Incidence and clearance of anal human papillomavirus infection in an acute HIV cohort in Thailand

1262

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INTRODUCTION

Anal high-risk human papillomavirus (HRHPV) infection, especially human papillomavirus (HPV) 16, is the leading cause of anal cancer. This study explored factors associated with HRHPV incidence and clearance among individuals with acute HIV acquisition.

METHODS

Participants who initiated antiretroviral therapy during acute HIV acquisition, defined as Fiebig stages 1–5, and agreed to undergo anal HPV genotyping and high-resolution anoscopy were enrolled at a sexual health clinic in Bangkok, Thailand, from May 2017 to June 2020. Demographic data, sexual history, and baseline laboratory tests were obtained at the time of acute HIV diagnosis. Anal HPV genotyping tests were performed at baseline and 6-monthly visits. Two-state continuous-time Markov models were created separately for HPV 16, HPV 18 and/or 45 (18/45), and HRHPV other than 16/18/45 (other HRHPV). Multivariate analyses were performed by adjusting for age and baseline CD4 level.

RESULTS

A total of 87 cisgender men and 4 transgender women, median age 26 years, were included in the analyses. Over 226.6 person-years (PY), the incidence rates of anal HPV 16, 18/45, and other HRHPV were 18.6, 13.7, and 40.3 per 100 PY, respectively. The clearance rates of anal HPV 16, 18/45, and other HRHPV were 77.3, 94.0, and 90.1 per 100 PY, respectively. Factors associated with HPV-related outcomes were having six or more lifetime sex partners, compared to fewer partners, for incidence of HPV 16 (aHR 4.79, 95% CI 1.08–21.35), and being diagnosed with HIV during Fiebig stage 4, compared to stages 1–3, for clearance of HPV 18/45 (aHR 0.14, 95% CI 0.02–0.90) and incidence of other HRHPV (aHR 0.27, 95% CI 0.07–0.96), after adjusting for age and baseline CD4 level.

CONCLUSIONS

Individuals who acquired HIV and initiated antiretroviral therapy continued to engage in sexual activity, leading to the high rate of HRHPV acquisition over time. The number of lifetime sexual partners was identified as a key predictor of HRHPV acquisition. Even after early antiretroviral therapy initiation regular sexual health consultations, HPV immunization, and anal cancer screening should be strongly encouraged for people living with HIV.

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The rate of high-risk HPV acquisition remains high after ART initiation. It is crucial to strongly encourage regular sexual health consultations, HPV immunization, and anal cancer screening for individuals living with HIV.

TABLE 1 Participant characteristics at baseline, presented with row percentages

Characteristic	Full Cohort (N = 91)	HPV 16 (n = 12)	HPV 18/45 (n = 14)	HRHPV other than 16/18/45 (n = 62)
Age (years)				
18–26	47	4 (8.51%)	6 (12.8%)	18 (38.3%)
27–45	42	8 (19.0%)	7 (16.7%)	17 (40.5%)
≥46	2	0 (0%)	0 (0%)	1 (50.0%)
Gender				
Cisgender men	87	11 (12.6%)	13 (14.9%)	35 (40.2%)
Transgender women	4	1 (25.0%)	0 (0%)	1 (25.0%)
Number of lifetime sex partners				
1–5	16	2 (12.5%)	3 (18.8%)	5 (31.3%)
≥6	75	10 (13.3%)	10 (13.3%)	31 (41.3%)
Receptive anal sex in the last 6 months				
Yes	87	12 (13.8%)	13 (14.9%)	33 (37.9%)
No	4	0 (0%)	0 (0%)	2 (75.0%)
Smoking status				
Never/past	80	10 (12.5%)	10 (12.5%)	34 (42.5%)
Current	11	2 (18.2%)	3 (27.3%)	2 (18.2%)
ATS use in the past 6 months				
Yes	20	3 (15.0%)	4 (20.0%)	9 (45.0%)
No	71	9 (12.7%)	9 (12.7%)	27 (38.0%)
Syphilis				
Negative/treated	82	9 (11.0%)	9 (11.0%)	36 (43.9%)
Newly diagnosed	9	3 (33.3%)	4 (44.4%)	0 (0%)
CD4 count (cells/mm³)				
≥200	82	11 (13.4%)	12 (14.6%)	31 (37.8%)
<200	9	1 (11.1%)	1 (11.1%)	5 (55.6%)
Fiebig stage				
1–3	81	11 (13.6%)	12 (14.8%)	32 (39.5%)
4	10	1 (10.0%)	1 (10.0%)	4 (40.0%)

Abbreviations: HPV, human papillomavirus; HRHPV, high-risk human papillomavirus.

