THE PREVALENCE OF ARTERIAL HYPERTENSION AND ITS RISK FACTORS TOWARD HIV-POSITIVE PERSONS IN FERGANA VALLEY

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ABSTRACT

Background: The data on the prevalence of arterial hypertension (AH) in patients with HIV/AIDS vary. Even though some authors have reported higher prevalence of high blood pressure and systemic arterial hypertension in this group, compared to the prevalence of AH in subjects without infection, other studies have found similar prevalence of AH between men and women with HIV and individuals without the infection. In Uzbekistan such researches were not conducted yet. Objective: Evaluate the prevalence of prevalence of arterial hypertension and its risk factors at the HIV-positive persons of Fergana Valley of Uzbekistan. Methods:A cross-sectional study aligned to a cohort of patients with HIV/AIDS. The study considered hypertension at levels ≥ 140/90 mmHg or use of antihypertensive drugs and pre-hypertension at levels > 120/80 mmHg. Results: Out of this total, 138 patients (48%) were male and 149 were female (52%); 65% of them were 40 years-old or younger, and other 35% were over 40 years of age. Among the individuals evaluated, 184 (64.1%) had blood pressure within the normal range, 62 (21.6%) were considered prehypertensive, and 41 (14.3%) were considered hypertensive. Twenty five patients (61%) knew they had hypertension, and 9 of them (36.0%) used antihypertensive medication on a continuous basis. The blood pressure levels were controlled in only 5 (20.0%) patients that knew that they were hypertensive. Conclusion: Among HIV-infected persons, 21.6% were considered prehypertensive, and 14.3% were considered hypertensive. It is important to warn clinicians who provide care to HIV/AIDS patients that such patients are not only individuals infected with a potentially fatal virus, but, despite the benefit of new antiretroviral therapies, they are also patients whose prognosis may be affected by comorbidities, such as hypertension.

UDC CODE & KEYWORDS

■ UDC: 616.12-008.331.1 ■ Arterial hypertension ■ HIV-positive persons ■ Risk factors

INTRODUCTION

Highly active antiretroviral therapy (HAART) has resulted in lasting suppression of HIV replication,reduction of opportunistic infections and malignancies associated with AIDS, and has had a substantial impact on the survival rate and quality of life of infected individuals (Hogg et al., 2008). However, the potential to keep these patients under treatment for decades may be limited by a variety of metabolic and cardiovascular abnormalities observed in patients on HAART, including dyslipidemia, fat redistribution, insulin resistance (Hadigan et al., 2001), hypertension (Baekken, Os, Sandvik & Oektedalen, 2008), and coronary ischemia (Friis-Møller N. et al., 2007).

Two large prospective studies(Friis-Møller et al., 2007;Mary-Krause et al., 2003) showed that the HIV infected population is at increased risk of cardiovascular disease in the long term. However, individual cardiovascular risk is determined by a complex overlapping of several risk factors that include age, family history, smoking, hypertension,diabetes, and high blood lipids(Yusuf et al., 2003). In the period prior to HAART, high blood pressure in infected patients was often associated with complications related to HIV, such as renal failure and vasculopathy (Winston & Klotman, 1998). In post-HAART period, some studies have raised the possibility that HAART may also induce hypertension (Aoun & Ramos., 2000; Sattler et al., 2001; Chow et al., 2003; Gazzaruso et al., 2003; Bergersen et al., 2003; Palacios et al., 2006; Coloma Conde et al., 2008) through the acceleration of atherogenesis and subsequent hardening of the vessel wall (Dube et al., 2008).

The data on the prevalence of arterial hypertension (AH) in patients with HIV/AIDS vary. Even though some authors have reported higher prevalence of high blood pressure(Chow et al., 2003)and systemic arterial hypertension (Baekken, Os, Sandvik & Oektedalen, 2008) in this group, compared to the prevalence of AH in subjects without infection, other studies have found similar prevalence of AH between men and women with HIV and individuals without the infection (Baekken, Os, Sandvik & Oektedalen, 2008; Bergersen et al., 2004; Khalsa et al., 2007). Another aspect that also shows different results is the role of antiretroviral drugs in the genesis of AH. Even though some authors (Baekken, Os, Sandvik & Oektedalen, 2008; Crane,Van Rompaey & Kitahata, 2006; Palacios et al., 2006) have found a relationship between AH and the longer time of use of antiretroviral drugs and the use of regimens containing protease inhibitors, other studies (Bergersen et al., 2004; Khalsa et al., 2007; Thiébaut et al., 2005) found no association between the onset of AH and the use or employment of an antiretroviral regimen. In Uzbekistan such researches were not conducted yet.

