HIV Infection Is Independently Associated with Carotid Plaque Burden and Echogenic Characteristics

Xiaomeng Li[1,2,&], Li Liu[1,&], Jun Chen[1], Jie Cao[1], Zhenyan Wang[1], Tangkai Qi[1], Jianjun Sun[1], Junyang Yang[1], Shuibao Xu[1], Wei Song[1], Yueming Shao[1], Youming Chen[1], Yang Tang[1], Jiangrong Wang[1], Lin Wang[1], Jiawei Huang[1], Kaixing Wang[1], Meiyan Sun[1], Yiping Jin[1], Zhen Zeng[1], Zihui Zhao[1,2], Renfang Zhang[1*], Yingying Ding[3*], **Yinzhong Shen[1*]**

[1] Shanghai Public Health Clinical Center, Fudan University, China; [2] Shanghai Institute of Infectious Disease and Biosecurity, Fudan University, China; [3] School of Public Health, Fudan University, China.

BACKGROUND

People living with HIV (PWH) are at increased risk of cardiovascular disease (CVD), which has become a leading cause of morbidity and mortality in this population. Subclinical atherosclerosis (SCA), an early and asymptomatic stage of CVD, is more prevalent among PWH than among people without HIV (PWoH).

We conducted a large cross-sectional study of PWH and age- and sex-matched PWoH aged ≥40 years in China.

METHODS

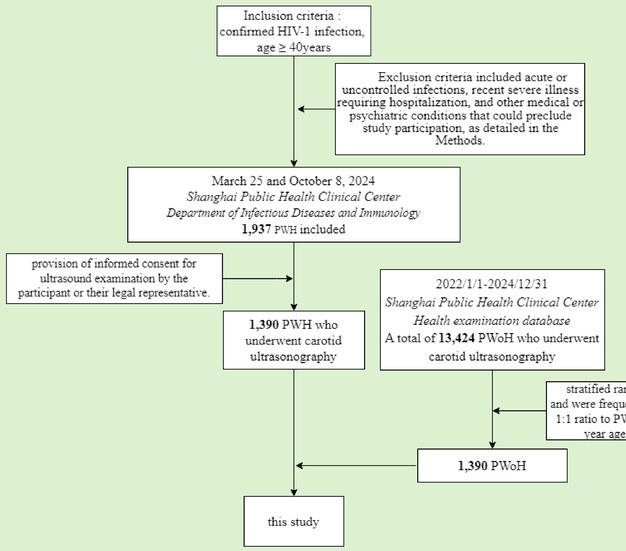


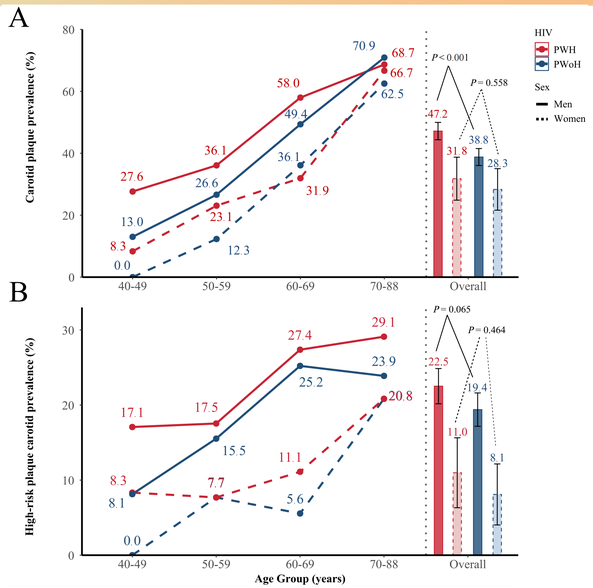
Figure 1

We enrolled 1,390 PWH and 1,390 age- and sex-frequency matched PWoH aged 40 years or older. Carotid ultrasonography was used to assess the presence, number, and echogenicity of carotid plaques(Figure 1).

Framingham atherosclerotic cardiovascular disease risk score (FRS) was categorized as low (<10%), intermediate (10–20%), or high (>20%).

Logistic regression was used to assess the association between HIV status and the presence of carotid plaques. Three models were constructed: (1) unadjusted; (2) adjusted for age and sex; and (3) further adjusted for dyslipidemia.

