**ABSTRACT**

**Introduction:** The contribution of *M. genitalium* in genital infections in Senegal is poorly understood due to a limited access to molecular biology platforms. The aim of this study is to document the place of *M. genitalium* infection in men and women attending a private laboratory and to document its association with other STI pathogens.

**Materials and methods:** *M. genitalium* detection was performed in genital secretions using RealLine Chlamydia trachomatis/ *Mycoplasma genitalium* (Biosynex, France) at BIO24 biomedical laboratory in Dakar (Senegal). In parallel, other genital pathogens including *N. gonorrhoeae* and common *Mycoplasma* species were detected through culture and microscopic analysis.

**Results:** From March 2016 to November 2017, genital secretions from 3550 patients were analyzed. The mean age was 32 years (range: 16 to 71) with a sex-ratio of 0.13. Overall, *M. genitalium*, *C. trachomatis*, *N. gonorrhoeae* and *U. urealyticum* were detected at a frequency of 1.7%, 2.82%, 0.5% and 11.86%, respectively. In women, *C. albicans*, bacterial vaginosis, *T. vaginalis* and *M. hominis* were found at a frequency of 19.6%, at 22%, 0.8% and 0.9%, respectively. *M. genitalium* infection was significantly more prevalent in men than women and more frequently associated with *C. trachomatis* than *N. gonorrhoeae*. One third of *M. genitalium* infected women presented also bacterial vaginosis signs and a high pH value (>4.5) of genital secretions was observed in all infected women.

**Conclusion:** *M. genitalium* appeared as a second most common STI pathogen identified in patients attending a private laboratory, indicating the need to include its routine detection for STI suffering patients also in public health sector.

**Keywords:** *M. genitalium*; Genital infections; Private laboratory; Senegal

**INTRODUCTION**

*Mycoplasma genitalium* is a sexually transmitted pathogen that has been poorly understood because of a slow and fastidious culture. Highlighted in the early 1990s with the advent of molecular biology [1], it is now well established that it is an emerging, cosmopolitan pathogen responsible for genital infections affecting both man and woman. For instance, *M. genitalium* is the common cause of non-gonococcal urethritis (NGU) in men after *Chlamydia trachomatis* [2-5]. In women, a significant association has been described in *gonococcal urethritis* (UNG) in men after *Chlamydia trachomatis* is a sexually transmitted pathogen that has *Mycoplasma genitalium* is also responsible for upper genital tract infections like salpingitis or endometritis and certain studies showed *M. genitalium* implicated in severe complications such as ectopic pregnancies and tubal sterility [3,6,10]. It would also be responsible for prematurity [11].

However, this routine etiologic diagnosis is very little carried out in resource-limited countries such as Senegal due to the weakness of technical platforms and the need of molecular technics for *M. genitalium* diagnosis. In Senegal, only few private laboratories perform the detection of *M. genitalium* from clinical specimens and only few epidemiological data are currently available regarding the prevalence of this agent, which would be more prevalent in resource-limited countries [12].

**Correspondence to:** Halimatou Diop-Ndiaye, Department of Bacteriology and Virology, Dakar Cheikh Anta Diop University, Dakar, Senegal, Tel: 0022177650828; E-mail: drhalimatou@gmail.com

**Received:** October 18, 2019; **Accepted:** November 4, 2019; **Published:** November 11, 2019


**Copyrights:** © 2019 Diop-Ndiaye H, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.
The aim of this study is to document the place of M. genitalium infection in men and women attending a private laboratory for genital infection diagnosis and, to document its association with other STI pathogens.

**MATERIALS AND METHODS**

**Study design**

From March 2016 to November 2017, testing for M. genitalium was carried out on a cross sectional study in genital secretions for both men and women at BIO24 biomedical private laboratory in Dakar (Senegal) for each request of C. trachomatis detection.

**Molecular testing**

These 2 pathogens were identified using a multiplex real time PCR (Amplex Biosynex, France) from cervical swabs collected in women genital tract and from men urine samples. DNA extraction was performed using the Nucleic acid extractor platform ExiPrepTM16DX and real time PCR by using the RealLine Chlamydia trachomatis/Mycoplasma genitalium (Biosynex, France) on Amplix platform according to manufacturer instructions.

