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The Incidence of Ureaplasma Urealyticum and Mycoplasma Hominis Infection in the Seminal Fluid and Cervical Mucus in Infertile Iraqi Couples

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Abstract:

Background: The impact of reproductive tract infections on fertility has been debated for several decades, without being able to reach definitive conclusions, this is due to several factors, among which we can mention: the difficulty in isolating responsible pathogens and inflammatory processes subclinical that produce at this level, among others. **Objective**: To assess the prevalence of Mh and Uu infection in infertile couple patients attending our hospital. **Patients and method:** A prospective cross-sectional study .

The study consisted of 10000 samples of vaginal and endocervical exudates taken from patients who attended infertility consultations and regular abortion patients for a microbiological study. **Results:** (61%) of the patients negative from infection, while 3900 (39%) were positive with infection [Ureaplasma urealyticum is found in 2850 (28%) patients, and Mycoplasma hominins is found in 1050 (10.5%) patients].

Conclusion: The prevalence of Mycoplasma hominis and Ureaplasma urealyticum was 39% in infertile Iraqi women.

Keyword: Mycoplasma hominis, Ureaplasma urealyticum, infertility, cervical mucus

Introduction:

The impact of reproductive tract infections on fertility has been debated for several decades, without being able to reach definitive conclusions, this is due to several factors, among which we can mention: the difficulty in isolating responsible pathogens and inflammatory processes subclinical that produce at this level, among others. It also contributes to this problem the frequent use of antibiotics, indiscriminately, without performing previous diagnosis to identify the causative organism, in order to administer specific therapy and subsequently monitor its effectiveness. (1) In recent years, infections have been given greater importance as a cause of infertility, perhaps because sexually transmitted diseases have become increased,

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worldwide, alarmingly and are producing conditions that culminate in infertility of the couple.

The urogenital mycoplasmas are classified within the class Mollicutes and these include (Mycoplasma hominis, Ureaplasma urealyticum), despite being part of the usual flora of the vagina, are among the bacterial species most frequently involved in the infertility of the couple. (2)

Structure and physiology

Mycoplasmas represent the smallest known self-replicating organisms, with a size between 0.1 and 0.3 um, they are facultative anaerobes, except the M. pneumoniae, which is strictly aerobic. They grow very slowly and most form small colonies that look like fried eggs. (3)

They are devoid of cell wall or chemical precursors of peptidoglycan, which makes it difficult for them to stain with Gram staining, despite this they are considered Gram positive bacteria. They are only limited by a plasma membrane that contains sterols, which gives them pleomorphism. Lacking a cell wall, the main antigenic determinants are glycolipids and membrane proteins, which have the ability to stimulate lymphocytes, monocytes, and macrophages. They consist of a genome that consists of a very small double-stranded DNA molecule, of no more than 2200 kbp (kilo pairs of bases), which explains why their biosynthetic capacity is limited, that is why they are developed in culture media rich in this - roles and with preformed amino acid and nucleotide precursors.

The requirement of cholesterols because it is the basal component of its outer covering. To differentiate the species, is used to metabolic characteristics, the use of arginine with production of ammonia by M. hominis or hydrolysis of the urea by U. urealyticum. (4)

Mycoplasmas are not sensitive to cell wall synthesis inhibitor antibiotics, nor those that intervene in folic acid synthesis, but they are sensitive to antibiotic agents that intervene protein synthesis such as tetracycline, Tetracyclines, macrolides, aminoglycosides and chloramphenicol. As well as they are sensitive to DNA chain inhibitors like fluro-quinolone. In almost 40-80% of asymptomatic sexually active women, these microorganisms can be found in the mucosal surfaces of the vagina. (5)

The particular importance, because they cause genital infections of a non-specific type, with few symptoms, sometimes remaining hidden for a long time, which can cause infertility and other sequelae. They are also involved in different pathologies, such as bacterial vaginosis. In the case of the U. urealyticum, it is etiologically related to the non - gonococcal urethritis, premature birth and pneumonia no interstitial; for his part M. hominis vaginitis cause pelvic disease, pyelonephritis and postpartum fever. Pregnant women carriers of U. urealyticum and

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M.hominis , have one more chance to have premature rupture of membranes and preterm birth, as well as colonize the newborn when it passes through the birth canal, presenting complications for the newborn; such as congenital neonatal sepsis, pneumonia, chronic lung disease, and bronchopulmonary dysplasia. (6)

Relationship with the infertility

It's well known that mycoplasma species ascend in mucous, settling in glands and epithelia lining the female and male reproductive system, perform movements adhesion to surfaces cell, at which constitutes one requirement essential for the colonization and infection, produce changes in the vaginal PH, alter the characteristics of the cervix and cervical mucus, cause thinning of the endo-cervical epithelium and increase the capillary fragility, which facilitates bleeding. All of this interferes with the mucocervical – semen interaction. (7)

