Histological changes of mice testis infected with *Trichomonas vaginalis in Vivo*

Wahda Abdul Razik Kharofa[1] , Ramzia Hassan Abdul Rahman[1], Maha Abdul AL-Jabar AL-♀Sammak[2]

[1] *Class of Medical Biology, Department of Anatomy, College of Medicine, University of Mosul , Mosul , Iraq*

[2] *Class of Histology, Department of Anatomy, College of Medicine, University of Mosul , Mosul , Iraq*

(Received 30 / 11 / 2008 , Accepted 12 / 4 / 2009)

Abstract

Background: This study concerned with the effect of *Trichomonas vaginalis* parasite on the histology of Mice testis.

Objective: many histological changes in the mice testis infected with this parasite.

Design and Setting: 25 experimental mice were used (10) as a control group and (15) mice of one month age .The parasite was taken from the vaginal swab of the female consult AL-Battol teaching hospital and after (15) days of inoculation of the parasite in the mice the testis was taken which showed many histological changes while no such changes in the testis of the control group.

Results: The testis of the second group showed the presence of the *Trichomonas vaginalis* together with intense inflammatory cellular infiltration, edema and congestion of blood vessels. Cessation in the process of spermatogesis with destruction of ledig cells.

Conclusion: All these changes indicated that the infection with the *Trichomonas vaginalis* parasite could affect all organs in the body especially the male and female genital organs.

The aim: This study was to show the effect of *Trichomonas vaginalis in Vivo* infection on the genital tissue of mice through histological section examinations

Key words: testis, *Trichomonas vaginalis*, parasites.

Introduction

Trichomonas vaginalis parasite is one of prokaryot flagellated parasites. It cause disease called Trichomaniasis , it could result in acute or chronic infection , in the vulva it cause vulvitits that lead to leucorrhoea which appear as yellowish green mucopurulent discharge, that increases during the menstruation , while the chronic infection is less occur and it could result in dysmenorrheal (1, 2, 3).

The parasite present mainly in the genitourinary tract. The infection in the male could be a symptomatic or it may infect the urethra causing urerthritis, the male can be infected because true infection was recorded through the work of others (4,5,6, 7).

The infection with this parasite is widely spread in the world and WHO explain that half of sexually transmitted disease is due to this parasite and it's occurrence in the united state of American is about 7.4 million cases in the year.

The percentage of this infection is 4.7%-8.6% in the female and 10%-30% in the male which are infected by chronic parasites. In the Arabian countries among them Iraq, the percentage of the infection is 1-2 % (8, 9)

The testis is one of the important organs in male genital organ which is liable to the invasion by this parasite. Normally the testis composed of seminiferous tubules between the interstitial spaces containing blood vessels, lymphatic and ledig cells which are important source for testosterone. The seminiferous tubules consist of central lumen and basement membrane, on the basement membrane rest the sperm forming cells and sertoli cells (3).

Material & Methods

The parasite was taken from the vaginal swab in the female consult AL-Battol teaching hospital 10 vaginal swab contain the parasite were culture in the specific media for this parasite *Trichomonas* media Oxoid (CM1161), *Trichomonas vaginalis* in logarithmic phase used by hemocytmeter slide with $(10)^7$ / parasite/ cm^3 concentration 25 experimental mice were used 10 a control and 15 mice of one month age and about 25-30g in weight and injection of the parasite intraperitonally in these mice and after 15 days , these mice were sacrified and testis was taken from them (12, 13).

In the male the urethra and the prostate are the most common site for this parasite in addition to the testis and epididymus. The male carry the disease as a symptomatic but some time urethritis with discharge and dysuria (14, 15, 16, 17).

The testis were put in 10% normal buffer formalin, histological section were done according to that mentioned by (18).

The Results

There is variable response to the presence of *Trichomonas vaginalis* parasite in the testis form one semineferous tubules to the other but in general all they show many changes. Normally the somniferous tubules consist of central lumen and on the basement membrane there are sperm forming cells and the sertoli cells can be seen (Fig1) .

