Signs and symptoms of urethritis and cervicitis among women with or without genital mycoplasma infection in governorate of Basrah

R.M. Al-Mosawi
Department of Biology, College of Science, University of Basrah, Iraq.

ISSN –1817 –2695
((Received 24/2/2008, Accepted 30/4/2009))

Abstract:

Due to the absence of antisera in Iraq, thereupon, in this search, the isolated species which belonged to genus Mycoplasma are presumptive (probably) species of genital mycoplasma, the characteristic and biochemical properties of them were fit with those of *M.hominis, U.urealyticum, M.fermentans, M.genitalium and M.penetrans* in dependence on Bergey's Manual of determinative bacteriology (Holt *et al*., 1994). ,

This study was current on 120 women attending the outpatient clinic of the obstetric and gynecology department of Basrah General Hospital during the period from February to July, 2007. Comprised women who suffered from some obstetric and gynecological conditions, for that purpose urethral swabs and the other from endocervix region were cultured then handled and processed with a Monophasic-diphasic culture setup (MDCS), a statistically significant difference at the level of (P< 0.01) was noted in the isolation of both presumptive mycoplasmal species *M.fermentans* and *M.hominis* from urethral region in comparison with endocervix region while, the isolation rates of *U.urealyticum* and *M.genitalium* were highest from endocervix region.

Also, the results show, presumptive (probably) mycoplasmal species: *M.fermentans* , *U.urealyticum*, *M.hominis* and *M.penetrans* were more frequently distributed in women who were complaining of vaginal discharge followed by urethral abnormal and itching. Statistically, the associated significance was noted only in case of *M.hominis* at level of (P< 0.05). The genital mycoplasmas were recovered 15.0 percent in 18 cases as a single infection and 20.8 percent in 25 cases as a mixed infection with other causative agents (bacterial other than mycoplasmas), so this study showed the conjunction of *U.urealyticum* with *M.hominis* in 5 cases (4.1 %) and the *M.genitalium* with *M.fermentans* in 6 cases (5.0 %). Finally, the *E.coli* was found as a single infection in 5 cases and conjuncted with *E.faecalis* in 3 cases (2.5 %) while, *P.aeruginosa* found as a single infection in 4 cases and recovered 0.8 percent in 1 case only as a mixed infection with *S.epidermidis*. .

Keywords: Genital mycoplasma, Gynecological condition, urethritis, vaginitis, cervicitis, Basrah governorate.

Introduction

The mycoplasmas are spherical to filamentous cells with no cell walls, and they are consequently placed in a separate class Mollicutes (mollis, soft, cutis, skin),comprising more than 150 species [1-2]. At least five species of mycoplasmas can be isolated from genitourinary tract as a major importance to human health (causative agents of disease):*Mycoplasma penetrans* was first reported in 1993 as an emerging infectious agent which is linked to the urogenital tract disease as sexually transmitted agents and isolated from patients with a severe immunodeficiency [3-4,18,27].*M.hominis* is a case of pelvic inflammatory disease, septic abortion, salpingitis and occasionally causes postpartum fever [7-8,22,26]; both *M.genitalium & M.fermentans* are associated with non-gonococcal urethritis in men and cervicitis in women. Also, are linked to urethral infections [6,9,19,21,24], and *Ureaplasma urealyticum* is a case of non-gonococcal urethritis in adults and lung disease in premature infants [3,10,20,25].One of the most useful distinguishing features of mycoplasmas is their peculiar fried-egg colony shape, consisting of a central zone of growth embedded in the agar and a peripheral one on the agar surface [1,3,20] . Nutritionally, mycoplasmas are very exacting ;

many require cholesterol (a unique property among prokaryotes). Ureaplasmas require urea for growth , arginine and the usual carbohydrates are not metabolized . Generally, mycoplasmas require a specialized complex media for growth (PPLO, Soy Peptone , SP_4) [1,19-20] . Various serological tests have been developed and are useful in classification [22-23] . Most of these tests (or methods) are very expensive or unavailable in many developing countries. **The aim of this study therefore, was to 1-** adopt the simple and inexpensive method for the rapid diagnosis of the genital mycoplasmas namely the monophasic-diphasic culture setup MDCS [24]; **because** the possible role of mycoplasmas in conditions like bacterial vaginitis, symptoms of urethritis and cervicitis has been indicated by many researchers [14-15,19,32-33] while, the others not [9,18,31] **thereupon, 2-**In this study an attempt was made to relate the isolation of genital mycoplasmas from cases with some urogenital symptoms as predictor for mycoplasmal colonization of the genital tract of women.

