

Original Research Article

Burden of cardiovascular disease risk factors among PLHIV individuals in Davanagere: a cross-sectional study

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ABSTRACT

Background: The HIV and Acquired Immunodeficiency Syndrome (AIDS) pandemic has significantly contributed to mortality rates in many countries over the past three decades. The risk of acquiring NCDs has increased with usage of ART among HIV people.

Methods: A cross-sectional study was done among 150 PLHIV registered in the ART centres of the teaching hospitals of Davanagere. Study subjects were selected randomly and were interviewed and examined to identify CVD risk factors like NCDs, lifestyle factors, duration of ART and CD4 count. Univariant analysis was done to determine association between NCD and risk factors.

Results: Among 150 PLHIV individuals, CVD risk factors prevalence was highest (75%) in diet, followed by female's waist-to-hip ratio (55%), hypertension (7.3%) and diabetes (5%) among PLHIV. Risk factors like diet, physical activity, anthropometric measures showed significant association (p value-0.00001 which is <0.05) in developing NCDs. Chi-square test showed significant association (p value-0.0024 which is <0.05) among risk factors like diet, BMI, W/H ratio whereas the HIV factors like ART duration, CD4 count and viral load didn't show any significant association (p>0.05).

Conclusions: CVD risk factors prevalence like poor diet and obesity was more, despite CVD prevalence being low among PLHIV. Adequate counselling on diet and physical activity can help improve their quality of life and reduce morbidity and mortality due to CVD with continuous ART.

Keywords: PLHIV, Cardiovascular disease, Risk factors, ART

INTRODUCTION

Non-communicable diseases (NCDs) have become a global public health emergency, with the most deaths occurring in the productive (30-69 years) age group. This leads to a diminishing workforce with employees being absent from work due to the nature of NCDs. The introduction of antiretroviral therapy has increased the life expectancy of People Living with HIV (HIV), but it has also increased the risk of developing NCDs.

Urbanisation has increased the burden of modifiable risk factors for NCDs like sedentary lifestyle, unhealthy diet,

harmful use of tobacco and alcohol and along with these factors, the effects of HIV and the adverse effects of Anti-retroviral Therapy (ART) may increase the risk of developing NCDs.¹

Knowledge among the burden of NCDs among PLHIV will likely foster integration of NCD/HIV care at primary health care centre in the region and hence improve comprehensive health care delivery. Currently, evidence available is suggestive of excessive risk to cardiovascular disease among HIV positive rather than HIV negative people. There is an increased risk of developing dyslipidaemia, carotid atherosclerosis, coronary calcification and coronary artery disease with or without

anti-retroviral therapy. Traditional cardiovascular risk factors are the main causes for CVD development in HIV positive patients. Some studies which evaluated the prevalence of traditional risk factors among HIV + patients saw that the rates were significantly low in developed countries, but again some of these differences could be due to un-detection or under-detection caused by reduced clinical suspicion or a very small sample size.²

In the light of existing knowledge gap, we conducted this study to determine the prevalence of CVD risk factors among PLHIV and also, to identify the risk factors for the NCDs among PLHIV individuals.

METHODS

Study place

ART centres of the teaching hospitals, JJM Medical College, Davangere.

Study duration

2 months (June to August 2025)

Study sample size

150 PLHIV Individuals

Sampling technique

Simple random sampling

A cross-sectional study was done among 150 PLHIV registered in the ART centres of the teaching hospitals of JJM Medical College, Davangere. Study subjects were selected using simple random sampling technique, interviewed in person and examined to identify the presence of any CVD risk factors like NCDs, lifestyle factors, duration of ART- TLD regimen only and CD4 count. Univariate analysis was done to determine the association between NCDs and risk factors

Inclusion criteria

All the patients who were diagnosed with HIV and only on the TLD regimen of Anti-retroviral therapy. PLHIV individuals registered at the ART centres of the teaching hospitals, JJM Medical College, Davangere

Exclusion criteria

PLHIV individuals who did not give consent for the study. PLHIV individuals who are < 30 years of age.