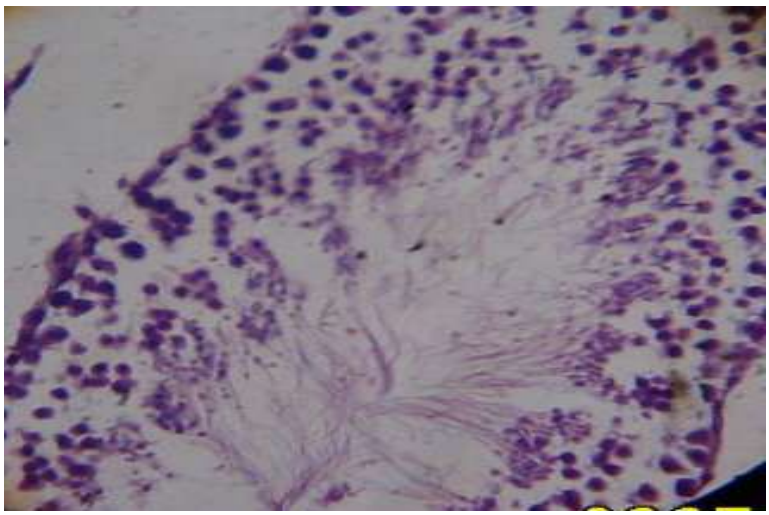

Fig.1-Normal mice testes showing normal semineferous tubule includes all the stages of development of sperms. (H&E 400X).

Thickening of the basement membrane of semniferous tubules (Fig 2). with inflammatory cells infiltration (Fig 3).

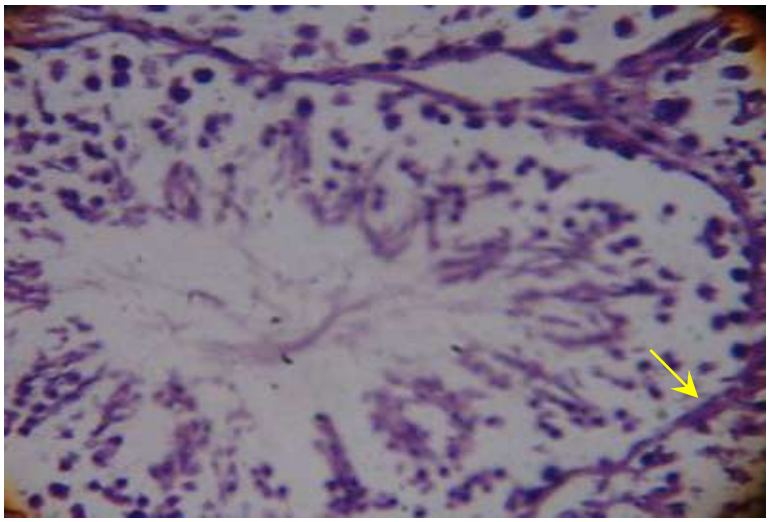

Fig. 2- Mice testes infected with *Trichomonus vaginalis* parasite showing thickening in the basement membrane of semineferous tubule (arrow). (H&E 400X).

