia coli Pathotypes in Urinary Tract Infections: Implications for Diagnostics and Treatment." Cent Asian J Med Nat Sci 6.1 (2024): 179-191.

18. De Aquino, M. F. K., Hinderfeld, A. S., & Simoes-Barbosa, A. (2020). *Trichomonas vaginalis*. Trends in Parasitology, 36(7), 646-647.

19. Egan MF, Lipsky MS. (2000).Diagnosis of vaginitis. J Am Fam Phys. 62(5):1095-1104.

20. Ferré, V. M., Ekouevi, D. K., Gbeasor-Komlanvi, F. A., Collin, G., Le Hingrat Q., Tchounga, B., ... & Dagnra, A. C. (2019). Prevalence of human papillomavirus human immunodeficiency

virus and other sexually transmitted infections among female sex workers in Togo: a national cross-sectional survey. Clinical Microbiology and Infection, 25(12), 1560-e1.

21. Gavinho, B., Rossi, I. V., Evans-Osses, I., Lange, S., & Ramirez, M. I. (2019). Peptidylarginine deaminize inhibition abolishes the production of large extracellular vesicles from Giardia intestinalis, affecting host-pathogen interactions by hindering adhesion to host cells. Biorxiv, 586438.
22. Mustafa, Hamssa Majid, Anas Abdullah Hamad, and Osama A. Mohsein. "Entamoeba histolytica and Giardia lamblia predominance in Iraq's southern governorates." International Journal of Environmental Health Engineering 13.1 (2024): 10.
23. Gunn A, Pitt SJ. (2012).Parasitology an integrated approach. 1th ed Wiley e Blackwell. A John Wiley and Sons, Ltd, Publication UK. p. 37e8.
24. Hansh, Wesam Jasim (2024) .A Review on *Trichomonas vaginalis* and The Impact of Some Demographic Variables on The Prevalence in Iraq Maaen Journal for Medical Sciences: Vol. 3 : Iss. 1 , Article 11 Available at: https://doi.org/1045.
25. Hassan, F. A., Al-Marsomy, H. D., & Mustafa, S. A. (2019). Diagnosis of *Trichomonas vaginalis* infection by detection of glutaminase (Glut) gene by nested PCR. scopus ijphrd citation score, 10(7), 478.
26. Hinderfeld, A. S., & Simoes-Barbosa, A. (2020). Vaginal dysbiotic bacteria act as pathobionts of the protozoal pathogen *Trichomonas vaginalis*. Microbial Pathogenesis, 138, 103820.
27. Hirt ,RP. NC, Sicheritz-Ponten T, Tachezy J, and Fiori PL(2007).
28. Trichomonas vaginalis surface proteins: A view from the genome. Trends in Parasitology,23(11)540-547.
29. (2013). Trichomonas vaginalis virulence factors : an integrative .Hirt RP overview. Sex Transm Infect Published, 89 (6):439-443.
30. Hobbs M.M., Seña A.C. (2013). Modern diagnosis of Trichomonas vaginalis infection. Sexually Transmitted Infections 89(6): 434–438. doi:10.1136/sextrans-2013-051057.
31. Hussein AA, Shaker MJ. (2017).Infection rate of *Trichomonas vagi nalis* among women in Baqubah city. Int J Sci Res;6(8): 1954-7.
32. Kadhum NJ, AL-Mayah SH, Raisan SJ. (2020).Epidemiological
33. study on *Trichomonas vaginalis* among the women who attended the hospitals of Basra province. J Basrah Res (Sciences);46(2):64e73.
34. Qassim Mohammad, Sarmad, Abdullah Khazal Mohsen, and Idriss Saleh Jalil. "Assessing the Prevalence of Bacterial Vaginosis among Infertile Women in Thi-Qar Province, Iraq." Infection Epidemiology and Microbiology 10.4 (2024): 287-296.
35. Kadir MA, Fattah CO. (2010).*Trichomonas vaginalis* among women
36. in Sulaimania governorate-Iraq. Tikr J Pharma Sci;6(1).1-9.
37. Kusdian, G., & Gould, S. B. (2014). The biology of *Trichomonas vaginalis* in the light of urogenital tract infection. Molecular and biochemical parasitology, 198(2):92-99
38. Mahmud, R., Lim, Y. A. L., & Amir, A. (2017). Medical Parasitology. Springer International Publishing: Cham, Switzerland.
39. Nouraddin AS, Alsakee HM. (2019).Immunological aspects of *Trichomonas vaginalis* infection in women attending maternity teaching hospital and some public health centers in Erbil governorate, northern Iraq. Cihan Univ Erbil Sci J 2019;3(1)56-60https://doi.org/10.24086/cuesj.v3n1y.pp56-60.

40. Noor Khudair Saad AL-Majidii:(2020). Epidemiological and Molecular Study of *Trichomonas vaginalis* Parasite among Women in Maysan Province South of Iraq.M.S.c Thesis , College of Science,University of Maysan/Iraq.

41. Okumura CY BL, Johnson PJ.: (2008).Galectin-1 on cervical epithelial cells is a receptor for the sexually transmitted human parasite *Trichomonas vaginalis*. Cell Microbiol, 10((10)):2078-2090.

42. Owino, E. A. (2020). Trends in Parasitology: Protozoology. Excelled Books.

43. Poole ND, Mc Clelland RS.(2013). Global epidemiology of *Tricho monas vaginalis*. Sex Transm Infect;89(6):418e22. https doi.org/10.1136/sextrans-2013-051075.

44. Rahi AA, Kadhim RW, Sajad H. (2014).Prospective study of *Trichomonas vaginalis* infection. Scholars J Appl Med Sci2(ID):455-60.

45. Riestra, A. M., Valderrama, J. A., Patras, K. A., Booth, S. D., Quek, X. Y., Tsai C. M., & Nizet, V. (2019). Trichomonas vaginalis induces NLRP3 inflammasome activation and pyroptotic cell death in human macrophages. Journal of innate immunity, 11(1), 86-98.

46. Schwebke, J. R., Gaydos, C. A., Davis, T., Marrazzo, J., Furgerson, D., Taylor, S N., ... & Ferris, D. (2018). Clinical evaluation of the Cepheid Xpert TV assay for detection of *Trichomonas vaginalis* with prospectively collected specimens from men and women. Journal of clinical microbiology, 56(2).

47. Shaw, M. K., Porterfield, H. S., Favaloro, S., Dehon, P. M., Van Der Pol, B Quayle, A. J., & McGowin, C. L. (2019). Prevalence and cervical organism burden among Louisiana women with Trichomonas vaginalis infections. PloS one, 14(6). e0217041.

48. Sastry AS, Bhat S.(2014). Essentials of medical parasitology. New Delhi. London. Philadelphia. Panama: Jaypee Brothers Medical Publishers (P) Ltd; 2014. p. 55e8.

49. Squire, D. S., Lymbery, A. J., Walters, J., Ahmed, H., Asmah, R. H

50. Thompson, R. A. (2019). *Trichomonas vaginalis* infection in southern Ghana clinical signs associated with the infection. Transactions of The Royal Society of Tropical Medicine and Hygiene, 113(7), 359-369.

51. Thompson, A., Timm, K., Borders, N., Montoya, L., & Culbreath, K. (2020). Diagnostic performance of two molecular assays for the detection of vaginitis in symptomatic women. European Journal of Clinical Microbiology & Infectious Diseases, 39(1), 39-44.

52. Zeibig EA. (2013).Clinical Parasitology. A practical approach. Second Edition. Philadelphia: WB. B. Saunders Company; 2013 p. 97e100.