



The Association between HIV-related stigma and ART adherence on Cardiovascular Disease Risk in People living with HIV.

Patane Shilabye^{1,2}, Alinda G. Vos-Seba^{1,5}, Hugo Tempelman³, Walter Devillé¹, Roel Coutinho^{1,4}, Francois Venter⁵, Diederick E. Grobbee¹, Kerstin Klipstein-Grobusch^{1,6}, and Karine Scheuermaier^{2,5}



1. Julius Global Health, Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, Utrecht University, Utrecht, The Netherlands
2. School of Physiology, Faculty of Health Sciences, University of Witwatersrand, Gauteng, South Africa
3. Ndlovu Care Group, Elandsdoorn, Limpopo, South Africa
4. PharmAccess Foundation, Amsterdam, The Netherlands
5. Ezintsha, Wits Reproductive Health and HIV Institute, Gauteng, South Africa
6. Division of Epidemiology and Biostatistics, School of Public Health, Faculty of Health Sciences, University of Witwatersrand, Gauteng, South Africa



INTRODUCTION

- People living with HIV (PLWH) have a 2-fold increased cardiovascular disease (CVD) risk compared to people living without HIV (PLWOH).⁴
- To date, HIV-CVD pathogenesis is still unclear, however, the pathway is suspected to be multifactorial with inflammation being the principal factor.^{2,4}
- Social barriers such as stigma may have an impact on CVD risk, but not enough is understood about its impact.^{2,3}
- HIV-related stigma and discrimination may limit adherence to antiretroviral therapy (ART), increasing viremia, inflammation, and CVD risk.^{1,3}

AIM

- To investigate stigma, ART adherence, and CVD risk among PLWH.

METHODS

Setting & Study Population

- Ndlovu Cohort Study, Limpopo Province, South Africa.⁵
- Participants enrolment: 2014-2017.
- 325 PLWH (aged 18 and older).



Data collection methods

Self-administered questionnaire on SES, stigma, HIV status, medical and family history on CVD, Lifestyle, and chronic medication use.
Laboratory assessment: Viral load, Pulse wave velocity (PWV), and anthropometric measurements were recorded.⁵

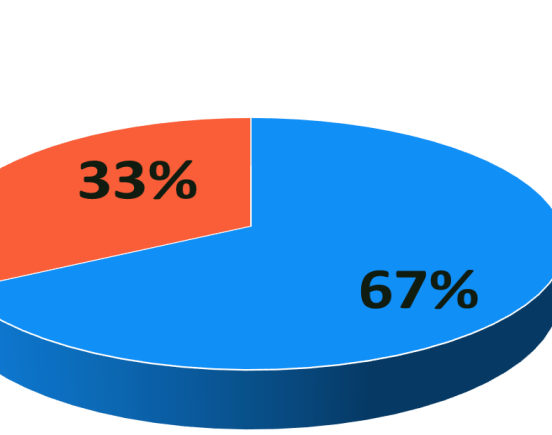
Statistical analysis: performed on RStudio.

- Multiple linear regression to assess the relationship between stigma, and ART adherence on CVD risk.
- Mixed models were used to assess PWV over time (from 12 to 36 months).
- Multiple imputations at 12 months of data.

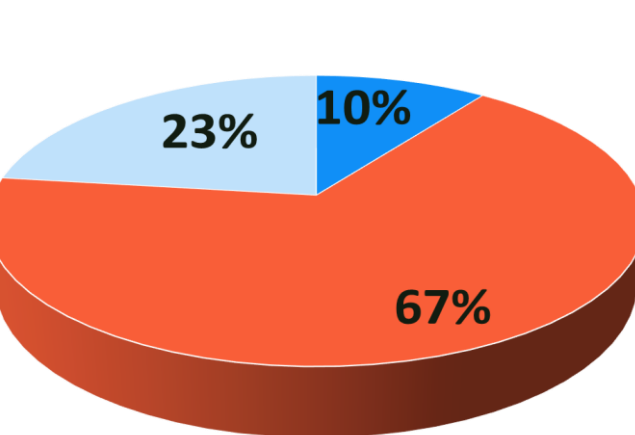
RESULTS

• At 12 months:

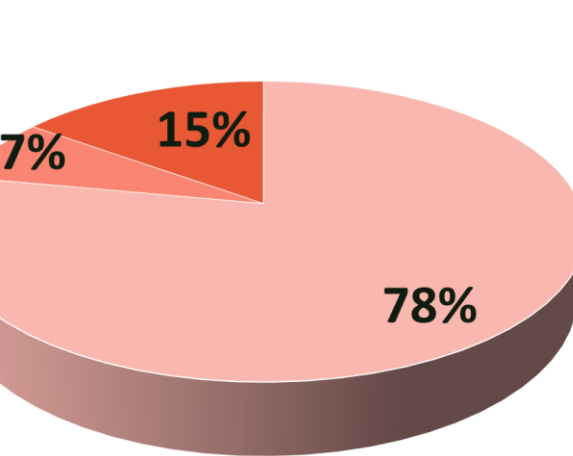
Sex Distribution



Age (in years)



Viral Load (VL)



• At 36 months:

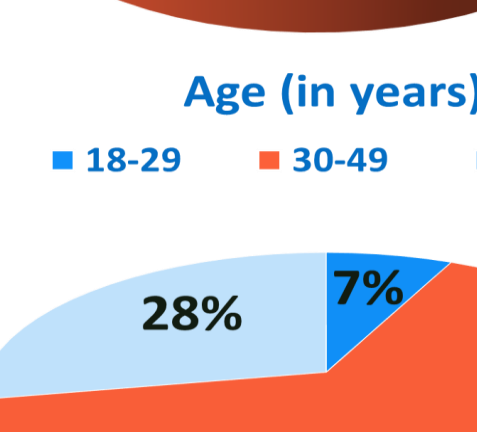
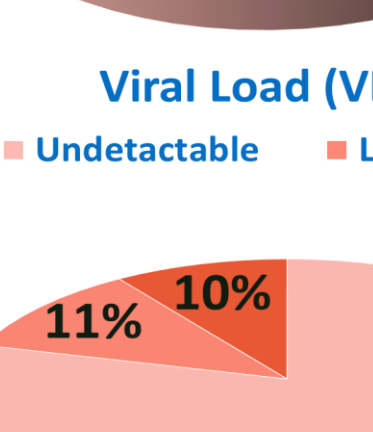


Table 1: association between HIV-related stigma, and ART adherence on CVD risk (outcome=PWV) at 12 months.

		β (95%CI)	P-value
Model 1	Stigma	-0.08 (-0.18_0.02)	0.13
Viral load (REF= VL<50 copies/ml)	VL 50-1000 copies/ml	1.15 (0.28_2.02)	0.01
	VL>1000 copies/ml	-0.51 (-1.15_0.12)	0.12
Model 2	stigma	-0.04 (-0.12_0.05)	0.43
Viral load (REF= VL<50 copies/ml)	VL 50-1000 copies/ml	1.06 (0.37_1.84)	0.001
	VL>1000 copies/ml	-0.33 (-0.88_0.21)	0.18
Age (REF= 18_29 yrs.)	30-49 yrs.	0.46 (-0.34_1.27)	0.26
	>49yrs.	2.92 (2.16_3.69)	<0.001

Model 1: stigma and ART adherence

Model 2: adjusted for sex, age, systolic blood pressure, time on ART, smoking, waist circumference, triglycerides, and interaction terms (viral load: age)

• Variables included in the analysis:

- Stigma, Viral load (a surrogate marker for ART adherence), age, gender, systolic blood pressure, time on ART, waist circumference, triglycerides, and PWV (cardiovascular disease risk predictor).
- Poor/no adherence = High viremia (viral load, VL) > 1000 copies/ml, suboptimal adherence = low viremia (VL 50-1000 copies/ml), and good adherence = undetectable viral load (<50 copies/ml).
- Interaction terms: (reference (REF)= VL<50:18-29yrs., VL 50-1000: age 30-49yrs., VL>1000: age 30-49yrs., VL 50-1000: age>49yrs., and VL>1000: age>49yrs.