Methodology

Study population :The population under study was among women attending the outpatient of obstetric and gynecology department of Basrah General Hospital . The samples obtained consisted of women with genital tract symptoms or signs (vaginal discharge, urethral pain during micturition, urethral discharge) . A total of (120) women were investigated during the period extending from February to July of 2007, their ages ranged from 15-54 years.

Collection of specimens:

Two swabs from urethra and the other from endocervix were obtained from each women by a doctor, and each was inoculated onto a suitable medium (the modified PPLO agar / broth) according to the MDCS . A sterile speculum was used . All swabs were transported to the laboratory within one hour for culture [3,24].

Media for isolation and identification species of genital mycoplasmas (Applied according to Marmion and Harris,1996):

1- <u>Liquid medium</u> (liquid-phase)

PPLO broth	70ml
Horse serum	20ml
Yeast extract	10ml
Thallium acetate 1 in 80 (w/v)	1ml
Penicillin (50000 I. U./ml)	0.2ml
Glucose solution 10% (w/v)	10ml
Cresol red 0.2% (w/v)	1ml
DNA 0.2 (w/v)	1ml
K_2HPO_4 1.0 (mol/liter)	2ml
The final pH should be(7.8).	

<u>1-a. Base Mycoplasms (PPLO) broth.</u>

1- Beef heart infusion	50gm
2- Peptone	10gm
3- Sodium chloride (NaCl)	5gm

2- <u>Solid media</u> (Solid-phase)

PPLO agar	70ml
Horse serum	20ml
Yeast extract	10ml

Thallium acetate 1 in 80 (w/v)	1ml
Penicillin (50000 I. U./ml)	0.2ml
Glucose 10% (w/v)	10ml
DNA 0.2 (w/v)	1ml
K_2HPO_4 1.0 (mol/liter)	2ml

2-b. Base Mycoplasma (PPLO) agar.

1- Beef heart infusion	50gm
2- Peptone	10gm
3- Sodium chloride (NaCl)	5gm
4- Agar	14gm

Cultivation and isolation of mycoplasmas (genital mycoplasmas) and other bacteria:

Urethral and endocervix swabs were taken from the women under study, then each specimen was directly inoculated into the liquid phase of the MDCS, mixed up well and then tilted once or twice to cover the upper portion of the slant for a while prior to incubation [24] . All inoculated media were incubated aerobically at 37 C^0 and observed daily for colour change from red to yellow in the liquid phase after 24 hrs. Isolated colonies appeared after that on the slanted solid phase. Sheep erythrocytes (7 %) and the suspension of egg-yolk (15 ml) were added to the solid phase of the MDCS and standard PPLO agar to detect both ; blood haemolysis of *M.fermentans*, *U.urealyticum* and lipolytic ability by *M.fermentans* only [3,24] . Also, other same swabs (specimens) were obtained from the women under study for bacterial isolation other than mycoplasmas, then; each specimen (swab) was directly cultured by the streaking method onto MacConkey and Blood agar then incubation after transported to the laboratory within (one) hour [1,25] .

Tests for identification of genital mycoplasmas (species) were applied according to Bergey's manual of determinative bacteriology (1994), as shown in Table (1).

Results:

In table (2) the difference noted was significant for both mycoplasmal species *M.fermentans* and *M.hominis* with a higher percentage from the urethra region than endocervix region (x^2=40.96; p<0.01), (x^2=16.00; p<0.01) respectively, whereas, *U.urealyticum* and *M.genitalium* were isolated in higher percentage from the endocervix region than the urethra region with a significant difference (p<0.01) for only *M.genitalium*. In case of *M.penetrans* the freedom degrees correspond to zero therefore we can't calculate the x^2 value (CNC). The relation between genital mycoplasmas and some urogenital complaints is shown in table (3). A difference was found to be just significant for *M.hominis* (x^2=6.63; p<0.05) and *M.penetrans* (x^2=23.33; p<0.01) that's evident, from the higher isolation rates of these microbes which associated with women complaining of vaginal discharge followed by urethral discharge and itching, generally, four mycoplasmal species: *M.fermentans*, *U.urealyticum*, *M.hominis* and *M.penetrans* tend to be frequently distributed in women complaining of vaginal discharge except *M.genitalium* tends to be frequently distributed in women complaining of urethral discharge followed by vaginal discharge and itching. The total isolates identified as genital mycoplasmas were 43 of 120 urethral and endocervix swabs, which correspond to 15.0 percent distributed in 18 cases as a single infection with genital mycoplasmas and 20.8 percent in 25 cases as a mixed infection with other causative agents, as shown in Table (4).

