Mycoplasma hominis and *Ureaplasma urealyticum* infections in male urethritis and its complications

Zdrodowska-Stefanow B[1], Kłosowska WM[2], Ostaszewska-Puchalska I[2], Bułhak-Kozioł V[2], Kotowicz B[2]

[1] Department of Dermatology and Venerology, Medical University of Białystok, Poland
[2] Center for Sexual Transmitted Disease Research and Diagnostics in Białystok, Poland

Abstract

Purpose: The aim of this study was to estimate the incidence of *M. hominis* and *U. urealyticum* infections among men with urethritis and its complications.

Material and methods: Material for analysis were urethral swabs and EPS. Mycoplasma IST 2 kit was applied to diagnose mycoplasmal infections. All patients were additionaly tested for *C. trachomatis*, *C. albicans* and *T. vaginalis* and Gram stain specimens were obtained to identify the presence of PMN.

Results: *U. urealyticum* was detected in 57/390 (14.6%), and *M. hominis* in 4/390 (1%) men. Exclusive *U. urealyticum* infection was found in 45 (11.5%) men, and only 2 patients had exclusive *M. hominis* infection. *U. urealyticum* infection the most frequently coexisted with *C. trachomatis* – 5 (8.8%), next with *C. albicans* – 4 (7%) and *M. hominis* – 2 (3.5%) infections. Mycoplasmal infections were the most frequently found in patients aged 30 to 39 (35.1%) diagnosed with epididymitis (29.2%). The most commonly reported symptom was dysuria.

Conclusions: *U. urealyticum* is the common pathogen among men with urethritis and its complications. The most common symptoms in *U. urealyticum* patients were: dysuria, hypogastric pains and urethrorrhoea, however, clinical symptoms are not frequently observed.

Key words: *Ureaplasma urealyticum*, *Mycoplasma hominis*, urethritis, epididymitis, prostatitis.

* CORRESPONDING AUTHOR:
Center for Sexual Transmitted Disease Research
and Diagnostics in Białystok
ul. Św. Rocha 3, 15-879 Białystok, Poland
Tel: +48 85 7426361, Fax: +48 85 7423630
e-mail: centstd@poczta.onet.pl (Wioletta Marta Kłosowska)

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Introduction

Mycoplasmas are the smallest identified free-living organisms that comprise a large group of microorganisms widespread in nature. Found in plants, animals and humans, they cause various ailments or constitute the commensal flora [1]. There are two species which are pathogenic to humans: Mycoplasma and Ureaplasma. The mycoplasmas isolated from humans tend to inhabit the respiratory and urinary tract mucosa [2]. Three species have been isolated from the surface of the genitourinary tract mucosa: *Mycoplasma hominis* (*M. hominis*), *Ureaplasma urealyticum* (*U. urealyticum*) and recently discovered *Mycoplasma genitalium* (*M. genitalium*). They are referred to as "sexual mycoplasmas", as they cause the infection via sexual contacts. Their pathogenicity is likely to be associated with the ability to adhere to epithelial cells of the genitourinary tract, to erythrocytes and spermatozoa [3]. The involvement of *M. hominis* and *U. urealyticum* in the inflammatory conditions of the male genitourinary organ still arouses numerous controversies. Their presence is associated with urethritis and its complications, such as epididymitis, prostatitis or infertility [4-6].

Aim of study

The aim of the current study was to assess the incidence of *M. hominis* and *U. urealyticum* in men with urethritis and its complications.

Material and methods

The study group consisted of 390 men aged 18-59 years (mean 38.5), with clinical symptoms of inflammation of the genitourinary tract, who were referred to the Center for Sexual Transmitted Disease Research and Diagnostics in Białystok from urological and venereological outpatient departments and from Endocrinology Outpatient Unit, Department of Gynecology and Obstetrics, University Hospital of Białystok. Patients of the latter had infertility diagnosed basing on the assessment

***Table 1*. Prevalence of *M. hominis* and *U. urealyticum* detection in studied groups of men**

Studied group	*M. hominis*		*U. urealyticum*	
	+ n (%)	– n (%)	+ n (%)	– n (%)
urethritis (n=111)	0 (0)	0 (0)	13 (11.7)	98 (88.3)
prostatitis (n=156)	0 (0)	0 (0)	13 (8.3)	143 (91.7)
epididymitis (n=41)	0 (0)	0 (0)	12 (29.3)	29 (70.7)
fortility impairment (n=37)	1 (2.7)	36 (97.3)	8 (21.6)	29 (78.4)
patients of STI clinic (n=45)	3 (6.7)	42 (93.3)	11 (24.4)	34 (75.6)

***Table 2*. Coexsistence of *U. urealyticum* infections with the other sexually transmitted pathogens (n=57)**

Pathogen	n (%)
U. urealyticum + *C. trachomatis*	5 (8.8)
U. urealyticum + *C. albicans*	4 (7)
U. urealyticum + *M. hominis*	2 (3.5)
U. urealyticum + *T. vaginalis*	0 (0)
U. urealyticum + *C. trachomatis* + *C. albicans*	1 (1.7)
U. urealyticum	45 (79)