Statistical data analysis

Data was entered in MS excel and analysis was done by using SPSS version 21.0. Descriptive statistics like

frequency and percentage were calculated. The categorical data was analysed with frequency and percentage.

RESULTS

Among the 150 PLHIV individuals, 91(61%) participants were female and 59(39%) participants were male.

In age distribution, 59(39%) participants were from the age group 30-40 yrs, 46(31%) participants belonged to 41-50 yrs, 35(23%) participants in the age group of 51-60 years and 10(7%) people in the 61-70 yrs age group (Table 1).

Table 1: Age distribution of PLHIV (n=150).

Age group (years)	Frequency
30-40	59 (39%)
41-50	46 (31%)
51-60	35 (23%)
61-70	10 (7%)

Out of 150 participants, 76(51%) were diagnosed with the disease in between 2010 -2020. 41(27%) patients were diagnosed before 2010, 24(16%) patients were diagnosed between 2021-2024 and 9(6%) patients in 2025 (Table 2).

Table 2: Year of HIV diagnosis and duration of antiretroviral therapy (n=150).

Diagnosis year	N=150	Percentage
Before 2010	41	27%
2010-2020	76	51%
2021-2024	24	16%
2025	9	6%

59% of the PLHIV individuals have been on ART for more than 10 years followed by 17% for 5-10 years and 17 members for 1-5 years of duration leading to an average duration of ART as 11 years.

Among 150 PLHIV, 22(15%) were already having NCDs (Table 3), of which 9 were with Type 2 Diabetes Mellitus, 11 were hypertensive, 1 patient having stroke and 1 with CVD, so the prevalence of Hypertension, T2DM, CVD and stroke was 7.33%, 6%, 1.33% and 1.33% respectively (Table 4). Among the PLHIV having hypertension and diabetes, 11(100%) were on antihypertensives and 7(78%) were on oral hypoglycaemic agents (Table 5).

Table 3: NCDs among PLHIV (n=150).

Category	Value
Total PLHIV	150
PLHIV with NCDs	22 (15%)

Table 4: Prevalence of NCDs among PLHIV (n=150).

Condition	Prevalence
Diabetes mellitus	6%
Hypertension	7%
Other NCDs	
CVD	1%
Stroke	1%

Table 5: PLHIV with NCDs on treatment.

Treatment	Value
PLHIV on oral hypoglycaemic agents (n=9)	7 (78%)
PLHIV on anti-hypertensives (n=11)	11 (100%)

The risk factors assessed were based on gender, pre-existing diabetes and hypertension disease, consumption of oily food, pickles or a high salt diet, smoking tobacco and non-smoking tobacco usage, PLHIV with a CD4 count less than 250, BMI more than 25.0, WHR more than 1.0 in male and WHR more than 0.85 in females. Among all these risk factors assessed individually, modifiable risk factors like habits (food and others) were statistically significant with a p value = 0.00001 ($p < 0.05$) and chi square test value of 27.075 and anthropometric measurements like BMI, WHR showed a chi square value of 11.99 which was statistically significant with p value of 0.002479 ($p < 0.05$). (Table 6).

Table 6: NCD risk factors among PLHIV.

Risk factor	Value	Chi square test; p < 0.05 is statistically significant
Diabetes	8 (40%)	Chi square=0.90; p=0.34
Hypertension	11 (55%)	
Consumption of oily food/pickles/high salt diet	15 (75%)	Chi square=27.075; p=0.00001
Smoking tobacco	1 (5%)	
Non-smoking tobacco	5 (25%)	
CD4<250	5 (25%)	Chi square=11.99; p=0.002479
BMI >=25	8 (45%)	
W/H ratio male >1.0	1 (5%)	
W/H ratio female >0.85	11 (55%)	
Males	6 (30%)	
Females	14 (70%)	

PLHIV with pre-existing diabetes or hypertension were found to 20 and their duration of taking the ART regimen did not show any statistical significance as the chi square

value was 0.42 ($p < 0.05$) meaning that long duration of ART regimen did not have any effect on preexisting NCDs in PLHIV (Table 7). Similarly, the presence of pre-existing NCDs did not influence the viral load results either of the PLHIV showing a chi square value of 0.49 which was not statistically significant (Table 8).

