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Prevalence of *Mycoplasma genitalium* infection with resistance-associated mutations to macrolides and fluoroquinolones among people living with HIV and people on pre-exposure prophylaxis in Taiwan

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BACKGROUND & OBJECTIVES

1. *Mycoplasma genitalium* (MG) is an emerging etiology of sexually transmitted infection (STI) with increasing trends of antimicrobial resistance.
2. Data are limited among at-risk populations because molecular diagnosis of MG infection is infrequently performed in individuals seeking counseling and treatment of STIs in Asia-Pacific region.
3. We aimed to examine the prevalence of MG infection and its genotypic resistance to macrolides and fluoroquinolones among people living with HIV (PLWH) seeking STI care and people seeking pre-exposure prophylaxis (PrEP) for HIV in Taiwan.

MATERIALS & METHODS

1. Between August 2021 and September 2022, PLWH presenting with STIs and PrEP users were enrolled.
2. Clinical specimens were collected from the rectum, urethra, and oral cavity for identification of seven pathogens (MG, *C. trachomatis*, *N. gonorrhoeae*, *T. vaginalis*, *M. hominis*, *Ureaplasma urealyticum*, and *U. parvum*) with the use of multiplex PCR assay (Allplex™ STI Essential Assay, Seegene Inc., South Korea).
3. Tests for rapid plasma reagin (RPR) titer and HCV RNA were performed.
4. Resistance-associated mutations of MG to macrolides were examined in region V of the 23S rRNA gene (A2058 and A2059), to tetracycline in 16S rRNA gene, and to fluoroquinolones in parC and gyrA gene (Figure 1).

RESULTS

1. 563 participants were enrolled: 327 PLWH and 236 PrEP users (Table 1).
2. The overall prevalence of MG infection was 11.0% (n=62) (95% CI, 8.4-13.6%): 74.2% in rectal swab, 24.2% in urethral swab, and 1.6% in oral rinse samples.
3. The prevalence of MG infection was similar between PLWH and PrEP users (12.5% vs 8.9%, p=0.221). The rate of co-infection with other STIs was 48.4% (95% CI, 36.0-60.8) (Table 1).
4. The prevalence rates of MG coinfections with other single pathogen in PLWH was 77.2% (17/22) and in PrEP was 75.0% (6/8), respectively and showed the highest rate in UU with 73.3% (Table 2).
5. The overall prevalence of resistance-associated mutations of MG to macrolides only was 6.0%, fluoroquinolones only 13.3%, and both macrolides and fluoroquinolones 10.0%.
6. 55 (88.7%) patients received doxycycline treatment. The test-of-cure (TOC) testing was performed in 20 (36.4%) patients after a median of 45.5 days (IQR=28-71) of treatment. Treatment failure was detected in 11 patients.
7. The overall prevalence of resistance-associated mutations of MG to macrolides was 11.1%, to fluoroquinolones was 20.0%, and to both macrolides and fluoroquinolones 0% after in treatment (Table 3).

CONCLUSIONS

While the rate of MG infection remains low among PLWH seeking STI care and PrEP users, surveillance studies to follow the trends of antimicrobial resistance are warranted to inform the treatment recommendations for MG infection.