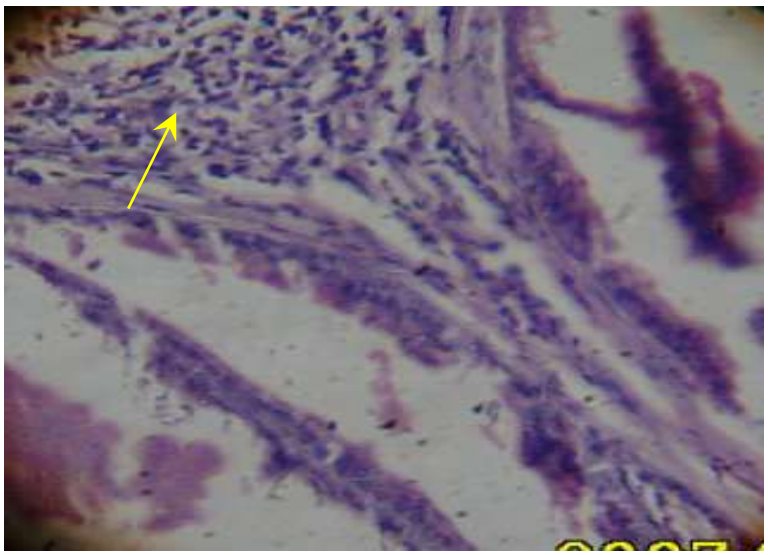

Fig. 3- Mice testes infected with *Trichomonus vaginalis* parasite showing inflammatory cell infiltration in the interstitial space of semineferous tubule (arrow), (H&E 400X). and edoma in the interstial spaces (Fig 4)

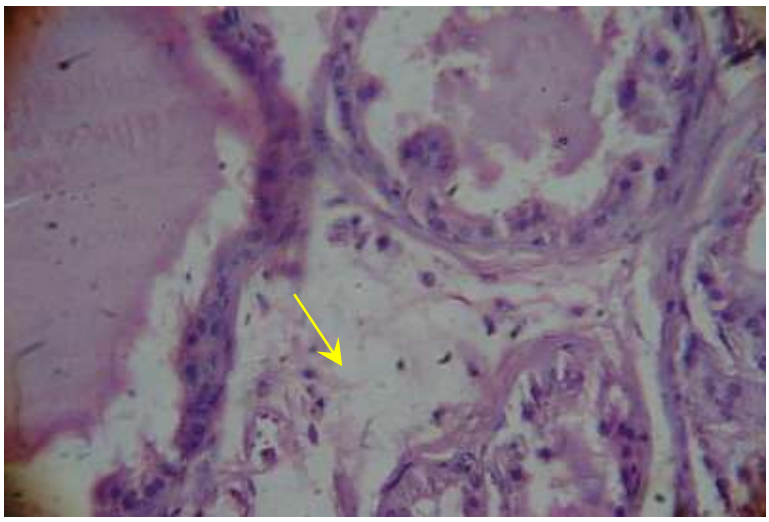

Fig.4- Mice testes infected with *Trichomonus vaginalis* parasite showing edema of the interstitial space of the semineferous tubule (arrow),(H&E 400X).

The presence of the parasite invade the seminiferous tubules (Fig 5 and 6) .

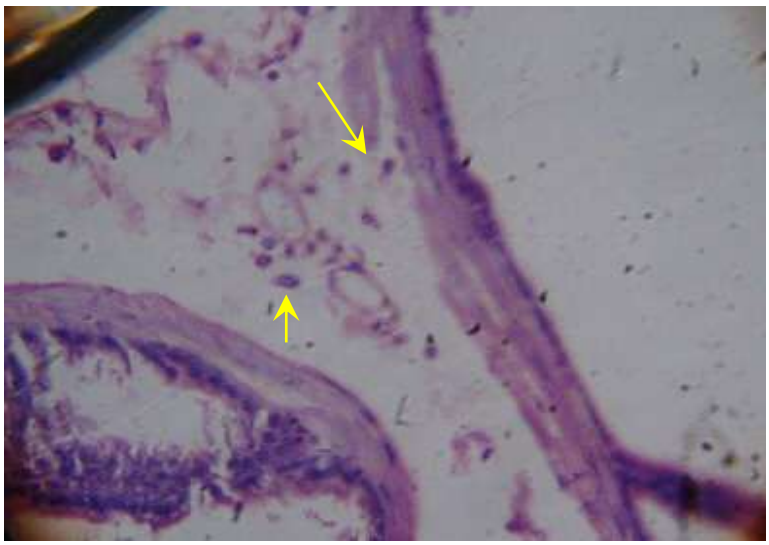

Fig.5-Mice testes infected with *Trichomonus vaginalis* parasite showing the parasite in the interstitial space (arrows),(H&E400X).

