

Behavioral risk factors for hypertension among adults living with HIV accessing care in secondary health facilities in Lagos State, Nigeria

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ABSTRACT

Background: Excess risk for cardiovascular disease, especially hypertension, may exist among human immunodeficiency virus infection (HIV)-positive persons. This study was carried out to assess the prevalence of the behavioral risk factors for hypertension, including their awareness of these factors and their attitudes toward them. **Methods:** This descriptive cross-sectional study was conducted among 400 HIV-infected adults who accessed care in nine secondary health facilities in Lagos State, Nigeria. Respondents were selected by multistage sampling and data elicited using a structured, interviewer-administered questionnaire. Blood pressure (BP) was measured thrice and a respondent was considered as having raised BP if the mean of the last two measurements is ≥ 140 mm Hg (systolic BP) or ≥ 90 mm Hg (diastolic BP) or if respondents are currently taking anti-hypertensive. **Results:** Prevalence of key behavioral risk factors for hypertension was high. For instance, 82.0% of the respondents were physically inactive. Stress and physical inactivity were the two most known risks of hypertension, identified by 87.3% and 70.5% of the respondents, respectively. Majority (66.0%) had positive attitudes toward hypertension risk factors and 26.7% of them had raised BP. Lower age, that is, 30 years and below (OR = 2.89, 95% CI = 1.26-6.64), BMI of less than 25 (OR = 1.87, 95% CI = 1.16-3.01), and being diagnosed of HIV for 5 years and less (OR = 1.62, 95% CI = 1.006-2.62) were significantly associated with normal BP measurements among respondents. **Conclusion:** The proportion of people living with HIV/AIDS who show known behaviors that place them at risk for hypertension is high. Measures to address these risk factors among them are warranted.

Keywords: Behavioral, HIV, hypertension, Nigeria, risk factors

Background

Nigeria, like other Sub-Saharan African countries, is undergoing an epidemiological transition, with a decline in the prevalence of

many infectious diseases and a steady increase in cardiovascular and other noncommunicable diseases, as major causes of death.^[1] High blood pressure (BP) is the leading cause of cardiovascular disease,^[2] affecting approximately 1 billion people worldwide.^[3] It is a major contributor to the global burden of disease and premature death.^[4] It is estimated that by 2025, 1.56 billion adults will be living with hypertension.^[5]

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Received: 04-04-2020

Revised: 26-04-2020

Accepted: 11-05-2020

Published: 30-07-2020

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_544_20

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How to cite this article: Odukoya O, Badejo O, Sodeinde K, Olubodun T. Behavioral risk factors for hypertension among adults living with HIV accessing care in secondary health facilities in Lagos State, Nigeria. J Family Med Prim Care 2020;9:3450-7.

Across the World Health Organization (WHO) regions, the prevalence of raised BP is highest in Africa, where it is 46% for both sexes combined.^[6] In 2015, a meta-analysis on the prevalence of hypertension among Nigerian adults reported estimates ranging from 25.1% to 32.8%.^[7] Risky behaviors, such as physical inactivity, unhealthy diet, harmful use of alcohol, and tobacco, are associated with the development of hypertension.^[3] In low- and middle-income countries with a high burden of human immunodeficiency virus infection (HIV), the prevalence of these behavioral risk factors may be rising, as these countries increase their levels of development and adopt Western living patterns.^[8]

The risk of cardiovascular disease (CVD) may be higher among HIV-positive persons compared with HIV-negative persons.^[9] HIV infection itself and the use of highly active antiretroviral therapy (HAART) are implicated as potential contributors to the increased risk of hypertension in this group of people.^[10] Some studies suggest that HIV-associated inflammation and immune activation are important mediators of this excess cardiovascular risk.^[11] In addition, antiretroviral therapy may also contribute to the development of hypertension through its impact on metabolic and body fat parameters, and possibly through other factors that are still unclear.^[12]

Life expectancy among HIV-infected individuals has significantly increased due to increased access and adherence to antiretroviral therapy (ART).^[13] Although much progress is being made in the reduction of HIV-related deaths, increased deaths from noncommunicable diseases among surviving HIV-infected persons may offset the gains made from effective therapy. A double burden of hypertension and HIV among persons at risk may cause significant personal and family disruption, loss of income, reduced productivity, tremendous healthcare expenditure, and premature death. Ultimately, this takes a toll on families, communities, and national finances.