Concerning figure (1) it shows *U.urealyticum* as a single causative agent in 7 cases and associated with *M.hominis* in 5 cases, which corresponds to 4.1 percent , whereas*M.genitalium* was found as a single causative agent in 3 cases and associated with *M.fermentans* in 6 cases, with a rate of 5.0 percent. Figure (2) shows *E.coli* as a single causative agent in 5 cases and associated with *E.faecalis* in 3 cases, with a rate of 2.5 percent. While *P.aeruginosa* was found as a single causative agent in 4 cases and associated with *S.epidermidis* in 1 case, which corresponds to 0.8 percent.

Table (2): Association between genital mycoplasmas and sources of isolation

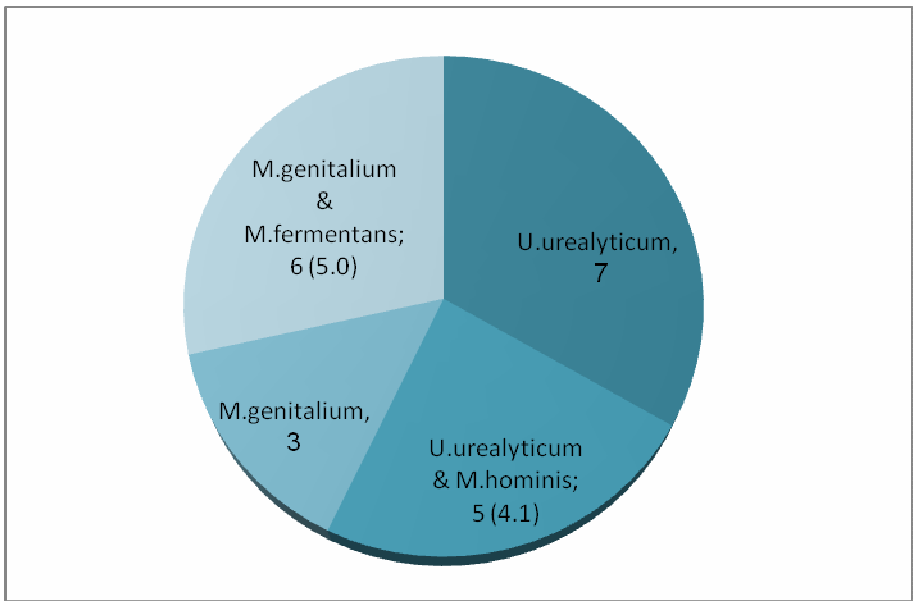
Presumptive Species of genital mycoplasma	No. of isolates (+ve)	No. of tested women 120					
		Sources of isolation					
		Urethra	%	Endocervix	%	X^2	P
Mycoplasma fermentans	11	9	81.8	2	18.1	40.96	0.01
M.genitalium	9	3	33.3	6	66.6	11	0.01
Ureaplasma urealyticum	12	5	41.6	7	58.3	2.56	NS
M.hominis	10	7	70	3	30	16	0.01
M.penetrans	1	1	100	0	0	CNC	
Total	43						