The fundamental pathogenetic mechanisms of tissue damage has been most thoroughly studied in semen. The presence of these mycoplasmas in the semen, is associated with the ability of sperm to transport these bacteria directly to the endometrium and to the tubes of tube; where they can cause reproductive disorders such as: pelvic inflammatory disease, endometritis, spontaneous abortion, ruptured membranes and preterm delivery. Specifically, in the infertility male, they are cited as pathogens that alter the quality of the semen, specifically affecting transport pH, maturing and fertilization ability of the sperm; (viability, motility, morphology and deformities of the head and apoptosis of these), for all that they have gained vital importance in the management of the male infertility. (8)

The Center for Disease Prevention and Control reports that in the United States, each year, 19 million people acquire a sexually transmitted infection. Unfortunately, in developing countries, little is known about the incidence and prevalence of urogenital mycoplasmas infections or their sequelae especially, its relation with infertility. There are few reports in the medical literature that relate the incidence of these microorganisms in the genital tract, in infertile women or habitual abortions.

In women, it can cause pelvic inflammatory disease, pain and, in some cases, fever and vaginal bleeding. So far there are no standardized tests to diagnose this infection, but a genital exudate is usually done in women and a urinalysis in men who have symptoms, or if a sexual partner has been diagnosed with this condition. Treatment consists of a cycle of a family of antibiotics called macrolides. However, doctors warn that the infection is developing resistance to some of these drugs. Sexually transmitted infections (STIs) have increased alarmingly worldwide, producing alterations that culminate in infertility of the

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couple. In women, these infections are responsible for a significant proportion of gynecological morbidity, related to fertility disorders. (9)

There are a variety of microorganisms that infect the female genital tract, related to pathologies that can lead to infertility. These microorganisms generally present asymptomatic, which makes their diagnosis and treatment more difficult, and they are also directly related to the infectious etiology of infertility, which is why they are considered the major cause of this disorder worldwide. 5 Urogenital mycoplasmas are considered important human pathogens as sexually transmitted agents and are related to bacterial vaginosis and pelvic inflammation. Mycoplasma hominines infection can cause salpingitis, infertility and ectopic pregnancy, pelvic inflammatory disease (PID), and can be associated with postpartum infections and miscarriages. (10)

Uu is frequently isolated in the female genital tract and is considered the etiological agent of bacterial vaginosis, in addition to causing pelvic inflammation, miscarriages, premature births, puerperal fever and leading to fertility disorders. Mg, despite not being a new bacterium, is considered by the World Health Organization (WHO) as of 2015 as an emerging sexually transmitted pathogen of growing importance, related to the development of urogenital syndromes, vaginal discharge, lower abdominal pain, infertility, and miscarriage in women. (11)

Currently, the presence of genital mycoplasmas associated with an increase in cases of PID, produce changes in vaginal pH and cause various damages, among those reported, the deterioration in the characteristics of the cervix and the quality of cervical mucus, which can interfere with the cervical mucus-semen interaction.

The literature in this regard has also described numerous factors associated with Mh and Uu infections. (12)

Aim of the study:

There are no previous data on the frequency of urogenital mycoplasma infections in women who consult for infertility, so the possibility of detecting these infections allows us to assess the prevalence of Mh and Uu infection in infertile couple patients attending our hospital.

Patients and method:

A prospective cross-sectional study .The study consisted of 10000 samples of vaginal and endocervical exudates taken from patients who attended infertility consultations and regular abortion patients for a microbiological study.

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Exclusion criteria:

-Have received oral or vaginal antimicrobial treatment one week prior to the time of the sample taking.

- Vaginal bleeding.

- Sexual intercourse three days before taking the sample.

Collection of information

It was obtained by means of surveys carried out on the patients.

Information processing techniques:

A previously created Microsoft Excel database was used to fill the information's, taking into account the variables used in the research.

Statistical analysis

Frequency distribution technique was used. Relative variables expressed as a percentage were calculated. Once the data was processed and analyzed, they were related in tables and figures. SPSS version 25 was used to analyzed the data.

Results:

As shown in figure 1, 6100 (61%) of the patients with infertility enrolled in this study were negative from infection by the Ureaplasma urealyticum and Mycoplasma hominins, while 3900 (39%) were positive with infection [Ureaplasma urealyticum is found in 2850 (%) patients, and Mycoplasma hominins is found in 1050 (10.5%) patients].