TABLE 2 Risk factors for incidence and clearance of anal human papillomavirus infection

Variable	HPV 16, aHR[a] (95% CI)		HPV 18/45, aHR[a] (95% CI)		HRHPV other than 16/18/45, aHR[a] (95% CI)	
	Incidence	Clearance	Incidence	Clearance	Incidence	Clearance
Age (years)[b]						
≥27	1.51 (0.68–3.36)	0.95 (0.42–2.15)	0.73 (0.17–3.06)	0.76 (0.14–4.05)	0.75 (0.39–1.46)	0.94 (0.50–1.78)
<27	Ref	Ref	Ref	Ref	Ref	Ref
Gender						
Transgender women	0.85 (0.06–11.34)	2.52 (0.09–70.34)	0.78 (0.05–11.65)	1.57 (0.24–10.14)	7.79 (0.00–7.82e11)	8.12 (0.00–8.06e11)
Cisgender men	Ref	Ref	Ref	Ref	Ref	Ref
Number of lifetime sex partners						
≥6	4.79 (1.08–21.35)	2.24 (0.29–17.09)	1.19 (0.39–3.59)	2.57 (0.74–8.99)	2.27 (0.84–6.13)	0.79 (0.32–1.97)
<6	Ref	Ref	Ref	Ref	Ref	Ref
Receptive anal sex in the past 6 months[b]						
Yes	1.41 (0.51–3.91)	0.82 (0.26–2.59)	4.44 (0.92–21.50)	1.37 (0.35–5.39)	1.05 (0.44–2.46)	0.77 (0.38–1.53)
No	Ref	Ref	Ref	Ref	Ref	Ref
Smoking status[b]						
Current	0.55 (0.16–1.96)	0.54 (0.16–1.84)	1.21 (0.26–5.57)	2.17 (0.66–7.07)	8.58 (0.00–1.46e5)	11.58 (0.00–1.97e5)
Past/never	Ref	Ref	Ref	Ref	Ref	Ref
ATS use in the past 6 months[b]						
Yes	1.52 (0.55–4.24)	0.92 (0.27–3.14)	1.63 (0.50–5.31)	1.52 (0.54–4.25)	1.92 (0.66–5.60)	1.90 (0.73–4.94)
No	Ref	Ref	Ref	Ref	Ref	Ref
Chlamydia or gonorrhea[b]						
Positive	1.24 (0.48–3.24)	0.78 (0.22–2.78)	1.37 (0.48–3.88)	0.77 (0.27–2.19)	1.12 (0.45–2.76)	1.16 (0.55–2.44)
Negative	Ref	Ref	Ref	Ref	Ref	Ref
Syphilis[b]						
Newly diagnosed	0.85 (0.20–3.57)	0.20 (0.03–1.58)	1.46 (0.40–5.39)	0.30 (0.04–2.19)	0.55 (0.15–1.97)	0.52 (0.12–2.20)
Negative/treated	Ref	Ref	Ref	Ref	Ref	Ref
Baseline CD4 (cells/mm³)						
<200	1.39 (0.34–5.69)	0.35 (0.09–1.46)	4.40 (0.00–7.69e5)	11.52 (0.00–1.91e6)	0.66 (0.17–2.56)	1.73 (0.57–5.22)
≥200	Ref	Ref	Ref	Ref	Ref	Ref
Baseline HIV-1 RNA (log_{10} copies/mL)[c]						
≥6	1.11 (0.50–2.47)	0.80 (0.34–1.86)	1.19 (0.48–2.91)	1.49 (0.62–3.58)	1.55 (0.79–3.05)	1.60 (0.86–2.99)
<6	Ref	Ref	Ref	Ref	Ref	Ref
Fiebig stage						
4	3.13 (0.41–24.15)	4.09 (0.47–35.69)	0.79 (0.23–2.66)	0.14 (0.02–0.90)	0.27 (0.07–0.96)	0.71 (0.27–1.82)
1–3	Ref	Ref	Ref	Ref	Ref	Ref

[a]Two-state continuous-time Markov models were created separately for HPV 16, 18/45, and HRHPV other than 16/18/45, and separately for each variable, adjusted for age group and baseline CD4 level.

[b]Time-varying variables., [c]Adjusted for age group only.

Bold indicates statistically significant at P = 0.05.

Abbreviations: ATS, amphetamine-type stimulant; aHR, adjusted hazard ratio; CI, confidence interval; HPV, human papillomavirus; HRHPV, high-risk human papillomavirus.