***Table 3*. Frequency of clinical symptoms observed among men with exclusive *U. urealyticu*m infection (n=45)**

Symptoms	n (%)
dysuria	31 (68.9)
erythema of external meatus of the urethra and/or glans penis	12 (26.7)
mucous or mucopurulent discharge	9 (20)
hypogastric pain	19 (42.2)
hematospermia	5 (11.1)
painful erection	3 (6.7)
asymptomatic course	10 (22.2)

of spermatogram in accordance with WHO requirements [7]. Urethritis was identified in 111 patients, chronic prostatitis in 156, epididymitis in 41, while fertility impairment in 37. In 45 patients, the examination was performed for epidemiological reasons (casual sexual contacts).

Material for analysis included urethral swabs and EPS-expressed prostatic secretions. Mycoplasma IST 2 kit (BioMerieux) was applied to diagnose mycoplasmal infections. It enables culture, identification, indicative enumeration and antibiotic susceptibility testing (with 9 antibiotics) of *M. hominis* and *U. urealyticum*. It combines a selective culture broth with a strip containing 22 testes. This kit allows pathogen identification within 48 hours and determines the amount of bacteria, thus making differentiation possible between colonization and infection (cell count above 10^4 is the evidence of infection). The combination of three antibiotics and one antifungal agent provides selectivity, ensuring that any contamining flora present in the specimen does not affect the test. Moreover, all male patients were examined for *Chlamydia trachomatis* (*C. trachomatis*) using direct immunofluorescence method with monoclonal antibodies (Trinity Biotech), and for *Trichomonas vaginalis* (*T. vaginalis*) and *Candida albicans* (*C. albicans*) using standard culture methods (Biomed). In all the 390 patients, urethral and prostatic secretions were examined using the Gram staining procedure (direct examination) to determine the presence of polymorphonuclear leucocytes (PMN) and to exclude Neisseria gonorrhoeae infection (*N. gonorrhoeae*). Urethritis was diagnosed when PMN count was 4 or higher, while prostatitis when the count was 10 or higher in a field of vision under a light microscope at magnification of 1000 [8].

The study was approved by the Ethics Committee, Medical University of Bialystok.

Results

In the group of 390 men, *U. urealyticum* infection was found in 57 (14.6%), while *M. hominis* in 4 patients (1%).

The incidence of *M. hominis* and *U. urealyticum* according to clinical diagnosis has been presented in *Tab. 1*. *U. urealyticum* infection was most frequently observed in patients with epididymitis – 29.2%, then in men with fertility impairment – 21.6% and in venereological patients – 24.4%. *U. urealyticum* was found in 11.7% of urethritis patients and in 8.3% of prostatitis patients. *M. hominis* was identified in venereological and infertile men (6.7% and 2.7%, respectively). The remaining groups of patients were *M. hominis* negative. Our results showed a distinct dysproportion between the incidence of both mycoplasmas.

U. urealyticum was much more common than *M. hominis*.

The coexistence of *U. urealyticum* with other sexually transmitted pathogens has been shown in *Tab. 2*. Isolated *U. urealyticum* infection was observed in 45 patients, while co-infection was revealed with *C. trachomatis* (8.8%), *C. albicans* (7%) and *M. hominis* (3.5%), but not with *T. vaginalis* or *N. gonorrhoeae*. Only in one case, three pathogens: *U. urealyticum*, *C. trachomatis* and *C. albicans* were involved. Isolated *M. hominis* infection was detected only in 2 cases (0.5%).

The incidence of clinical symptoms in men infected with U. urealyticum alone has been presented in *Tab. 3*. The most common symptoms included dysuria (68.9%), hypogastric pain (42.2%) and reddening of the external meatus of the urethra and/or glans penis (26.7%). Other complaints including urethrorrhoea, haematospermia or painful penile erection were less common (20%, 11.1% and 6.7%, respectively). In 22.2% of cases, mycoplasma infections were clinically asymptomatic.

The incidence of *M. hominis* and *U. urealyticum* according to age has been presented in *Tab. 4*. The highest incidence rate

Table 4. **Incidence of *M. hominis* and *U. urealyticum* regarding age of patients**

Age	*M. hominis* n (%)	*U. urealyticum* n (%)
18-19 (n=6)	0 (0)	1 (1.7)
20-25 (n=50)	1 (25)	10 (17.5)
26-29 (n=64)	0 (0)	9 (15.8)
30-39 (n=143)	2 (50)	20 (35.1)
40-49 (n=90)	1 (25)	12 (21.1)
50-59 (n=37)	0 (0)	5 (8.8)
Total (n=390)	4 (100)	57 (100)

was noted for the age range of 30-39 years (35.1%), then 40-49 (21.1%). Negative results were the most common in the peripheral age intervals – 18-19 and 50-59 years.