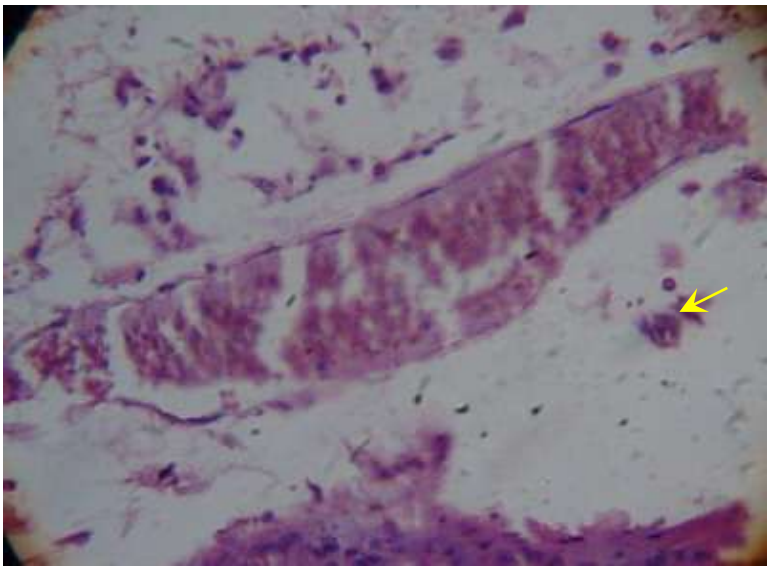

Fig.6-Mice testes infected with *Trichomonus vaginalis* parasite showing congestion of the blood vessels with the presence of the parasite (arrow) in the interstitial space of the semineferous tubule.(H&E 400X).

Also decrease in the number of ledig cells when compare with the control group on the basement membrane the spermatogonia primary spermatocyte can be seen but the spermtid and spermatozoa are not present .(Fig 7).

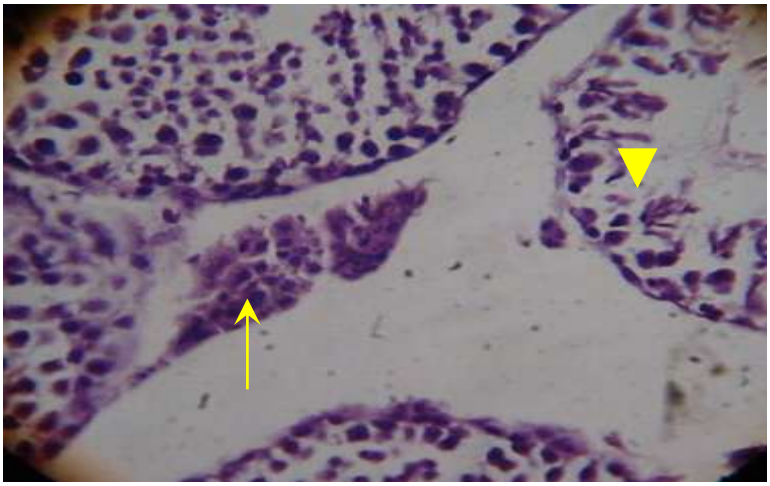

Fig.7- Mice testes infected with *Trichomonus vaginalis* parasite showing destruction of Ledig cells in the interstitial space of the semineferous tubue (arrow), with cessation of spermatogenesis (arrow head),(H&E 400X).

Discussion

There are many histological changes in the testis caused by this parasite (17).

In acute infection with *Trichomonas vaginalis* parasite in mice mortality , mortality can result either from parasite number or due to excessive immunoloical response against the infection (19).

The parasite present mainly in the genital organs of male and female, but this not present that this parasite can be disseminated via the blood circulation to reach the lever and spleen and this is according to Ph.D study of Dr. Wahda Abdul Razik Kharofa (20).

In the present study many histological changes were observed in the mice testis infected with *Trichomonas vaginalis* parasite compared with the control group.

