Prevalence and antibiotic susceptibility of genital *Mycoplasma hominis* and *Ureaplasma urealyticum* in a university hospital in Turkey

O. Karabay[1], *M.D., Assist. Prof.*; **A. Topcuoglu**[3], *M.D., Assist. Prof.*; **E. Kocoglu**[2], *M.D., Ph.D.*; **S. Gurel**[1], *M.D., Prof.*; **H. Gurel**[1], *M.D., Prof.*; **N. K. Ince**[1], *M.D., Resident*

[1]*Department of Infectious Diseases and Clinical Microbiology;* [2]*Department of Microbiology and Clinical Microbiology;*
[3]*Department of Obstetrics and Gynecology,*
Izzet Baysal Medical Faculty, Abant Izzet Baysal University, Bolu (Turkey)

Summary

This study aimed to assess the colonization prevalence and antibiotic susceptibility of genital *Ureaplasma urealyticum* and *Mycoplasma hominis* in a teaching hospital, in Turkey.

A total of 382 sexually active women with abnormal vaginal discharge were included in the study. Samples that were obtained with cotton swabs were microbiologically analyzed for *U. urealyticum* and *M. hominis,* together with antimicrobial susceptibility to doxycycline, ciprofloxacin, ofloxacin, erythromycin, josamycin, pristinamycin, and tetracycline.

Ureaplasma urealyticum was detected in 185 (48.4%) cultures, and *M. hominis* in 17 (4.4%). Eight (2.1%) cultures were positive for both. Resistance of *M. hominis* to doxycycline, ciprofloxacin, ofloxacin, erytromycin, josamycin, pristinamycin and tetrascycline was 5.9%, 17.6%, 41.2%, 88.2%, 5.9%, 5.9% and 11.8%, respectively. Resistance to doxycycline, ciprofloxacin, ofloxacin, erytromycin, josamycin, pristinamycin and tetrascycline in U. urealyticum isolates was 1.6%, 40.5%, 58.4%, 54.0%, 1.6%, 8.1% and 13.5%, respectively. Both *U. urealyticum* (94.1%) and *M. hominis* (96.2) were most sensitive to josamycin, and most resistant to erytromycin (*U. urealyticum* 54.0%, *M. hominis* 88.2) and ofloxacin (*U. urealyticum* 58.4%, *M. hominis* 41.2%).

As a result, the rate of *U. urealyticum* and *M. hominis* was found to be 48.4% and 4.4%, respectively. We conclude that doxycycline may be used in empirical treatment of genital tract infections in sexually active women.

Key words: Mycoplasma hominis; Ureaplasma urealyticum; Prevalence; Antibiotic susceptibility.

Introduction

Mycoplasma hominis and *Ureaplasma urealyticum* are involved in the *Mycoplasmataceae* family and do not have a peptidoglycan cell wall. They can commensally be found in the lower genitourinary tract of sexually active women resulting in colonization of the genitalia by sexual contact [1, 2]. Vaginal colonization with these mycoplasmas can be associated with an increased risk of developing certain pathogenic conditions and pregnancy abnormalities, bacterial vaginosis, pelvic inflammatory disease, postpartum fever, postpartum septicemia, infertility, premature rupture of membranes, preterm labor, preterm birth, and systemic neonatal infections [2-5].

Genital infections have shown up with different epidemiological characteristics due to different cultural features. Therefore, the distribution of agents and the susceptibility of antibiotics have changed in terms of time and geographical region [1, 6]. We conducted a cross-sectional study to assess the colonization prevalence and antibiotic susceptibilities of the genital mycoplasma isolates in a teaching hospital of the West Black Sea region of Turkey.

Revised manuscript accepted for publication September 20, 2005

Materials and Methods

Patients attended the outpatient clinic of the Department of Obstetrics and Gynecology of AIBU Izzet Baysal Medical Faculty, Bolu, Turkey for routine gynecological examinations over an 18-month period. After obtaining detailed histories all complaints concerning the lower genital tract, such as vaginal discharge, and vulvae and vaginal irritation, were recorded. Clinical speculum examination established the presence of non-physiological vaginal discharge. Sampling with a single cotton swab was performed in the posterior vaginal fornix and the swabs were sent to the microbiology laboratory. None of the patients had used any local or systemic anti-infection medication for 30 days preceding the study.