An appreciable number of the risk factors for high BP are modifiable and cost-effective solutions exist among the general populace.^[14] Assessing these risk factors among HIV-infected persons may be vital in the modification of lifestyle behaviors to reduce the inherent CVD risk that exists among this population. Strategies to achieve even a modest lowering of the levels of BP in this group of persons are therefore important public health goals.^[15] This study aimed to assess the prevalence of the key behavioral risk factors associated with high BP among people living with HIV, their awareness of and attitudes toward these factors.

Materials and Methods

Study area, study design and population, and sample size estimation

This cross-sectional descriptive study was carried out in nine randomly selected secondary health facilities providing HIV care in Lagos State. Lagos State has 25 secondary health facilities,

which are under the supervision of the Lagos State Ministry of Health, of which 23 provide HIV care and services.^[16]

Participants included HIV positive patients, aged 18 years and above, who were not acutely ill and who had been receiving care at the facility for at least 3 months, irrespective of their antiretroviral therapy status. Pregnant and lactating women were excluded from the study. The minimum sample size was determined using the standard formula for the determination of sample size for descriptive studies. A standard normal deviation of 1.96, prevalence of 25.6% from a similar Cameroonian study,^[17] and a margin of error of 5% were inputted into the formula to give a minimum sample size of 296. This was increased to 400 to give account for possible nonresponses.

Sampling method, data collection tools and techniques, study measures

We used a multistage probability sampling to select participants. In the first stage, we selected nine secondary health facilities using simple random sampling method (balloting) from the sample frame of the 23 secondary health facilities in the State. In the next stage, based on the estimated number of HIV-positive patients enrolled at each facility, we calculated a proportionate sample of patients required in each facility. Then, we recruited patients consecutively till the number allocated to each hospital was attained.

Data were collected using a semistructured interviewer-administered questionnaire adapted from WHO STEP wise approach to surveillance instrument. The questionnaire sought information on the respondents' sociodemographic data: the prevalence of key risk behaviors for hypertension, that is, alcohol consumption, tobacco use, physical inactivity, dietary factors, and their knowledge of and attitude to these risk behaviors.

BP was measured using the OMRON digital automatic BP monitors with the patients seated in a relaxed position and their arms supported at the level of their hearts. The BP was measured three times, with 3 min between each measurement. A respondent was considered as having raised BP if the mean of the last two measurements is ≥ 140 mm Hg (systolic BP) or ≥ 90 mm Hg (diastolic BP) or if respondents are currently taking anti-hypertensive medication.

Height was measured using a stadiometer that was calibrated in meters, with the subject standing bare-foot, with heels touching the wall and head coverings removed. Weight was measured using the Goro -Nyani -Hana Design bathroom scale, (Serial Number: 15320642) calibrated in kg with the subject bare-foot and without heavy garments.

Body mass index (BMI) was estimated from the weight and height readings as weight in kg per square of the height in meters. BMI was categorized using standard cutoff values according to the WHO International Classification for adults,

that is, underweight (<18.5 kg/m²), normal (18.5–24.9 kg/m²), overweight (25.0–29.9 kg/m²), and obese (>30.0 kg/m²).

Waist circumference and hip circumference were measured using a standard tape rule. The waist circumference was measured to the nearest 0.5 cm at the level of the smallest girth above the umbilicus in the standing position. The hip circumference was measured over the widest part of the gluteal region and the waist-to-hip ratio (WHR) was calculated.

Tobacco use: This was assessed using the questions: “Do you currently smoke any tobacco products, such as cigarettes, “weed,” cigar?”; “Do you currently smoke tobacco products daily?”; “On the average, how many sticks do you smoke daily?”; and “For how long have you been smoking?” Respondents who answered in the affirmative were classified as being ever-tobacco users. Current use was defined as one who currently smokes cigarettes.^[18]

Alcohol use: This was assessed using the questions: “Have you ever consumed an alcoholic drink such as beer, wine, spirits, fermented cider, alombo?”; “Have you consumed an alcoholic drink within the past 12 months?”; “During the past 12 months, how frequently have you had at least one alcoholic drink?”; “Have you consumed an alcoholic drink within the past 30 days?”; and “During the past 30 days, on how many occasions did you have at least one alcoholic drink?” One who drinks any amount of alcohol within the past 30 days of the study was considered as current alcohol drinker.^[18]