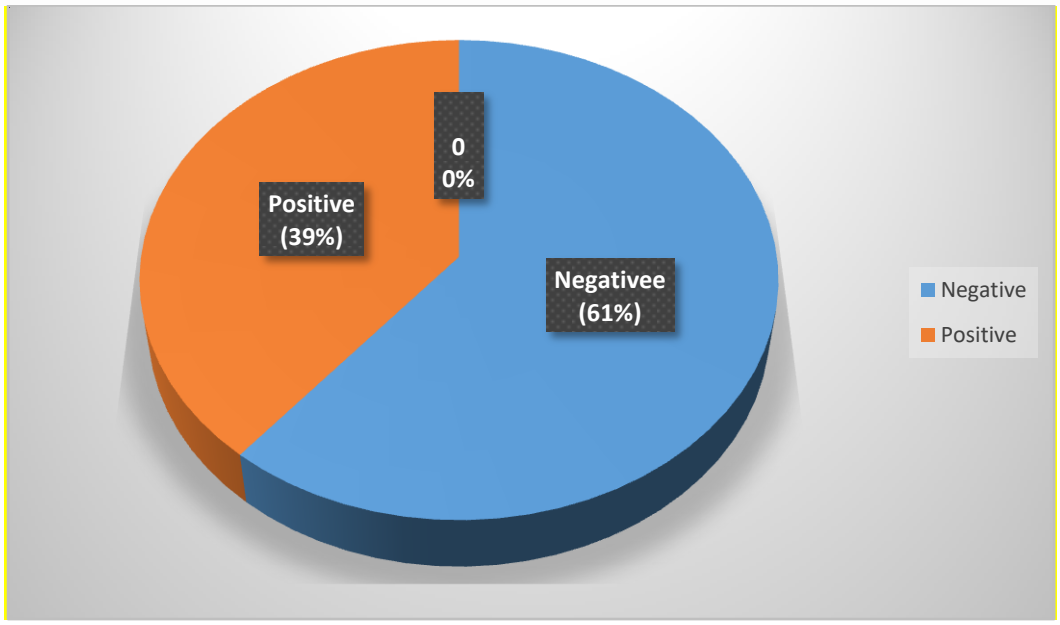

Figure 1: Molecular Detection for Ureaplasma urealyticum and Mycoplasma hominis using Real Time PCR

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Table 1: Distribution of the positive infection in infertile patients (n=3900)

Infections (n=3900)	No.	%
Ureaplasma urealyticum	2850	73.1
Mycoplasma hominins	10500	26.9
Total	3900	100.0

As shown in table 2, the range of semen volume was (0.5-3 ml) and range of semen count was very low (0 – 15 million) with vitality range from (0-20%) and majorities of semen was in grade D (50-80%) with morphology defects (40-60%), pus found between (6-20)

Table 2: General information for semen analysis:

Range of Semen volume	0.5 – 3 ml
Range of count	0 – 15 million
Range of Total Vitality	0-20 %
Grade A	0 – 2 %
Grade B	0 – 5%
Grade C	0 – 20 %
Grade D	50 – 80 %
Morphology defects	40-60 %
Pus cells	6-20
Time of liquation	20-25 min

Discussion:

In our study, a positivity of 39.0% was obtained in vaginal and endocervical exudates performed on patients from infertility consultations and regular abortion patients, authors such as Steinhandler L found 50.3% positivity. (13)

Regarding the microorganisms found in the present investigation, C. trachomatis was the most frequent, this bacterium considered as an agent of sexual transmission has been pointed out as one of the main causes of these infections in countries such as the USA. (14)

Currently, the presence of C. trachomatis and genital mycoplasmas is associated with an increase in cases of PID, these produce changes in vaginal pH and cause different damages, they can alter the characteristics of the cervix and the quality of cervical mucus due to

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increased number of macrophages, the production of different enzymes and toxic substances, likewise cause thinning of the endocervical epithelium and increased capillary fragility that facilitates bleeding, which can interfere with the cervical mucus-semen interaction. (9)

In the current study Ureaplasma urealyticum is found in (28%) of the infertile patients which is in agreement with that revealed by Rodrigues M reports to U. urealyticum in 23.5% of infertile women, and also relates the presence of this microorganism with infertility. (15)

Yu P et al., In a study in infertile couples report the presence of 28.64% and 36.59% identification of C. trachomatis and U. urealyticum, respectively, and conclude that these microorganisms were causal factors of infertility. (16)

When applying the diagnostic test for M. hominis we found that it represented 10.5% of the positivity of the infection in the present study, which is less than that found by Jamalizadeh B et al, study when mentioned that M hominis found in 37% of the infertile couple in their study. (17)

Guerra (18) reports a high association of C. trachomatis with M. hominis and U. urealyticum in infertile couples, coupled with increased tubal obstruction and ectopic pregnancy. Therefore, it is a necessary condition to carry out routine clinical examination and microbiological diagnosis of these microorganisms in the initial evaluation of these women. (19)

It has been reported that in some women U. urealyticum is found in the vaginal fluid in relatively high concentrations due to a poor immune response. This can cause ascending infections such as subacute or chronic endometritis, causing infertility, and in the case of pregnancy, cause complications such as miscarriage, chorioannionitis, or premature delivery, depending on the time of infection. (20)

Conclusion: The prevalence of Mycoplasma hominis and Ureaplasma urealyticum was 39% in infertile Iraqi women.

No conflicts of interest

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Ethical clearance: was taken from the scientific committee of the Iraqi Ministry of health

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