Swabs were stored in transport media until transported to the laboratory. All swabs were processed in the laboratory within four hours of collection. The swab in R1 (bioMérieux transport medium, France) transport medium was processed according to the manufacturer's instructions. Briefly, the swab in R1 transport medium was vortexed for 30 sec and 3 ml of R1 broth was used to rehydrate the lyophilized growth medium, R2 (provided with the Mycoplasma IST kit, bioMérieux, France). A Mycoplasma IST strip, consisting of 16 wells, was then inoculated with the rehydrated R2 growth medium (50 ml per well, overlaid with mineral oil). The remaining broth and the inoculated strip were incubated at 37°C, observed for color changes, and the results were interpreted after 24 and 48 hours of incubation. The strips provided information on the presence or absence of *M. hominis* and *U. urealyticum*, and antimicrobial susceptibilities to doxycycline, ciprofloxacin, ofloxacin, erythromycin, josamycin, pristinamycin, and tetracycline.

Results

A total of 382 women with ages ranging from 16 to 60 were included in the study during the 18-month period. Of these patients 185 (48.4%) had positive vaginal cultures for *U.urealyticum* and 17 (4.4%) grew *M. hominis*. In eight cases (2.1%) cultures were positive for both *U. urealyticum* and *M. hominis* (Table 1). *Mycoplasma hominis* isolates were found to be resistant to doxycycline, ciprofloxacin, ofloxacin, erythromycin, josamycin, pristinamycin, and tetracycline at the rate of 5.9%, 17.6%, 41.2%, 88.2%, 5.9%, 5.9%, and 11.8%, respectively. In *U. urealyticum* isolates resistance to doxycycline, ciprofloxacin, ofloxacin, erythromycin, josamycin, pristinamycin, and tetracycline were 1.6%, 40.5%, 58.4%, 54.0%, 1.6%, 8.1%, and 13.5%, respectively. Both *U. urealyticum* (94.1%) and *M. hominis* (96.2) were most sensitive to josamycin, and most resistant to erytromycin (*U. urealyticum* 54.0%, *M. hominis* 88.2) and ofloxacin (*U. urealyticum* 58.4%, *M. hominis* 41.2%). Sensitivity results are shown in Table 2.

Table 1. — *Colonization frequency of subjects.*

Bacteria	n (%)
Mycoplasma hominis	17 (4.4)
Ureoplasma urealyticum	185 (48.4)
Colonization with both agents	8 (2.2)
No colonization	180 (47.1)
Total	382 (100)

Table 2. — *Antibiotic susceptibilities of the genital mycoplasma isolate determined by using the Myclospama IST kit (n, %).*

Antibiotic	*M. hominis* (n = 17)			*U. urealyticum* (n = 185)		
	Sensitive	Intermediate	Resistant	Susceptible	Intermediate	Resistant
Doxycyline	14 (82.3)	2 (11.8)	1 (5.9)	148 (80.0)	34 (18.4)	3 (1.6)
Ciprofloxacin	9 (52.9)	5 (29.4)	3 (17.6)	76 (41.1)	34 (18.4)	75 (40.5)
Ofloxacin	3 (17.6)	7 (41.2)	7 (41.2)	21 (11.4)	56 (30.2)	108 (58.4)
Erythromycin	0 (0)	2 (11.8)	15 (88.2)	19 (10.3)	66 (35.7)	100 (54.0)
Josamycin	16 (94.1)	0 (0)	1 (5.9)	178 (96.2)	4 (2.2)	3 (1.6)
Pristinamycin	15 (88.2)	1 (5.9)	1 (5.9)	143 (77.3)	27 (14.6)	15 (8.1)
Tetracycline	12 (70.6)	3 (17.6)	2 (11.8)	133 (71.9)	27 (14.6)	25 (13.5)

Discussion

Mycoplasma hominis and *Ureaplasma urealyticum* are frequently isolated mycoplasmas from the female genital tract, especially in sexually active women, with a colonization rate of 20 to 80% [7-9]. The prevalence of these organisms is significantly associated with the menstrual cycle, pregnancy, use of vaginal contraceptives, socioeconomic conditions such as poverty, and bacterial and protozoal infections [10, 11]. The presence of these organisms in otherwise healthy women makes them prima facie candidates for being classified as agents or co-agents of sexually transmitted diseases.