Physical activity

Adequate physical activity was defined as engaging in at least 150 min of activity per week from a combination of the activities at work, leisure, and while walking. Inadequate physical activity was engaging in less than 150 min of activities from the combination of activities at work, leisure, and while walking.^[18]

Fruits and vegetables consumption

Consumption of less than 5 servings of fruits and vegetable was considered as “insufficient,” whereas consumption of 5 or more servings was considered “sufficient.”^[18]

Data management and analysis

Information obtained from the questionnaire was entered into and analyzed using Statistical Package for the Social Sciences (SPSS) software, version 17.0. There were 12 questions assessing knowledge of hypertension and its risk factors. Every correct response on knowledge was scored 1, and every incorrect response was scored 0. The result was converted to percentage, ≥50% was considered as “good knowledge” and <50% was considered as “poor knowledge.” Attitude variables were judged on the basis of a 5-point Likert scale. The five options “not important at all,” “slightly important,” “moderately important,” “very important,” and “extremely important” were scored 1 to 5, respectively. The result was converted to percentage, ≥60% was considered as

“good attitude,” and <60% was considered as “poor attitude.” Chi-square was used to test for statistically significant associations between categorical variables. Variables that were significant in the bivariate analysis were inputted into a multivariate model using a block entry approach. Results were presented in odds ratios and 95% confidence intervals. P values of ≤ 0.05 were considered statistically significant.

Ethical considerations

Approval for this study was obtained from the ethical and research committee of the Lagos University Teaching Hospital. A written informed consent was also obtained from the Lagos State Ministry of Health, and permission was obtained from the selected secondary health facilities. Verbal and written informed consents were obtained from each respondent. Strict confidentiality was maintained.

Results

Table 1 shows that the mean age of the respondents was 40.2 ± 9.9 years. About three-quarters 297 (74.3%) of them were women and almost half 187 (46.8%) had attained at least a secondary level of education.

Table 2 shows that majority of the respondents (277 [69.5%]) had been living with HIV for less than 5 years and most (377[94.3%]) were on antiretroviral drugs. Forty-nine (12.3%) of the respondents were known hypertensive patients, who had used antihypertensive drugs within the last 2 weeks prior to the study. The most common risk factors for high BP mentioned were excessive worrisome thoughts (97.5%) and stressful

Table 1: Sociodemographic characteristics, duration of HIV diagnosis, use of antiretroviral and antihypertensive drugs, and knowledge of respondents (n=400)

Variables	Frequency	Percentage
Age (years)		
≤20	5	1.3
21-30	60	15.0
31-40	165	41.2
41-50	113	28.3
51-60	43	10.7
≥61	14	3.5
Mean	40.2±9.9	
Sex		
Male	103	25.7
Female	297	74.3
Marital status		
Single	66s	16.5
Married/cohabiting	268	67.0
Separated/divorced/widowed	66	16.5
Highest level of education		
No formal education	24	6.0
Primary	94	23.5
Secondary	187	46.8
Postsecondary	95	23.8

lifestyle (87.3%), respectively. Tobacco use (54.5%) was the least known risk factor for hypertension by the respondents. Overall, a large percentage of the respondents (72.5%) had good knowledge of the behavioral risk factors for high BP.

Table 3 shows respondents' attitudes toward the risk factors. Just about a third of the respondents considered weight loss (33.3%) and reducing dietary salt (41.1%) as very/extremely important measures to reduce chances of developing high BP. Overall, 66% of the respondents had a positive attitude toward the risk factors associated with high BP.

Table 4 shows that about one-third (32.0%) of the respondents had ever consumed alcohol. Few (2.0%) of the respondents currently smoked tobacco products. Only 18.0% of the respondents engaged in adequate physical activity (at least 150 min of moderate-intensity aerobic physical activity or its equivalent in a week). About half (47.5%) of the respondents had normal BP reading, one-quarter (25.7%) had readings suggestive of prehypertension, 16.5% had stage 1 hypertension, and one-tenth (10.3%) of the respondents had stage 2 hypertension according to JNC 7 Classification.