Table (3): Association of genital mycoplasmas with some urogenital complaints

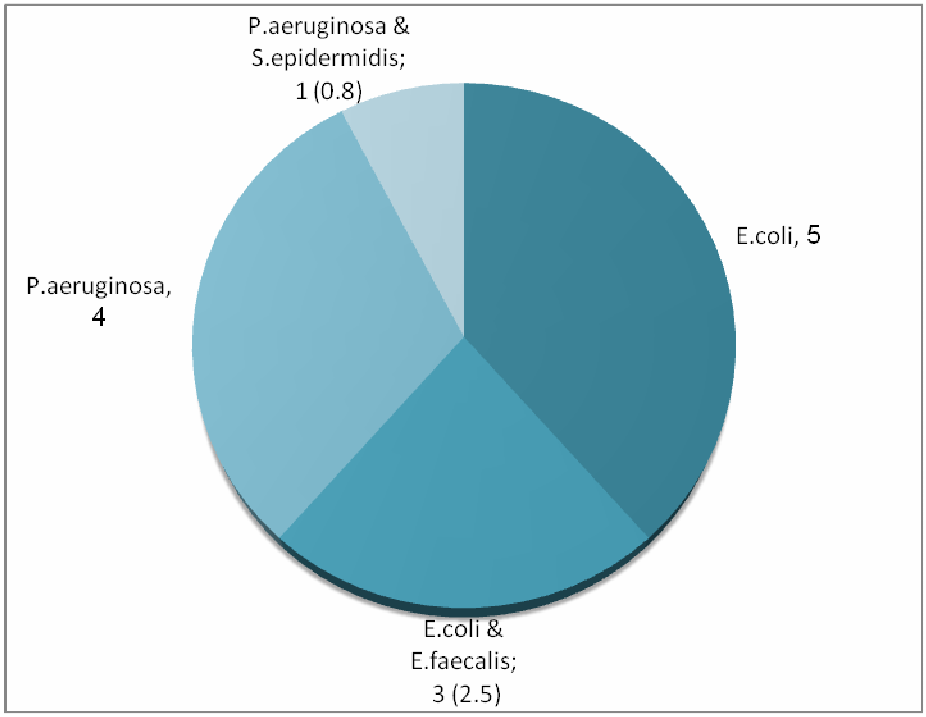
Urogenital complaints	No.of tested women	No.and (%) of women +ve in				
		M.fermentans	***M.genitalium***	***U.urealyticum***	***M.hominis***	***M.penetrans***
Vaginal discharge	55	6(10.9)	4(7.2)	8(14.5)	7(12.7)	1(1.8)
Itching	25	1(4.0)	0	0	1(4.0)	0
Urethral discharge	40	4(10.0)	5(12.5)	4(10.0)	2(5.0)	0
Total	120	11	9	12	10	1
X^2		3.44	1.8	1	6.633	23.33
P		NS	NS	NS	0.05	0.01

Table (4):presence of genital mycoplasmas alone or in conjunction with other bacteria

No . of tested women 120								
Total of genital mycoplasmas	**Alone**	**in conjunction with**						
		E.coli	***P.aeruginosa***	***K.pneumonia***	***E.faecalis***	***S.aureus***	***P.mirabilis***	***S.epidermidis***
43	**18**	**8**	**5**	**5**	**3**	**2**	**1**	**1**



Figure(1): Probably four species of genital mycoplasmas alone or in association



Figure(2): Bacterial isolates (other than mycoplasmas) alone or in association

Discussion:

Mycoplasmas have been implicated as an etiological factor (as pathogens) of the human genitourinary tract [26]. Their isolation rates of these microorganisms in the world are diverse and controversial because these bacteria are generally isolated together with other pathogens, so it is very difficult to know if they are the cause of the disease [28]. Various laboratory tests have been designed to diagnose mycoplasma infections [2,20-27,23-24,9]. The diagnostic value and applicability of any method depends on its simplicity, rapidity, reproducibility and cost

thereupon, the method of monophasic-diphasic culture setup MDCS was used in this recent search for the rapid isolation and identification of genital mycoplasmas from clinical specimens [3,24].

Statistically the difference was significant ($P<0.01$), in the isolation rates of *M.fermentans* and *M.hominis* from the urethra region than endocervix region, whereas both *U.urealyticum* and *M.*genitalium were isolated in higher proportion from endocervix region than urethra region with a significant difference ($X2=11.00$; $P<0.01$) for *M.genitalium* Table (2). Graber *et al* (30) found a significant reduction in the sperm counts and the mean percentage of progressive sperm motility in the *Ureaplasma* positive group. And in the study of Friberg (29) the presence of *U.urealyticum* was significantly higher in the infertile group than in a group of pregnant women. Also, Clausen *et al* [31] found that the mycoplasmas especially *M.genitalium* may be an independent risk factor in the development of an inflammatory process leading to the scarring of the uterine tubes in women and thereby causing infertility. Thereupon, the results of the present search indicated that both *U.urealyticum* & *M.genitalium* were recovered in higher proportion rates from endocervix than urethra of infected women, may be associated with inflammation disease leading to infertility. Furthermore, in the present study, it is evident that the highest isolation rates of *M.fermentans*, *U.urealyticum*, *M.homi*nis and *M.penetrans* were associated with women complaining of vaginal discharge followed by urethral discharge and itching with a significant difference for both *M.homi*nis & *M.penetrans* wheres, *M.genitalium* was isolated in a higher rate from women complaining of urethral discharge with no significant difference Table (3). The same results were reported by several investigators [14-15,19,32-33].