Table 7: PLHIV with NCDs and duration of ART regimen.

PLHIV with NCD	Duration of ART	Chi square test; p value < 0.05 is statistically significant
1	<1 year	Chi square 0.42
4	1-5 years	
4	5-10 years	
11	>10 years	

Table 8: PLHIV with NCDs its impact on viral load.

PLHIV with NCD	Viral load >1000 copies	Chi square test; p value < 0.05 is statistically significant
1	0	Chi square 0.49
4	0	
4	0	
11	0	

DISCUSSION

This is one among the few studies done in India to provide evidence on the prevalence of NCDs and their risk factors, where the prevalence rate of hypertension is higher and is comparable to a similar study conducted by Moyo-Chilufya M. et al conducted in sub-Saharan Africa.¹ Another study conducted by Kagaruki GB et al showed that there was a linkage between HIV and NCDs by direct damage from HIV virus or indirectly by ART regimens, whereas, in this study, there was no significant effect of ART on NCD development. PLHIV on ART are more likely to have other chronic illnesses like NCDs which are key risk factors in developing cardiovascular diseases and can cause various complications.^{2,3}

Our study reported a hypertension prevalence of 7.33% and a Type 2 Diabetes Mellitus (T2DM) prevalence of 6% among people living with HIV (PLHIV).

Hypertension comparison

The prevalence is significantly lower in our study than the pooled estimate of 20.1% found in Sub-Saharan Africa (SSA) by Moyo-Chilufya et al.¹ It is also markedly lower than the rates found in rural South Africa, where Clark et al reported hypertension in 40% of women and 30% of men, and Malaza et al reported 28.5% in women and

20.8% in men.^{3,4} However, the rate is very similar to the 7.4% prevalence found among HIV+ women in Western Kenya by Bloomfield et al and the 5.3% prevalence in ART-naïve Tanzanian adults reported by Peck et al.^{5,6}

Diabetes comparison

The 6% prevalence of diabetes in our study aligns closely with the SSA pooled prevalence of 5.4% reported by Moyo-Chilufya et al.¹ It is also consistent with the 1% to 4% prevalence range observed in northwestern Tanzania and southern Uganda by Kavishe et al.⁷

Overweight and obesity comparison

In our PLHIV cohort, 45% of the NCD risk group had a BMI ≥ 25 kg/m². This high rate of overweight/obesity is a consistent theme across the sources. Moyo-Chilufya et al found a pooled overweight/obesity prevalence of 32.2%.¹ Kavishe et al noted that up to 46% of participants were overweight in certain strata, and Malaza et al highlighted that 58.7% of women in their study were overweight or obese.^{7,4}

Our study had also identified dietary habits and anthropometric measurements as the most significant risk factors for NCDs in this population.

Dietary habits

Consumption of oily food, pickles, and high-salt diets was a statistically significant risk factor among the PLHIV in our study ($p = 0.00001$). This finding is supported by Peer N. who discusses the "nutritional transition" where populations shift toward urban diets higher in fat, sugar, and salt.⁸ Similarly, Kavishe et al noted that populations are increasingly exposed to diets high in calories and salt, contributing to the NCD burden.⁷

Anthropometric measurements (BMI and WHR)

Our study participants result showed that BMI and Waist-to-Hip Ratio (WHR) were statistically significant factors ($p = 0.002479$) for NCDs. Bloomfield et al corroborated this, finding that overweight/obesity was more strongly associated with hypertension in HIV+ men than even age (OR 2.41).⁵ Peck et al also identified BMI as a key factor associated with hypertension, and Kavishe et al reported that participants with high waist circumferences had two-fold higher odds of hypertension.^{6,7}