HIV infection was independently associated with greater carotid plaque burden, especially at ages 40–49, with a higher prevalence of ≥3 plaques among PWH with plaque.



men with HIV	123	496	464	134	1217
men without HIV	123	496	464	134	1217
women with HIV	12	65	72	24	173
women without HIV	12	65	72	24	173

Figure 2

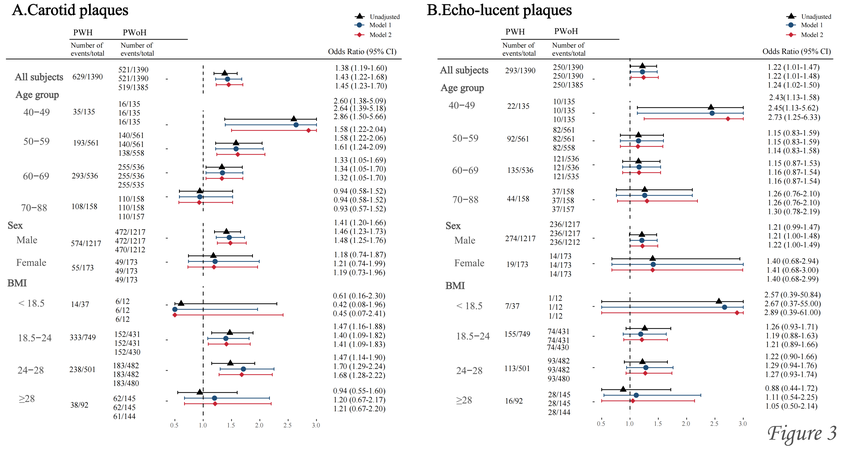


Figure 3

Plaque Burden and Morphology

The prevalence of carotid plaques was significantly higher in PWH than in PWoH (45.3% vs. 37.5%, $P < 0.001$), and the prevalence of echo-lucent plaques was also higher (21.1% vs. 18.0%, $P = 0.045$).

Table 2. Carotid plaque burden and echogenic characteristics between PWH and (PWoH), stratified by Sex

	PWH (*n*=629)	PWoH (*n*=521)	*P* value	Men			Women		
				PWH (n=574)	PWoH (n=472)	*P* value	PWH (n=55)	PWoH (n=49)	*P* value
Number of plaques			**<0.001**			**<0.001**			**0.002**
1	255 (40.5)	243 (46.6)		231 (40.2)	221 (46.8)		24 (43.6)	22 (44.9)	
2	149 (23.7)	168 (32.2)		138 (24.0)	146 (30.9)		11 (20.0)	22 (44.9)	
≥ 3	225 (35.8)	110 (21.2)		205 (35.7)	105 (22.2)		20 (36.4)	5 (10.2)	
Carotid plaque echogenicity			0.450			0.306			0.081
echo-lucent plaques	293 (46.7)	250 (48.5)		274 (47.8)	236 (50.5)		19 (34.5)	14 (29.2)	
heterogeneous plaques	112 (17.8)	100 (19.4)		98 (17.1)	88 (18.8)		14 (25.5)	12 (45.8)	
hyperechoic/ isoechoic plaques	223 (35.5)	165(32.0)		201 (35.1)	143 (30.6)		22 (40.0)	22 (25.0)	
Carotid plaque length, mm	**7.2 (5.0, 10.4)**	**6.4 (4.5–9.1)**	**<0.001**	**7.4 (5.2–10.8)**	**6.4 (4.6–9.2)**	**<0.001**	5.8 (4.1–8.4)	5.6 (3.6–8.0)	0.953
Maximum carotid plaque thickness, mm	2.0 (1.6, 2.5)	1.9 (1.5, 2.4)	**0.026**	**2.0 (1.6–2.5)**	**1.9 (1.5–2.4)**	**0.030**	**1.8 (1.5–2.2)**	**1.7 (1.5–2.1)**	0.601

Data are presented as median (IQR) or n (%).

HIV Infection and Carotid Plaques

After adjustment for age, sex, and dyslipidemia, HIV infection was independently associated with higher odds of carotid plaques (adjusted odds ratio [aOR] = 1.45; 95% CI: 1.23–1.70; $P < 0.001$), with a slightly stronger association in men (aOR = 1.48; 95% CI: 1.25–1.76; $P < 0.001$).

The association between HIV infection and echo-lucent plaques was weaker but remained statistically significant (aOR = 1.24; 95% CI: 1.02–1.50; $P = 0.030$) . *(Figure 3).*

Risk Stratification of FRS

Compared with individuals classified as low risk (<10%), those in the intermediate (10–20%) and high-risk (>20%) categories had significantly higher odds of carotid plaques (OR = 2.59, 95% CI: 1.89–3.59 and OR = 6.30, 95% CI: 4.60–8.72, respectively).

DISCUSSION

These findings support routine cardiovascular risk assessment and early preventive strategies in PWH.

FUNDING

ACKNOWLEDGEMENTS

We gratefully acknowledge the contributions of the clinical physicians, health examination center staff, all related personnel, and all participants involved in this study.

E-mail: shenyinzhong@shphc.org.cn, lxmeng_gw@126.com