While the others found that the presence of the vaginal discharge, itching and moniliasis is not a sufficient indicator for mycoplasmal infection [18,9,34]. Besides, among the suggestions that might be taken into consideration are the possibilities that strain variations or a threshold number of microorganisms may determine the outcome of the association of mycoplasmas as normal microbial flora of the host genitalia or as pathogens. On the other hand, in this study, the occurrence of genital mycoplasmas as a single causative agent corresponds to (15.0 %) and in mixed infection with other bacteria is (20.8 %), as shown in Table (4). In the study of Horner *et al* [18] they found that the rate of mixed infection caused by at least two pathogens was (15.8 %). Also, the current study shows that the associated rate of *U.urealyticum* with *M.homi*nis was (4.1 %) and that of , *M.genitalium* associated with *M.fermentans* in (5.0 %), as

appeared in Figure (1). Concerning Al-Bahli [35] study, the association between both (*U.urealyticum* and *M.homi*nis) was also detected. Finally, the present research shows that, the associated rate of *E.coli* with *E.faecalis* was (2.5 %) and that of , *P.aeruginosa* associated with *S.epidermidis* in (0.8 %) only, Figure (2). Al-Ali [36] noted that the percentages of most of the bacterial isolates from women using IUCDs were higher than women not-using IUCDs or any other contraceptive method with a rate of the mixed infection caused by at least two pathogens was (17.5 %).

References:

1-J.G.Holt, N.R. Krieg., P.H. Sneath., J.T. Staley., and S.T. Williams. The mycoplasmas or (Mollicutes): cell wall-less bacteria In:Bergeys, Manual of determinative bacteriology,Vol.30, PP.705-707,9th ed.Williams & Wilkins,U.S.A.**1994.**

2- S.,Razin. Molecular biology and genetics of mycoplasmas (Mollicutes).,Microbiol.Rev,49:419.**1985.**

3- B. Marmion., **and R. Harris.** *Mycoplasma pneumoniae* and other medically important members of the family mycoplasmataceae In:Mackie & Macrtiney Practical medical microbiology, Vol.30,pp.591-595; 600-601, Collee,J.,Marimion,B.,Fraser,A. and Simomons,A.,(Eds.),14th ed. Churchill Livingstione,New York. **1996**.

4- N. Behbahani., A. Blanchard., G.H. Cassell., and L. Montagnier. Phylogenetic analysis of *Mycoplasma penetrans*, isolated from HIV-infected patients. FEMS Microbiol.Lett 109:63-66.**1993.**

5- J.G. Tully., D. Taylor-Robinson.,R.M. Cole., *et al*. A newly discovered mycoplasma in the human urogenital tract. Lancet.1:1288-91.**1981.**

6- A. Blanchard., and L. Montagnier. AIDS-associated mycoplasmas. Annu.Rev.Microbiol.48:687.**1994.**

7- J. Ross. Pelvic inflammatory disease. Sexually Transmitted Diseases, 78 (1): 18-19.**2002.**

8- Unskula,-Anneli and K. Kohl,-Peter. Genital mycoplasmas, including *Mycoplasma genitalium*, As sexually transmitted agents.Int.J.STD-AIDS.13(2):79-85.**2002.**

9- R. Amsel, P.A. Totten., C.A. Spiegel., ***et al.*** Nonspecific vaginitis.Diagnostic criteria and microbial and epidemiologic associations. Am.J.Med.74:14-22.**1983.**

10- F.E. Keane., B.J. Thomas., C.B. Gilroy., ***et al.*** The association of *M.hominis, U.urealyticum* and M.genitalium with bacterial vaginosis:observations on heterosexual women and their male partners. Int.J.STD.AIDS.11:356-60.**2000.**

11- G. Mayer., and G. M., Murray., ***et al*** **.** Mycoplasma and Ureaplasma. Medical Microbiology, 3rd ed .,Chapter 42., MBIM 650/720, South Carolina University.**2002.**