The presence of parasite in the semniferous tubules and within the interstial spaces indicated that the testis is one of the important genital organs involved and affected during the parasitemia development of the parasite (1).

Ledig cells are important in the production of testosterone hormone and it is active metabolic cells and when such parasite invade the ledig cells cause disturbances in its metabolic activity which may lead to the cessation, that inhibit the process of spermatogensis, similar changes were also found by other workers mention the references (1, 2, 3), and some relate the disturbance in the Ledig cells function and shape to the DNA damage in these cells provoked by infection with *Trichomonas vaginalis* (5).

Microscopic examination also reveled intense infiltration of seminiferous tubules with mixed inflammatory cells, these cells leave the blood and enter the tissue as a result to the immunological response of the mice to the infection with this parasite also this changes was mentioned by other workers (3, 6, 9).

The absence of spermatid and spermatozoa could be due to the toxic metabolites (like super oxide, $2H_2O$) produce by this parasite leding to decrease motility of the sperm; this finding is also observed by other workers (10). Dr. Wahda Abdul Razik Kharofa found in her Ph.D study that peritoneal inoculation of this parasite disseminated widely in the body and the testis is one of important organs which involved by this parasite, this could be occur if there is predisposing factor like other infection which could lower the pH of the testis, also the male could be asymptomatic while the parasite present there.

References

1- Land, K.M. and Johnson, P.J. (1997). "Minireview: Molecular Mechanisms Underlying Metronidazole Resistance in Trichomonads". Exper. Parasitol. 87: 304-308.

2- Petrin, D.; Delgaty, K.; Bhatt, R. and Garber, G. (1998). "Clinical and Microbiological Aspects of *Trichomonas vaginalis*". Clin. Microb. Rev. 11(2): 300- 317.

3- Schwebk, J.R. (2004). "Trichomoniasis Care Today: A Clinician's Guide to Timely Diagnosis and Successful Treatment". Sex. Transm. Infect. 78: 378-379.

4- Pillitter, A. (1999). "Maternal and Child Health Nursing". 3rd ed. Lippincott. New York.

5- Benchomol, M.; Deniz, J.A.P. and Riberoi, K. (2000). "The Fine Structure of the Axostyle and its Associations with Organelles in Trichomonads, Tissue & Cell". 32(2): 178-187.

6- Guenthner, P.C.; Secor, W.E. and Dezzutti, C.S. (2005). "*Trichomonas vaginalis* Induced Epithelial Monolaye Disruption and Human Immunodeficiency Virus Type 1 (HIV-1) Replication: Implications for the Sexual Transmission of HIV – 1." Infect. Immunit. 73(7): 4155-4160.

7- Nida, (2006). "Partnerships to develop Tools to Evaluate Women's Health". Department of Health and Human Services. J. Med. 1:20.

8- Gaal, Z.H. (2000). "Urogenital Trichomoniasis among Women in Basrah". M.Sc. Thesis, College of Medicine, University of Basrah.

9- Al-Taee, L.M.R. (2000). "Microbiological Study of Vaginal Infection During Pregnancy and the Effect of Some Plant Extracts on the Isolated Micro-Organisms". M.Sc. Thesis. College of Medicine, University of Baghdad.

10- Deodhar, B.R.; Pandit, D.; Bhise, R. and Chatterjee, D.K. (1997). "Comparative Pathogenicity of Trichomonas vaginalis Isolated from Symptomatic & Asymptomatic Cases". J. Post. Med. 43: 68-70.

11- Rahemo, Z., I.F. and Kharofa, W.A.R. (2001). "Cultivation of an Iraqi Strain of *Trichomonas vaginalis* and Selecting the Appropriate P_H for Growth". Rivist. D. Parasitol. 111(1): 3-7.

12- Ruiz, N.J.; Escario, J.A.; Diaz, M.R.A. and Barrio, G.A.

