727: Hyperkyphosis and Aging in the Women's Interagency HIV Study

Anne M. Ritchie[1], Wendy B. Katzman[2], Yifei Ma[3], Rebecca Scherzer[3], Mardge Cohen[4], Michael T. Yin[5], Phyllis C. Tien[1,3]

[1]Department of Medicine, University of California, San Francisco, CA; [2]Department of Physical Therapy and Rehabilitation Science, University of California, San Francisco, CA; [3]Medical Service, Department of Veteran Affairs Medical Center, San Francisco; [4]Departments of Medicine, Stroger (formerly Cook County) Hospital and Rush University, Chicago, IL; [5]Columbia University Medical Center, New York, NY

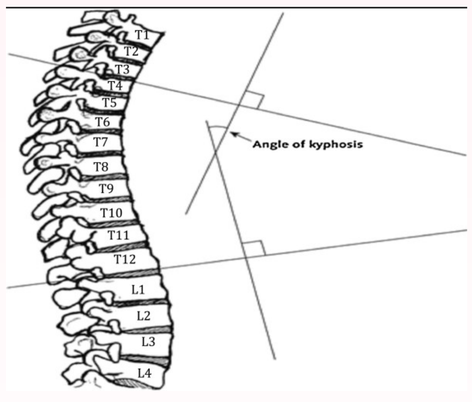
Corresponding Author:
Dr. Phyllis Tien
4150 Clement St, 111W,
SFVAMC, Infectious Diseases
San Francisco, CA 94121
Phone: (415) 221-4810, ext 22577
E-mail: Phyllis.Tien@ucsf.edu

Introduction

- HIV+ women have lower bone mineral density (BMD) and higher rates of fracture than HIV- women, but the contribution of HIV infection to hyperkyphosis is not known.
- Hyperkyphosis is a geriatric syndrome of multifactorial etiology including decreased BMD, increased vertebral fracture, and muscle weakness and is of significant clinical concern.
- Hyperkyphosis has been associated with decreased physical function, impaired pulmonary function, decreased quality of life, and increased all-cause mortality.
- We hypothesized that HIV infection would be associated with increased hyperkyphosis compared to uninfected women in a cohort of early postmenopausal women.

Methods

- The WIHS is a multicenter prospective study of the progression of HIV infection in women with HIV and women at risk for HIV that was established in 1993.
- From January 2012 through July 2016, 252 women from 3 clinical sites of the WIHS (San Francisco, Bronx, and Chicago) enrolled in the Musculoskeletal (MSK) Substudy of the WIHS (PI: Yin). Participants underwent dual X-Ray absorptiometry (DXA) scanning to measure BMD and regional body composition and were assessed for vertebral fracture.
- The Cobb Angle (CA) was measured from the DXA Vertebral Fracture Assessment in the first 200 women who completed DXA scans (130 HIV+ and 70 HIV-).
- CA was calculated from the extreme ends of spinal curvature (T4 and T12) using a single trained reader for adjustment as necessary (Figure).



- We performed logistic regression to estimate odds of hyperkyphosis (defined as Cobb Angle≥40°) associated with HIV infection, and to identify factors associated with hyperkyphosis. Candidate covariates included demographic, lifestyle, body composition, and HIV-related factors.

Results

Table 1. Demographic and clinical characteristics of participants stratified by HIV status

- Over half of women were African-American; the majority was overweight or obese.
- Median age was 50 in HIV+ and 49 years (IQR:44,53) in HIV-.
- HIV+ women had lower lumbar spine (LS), femoral neck, and total hip BMD than HIV-.