**Culture and microscopic analysis**

In parallel, other pathogens were detected through culture or microscopic analysis. N. gonorrhoeae diagnosis was performed by culture on a Thayer-Martin modified media with antibiotics (Biomerieux, France) and incubation is carried out under a CO₂ atmosphere at 37°C for 24-48 hours. Candida infection was detected using vaginal swabs seeded on chromogenic yeast agar and incubates at 30°C for 24-48 hours. Diagnosis of Mycoplasma hominis and Ureaplasma urealyticum infection was performed using both liquid Mycoplasma IST2 media (Biomerieux, France) and Mycoplasma A7 media (Biomerieux, France). Trichomoniasis was diagnosed by detection of motile trichomonads on wet mount microscopy and disruption of the vaginal microbiota was characterized by Nugent score (0-3=normal microbiota (reference group), 4-6=intermediate microbiota disruption, and 7-10=Bacterial vaginosis).

**Data analysis**

Data were recorded in an excel file used as a support for results analysis. The infection rates were expressed as percentages (%) with their 95% confidence intervals. Statistical analysis included comparison of the frequencies were carried out by Chi-square test and a "p value" less than 0.05 was considered significant.

**RESULTS**

**Patients**

From March 2016 to November 2017, 3550 analysis requests for C. trachomatis and/or M. genitalium addressed to BIO24 and were performed accordingly to manufacturer instructions. Patients were aged from 16 to 71 years (mean=32 years old) and the sex-ratio was 0.74 (428 Men versus 3122 women).

**STI and other genital pathogens detected**

The STI and other genital pathogens detected in the studied population were presented in Table 1. Overall, M. genitalium and C. trachomatis were detected in 100 cases (2.82% (95% CI=[2.3–3.4]) and 100 cases (2.82% (95% CI=[1.3–2.1]) and 100 cases (2.82% (95% CI=[2.3–3.4]), respectively. N. gonorrhoeae infection was detected in 19 patients giving a proportion of 0.5% (95% CI=[0.3–0.7]). In women, fungal infections with C. albicans were found at a frequency of 19.6%, bacterial vaginosis at 22% and T. vaginalis at 0.8%. U. urealyticum infection was present in 4.2% of cases in men and 12.9% of cases in women. M. hominis was found in 0.9% of the study population, exclusively in women.

**Factors associated to M. genitalium infection**

According to sex distribution, as shown in Table 2, M. genitalium infection were significantly more prevalent in male than women as well as other STI pathogens except U. urealyticum which was significantly more frequent in women. Moreover, M. genitalium infection in women appears to be significantly less common than C. trachomatis infection; furthermore these 2 pathogens were significantly more frequent than N. gonorrhoeae infection in both men and women (Table 2).

Table 3 highlights M. genitalium association with other pathogens. Regarding dual infection by both M. genitalium and C. trachomatis, 2.8% (12/428) of men were concerned whereas only 0.5% (16/3122) of women. Comparatively, the proportion of dual infection by both M. genitalium and N. gonorrhoeae was very low with 0.7% (3/428) and 0.03% (1/3122) in men and women, respectively.

Table 4 shows the association of M. genitalium with other STI and genital pathogens.

---

*Testing performed only in women*
frequently associated with C. trachomatis than N. gonorrhoeae (p<0.01). However, the risk of being co-infected is highest for women for both C. trachomatis (OR=74; p<0.01 vs. OR=9.9; p<0.01) and N. gonorrhoeae (OR=26.6; p<0.01 vs. OR=3.9; p<0.04). Moreover, one third of M. genitalium infected women was also infected with bacterial vaginosis pathogens, and a high pH value (>4.5) of genital secretions was observed in all infected women even in absence of bacterial vaginosis; two-third (66.7%) had abundant leucorrhoea and 66.7% presented also inflammation with leucocytes>5 cells per field. Regarding symptoms in women, abundant leucorrhoea was the most common symptom for both pathogens while Pelvic pain was more common in M. genitalium-infected women (14.3%) than in C. trachomatis-infected women (2.1%) (Figure 1).