(1997). “Evaluation of A Murine Model of Experimental Trichomoniasis”. Parasite. 2: 127-132.
13- Gomez-Barrio, A.; Ruiz, J.N.; Montero-Pereira, D.; Rodriguez-Gallego, E.; Romero-Fernandez, E. and Escario, J.A. (2002). “Biological Variability in Clinical Isolates of Trichomonas vaginalis”. Mem. Inst. Oswaldo Cruz. 97(6): 893-896.
14- Campero, C.M.; Dubra, C.R.; Bolandi, A.; Cacciao, C.; Cobo, E.; Perez, S.; Oden, A.; Cipolla, A. and Bondurant, R.H. (2003). “Two – Step (Culture and PCR) Diagnostic approach for Differentiation of Non-T. feotus Trichomonads from Genitalia of Virgin Beef Bulls in Argentina”. Veter. Parasit. 112: 167-175.
15- Hrdy, I.; Cammack, R.; Stopka, P.; Kulda, J. and Tachezy, J. (2005). “Alternative Pathway of Metronidazole Activation in Trichomonas vaginalis Hydrogenosomes”. Amer. Soc. Microb. 49(12): 5033-5036.
16- Zhang, Y.; Wang, W.H.; Wu, W.; Ealick, S.E. and Wang, C.C. (2005). “Identification of A Subversive Substrate of Trichomonas vaginalis Purine Nucleoside Phosphorylas and the Crystal Structure of the Enzyme Substrate Complex”. J. Biol. Chem. 280(23): 22318-22325.
17- Gudmore, S.L.; Delgaty, K.L.; Hayward-McClelland, S.F.; Petrin, D.P. and Garber, G.E. (2004). “Treatment of Infections Caused by Metronidazole Resistant Trichomonas vaginalis”. Am. Soci. Microb. 17(4): 783-793.
18- Luna, L.G. (1968). “Manual of Histological Staining Methods”. 3rd ed., McGraw – Hill Book Comp. New York.
19- Schwebk, J.R. and Burgess, D. (2004). “Trichomoniasis”. Clin. Microb. Rev. 17(4): 794-803.
٢٠- خروفة، وحدة عبد الرزاق ٢٠٠٦ "دراسات تجريبية حول طفيلي المشعّرات المهبلية المعزول من النساء في محافظة نينوى". أطروحة دكتوراه، قسم علوم الحياة، كلية العلوم، جامعة الموصل.

الملخص

خطة البحث:

تتعلق هذه الدراسة بتأثير طفيلي المشعرات المهبلية في التركيب النسجي لخصية الفئران، إذ أستخدمت خمس و عشرين فأرة عشر منها كعينة سيطرة و الباقي حقنت بهذا الطفيلي و تتراوح أعمار الفئران ما بين شهر إلى شهرين. أخذت الطفيليات من مسحة مهبلية لنساء مراجعات لمستشفى البتول التعليمي في مدينة الموصل و بعد خمسة عشر يوم من الإصابة شرحت الفئران و أخذت الخصى و مررت بمراحل تحضير المقاطع النسجية و وجد ان هناك تغيرات نسجية واضحة عند مقارنتها مع عينة السيطرة و لوحظ وجود الطفيلي في خصى الفئران المصابة مع وجود خلايا ألتهابية و احتقان في الأوعية الدموية مع توقف في عملية تكوين النطف مع موت في خلايا الـ (ledig cells) و التي تعد مصدراً مهما لتكوين هرمون الشحمون الخصوي الذي يلعب دورا أساسيا في تكوين النطف، لذلك فإن الكشف المبكر عن وجود الطفيلي يعد خطوة مهمة لإيقاف المضاعفات الناجمة عنه.

الهدف: هذه الدراسة بينت تأثير طفيلي المشعرات المهبلية داخل الجسم الحي من خلال فحص المقاطع النسجية لأنسجة الأعضاء التناسلية للفئران المصابة.

الكلمات الدالة: الخصى، طفيلي المشعرات المهبلية، الطفيليات.