Table 2: Duration of HIV diagnosis, use of antiretroviral, and antihypertensive drugs and knowledge of respondents (n=400)

Duration of HIV diagnosis (years)	Frequency	Percentage
0-5	277	69.5
≥ 6	122	30.5
Presently on antiretroviral drugs		
Yes	377	94.3
No	23	5.7
Presently on antihypertensives		
Yes	49	12.3
No	351	87.7
Knowledge of risk factors for hypertension	Frequency	Percentage
Tobacco use	218	54.5
Excessive alcohol consumption	250	62.5
High salt intake	255	63.8
Being overweight or fat	265	66.3
Inadequate physical activity	282	70.5
Stressful lifestyle	349	87.3
Excessive worrisome thoughts	390	97.5

Only 73 (18.2%) of the respondents consumed sufficient amounts of fruits and vegetables (at least 5 servings of fruits and vegetables per day).

Table 5 shows statistical significance in the association between respondents' BP and age ($P = 0.001$), BMI ($P = 0.001$), WHR ($P = 0.014$), and duration of HIV diagnosis ($P = 0.026$). There was however no statistically significant association between sex ($P = 0.251$), level of education ($P = 0.365$), smoking ($P = 0.910$), alcohol consumption ($P = 0.764$), physical activity ($P = 0.338$), and respondents' BP reading. A higher proportion of those who were 30 years and below ($n = 58, 89.2%$) had normal BP readings as compared to those who were above 30 years of age ($n = 235, 70.1%$). A higher proportion of those with BMI less than 25.0 ($n = 160, 80.0%$) had normal BP readings than those with higher BMI of 25.0 and above ($n = 133, 65.8%$). Similarly, a higher proportion of respondents who were diagnosed of HIV within 5 years ($n = 212, 76.5%$) had normal BP compared to those who had been diagnosed of HIV for longer than 5 years ($n = 81, 65.9%$). A logistic regression showed that lower age of 30 years and below (OR = 2.89, 95% CI = 1.26–6.64), BMI of less than 25 (OR = 1.87, 95 CI = 1.16–3.01) and being diagnosed of HIV for 5 years and below (OR = 1.62, 95% CI = 1.006–2.62) remained significant predictors of normal BP among respondents.

Discussion

Information on the prevalence of high BP plays a vital role in understanding the magnitude of the problem and evaluating the effects of interventions in policy and practice. The prevalence of raised BP in this study was 26.7% which was similar to what obtained in a Ugandan study where prevalence of hypertension was 27.9% among HIV patients.^[19] The similarity may be due to the fact that majority of the respondents in both studies were middle-aged individuals of African heritage. Our figures were however higher than those reported among PLWHA in a rural setting in South Western Nigeria with a hypertension prevalence of 12.3%–19.0%.^[20] The higher prevalence of hypertension in this study may be attributed to the fact that this study was conducted in an urban area in Nigeria. This supports the assertion that high BP may be more prevalent in urban areas in Nigeria.^[21] Our figures may also reflect the general rates of high BP among Nigerians which was reported to range from 8.0% to 46.4%.^[7]

Table 3: Perceived importance of the link between some known risk factors and hypertension for hypertension

	Not Important n (%)	Slightly Important n (%)	Moderately Important n (%)	Very Important n (%)	Extremely Important n (%)	Total n (%)
Regular consumption of fruits	17(4.3)	43(10.8)	58(14.5)	162(40.5)	120(30.0)	400(100.0)
Regular consumption of vegetables	14(3.5)	34(8.5)	58(14.5)	153(38.3)	141(35.3)	400(100.0)
Cessation of tobacco use	92(23.0)	59(14.8)	62(15.5)	115(28.8)	72(18.0)	400(100.0)
Moderate alcohol consumption	81(20.3)	57(14.3)	73(18.3)	119(29.8)	70(17.5)	400(100.0)
Reducing salt intake	71(17.8)	124(31.0)		103(25.8)	61(15.3)	400(100.0)
Maintaining normal weight	102(25.5)	83(20.8)	82(20.5)	93(23.3)	40(10.0)	400(100.0)
Regular exercise	70(17.5)	83(20.8)	97(24.3)	115(28.8)	35(8.8)	400(100.0)

Table 4: Alcohol, tobacco consumption, blood pressure reading, patterns of physical activity, fruit, and vegetable consumption among the respondents (n=400)