Characteristics Median (IQR) or %	HIV+ (n=130)	HIV- (n=70)	P value*
Demographics			
Age (yrs)	50 (48, 54)	49 (44, 53)	0.13
Race/ethnicity			
African American	63%	65%	0.71
White	7%	7%	
Hispanic	25%	25%	
Other¶	5%	1%	
Menopause (% AMH undetectable)	87%	80%	**0.028**
Lifestyle			
Smoking history			
Current	48%	64%	**0.015**
Never	14%	17%	
Former	38%	19%	
Alcohol consumption			
none	58%	60%	0.35
>0-7 drinks/wk	28%	20%	
Body Composition			
BMI (kg/m^2)	29 (25, 34)	30 (27, 34)	0.37
Trunk fat (kg)	17.3 (12.8, 20.9)	18.7 (13.2, 22.6)	0.29
Leg fat (kg)	11.4 (7.6, 14.0)	11.1 (8.4, 14.9)	0.22
Total Fat	31%	31%	0.16
BMD			
Lumbar Spine (LS)	1.19 (1.08, 1.31)	1.30 (1.15, 1.41)	**0.004**
Femoral neck	0.97 (0.89, 1.09)	1.03 (0.93, 1.11)	**0.011**
Total Hip	1.02 (0.91, 1.11)	1.07 (0.98, 1.17)	**0.006**
Cobb Angle	29° (23°, 35°)	30° (23°, 36°)	0.86
HIV related			
HCV infection	22%	23%	0.97
CD4 T cell count (cells/mm^3)			
Current	556 (398, 762)	-	-
Nadir	201 (113, 300)	-	-
HIV Viral Load	20 (20, 183)	-	-

HCV, hepatitis C virus; IQR, interquartile range; BMI, body mass index;
*P value from Pearson χ^2 test, Wilcoxon rank-sum test or Fisher's exact test
¶ Includes Asian, Pacific Islander, Native American, Alaskan and other study participants

Table 2. Age-adjusted univariate logistic regression for Cobb Angle >40°

- Overall, 10% of women had hyperkyphosis (Cobb Angle ≥40°). The prevalence was the same in HIV+ women (n=13, 10%) and HIV- women (n=7, 10%).
- Median Cobb angle was 29°(IQR:23°, 35°) in HIV+ and 30° (IQR: 23°, 36°) in HIV-; (p=0.86).
- HIV infection was not associated with higher odds of hyperkyphosis, even after adjustment for age.
- Greater LS BMD was associated with lower odds of hyperkyphosis.
- In HIV+ women, higher CD4 count was associated with non-significantly higher odds of hyperkyphosis.

	OR (95% CI)	p-value
HIV+ vs. HIV-	0.94 (0.34, 2.50)	0.90
Age (per 5 yrs)	1.52 (0.93, 2.50)	0.094
Race/ethnicity (*ref. African American*)		
White	1.21 (0.24, 6.10)	0.82
Hispanic	0.50 (0.14, 1.84)	0.30
Other¶	1.52 (0.17, 13.79)	0.71
Menopause (*ref. detectable AMH*)	0.93 (0.16, 5.31)	0.93
HCV infection	0.47 (0.13, 1.73)	0.26
Smoking history (*ref. current smoker*)		
Never	2.36 (0.77, 7.24)	0.13
Former	0.62 (0.19, 2.08)	0.44
Alcohol consumption€ (*ref. non-drinkers*)		
>0-7 drinks/wk	0.39 (0.11, 1.42)	0.15
BMI (*per 10%*)	1.10 (0.88, 1.38)	0.39
BMD (*per 10%*)		
Lumbar Spine	0.75 (0.57, 0.99)	**0.041**
Femoral neck	0.77 (0.56, 1.06)	0.11
Total Hip	0.83 (0.61, 1.12)	0.23
CD4 T cell count (*per doubling*)	2.47 (0.88, 6.90)	0.084

HCV, hepatitis C virus; BMI, body mass index;
¶ Includes Asian, Pacific Islander, Native American, Alaskan and other study participants
€ Unable to estimate >7-12 drinks/wk or >12 drinks/wk because none had Kyphosis

Conclusions

- In this study of early-postmenopausal women, contrary to our hypothesis, we did not find that HIV+ women had greater hyperkyphosis than HIV- women.
- As expected, lower lumbar spine BMD was associated with hyperkyphosis.
- Further study is needed in a larger cohort of aging post-menopausal women with HIV.

Acknowledgements

The WIHS is funded primarily by the National Institute of Allergy and Infectious Diseases (U01-AI-103401, U01-AI-103408, UO1-AI-35004, UO1-AI-31834, UO1-AI-34994, U01-AI-103397, U01-AI-103390, UO1-AI-34989, UO1-AI-42590, K24 AI108516, and R01 AI095089), with additional co-funding from the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD), the National Cancer Institute (NCI), the National Institute on Drug Abuse (NIDA), and the National Institute on Mental Health (NIMH).