Colonization of the female genital tract with *Ureoplasma urealyticum* and *Mycoplasma hominis* is associated with pelvic inflammatory disease, chorioamnionitis, endometritis, bacterial vaginosis and neonatal pulmonary disease [12]. Recently, they have been suspected of being involved in the etiology of low birth weight/prematurity [13, 14]. Moreover, it should be emphasized that early pregnancy screening for genital mycoplasms and subsequent treatment might reduce the rate of preterm deliveries [15]. Additionally, some infections such as pelvic inflammatory disease should be treated empirically [16]. Thus it is important to have the prevalence rate of these microorganisms in a particular region. In our study, a total of 202 cases (52.8%) were found to be colonized with these agents. These data are similar to the reported rates from other countries. In studies performed about 20 years ago, the incidence of *U. urealyticum* in sexually active women was reported to be between 20% and 67% [8, 17]. In the 1990s reports about *U. urealyticum* revealed a prevalence between 33.89 and 57.5% [9, 10, 18]. In a study recently performed in another part of Turkey, the rate of *U. urealyticum* was reported to be 48% [1]. In contrast, the rate of colonization of *M. hominis* in the urogenital tract was reported to be between 1.6 and 21% [1, 9-11, 17, 18]. Our findings are similar to that of previous reports showing a higher rate of ureoplasma colonization (48.4%), and relatively lower rate of mycoplasma colonization (4.4%).

One of the main aims of the study was to find out the antibiotic sensitivity of produced microorganisms. Beta lactam antibiotics (such as penicillins and cephalosporins) are inactive against these microorganisms because they have no cell wall. Moreover, the organisms are not susceptible to sulfonamides and trimethoprim because they do not synthesize folic acid. Thus, there were a limited number of drugs (tetracyclines, macrolides, quinolones) available against mycoplasmas. Doxycycline has been reported to be the most commonly used antibiotic against *U. urealyticum* [6]. Kilic *et al.* [1] also suggested the use of doxycycline or ofloxacin as a first choice in the empirical treatment of *U. urealyticum* and *M. hominis* infections. According to our results *U. urealyticum* isolates were more sensitive to josamycin and doxycycline, and similarly mycoplasma isolates were more sensitive to josamycin. However, in a study performed by Sow *et al.* [19], only 70% of *M. hominis* strains were found to be sensitive to josamycin, and fluoroquinolones were offered as a useful alternative in therapeutics. Unfortunately, josamycin and pristinamycin are not available in our country yet. In addition, we observed a high resistance of genital mycoplasms to eritromycin and quinolone derivatives (ofloxacin-ciprofloxacin). The widespread use of eritromycin and quinolone may have led to the high rate of resistance to these drugs in this region. Consequently, we can speculate that the use of eritromycin and quinolones in infections caused by these agents has to be readdressed in our region. We suggest doxycycline to be the first choice, similar to Kilic *et al.* [1], when empirical treatment is necessary.

Conclusion

As a result, in this cross-sectional study, the frequency of *M. hominis* and *U. urealyticum* in sexually active

women was found to be 4.4% and 48.4, respectively. Both isolates were found to be resistant to eritromycin and ciprofloxacin, and sensitive to josamycin and doxycycline. We conclude that doxycycline may be used in the empirical treatment of lower genital tract infections in sexually active women in this particular region of Turkey.

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Address reprint requests to:
O. KARABAY, M.D.
Abant Izzet Baysal Üniversitesi
Izzet Baysal Tıp Fakültesi
Infeksiyon Hastalıkları ve Klinik
Mikrobiyoloji AD
14280, Gölköy, Bolu (Turkey)