Variable	Frequency	Percentage
Alcohol use		
Ever consumed alcohol	128	32.0
Consumed alcohol within past 12 months (n=128)	56	43.8
Frequency of alcohol consumption within past 12 months (n=56)		
1-6 days per week	20	37.7
1-3 days per month	10	17.9
Less than once per month	26	46.4
Current alcohol drinker within last 30 days (n=56)	31	55.4
Tobacco use		
Currently smokes tobacco	8	2.0
Currently smokes tobacco daily (n=8)	1	12.5
Blood pressure reading		
Normal	190	47.5
Prehypertension	103	25.7
Stage 1	66	16.5
Stage 2	41	10.3
Engage in physical activities for at least 10 min continuously		
Walking	294	73.5
Moderate-intensity activity at work	128	32.0
Moderate intensity sports	30	7.5
Vigorous-intensity activity at work	50	12.5
Vigorous-intensity sports	38	9.5
Sufficient physical activities	72	18.0
Fruits consumption		
No. of days respondents eat fruit/week		
0-5	250	62.5
>5	133	33.3
Don't Know	17	4.3
Portions of fruit eaten daily (n=374)		
1-2	270	72.2
3-4	73	19.5
5-6	13	3.5
Don't Know	18	4.8
No. of days respondents eat vegetable/week (n=400)		
0-5	321	80.2
>5	56	14.0
Don't Know	23	5.8
Portions of vegetables eaten daily (n=369)		
1-2	310	84.0
3-4	37	9.3
Don't know	19	4.8
Consumption of sufficient fruits and vegetables	73	18.2

The level of physical activity among the respondents was poor as more than 80.0% do not engage in adequate physical activity. Approximately 12.5%–32.0% of them were physically active at work. The proportion of the respondents that partake in sporting activities of any kind was also very low at 9.5%. Similar to these findings, PLWHA in Rwanda

also had high level of physical inactivity (70.0% of the participants).^[22]

Contrary to these findings, HIV-positive males in Canada were more physically active that 84.5% of the patients were found to engage in adequate physical activity regularly.^[23] This disparity may be attributable to the fact that the Canadian study was conducted among only male respondents, who tend to be more physically active compared to females^[24] who formed the majority (74.3%) of the respondents of this study. In addition, the disparity may stem from the fact that this study was conducted in a low-resource setting where facilities for physical exercises may not be readily available as compared to the Canadian environment where sporting facilities are readily available.

Approximately 55.4% of the respondents were currently consuming alcohol. These findings differ from that of another study conducted among HIV-infected individuals in Baltimore, MD, USA where the overall prevalence of alcohol use was 40.0% and 11.0% of the study population were classified as hazardous drinkers.^[25] The self-reported tobacco use among the respondents in this study was very low as only 8 (2.0%) of the respondents currently smoked tobacco. All the smokers were males as consistent with what obtains in Nigeria where tobacco use is predominantly among males.^[26] In contrast, in a cross-sectional study conducted among PLWHIV in Jos, Nigeria, the prevalence of those who had or were currently smoking cigarette was reported to be 25.7%.^[27] The low prevalence of tobacco use in this study may be attributed to the fact that there was a greater proportion of females in the study who have been documented to be less likely to smoke, unlike males.^[26]

The level of knowledge of the behavioral risk factors for high BP among the respondents in this study was good (72.5%). Many were aware that high salt intake, excessive alcohol consumption, and physical inactivity are behavioral risk factors for high BP. However, a gap in knowledge was seen with respect to tobacco use as almost half of them (44.5%) were not aware that it is a risk factor for high BP. This proportion of respondents who were not aware of tobacco use as a risk factor for hypertension was similar to that was documented in a Tanzanian study, where 41.1% of people infected with HIV had low knowledge of this risk factor for hypertension.^[28]

The respondents of this study had a good attitude toward the behavioral risk factors for high BP. More males (87.4%) however had a positive attitude compared to females (79.1%). These findings are similar to that of an Armenian study carried out to explore nutrition-related knowledge, attitudes, and practices among PLHIV.^[29] The Armenian study reported that the mean attitude score was 71.2%. The level of positive attitude toward healthy diet as seen in that study and in this study may be related to the fact that fruits, vegetables, and healthy diet generally enhance immunity, which is an important component of HIV care.

