Molecular detection of *Mycoplasma genitalium* in endocervical swabs and associated rates of macrolide and fluoroquinolone resistance in Hong Kong

Kevin KM Ng[1], Patricia KL Leung[2], Terence KM Cheung[2]
[1]Department of Pathology, Queen Elizabeth Hospital [2]Public Health Laboratory Services Branch, Centre for Health Protection

Background

Mycoplasma genitalium (MG) is able to cause urogenital infection, especially urethritis in men. Emerging resistance in macrolides and fluoroquinolones has been increasingly reported worldwide. However, local data on both prevalence and antimicrobial resistance are lacking.

Objectives

- To determine the prevalence of MG in women attending social hygiene clinics by using molecular methods.
- To determine the rates of macrolide and fluoroquinolone resistance in MG-positive endocervical swabs.

Methods

- From March to May 2019, endocervical swabs sent from two social hygiene clinics in Hong Kong for routine molecular detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* were also subjected to detection of MG.
- All available laboratory information including detection of other sexually transmitted infections for each patient was reviewed.
- A commercial qualitative nucleic acid assay (cobas TV/MG, Roche Diagnostics) was used to detect the presence of MG.
- Mutations at nucleotide positions 2071 and 2072 of the 23S rRNA gene have been associated with macrolide resistance in MG and subsequent treatment failure; mutations in the quinolone resistance-determining region of the *par*C gene, and possibly the *gyr*A gene, have been associated with fluoroquinolone resistance.
- Nucleic acids extracted were subjected to polymerase chain reaction and sequencing of these gene targets.

Table 1. Sexually transmitted infections detected among 285 patients in Hong Kong

Sexually transmitted infection	No. of patients with positive results	No. of symptomatic patients with positive results
MG	14	10
MG, CT	5	4
MG, TV	2	2
CT	27	22
TV	15	8
SYP	11	3
NG	4	3
HSV 1 or 2	4	3
CT, TV	3	3
NG, SYP	3	3
CT, NG	2	2
NG, TV	1	1
CT, NG, TV	1	1
Negative	193	108
Total	285	173

Table 3. Association between sexually transmitted infections and symptoms

Sexually transmitted infection	Presence of symptoms	
	Odds ratio (95% CI)	P value
MG	2.181 (0.776-6.132)	0.131
CT	4.009 (1.618-9.937)	0.001
TV	1.424 (0.526-3.611)	0.455
SYP	0.467 (0.158-1.384)	0.161
NG	6.81 (0.86-54)	0.055
HSV 1 or 2	1.959 (0.201-19.07)	1

Abbreviations: 95% CI = 95% confidence interval; CT = *Chlamydia trachomatis*; HSV = herpes simplex virus; MG = *Mycoplasma genitalium*; NG = *Neisseria gonorrhoeae*; SYP = syphilis; TV = *Trichomonas vaginalis*

Results

285 non-duplicated specimens from 285 patients were included. Mean age was 35.5 years (range, 16-76 years). 23.9% (n=68) were in the younger age group (≤25 years old). 59.6% (n=170) were new patients without a previous relevant testing record. 18.9% (n=54) had a documented history of sexually transmitted infection. 60.7% (n=173) were symptomatic. 7.4% (n=21) had MG-positive test results (14 had MG alone; 7 had co-infection).

Table 2. Univariate analysis of risk factors for detection of *Mycoplasma genitalium* and detection of resistance mutation in *Mycoplasma genitalium*–positive specimens

Characteristic	Detection of MG		Detection of resistance mutations in MG–positive specimens	
	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value
Age ≤25 years	0.997 (0.351-2.83)	0.996	0.9 (0.115-7.031)	1
Previous STI clinic visit	0.903 (0.362-2.253)	0.827	0.18 (0.026-1.236)	0.164
Previous STI	1.371 (0.479-3.922)	0.555	0.083 (0.007-0.982)	0.047
Symptomatic	2.181 (0.776-6.132)	0.131	0.321 (0.029-3.556)	0.606
Co-infection	1.359 (0.527-3.505)	0.524	0.109 (0.014-0.872)	0.056

Abbreviations: 95% CI = 95% confidence interval; MG = *Mycoplasma genitalium*; STI = sexually transmitted infection

Conclusion

MG was detected in 7.4% of 285 endocervical swabs collected from local social hygiene clinics. Among MG-positive samples, macrolide resistance-mediating mutations and fluoroquinolone resistance–related mutations were detected in 42.1% and 65% respectively. Dual resistance was also detected in all macrolide-resistant strains (42.1%). These findings suggest that both testing and treatment strategies require careful review to avoid further enhancing the prevalence of antibiotic resistance.

Limitations

Absence of other clinical information such as sexual practices, antimicrobials prescribed, and treatment outcomes. Small number of MG-positive samples limited the ability to assess correlations.

The authors thank the excellent work and contributions by staff at the Special Investigation Laboratory of Public Health Laboratory Services Branch, Centre for Health Protection, Department of Health, Hong Kong SAR Government.