**DISCUSSION**

M. genitalium is an emerging STI pathogen; its role in genital infections has been ignored in most developing countries and still probably underestimated, due to a suboptimal diagnosis related to a lack of knowledge of the pathogen and lack of molecular biology platforms on health facilities and clinical laboratories. In Senegal, M. genitalium diagnosis is not realized in routine laboratory testing and only few private structures like BIO24 performed its detection using molecular tools. To our knowledge this is the first description of M. genitalium infection in the country. On a period of 19 months, a Mutiplex PCR was performed for the detection of both M. genitalium and C. trachomatis from a large number of cervical swabs and men’s urine specimens.

With a prevalence of 1.69%, M. genitalium appeared to be the 2nd most common STI pathogen detected after C. trachomatis as in different studies [13-15]. This prevalence was lowest than those reported in many developing countries where M. genitalium was found at rates ranging from 3.2% to 5.2% [12]. This low prevalence includes patients without symptoms (one third of men and about 40% of women detected positive for M. genitalium) and demonstrates that this pathogen could be identified in asymptomatic persons in a non-negligible proportion [16]. This prevalence was more related to those reported in high-income countries (HIC) like in study realized among 5628 patients consulting for STI [14], or among 1652 patients from general population [17], (or among adults (16-44 years) during the third national survey [18] with 1.9% in Netherland, 1.7% in Denmark and 1.2% in England, respectively.

However, in a multicenter study realized in France including 2652 urogenital tract specimens collected all around the country, the picture was different with 3.4% [16]. In fact, it is well established that M genitalium prevalence could varied among different risk groups; the highest rates were found in STI treatment centers [16,19], key populations such as Men having sex with men (MSM) or female sex workers [20-22], or HIV infected patients [23-25]. According to sex, M genitalium was found significantly more prevalent in men than women (7% vs. 0.96%; p<0.01). This is in line with studies in general population or community based in other africans countries but the prevalence found in women was slightly lower than those reported with 3.2% in Tanzania [26], 2.7% at Madagascar [12], as well as in a recent study in adult women in Chad [27].

In the other hand, men appear very vulnerable to M genitalium with prevalence (7%) similar to what was found in MSM [12] or in a specific population of men with urethral discharge [2,28]. This difference could be explained by the relatively small number of samples analyzed comparing to women, the bias linked to the frequentation of clinics by men only when they have symptoms, and finally related to the specificity of M. genitalium for urethritis in men. Clinical symptoms for M. genitalium positive patients were similar to those noted by Pereyre et al. in France with urethral discharge and vaginal discharge accounted for the majority of the signs observed. However, in this French study, unlike our study, a high percentage (70%) of M. genitalium positive patients were found with no associated symptoms [16].

Regarding the other factors associated with M. genitalium infection in women, it appears that vaginal pH was greater than 4.5 (ranging from 4.6 to 6.7) in all M. genitalium infected women which corroborate Huppert et al. results who demonstrated that pH>4.5 was a predictive sign of M. genitalium infection (odds ratio 4.4, p<0.05). He showed that among women without bacterial vaginosis, and not infected with TV, 25% of those with a vaginal pH>4.5 were infected with M. genitalium, compared to 9% for those with a pH ≤ 4.5 (p=0.02) [29].

Regarding the microscopic signs of the inflammatory reaction (number of leucocytes/ microscopic field), 66.7% of women positive for M. genitalium had an important inflammation with more than 4.5 leucocytes/microscopic field. These results agreed with Anagrius et al. study, which show a strong association between M. genitalium infection and microscopic signs of urethritis and/or cervicitis [30]. M. genitalium appears to be also associated to bacterial vaginosis that could enhance patient susceptibility to infection as described par Lokken [31].

**CONCLUSION**

This pioneering study focusing on M. genitalium detection in both men and women in a private laboratory in Senegal, showed a prevalence that place it as a second most common STI pathogen identified in both symptomatic and asymptomatic patients.
In women, M. genitalium infection was often associated to bacterial vaginosis and could be suspected in case of large inflammation reaction associated to pH value greater than 5 whereas the proportions in men highlighted the need of its detection especially in men suffered for urethritis. These results showed also the risk of co-infection with others STI pathogen that could impact at long term fertility and should be considered for a better uptake of cases. Further studies in public health sector as well as advocacy for clinician’s awareness in order to increase demand of M. genitalium testing and for decision-makers to better consider this agent in STI programs are needed.

REFERENCES