12- B. Ken., K. B. Waites., L. Gary., B. Richard., A. Burke., M. D. Cunha . Ureaplasma infection.
Clin.Infect.Dis.Med.Obstet.Gynecol.29(7):183-7.**2004.**

13- I. Casin., D. Vexian-Robert., P. de la Salmoniere., ***et al*** **.** High prevalence of *M.genitalium* in the lower genital tract of women attending a sexually transmitted disease clinic in Paris,France..Sex.Transm.Dis.29:353-9.**2002.**

14- L.Falk., H. Fredlund., J.S. Jensen.,*et al.* Signs and symptoms of urethritis and cervicitis among womenwith or without *M.genitalium* or *Chlamydia trachomatis* infection. Sex.Transm.Infect.81:73-8.**2005.**

15- J. Pepin., F. Sobela., S. Deslandes., ***et al.*** Etiology of urethral discharge in West Africa:the role of *M.genitalium* and *Trichomonas vaginalis*. Bull.World.Health.Organ.79:118-26. **2001.**

16- F. Brus., W. M. van Waarde., C.Schoots.,and S. B. Oetomo. Fetal ureaplasmal pneumonia and Sepsis in a newborn infant.Eur.J.Pediatr.150:782-3.**1991**

17- S.Razin.,and J. G. Tully. Methods in mycoplasmology, Vol. 1. Mycoplasma characterization. Academic press,Inc.,New York,N-Y.**1983.**

18-P.Horner.,B.Thomas.,C.B.Gilroy.,*et al.* Role of M.genitalium and U.urealyticum in acute and chronic nongonococcal urethritis. Clin.Infect.Dis.32:995-1003.**2001.**

19- R.C .Brunham., J. Paavonen., C.E. Sterens., ***et al.*** Mucopurulent cervicitis-the ignored counterpart in women of urethritis in men. N.Engl.J.Med.311:1-6.**1984.**

20- A.W. Rodwell. Introductory remarks.In:Diagnostic Mycoplasmology.Methods in mycoplasmology.Vol.II.Tully,J.G.,Razin,S.Academic Press Inc.111 fifth avenue,New York,10003 USA:Page 93. **1983.**

21- J.G.Tully. Culture medium formulation of primary isolation and maintenance of mollicutes . In Molecular and diagnostic in mycoplasmology,Vol. AL– 2 , PP. 29 – 39 , Razin , S . and Tully , J ., (eds.), Academic.Press,USA.**1995**

22- K.S.Wise . Adaptive surface variation in mycoplasmas. Trends Microbiol.1:59.**1993.**

23- G. Kenny., G. Kaiser., M. Cooney., and H. Foy. Diagnosis of *M.pneumoniae* sensitivities and specifies of serology with lipid antigen and isolation of 19-Yoshida T et al. Phylogeny-based rapid identification of mycoplasmas and ureaplasmas from urethritis patients.J.Clin.Microbiol.40:105.110.**2002.**

24- A.A. AL-Sulami., S.S. Hammadi., and G.J. AL-Gizawi. A single method for rapid isolation and identification of *M.pneumoniae* from clinical specimens. Eastern Mediterranean Health Journal,8(1):1-7.**2002**.

25- J.G. Collee., R.S. Miles., and B. Watt. Tests for the identification of bacteria .In:Makie and MacCarteny Practical Medical Microbiology.Edited by Collee,J.G.,Fraser,A.G.Marmion,B.P. and Simmons,A.111114th ed. P.131-149.Churchill Livingstone, London.**1996.**

26- S.Razin., and M.F. Barile., ***et al.*** The mycoplasmas, Vol.4,Mycoplasma Pathogenicity Academic Press,Orlando.**1985.** .

27- S. Razin . DNA probes and PCR in diagnosis of mycoplasm infections. Molec.Cellular Probes,8:497.**1994.**

28- G.H.Cassell., and B.D. Cole. Mycoplasmas agent of human disease. N.Engl.J.Med.304:80-83.**1981.**

29- J.Friberg. Mycoplasma and ureaplasma in infertility and abortion. Fertil.Steril.4:351-7.1980.