Discussion

The most common infection of the lower part of the genitourinary tract in men is nongonococcal urethritis (NGU). In our NGU patients, *U. urealyticum* was found only in 11.7% of cases. According to Taylor-Robinson and Furr, mycoplasmas, especially *M. genitalium* and *U. urealyticum*, are the second common aetiological factor of this ailment, after *C. trachomatis* [9]. This has been confirmed by other researchers [10, 11]. Also Varela et al. have shown that there has been a growing incidence of *U. urealyticum*-induced urethritis in men recently [12]. *U. urealyticum* involvement in chronic NGU has been emphasized [13]. Horner et al. have demonstrated that acute urethritis is associated with *M. genitalium* and *C. trachomatis* infection, but not with *U. urealyticum* [14]. In a study by McKee et al. which involved 400 American soldiers with the symptoms of urethritis, this microorganism was isolated in 19% [15]. Chandeying et al. performed microbiological examination of urethral swabs collected from 479 students in southern Tailand [16], detecting *U. urealyticum* in 10.9% and *M. hominis* in 1.3% of the patients.

In fertility impairment, it is *U. urealyticum* that is usually involved [17,18]. We found this pathogen in men with fertility impairment in 21.6%, while *M. hominis* only in 2.7%. Unzeitig et al. emphasize the relatively high percentage of *U. urealyticum* (91%) in the sperm of sexual partners of women with secondary infertility and point at the reduced semen quality [17]. A similar role of ureaplasmas has been indicated by Taylor-Robinson and McCormack [5]. Biernat-Sudolska et al. have revealed a considerably higher incidence of U. urealyticum in patients treated for infertility (38%), who had abnormal semen patterns [19]. However, a study by Andrade-Roch indicates that routine diagnostic investigations for mycoplasmas is not clinically significant [20]. The author also emphasizes the scarcity of reports on the effect of these microorganisms on the quality of semen. However, Purvis and Christiansen suggest that *U. urealyticum* infection may play a significant role in male infertility [21], although the microorganisms can be found as commensals in the genitourinary tract. On the other hand, Rodrigues et al. have demonstrated that infertility diagnostics requires investigations for mycoplasmas, also for *C. trachomatis* and *N. gonorrhoeae*. They found a positive correlation between *U. urealyticum* infection and infertility [18].

There are very few literature reports on the significance of sexual mycoplasmas in prostatitis [22,23]. The role of atypical bacterial flora, and particularly the involvement of mycoplasmas in this ailment still remains unclear [24]. We found *U. urealyticum* in 8.3% of prostatitis patients, while *M. hominis* was not detected. Skerk et al. examined a group of 388 patients with the symptoms of chronic prostatitis [25], confirming its bacterial aetiology in 71.1% of cases, of which only 2.5% were *U. urealyticum* positive. Weidner et al., examining a group of 187 men with clinical symptoms of prostatitis [26], isolated *U. urealyticum* in as many as 103 patients (55.1%). However, these authors finally admitted that these bacteria could be responsible for prostatitis in 8.6% of cases, just like in our study group. Taylor-Robinson and McCormack emphasize the fact that the results are difficult to interpret as the microorganisms detected in the prostatic secretion may actually come from the urethra [4].

Even fewer reports are available on the mycoplasmal infections among patients with epididymitis. We found *U. urealyticum* infection in 29.9% of men with this ailment, being the highest percentage among all the study groups. All the patients were *M. hominis* negative. Eickhoff et al. detected *U. urealyticum* in 15% of their epididymitis patients, while *M. hominis* in 1.9% [27]. Joly-Guillon and Lasry believe that the type of bacteria responsible for genitourinary tract infections in males, including epididymitis, is age-dependent [28]. In under 35 year old patients sexually-transmitted bacteria prevail, including mycoplasmas, *C. trachomatis* and *N. gonorrhoeae*.

In our study, *U. urealyticum* was found in 24.4% of venereological patients. The men were frequently asymptomatic and they were referred to diagnostic examinations for epidemiological reasons. Frequent occurrence of sexual mycoplasmas (40--70%) in the lower part of the female reproductive system facilitates their transitory colonization in men due to sexual contacts. Risi and Sanders have revealed that the percentage of *U. urealyticum* in men who had more than 14 sexual partners was 56% [6]. However, whether this is colonization or infection depends on the amount of culture-grown microorganisms.

Patients with isolated *U. urealyticum* most commonly reported dysuria (68.9%) and hypogastric pain (42.2%). Every fifth man was asymptomatic.

The majority of sexual mycoplasmas - positive results were obtained in men aged 30-39 years (35.1%) and 40-49 years (21.1%). According to literature data, young and sexually active men are most frequently affected [29]. Similar results were obtained by Biernat-Sudolska et al. [19]. A slight, but distinct, reduction in age limit in our material can be due to a high number of patients with prostatitis.

Conclusions

1. *U. urealyticum* is frequently found in the genitourinary tract in men with urethritis and its complications.
2. *U. urealyticum* infection is most frequently diagnosed in men with epididymitis and venereological patients.

3. Although *U. urealyticum* infection might be clinically asymptomatic but the most common symptoms are: dysuria, hypogastric pains and urethrorrhoea.

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