

# Prevalence of human papillomavirus coinfection in adolescent girls and young women infected with *Chlamydia trachomatis* in Cape Town, South Africa



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## Introduction

Adolescent girls and young women (AGYW) are at high risk for sexually transmitted infections (STI) like *Chlamydia trachomatis* (CT) and human papillomavirus (HPV). High-risk HPV types can cause cervical cancer, and the risk of cervical disease increases with persistent HPV infections. CT infection may exacerbate risk and severity of HPV infections.

## Aim

This study aimed to investigate whether CT infected AGYW are more likely to be HPV infected and experience persistent HPV infections than CT negative AGYW.

## Methods

Cervical samples from a total of 108 women were available from the 130 AGYW (15 to 19 years) who previously participated in the uCHOOSE study. From these samples, CT infections and other STIs were determined by multiplex PCR. CT was determined by qPCR measuring the CT *omcB* gene. HPV genotypes were determined by MasterDianostica HPV Direct Flow Chip. The Fisher's exact test was used to test significance.

## Results

Overall, the prevalence of HPV was high in these young women, with 94% (102/108) being infected at baseline, and 91% being infected at crossover (86/95) (Table 1). HR-HPV infections were also highly prevalent at both baseline [84% (86/102)] and crossover [85% (73/85)], with the most common HR-HPV types at baseline being HPV-52 [detected in 27% (27/102) of women] followed by HPV-18, HPV-35, and HPV-51 [all 18% (19/102)]. HPV-16 was found in 12% of the participants at baseline (12/102); this rate remained similar at crossover [14% (12/85)].

## HPV prevalence in adolescent girls and young women during baseline and crossover

Table 1

HPV type	Baseline	Cross-over (4 months)	P-value <sup>a</sup>
Any HPV	94% (102/108)	90% (86/96)	0.2967
Any HR-HPV	84% (86/102)	85% (73/86)	>0.9999
<b>HPV-16</b>	12% (12/102)	14% (12/85 <sup>b</sup> )	0.6656
<b>HPV-18</b>	19% (19/102)	11% (10/85 <sup>b</sup> )	0.2274
HPV-31	10% (10/102)	11% (10/85 <sup>b</sup> )	0.8129
HPV-35	19% (19/102)	15% (14/85 <sup>b</sup> )	0.8475
HPV-39	16% (16/102)	12% (10/85 <sup>b</sup> )	0.5266
HPV-45	18% (18/102)	15% (14/85 <sup>b</sup> )	0.8483
HPV-51	19% (19/102)	18% (15/85 <sup>b</sup> )	>0.9999
HPV-52	27% (27/102)	17% (14/85 <sup>b</sup> )	0.1125
HPV-58	17% (17/102)	11% (9/85 <sup>b</sup> )	0.2903
HPV-59	17% (17/102)	9% (8/85 <sup>b</sup> )	0.1957
Any LR-HPV	87% (88/102)	72% (61/86)	0.0116*
<b>HPV-6</b>	20% (20/102)	17% (14/85 <sup>b</sup> )	0.7039
<b>HPV-11</b>	10% (10/102)	8% (6/85 <sup>b</sup> )	0.6042
HPV-61	20% (20/102)	7% (6/85 <sup>b</sup> )	0.0185*
HPV-62/81	31% (32/102)	27% (23/85 <sup>b</sup> )	0.6290
HPV-67	27% (27/102)	9% (8/85 <sup>b</sup> )	0.0043**
HPV-84	11% (11/102)	4% (3/85 <sup>b</sup> )	0.0920

a-Fisher's exact test  
b-one sample HPV genotype was not determined  
Red text shows the highest prevalent HPV types

## AGYW with evidence of persistent or repeat infection with HR-HPV types

To investigate whether persistence or repeat infections with any HPV genotype was impacted by infection with multiple HPV strains, the prevalence of these repeatedly detected HPV genotypes was compared in AGYW with multiple versus single HPV infections. AGYW infected with multiple HPV types were not significantly more likely to have HPV infections that persisted (between enrolment and cross over) than those infected with single HPV types (34/53, 61% vs. 29/53, 55%,  $p = 0.4290$ ; data not shown). However, more than 50% of women had persistent infection between baseline and crossover.

## Relationship between CT infection and HPV prevalence at baseline

At baseline, 108/130 AGYW had samples available for HPV typing, of which 102/108 were infected with HPV (94%) and 17/108 were infected with CT (16%) (Table 2). Of these, all 17 CT+ women were co-infected with HPV, compared to 93% (85/91) of those who were CT-, which did not differ ( $p = 0.5869$ ; Fisher's exact test)

Table 2

Status	HPV negative	HPV positive	Total
CT negative	6/91 (7%)	85/91 (93%)	91
CT positive	0/17 (0%)	17/17 (100%)	17
Total	6	102	108

## Comparison of HPV prevalence in AGYW by CT status at baseline

Table 3

	CT negative	CT positive	P-value
N	91	17	
# HPV types (median; IQR)	3 (2-6)	4 (3-7)	0.2406 <sup>a</sup>
Multiple HPV (>2)	67/91 (74%)	16/17 (94%)	0.1132 <sup>b</sup>
Any HR-HPV	70/91 (77%)	16/17 (94%)	0.1863 <sup>b</sup>
HPV-16	9/91 (10%)	3/17 (18%)	0.3981 <sup>b</sup>
HPV-18	17/91 (19%)	2/17 (12%)	0.7315 <sup>b</sup>
Any LR-HPV	58/91 (64%)	16/17 (94%)	0.0114 <sup>b</sup>

a-Mann-Whitney U  
b-Fisher's exact test

Similarly, the prevalence of HR-HPV types tended to be higher in CT-infected and CT- women, with 94% (16/17) of CT+ women having any HR-HPV infection compared to 77% (70/91) of CT- women, although this was not significant (Table 3). The prevalence of any LR-HPV infection was significantly different between CT+ and CT- women [64% (58/91) versus 94% (16/17);  $p = 0.0114$ ; Fisher's exact test].

## Persistence of HPV (over 2 study visits) in CT+ cases versus CT negative controls

Table 4

HPV status	CT positive (n=14)	CT negative (n=81)	P-value <sup>a</sup>
Persistently negative	0% (0/14)	5% (4/81)	1.0
Persistence of any HPV type	100% (14/14)	75% (61/81)	0.04
Persistence of any HR-HPV type	93% (13/14)	59% (48/81)	0.02
Acquired any HPV type	0% (0/14)	1% (1/81)	1.0
Acquired any HR-HPV type	0% (0/14)	6% (5/81)	1.0
Cleared any HPV type	0% (0/14)	7% (6/81)	0.59
Cleared any HR-HPV type	7% (1/14)	10% (8/81)	1.0

a-Fisher's exact test

The prevalence of persistent HPV infections was significantly higher in AGYW with CT infections compared to those not infected with CT (14/14 vs 61/81;  $p = 0.04$ ; Fisher's exact test), particularly HR HPV types (13/14 vs 48/81;  $p = 0.0200$ ; Fisher's exact test) (Table 4). CT+ women were not more likely to acquire an HPV infection at a subsequent visit compared to CT- women, nor clear an existing HPV infection.

## Conclusion

HPV prevalence was high overall in these AGYW, and was also associated with CT infections which may increase risk for persistent HPV infections

## References

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