Characterisation of Cardiac Disease in Adolescents with HIV in the antiretroviral therapy era

1068

Edith D Majonga[1,2], Miriam Lacharie [3], Betty Raman [3], Tawanda Nyengerai [1], Hilda A Mujuru [4], Kirti Naik [5], Anoop SV Shah [2], Rashida A Ferrand [6], Masliza Mahmod [3]

[1] Biomedical Research and Training Institute, Harare, Zimbabwe, [2] Department of Non-communicable Disease Epidemiology, London School of Hygiene & Tropical Medicine, London, United Kingdom, [3] Division of Cardiovascular Medicine, Radcliffe Department of Medicine, University of Oxford Centre for Clinical Magnetic Resonance Research (OCMR), University of Oxford, John Radcliffe Hospital, United Kingdom [4]Child and Adolescent Health Unit, Faculty of Medicine and Health Sciences, University of Zimbabwe, Harare, Zimbabwe, [5] Baines Imaging Group, Harare, Zimbabwe, [6]Department of Clinical Research, London School of Hygiene & Tropical Medicine, London, United Kingdom

BACKGROUND

- Young people with perinatally acquired HIV (PHIV) have an increased risk of cardiac disease despite effective antiretroviral therapy (ART).
- The study aimed to characterise myocardial structure and function in adolescents with PHIV who are established on ART using cardiac magnetic resonance (CMR) imaging.
- We also explored the association between biomarkers of inflammation and cardiac stress.

METHODS

When
- September 2022 to March 2024

Where
- Harare, Zimbabwe

Who
- Adolescents with perinatally acquired HIV aged 10-19 years, established on ART for at least 6 months
- Unmatched HIV negative comparison group

What
- In a cross-sectional design, we compared the myocardial structure and function of adolescents with PHIV

How
- A 3-Tesla CMR scan assessed cardiac structure and function (cine) and focal myocardial fibrosis (late gadolinium enhancement, LGE).
- Circulating biomarkers of inflammation (CRP, TNF-α), fibrosis (Gal-3, TIMP-1), and cardiac stress (ST2, GDF-15) were assessed using a multiplex bead assay (Luminex Technology).

RESULTS

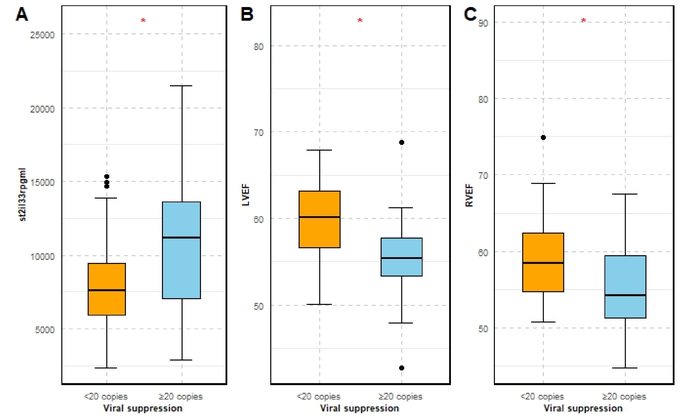
- 120 participants enrolled (60 PHIV and 60 HIV negative)
- Of these, 96 participants had available CMR scans (49 PHIV and 47 uninfected controls).

There is evidence of ***subclinical myocardial injury*** in adolescents with perinatally acquired HIV

Adolescents who are not virally suppressed have ***reduced cardiac function*** and elevated ST2 (cardiac stress) biomarker.

Table 1: Clinical characteristics, CMR and log-biomarkers of the participants

Characteristics	PHIV N=60	HIV Neg N=60	P-value
Female, n (%)	28 (47)	22 (42)	0.581
Age, y	18(16-19)	15 (13-17)	**<0.001**
Stunted, n (%)	31 (51.7)	20 (33.3)	**0.042**
Wasted, n (%)	23 (38.3)	7 (11.7)	**0.001**
Viral suppression, (<20 copies/ml) n (%)	42 (70)		
Age at HIV diagnosis, y, median (IQR)	5.5 (4- 8)		
Cardiac magnetic resonance (CMR)	**N=49**	**N=47**	
LV end diastolic volume index (ml/m^2)	72.7 (11.6)	68.2 (11.6)	0.061
LV end systolic volume index (ml/m^2)	30.2 (6.8)	27.8 (5.9)	0.071
LV Ejection fraction (%)	58.5 (5.6)	59.2 (4.6)	0.463
LVMI (g/m^2	39.4 (5.9)	35.9 (6.0)	**0.006**
RV Ejection fraction (%)	58.0 (6.1)	56.7 (6.0)	0.325
RV End diastolic volume (ml/m^2)	108.0 (27.8)	104.3 (26.0)	0.498
RV end systolic volume index. (ml/m^2)	46.1 (16.0)	45.3 (13.5)	0.789
Biomarkers	**N=60**	**N=60**	
C-reactive protein (pg/mL)	0.42 (0.8)	5.45 (0.8)	0.829
Galectin-3 (pg/mL)	3.59 (0.1)	3.54 (0.1)	0.059
ST2 (pg/mL)	3.91 (0.2)	3.91 (0.2)	0.933
TNF-α (pg/mL)	0.49 (0.3)	0.24 (0.4)	**<0.000**
TIMP-1 (pg/mL)	4.68 (0.2)	4.59 (0.1)	**0.001**
GDF-15 (pg/mL)	2.71 (0.3)	2.37 (0.1	**<0.001**



- Plasma levels of TNF-α, TIMP1 and GDF-15 were higher in the PHIV group compared to uninfected control (p<0.001).
- ST2 was higher in those who were not virally suppressed
- Adjusting for age, sex and viral load, ST2 was associated with higher LVMi (adjusted β, 1.368 ; p=0.040), LV end diastolic and systolic volume index (3.428 ; p=0.006 and 2.030 ; p=0.027, respectively) among adolescents with PHIV

CONCLUSION

- Adolescents who are virally unsuppressed have reduced LV and RV function
- Biomarkers of inflammation and cardiac stress were elevated in adolescents with HIV, specifically TNF-α, TIMP1 and GDF-15 while CRP, and ST2 was higher in those not virally suppressed.
- Evidence suggests the presence of subclinical myocardial injury in adolescents with PHIV established on ART.
- There is need to understand the clinical implications of subclinical myocardial injury as these adolescents transition to adulthood.

Edith Majonga
:Edith.Majonga@lshtm.ac..uk
: thruzim.org