30- D.C. Graber., P. Creticos., J. Valicent., and H.O. Williamson., *et al*. T-mycoplasma in human reproductive failure. Am.J.Obstet.Gynecol.113:150-165. **1996 .**

31- H.F. Clausen., G. Christiansen., P.K. Nielsen., B. Toft., *et al* . Serological investigation of *M.genitalium* in infertile women. Hum.Reprod.Aarhus University.26(3):407-37.**2005.**

32- T. Deguchi., C.B. Gilroy., and D. Taylor-Robinson . Detect of *M.fermentans* and *M.penetrans* in the urethra of patients with acute-nongonococcal urethritis. Eur.J.Clin.Microbiol.Infect.Dis.17:196-181.**2005.**

33- J.S.Jensen., H.T. Hanser and K. Lind . Isolation of *M.genitalium* strains from the female urethra. J.Clin.Microbiol.77:91-98.**2002.**

34- J.M. Hamilton-Miller. The urethral syndrome and its management. Journal of Antimicrobial Chemotherapy.33,Suppl A:63-73. **1994.**

35- S.A.H. Al-Bahli . Prevalence of genital mycoplasma in women with selected obstetric and gynecological conditions. M.Sc.thesis,College of Medicine,Basrah University. **1993.**

36- N.S. Al-Ali . Influence of some predisposine factors for PID in women associated with intrauterine contraceptive device (IUCD). B.Sc.thesis,College of Science,Basrah University. **1998.**

أعراض وعلامات التهاب الاحليل وعنق الرحم المرتبطة أو غير المرتبطة بالإصابة بالمايكوبلازما التناسلية للنساء في محافظة البصرة

ريهام الموسوي

كلية العلوم, قسم علوم الحياة, جامعة البصرة,العراق

الخلاصة:

لعدم وجود المضاد المصلي في العراق فان الانواع المعزولة في هذا البحث والعائدة لجنس المايكوبلازما هي الانواع المحتملة من المفطورات التناسلية , وكانت مميزاتها وخواصها البايوكيميائية مطابقة لكل من *M.hominis* و *U.urealyticum* و *M.fermentans* و *M.genitalium* و *M.penetrans* من المصدر المعتمد (Holt et al., 1994) Bergey's Manual of determinative bacteriology . أجريت هذه الدراسة على 120 أمرآة من المراجعات إلى العيادة الاستشارية الخارجية في قسم النسائية والتوليد في مستشفى البصرة العام للفترة من شباط إلى تموز 2007. حيث شملت النساء اللواتي يعانين من بعض الحالات النسائية الخاصة ولهذا الغرض زرعت مسحات من الاحليل وأخرى من منطقة عنق الرحم وعوملت بتقنية نظام الزرع أحادي الطور وثنائيه MDCS حيث لوحظ وجود اختلاف مهم إحصائيا وبفارق معنوي عال عند مستوى الأهمية ($p< 0.01$) في عزل كلا من. *M.fermentans* و *M.hominis* المحتملة من منطقة الاحليل مقارنة بمنطقة عنق الرحم بينما كانت معدلات عزل الـ *U.urealyticum* و *M.genitalium* أعلى من منطقة عنق الرحم. كما وأظهرت النتائج بان كل من الانواع المايكوبلازمية المحتملة (الافتراضية) وهي *M.fermentans* و *U.urealyticum* و *M.hominis* و*M.penetrans* منتشرة بكثافة في النساء اللواتي يعانين من الإفرازات المهبلية المفرطة تتبعها إفرازات الاحليل غير الطبيعية والحكة والارتباط المهم إحصائيا لوحظ فقط في حالة *M.hominis* عند مستوى الأهمية *(P< 0.05)* . كما و غطت المايكوبلازما التناسلية 15.0 % كإصابة مفردة في 18 حالة و 20.8 % متداخلة مع مسببات مرضية أخرى غير المفطورات (بكتريا أخرى غير المايكوبلازما) في 25 حالة على التوالي. . كذلك أظهرت تلك الدراسة تداخل إل *U.urealyticum* مع *M.hominis* في 5 حالة وبنسبة (4.1 %) إضافة إلى تداخل مفطورة *M.genitalium* مع *M.fermentans* في 6 حالة بنسبة (5.0 %) , وأخيرا وجدت جرثومةُ *E.coli* كإصابة منفردة في 5 حالة ومتداخلة مع *E.faecalis* في 3 حالة بنسبة (2.5 %) بينما جرثومة *P.aeruginosa* وجدت كإصابة منفردة في 4 حالة ومتداخلة مع *S.epidermidis* في 1 حالة فقط وبنسبة(0.8 %) .