Table 2: estimates of the fixed effects for the association of HIV-Related stigma, ART adherence, and CVD risk at 12 and 36 months.

		β (95%CI)	P-value
Model 1			
Clinic visit	36 months	0.21 (0.01-0.40)	0.04
(REF=12 months)			
Stigma		-0.06 (-0.14-0.02)	0.17
Viral load	VL 50-1000 copies/ml	0.24 (-0.20-0.68)	0.28
(REF= VL<50 copies/ml)			
	VL>1000 copies/ml	-0.35 (-0.76-0.06)	0.09
Model 2			
Clinic visit	36 months	-0.13 (-0.34_0.08)	0.23
(REF=12 months)			
Stigma		-0.03 (-0.10_0.30)	0.30
Viral load	VL 50-1000 copies/ml	-0.03 (-1.64_1.03)	0.66
(REF= VL<50 copies/ml)			
	VL>1000 copies/ml	-0.93 (-1.91_0.05)	0.07
Age (REF= 18_29 yrs.)	30-49 yrs.	0.68 (0.13_1.24)	0.07
	>49yrs.	1.75 (1.13_2.38)	<0.001
Model 1: clinic visit, stigma, and viral load.			
Model 2: model 1 adjusted for age, systolic blood pressure, time on ART, smoking, waist circumference, triglycerides, and interaction terms (viral load: age).			

Model 1: clinic visit, stigma, and viral load.

Model 2: model 1 adjusted for age, systolic blood pressure, time on ART, smoking, waist circumference, triglycerides, and interaction terms (viral load: age).

- Mean age: 42.1 (SD 10.2) years.

- Overall stigma: 20.00 (18.00-21.00)

- Median (IQR) Time on ART (in months): 55.0(15.0-106.0)

- Median (IQR) PWV: 7.30 (6.30-8.50)

- Most participants(78%) are found in an undetectable viral load group.

- Stigma is not significantly associated with PWV (-0.02, p=0.54).

- VL 50-1000: age>49yrs. Was significantly associated with PWV at 12 months (4.21 (1.64_6.79), p=0.001)

CONCLUSION/DISCUSSION

Discussion: There is an increased PWV in participants >49 years and with low viremia. In the higher viremia group, PWV was not observed to be increased.

There was a non-significant increase in PWV across the 36-month follow-up period.

Conclusion: In this study, HIV-related stigma was not associated with the risk of CVD. Suboptimal adherence in those aged >49 years was significantly associated with PWV.

ACKNOWLEDGMENTS

I want to express my gratitude to all the study participants and my colleagues from the Ndlovu Research Consortium and Ndlovu Care Group for their contributions. I acknowledge funding by the National Research Foundation / NUFFIC.

REFERENCES

1. Bergmann T, Sengupta S, Bhurshundi MP, Kulkarni H, Sengupta PP, Fergus I. HIV related stigma, perceived social support and risk of premature atherosclerosis in South Asians. Indian Heart J. 2018;70(5):630–6.
2. Mazzuti L, Turriziani O, Mezzaroma I. The Many Faces of Immune Activation in HIV-1 Infection: A Multifactorial Interconnection. Biomedicine. 2023;11(1):159.
3. Mee P, Rice B, Kabudula CW, Tollman SM, Gómez-Olivé FX, Reniers G. The impact of HIV status on the distance traveled to health facilities and adherence to care. A record-linkage study from rural South Africa. J Glob Health. 2020;10(2)
4. World Health Organization. Cardiovascular diseases (CVDs) (2021). Available at: <https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-cvds> (Accessed: 8 January 2022).
5. Vos AG, Barth RE, Klipstein-Grobusch K, Tempelman HA, Devillé WL, Dodd C, et al. Cardiovascular Disease Burden in Rural Africa: Does HIV and Antiretroviral Treatment Play a Role? Baseline Analysis of the Ndlovu Cohort Study. J Am Heart Assoc. 2020;9(7):e013466.

Corresponding author: Shilabye Patane Sylvester

Contact details: p.s.shilabye@umcutrecht.nl/2527437@students.wits.ac.za