The Role of ART

Our study found that longer duration of ART (average 11 years) did not show statistical significance with regard to pre-existing NCDs ($p = 0.42$). This mirrors Bloomfield et al who found that the length of time on protease inhibitors was not related to hypertension after adjusting for other variables.⁵ In contrast, Peck et al suggested that ART can

"unmask" hypertension through weight gain or immune-related inflammation, noting that those on ART for >2 years had twice the odds of hypertension compared to negative controls.⁶

Gender

The NCD risk group in our study was predominantly female (70%). This disproportionate impact on women is highlighted by Malaza et al who found the prevalence of obesity in women to be 6.5 times higher than in men.⁴ Moyo-Chilufya et al also noted that while they did not investigate gender differences, such factors likely contribute to the heterogeneity of NCD prevalence.¹

Age

While our study focused on adults >30 years, Kavishe et al emphasized that although hypertension increases with age (OR 10.30 for age ≥ 45), it still affects a substantial proportion of young people under 25.⁷ Moyo-Chilufya et al added that life expectancy increases due to ART have naturally increased the risk of acquiring NCDs as PLHIV age.¹

CONCLUSION

To conclude, CVD risk factors prevalence like poor diet and obesity was more, despite CVD prevalence being low among PLHIV. Adequate counselling on diet and physical activity can help improve their quality of life and reduce morbidity and mortality due to CVD with continuous ART. Initiating early blood pressure and GRBS monitoring along with comprehensive cardiac assessments could be integrated in the program settings of PLHIV regardless of age or gender which is feasible for PLHIV attending the ART centres. Early detection and management of NCDs is important to reduce cardiovascular complications and prevent mortality.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Moyo-Chilufya M, Maluleke K, Kgarosi K, Muyoyeta M, Hongoro C, Musekiwa A. The burden of non-communicable diseases among people living with HIV in Sub-Saharan Africa: a systematic review and meta-analysis. *EClinicalMedicine*. 2023;65:102255.
2. Kagaruki GB, Mayige MT, Ngadaya ES, Kimaro GD, Kalinga AK, Kilale AM, et al. Magnitude and risk factors of non-communicable diseases among people living with HIV in Tanzania: a cross-sectional study from Mbeya and Dar es Salaam regions. *BMC Public Health*. 2014;14:904.

3. Clark SJ, Gómez-Olivé FX, Houle B, Thorogood M, Klipstein-Grobusch K, Angotti N, et al. Cardiometabolic disease risk and HIV status in rural South Africa: establishing a baseline. *BMC Public Health*. 2015;15:135.
4. Malaza A, Mossong J, Bärnighausen T, Newell ML. Hypertension and obesity in adults living in a high HIV prevalence rural area in South Africa. *PLoS One*. 2012;7(10):e47761.
5. Bloomfield GS, Hogan JW, Keter A, Sang E, Carter EJ, Velazquez EJ, et al. Hypertension and obesity as cardiovascular risk factors among HIV seropositive patients in Western Kenya. *PLoS One*. 2011;6(7):e22288.
6. Peck RN, Shedafa R, Kalluvya S, Downs JA, Todd J, Suthanthiran M, et al. Hypertension, kidney disease, HIV and antiretroviral therapy among Tanzanian adults: a cross-sectional study. *BMC Med*. 2014;12:125.
7. Kavishe B, Biraro S, Baisley K, Vanobberghen F, Kapiga S, Munderi P, et al. High prevalence of hypertension and of risk factors for non-communicable diseases (NCDs): a population based cross-sectional survey of NCDs and HIV infection in Northwestern Tanzania and Southern Uganda. *BMC Med*. 2015;13:126.
8. Peer N. The converging burdens of infectious and non-communicable diseases in rural-to-urban migrant Sub-Saharan African populations: a focus on HIV/AIDS, tuberculosis and cardio-metabolic diseases. *Trop Dis Travel Med Vaccines*. 2015;1:6.

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