Figure 1. Study flow

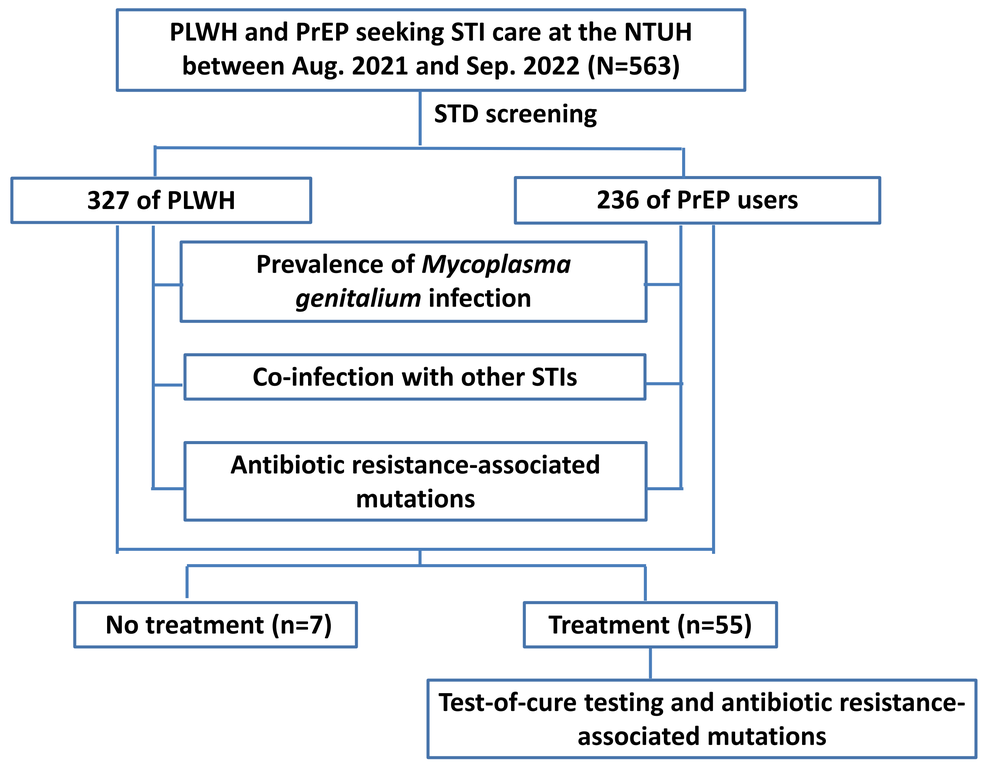
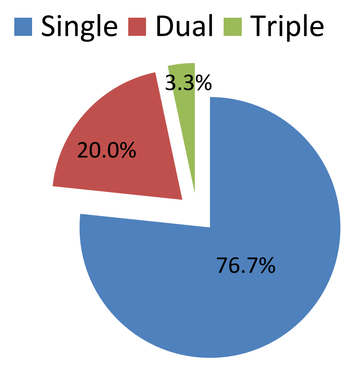


Table 1. Clinical characteristics between PLWH and PrEP with *Mycoplasma genitalium* infection

Characteristics		PLWH	PrEP users	*P value*
Patient number, N=		327	236	-
Age at the initiation for *M. genitalium* testing, median (IQR), years		36.1 (31.7-42.5)	30.1 (26.7-33.9)	<0.001
HCV viremia at the estimated time-point of *M. genitalium* testing, n/N (%)		8/238 (1.9)	0/133 (0)	0.078
M. genitalium Infection, n (%)	rectal swab	31 (75.6)	15 (71.4)	0.961
	urethral swab	9 (22.0)	6 (28.6)	0.793
	oral rinse	1 (2.4)	0	>0.999
Gonorrhea, n/N (%)		12/324 (3.7)	3/231 (1.3)	0.145
RPR≥1:4 at the estimated time-point of *M. genitalium* testing, n/N (%)		244/318 (76.7)	34/225 (15.1)	<0.001
Syphilis acquisition, n (%)	Primary	16 (8.7)	3(10.7)	>0.999
	Secondary	62 (33.9)	12 (42.9)	0.933
	Early latent	105 (57.4)	11 (39.3)	0.112
	Late latent	-	2 (7.1)	<0.01
Latest RPR ≥1:4, n/N (%)		164/313 (52.4)	9/186 (4.8)	<0.001
co-infection other STIs, n (%)	rectal swab	18 (81.8)	8 (100)	0.491
	urethral swab	3 (13.6)	-	
	oral rinse	1 (4.6)	-	

Table 2. The prevalence rates of MG coinfections with other STI pathogens between PLWH and PrEP users



pathogens	PLWH	PrEP users	*P value*
Patient number, N=	22	8	-
CT	2	1	>0.999
GC	2	0	0.956
MH	3	0	0.68
UU	10	5	0.68
MH+UU	2	1	>0.999
CT+UU	0	1	0.592
GC+UU	2	0	0.956
GC+MH+UU	1	0	>0.999

Table 3. The prevalence of resistance-associated mutations of MG between PLWH and PrEP users

Antibiotic resistance mutations		Baseline		At test-of-cure	
		PLWH	PrEP users	PLWH	PrEP users
Fluoroquinolone	parC	16.3% (7/43)	5.9% (1/17)	25.0% (1/4)	16.7% (1/6)
	gyrA	0% (0/41)	0% (0/17)	0% (0/5)	0% (0/6)
Macrolide	23S rRNA	2.9% (1/34)	12.5% (2/16)	0.0% (0/4)	20.0% (1/5)
Dual	23S rRNA and parC	2.9% (1/34)	25.0% (4/16)	-	-
Tetracycline	16SrRNA	0% (0/40)	0% (0/18)	0.0% (0/4)	0.0% (0/6)

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