Sleep apnea in people with and without HIV in primary care

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Jennifer O. Lam[1], Craig E. Hou[2], Stacey Alexeeff[1], Tory Levine[1], Varada Sarovar[1], Verena E. Metz[1], Michael A. Horberg[3], Derek D. Satre[1,4], Michael J. Silverberg[1]
[1]Division of Research, Kaiser Permanente Northern California, Oakland, CA, USA, [2]South San Francisco Medical Center, Kaiser Permanente Northern California, South San Francisco, CA, USA ,
[3]Mid-Atlantic Permanente Research Institute, Kaiser Permanente Mid-Atlantic States, Rockville, MD, USA, [4]Weill Institute for Neurosciences, University of California, San Francisco, CA, USA

BACKGROUND

- Sleep apnea negatively impacts health and quality of life.
- Data on sleep apnea in people with HIV (PWH) are sparse.
- We sought to better understand sleep apnea incidence among PWH in care.

METHODS

Population and setting

- ≥18-year-old PWH matched 1:20 to people without HIV (PWoH) by sex, age, and race/ethnicity
- Kaiser Permanente Northern California (KPNC), a U.S. healthcare system
- Study period was July 1, 2013 to December 31, 2021.
- People were eligible for inclusion if they had ≥1 year of health plan enrollment and no prior sleep apnea.

Study design and data collection

- Retrospective cohort
- Incident sleep apnea was identified using ICD codes.
- Covariates: Data were collected at time of study inclusion (i.e., baseline) on demographics, body mass index, smoking, and ICD-coded diagnoses of substance use disorders, depression, anxiety, diabetes, cardiovascular disease, cerebrovascular disease, and cognitive impairment.
- For PWH, data were also collected on ART prescription fills, CD4 count, and HIV RNA level.

Data sources

- KPNC electronic health records (EHR)
- KPNC HIV registry (all HIV cases verified via chart review)

Analyses

- Poisson regression was used to calculate the incidence rate ratio (IRR) of sleep apnea comparing PWH vs. PWoH:
  - Overall (All PWH vs. PWoH)
  - PWH with sub-optimally treated HIV vs. PWoH
  - PWH with optimally treated HIV vs. PWoH
- Optimally treated HIV was defined as meeting the following 3 criteria: ≥1 ART prescription fill in the year before baseline, CD4 count ≥500 cells/μl, and HIV RNA <200 copies/ml.
- Sleep apnea incidence was then examined among PWH only, adjusting for all HIV factors.

Lower sleep apnea incidence among people with HIV may reflect underdiagnosis in sub-optimally treated HIV infection.

RESULTS

- The study included 11,568 PWH (mean baseline age 48 years, 90% men, 48% White, 20% Hispanic, 17% Black, 7% Asian, 8% other/unknown race/ethnicity) and 225,097 demographically similar PWoH.
- 93% of PWH had at least 1 ART prescription fill in the year before baseline.
- 63% of PWH had optimally treated HIV.
- Median baseline BMI was 25.9 (IQR: 23.4-29.1) in PWH and 28.0 (IQR: 25.1-31.6) in PWoH.

Table 1. Incidence of sleep apnea in PWH and PWoH

PWH		PWoH		Adjusted IRR (95% CI)		
Cases	Incidence	Cases	Incidence	All PWH vs. PWoH	PWH with sub-optimally treated HIV vs. PWoH	PWH with optimally treated HIV vs. PWoH
820	**17.2**	**19,058**	**19.6**	**0.90 (0.84-0.97)**	**0.79 (0.70-0.89)**	**0.97 (0.89-1.06)**

Incidence per 1,000 person-years. Adjusted models included terms for number of outpatient visits in the year before baseline and all the covariates listed in the Methods, including BMI.

- Compared with PWoH, PWH had lower sleep apnea incidence overall (Table 1).
- Compared with PWoH, lower sleep apnea incidence was observed in sub-optimally treated PWH but not in optimally treated PWH (Table 1).
- Among PWH, sleep apnea incidence was lower among PWH with lower CD4 or higher HIV RNA (Table 2).

Table 2. Association of HIV factors with sleep apnea

PWH	Adjusted IRR (95% CI)
CD4 count ≥500	Reference
200-499	**0.89 (0.75-1.05)**
<200	**0.58 (0.35-0.99)**
HIV RNA <200	Reference
200-9,999	**1.00 (0.64-1.56)**
≥10,000	**0.59 (0.29-1.19)**

STRENGTHS & LIMITATIONS

- Strengths: large population and matched comparator group of PWoH; individual-level adjustment for sleep apnea risk factors using EHR data; extensive capture of HIV factors and ART prescription fills in HIV registry.
- Limitations: ICD-coded diagnoses may under-capture less severe sleep apnea; no objective sleep measures; no data on ART adherence.

CONCLUSIONS

- People with optimally treated HIV infection had similar sleep apnea incidence compared with PWoH, but people with sub-optimally treated HIV had lower sleep apnea incidence.
- Important areas for future investigation include potential underdiagnosis of sleep apnea among PWH as well as ideal approaches for screening and risk stratification of PWH for sleep evaluation and treatment.

Funding: National Institute of Allergy and Infectious Diseases (K01AI157849; Lam), National Institute on Alcohol Abuse and Alcoholism (U01AA026230, Silverberg/Satre).
Contact: Jennifer.O.Lam@kp.org

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