Risk Factors for Airflow Obstruction among HIV+ Individuals in Nairobi, Kenya

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Background

- The spectrum of HIV-related pulmonary complications is shifting toward a greater burden of chronic lung disease (CLD)
- CLD impacts HIV+ individuals globally, including in low- and middle-income countries (LMICs)
- Yet, little is known about risk factors for CLD among HIV+ individuals in LMICs

Research Objective

- To determine whether airflow obstruction (AFO) – a CLD manifestation – is associated with the following factors among HIV+ patients in Nairobi:
  - Vertically-acquired HIV
  - Indoor biofuel burning
  - Cigarette smoking

Methods

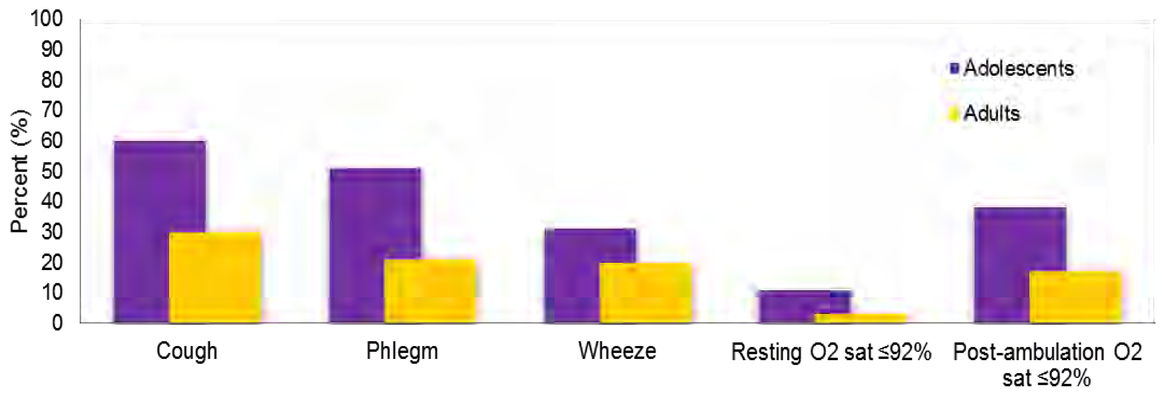
- Subjects: 451 HIV+ adults and adolescents ≥10 years old enrolled in the Coptic Hope Center for Infectious Diseases in Nairobi, Kenya
- Outcome: Post-bronchodilator AFO
  - FEV_1/FVC <0.7 by spirometry
- Exposures: Based on questionnaire data
  - Vertically-acquired HIV—all included adolescents aged 10-19 years old met criteria for vertically-acquired HIV (report of vertical transmission, no sexual debut, or mother/siblings with HIV)
  - Indoor biofuel burning—wood, paraffin, charcoal
  - Cigarette smoking
- Covariates:
  - Demographics, prior pulmonary-related history, respiratory symptoms—via questionnaire
  - Oxygen saturation (O2 sat)—physical exam
  - HIV-related variables—abstracted from Hope center laboratory & pharmacy data
- Analysis: Cross-sectional
  - Bivariate and multivariable logistic regression models to determine odds ratios (ORs) for risk of AFO associated with potential risk factors

Results

Table 1. Baseline characteristics of HIV+ participants enrolled at the Hope Center

Characteristic	Adolescents (10-19 years old) *n* = 55	Adults (≥20 years old) *n* = 396	*p*-value
Age (years), median (IQR)	13 (11 – 14)	40 (35 – 46)	--
Post-bronchodilator AFO (FEV_1/FVC <0.7), %	15	6	0.02
Pre-bronchodilator AFO (FEV_1/FVC <0.7), %	18	8	0.02
HIV-related variables			
Nadir CD4 <200 cells/μL, %	26	55	<0.001
Nadir CD4 cell count, cells/μL, median (IQR)	269 (193 – 471)	179 (74 – 294)	<0.001
Recent CD4 <200 cells/μL, %	4	13	0.001
Recent CD4 cell count, cells/μL, median (IQR)	689 (453 – 951)	431 (285 – 633)	<0.001
Current antiretroviral therapy (ART) use, %	94	85	0.09
Current cotrimoxazole use, %	98	93	0.2
Current/former smoker, %	0	12	0.009
Biofuel burning (wood, paraffin, charcoal), %	85	85	1.0
Reported history of prior pulmonary infections, %			
Pneumonia	33	26	<0.001
Tuberculosis	25	22	0.03
Reported history of non-infectious pulmonary disease, %			
Asthma	4	7	0.6
COPD	0	1	0.6

Figure 1. Adolescents had significantly more cough, phlegm, wheezing and desaturation (before and after ambulation) compared to adults



Results

Table 2. Vertically-acquired HIV, nadir CD4 <200 and cigarette smoking are independently associated with post-BD AFO

	Adjusted OR	95% *CI*
Vertically-acquired HIV	5.56	2.08 – 14.9
Nadir CD4 <200	2.47	1.11 – 5.52
Cigarette smoking	3.87	1.42 – 10.6
Any biofuel burning	2.63	0.65 – 10.7
Current ART use	1.05	0.24 – 4.58

Limitations

- Lack of an HIV- comparison group
- No diffusing capacity, quantification of indoor air pollution exposure
- Difficult to determine temporal association between AFO and pulmonary infections

Conclusions

- Vertically-acquired HIV, nadir CD4 and cigarette smoking are independent risk factors for AFO among HIV+ patients at the Hope Center
- Adolescents with vertically-acquired HIV have a substantial burden of chronic respiratory signs and symptoms despite ART/cotrimoxazole use

Implications

- Acquisition of HIV infection during early stages critical in lung development may impact mechanisms and manifestations of CLD in LMICs
- Further investigation required to:
  - Determine magnitude of CLD burden among HIV+ compared to HIV- individuals
  - Characterize CLD etiologies among HIV+ utilizing chest imaging and longitudinal lung function data

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