Table 5: Associated factors and predictors of blood pressure among respondents

Associated factors Variable	Blood pressure Normal n (%)	High n (%)	P	Odd's ratio	Predictor 95% CI	P
Age						
≤30	58 (89.2)	7 (10.8)		2.89	1.26-6.64	0.012
≥31	235 (70.1)	100 (29.9)	0.001	1.00		
Sex						
Male	71 (68.9)	32 (31.1)				
Female	222 (74.7)	75 (25.3)	0.251			
Education						
No tertiary education	220 (72.1)	85 (27.9)				
Tertiary education	73 (76.8)	22 (23.2)	0.365			
Marital status						
Currently married	197 (73.5)	71 (26.5)				
Not currently married	96 (72.7)	36 (27.3)	0.868			
Occupation						
Trading	115 (69.7)	50 (30.3)				
Non-trading	178 (75.7)	57 (24.3)	0.179			
Knowledge of hypertension/risks						
Poor knowledge	87 (79.1)	23 (20.9)				
Good knowledge	206 (71.0)	84 (29.0)	0.104			
Attitude to hypertension risk behaviors						
Poor attitude	97 (71.3)	39 (28.7)				
Good attitude	196 (74.2)	68 (25.8)	0.532			
Currently smoking						
Yes	6 (75.0)	2 (25.0)				
No	287 (73.2)	105 (26.8)	0.910			
Alcohol consumption						
Yes	95 (74.2)	33 (25.8)				
No	198 (72.8)	74 (27.2)	0.764			
Fruits and vegetable consumption						
Insufficient	242 (74.0)	85 (26.0)				
Sufficient	51 (69.9)	22 (30.1)	0.470			
Physical activities						
Inadequate	237 (72.3)	91 (27.7)				
Adequate	56 (77.8)	16 (22.2)	0.338			
BMI						
Not overweight (< 25.0)	160 (80.8)	38 (19.2)		1.87	1.16- 3.01	0.011
Overweight (≥ 25.0)	133 (65.8)	69 (34.2)	0.001	1.00		
Waist/hip ratio						
Non obese	85 (82.5)	18 (17.5)		1.60	0.89-2.90	0.118
Obese	208 (70.0)	89 (30.0)	0.014	1.00		
Duration of HIV diagnosis						
0-5	212 (76.5)	65 (23.5)		1.62	1.01-2.62	0.047
≥6	81 (65.9)	42 (34.1)	0.026	1.00		
Presently on ARV						
Yes	276 (73.2)	101 (26.8)				
No	17 (73.9)	6 (26.1)	0.941			

In this study, attitude toward physical activity was noted to be poor despite overall positive attitude. For instance, though approximately 70% of the respondents identified inadequate physical activity as a risk factor for high BP, only 28.8% of them considered regular exercise a very important measure toward reducing risk of high BP. In addition, only 23% of the respondents considered losing weight a very important measure toward lowering risk of high BP. This poor attitude toward physical activity and maintaining a normal weight may be attributed to the fact that HIV is usually

characterized by weight loss which could inadvertently reveal the status of a HIV-infected person and could make such persons prone to stigmatization in the society.

This is one of the first few studies to assess behavioral risk factors for hypertension among an exclusive sample of PLWHA in several secondary facilitates. It however does have some limitations. Information on compliance with antihypertensives among PLWHA who were known hypertensives was not elicited.

Also, information was obtained by self-report and in a hospital facility which may have led to possible under reporting. Future research directions may include an analysis of the effects of possible mediators of hypertension like exposure to antiretroviral therapy on BP or its risk factors among PLWHA.

Conclusion

The prevalence of raised BP in this study was 26.7%. The proportion of PLWHA who show known risk behaviors for hypertension was high. The level of knowledge of the behavioral risk factors for high BP among the respondents in this study was good; however, a gap in knowledge was seen with respect to tobacco use. The respondents of this study also had a good attitude toward the behavioral risk factors for high BP; however, attitude toward physical activity was noted to be poor despite overall positive attitude.

To reduce the inherent cardiovascular risk that exists among PLWHA, primary care physicians should regularly screen for behavioral risk factors of hypertension among their HIV patients, and educate and counsel accordingly.

Acknowledgments

The participants of this study are appreciated for their contributions. The protected time for the contribution of OO (Oluwakemi Odukoya) towards the research reported in this publication was supported by the Fogarty International Center of the National Institutes of Health under the Award Number K43TW010704. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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