The purpose of this work is studying of prevalence of arterial hypertension and its risk factors at the HIV-positive persons of Fergana Valley of Uzbekistan.

Methods

This is a cross-sectional study in progress in the Ferganavalley of Uzbekistan, which is aligned with a cohort for the study of cardiovascular disease and metabolic disorders in individuals over the age of 18 with HIV/AIDS. The study was conducted from January 2014 to December 2014 and it included a baseline analysis of the first 300 patients included in the cohort. The subjects were treated in the Namangan and Fergana regional centers struggling AIDS, consecutively selected. They completed a questionnaire and their blood pressure (BP), weight, height and waist circumference were measured by trained technicians. A data collection form was filled out with information, contained in medical records, about how long the person had had the HIV infection, type of antiretroviral treatment and CD4 lymphocyte counts. A blood sample was collected for testing blood glucose, cholesterol and triglyceride levels.

Measuring BP was done by mercurial sphygmomanometer. The diagnosis of AH was confirmed on a second visit, paid after an interval of up to two months. On both visits, two measurements of the blood pressure were made on one of the upper limbs, and in the end, the mean systolic and diastolic pressures were used. The AH was classified according to the classification of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC 7) (Chobanian et al., 2003), which considers the following classifications of blood pressure: normal (systolic BP < 120 mmHg and diastolic BP < 80 mmHg); prehypertension (systolic BP between 120-139 mmHg or diastolic BP between 80-89 mmHg); and hypertension (systolic BP > 140 mmHg and diastolic BP >90 mmHg).

The body mass index (BMI) was calculated by using the BMI formula = [weight (kg)] / [height (m)2]. Regular physical activity was defined as the practice of physical activity during work breaks or leisure time, calculated by the metabolic equivalent of the last week of the interview, according to the International Physical Activity Questionnaire (IPAQ) (International Physical Activity Questionnaire, 2005). All subjects who reported being a smoker at the time of the interview were considered smokers, regardless of the quantity of cigarettes. The consumption of alcohol was classified according to the standardized questionnaire intended for this purpose.

This study was approved by the Research Ethics Committee of Andijan state medical institute.

The statistical analysis of the data was carried out by using the statistical software “R” (The R Project for Statistical Computing: www.r-project.org). For a comparative analysis of the categorical variables, we applied the chi-square test, and, when necessary, the Fisher’s exact test. For the comparative analysis of continuous variables, we used the Student’s t-test. p values < 0.05 indicate statistical significance.

Results

300 individuals with HIV/AIDS were consecutively evaluated. There was the loss of two patients (0.66%), because they were pregnant and 11 patients (3.6%) were excluded because the BP of such patients had been measured only once. Thus, the universe of this study consisted of 287 subjects. Out of this total, 138 patients (48%) were male and 149 were female (52%); 65% of them were 40 years-old or younger, and other 35%were over 40 years of age. The average age of the cohort was 44.36 ± 10.08 years.

Figure 1 shows the distribution of respondents according to the classification of BP levels and the categories of hypertension. Among the individuals evaluated, 184 (64.1%) had blood pressure within the normal range, 62 (21.6%) were considered prehypertensive, and 41 (14.3%) were considered hypertensive. Twenty five patients (61%) knew they had hypertension, and 9 of them (36.0%) used antihypertensive medication on a continuous basis. The blood pressure levels were controlled in only 5 (20.0%) patients that knew that they were hypertensive.

Out of the total of hypertensive patients, 23 (56.1%) were men, 29 (70.7%) had a family history of AH. 13 patients (31.7%) smoked, 24 (58.5%) ate fruit on a daily basis and 26 (63.4%) ate vegetables on a daily basis (Table 1).

Table 1: Biological characteristics, level of education, habits and history of pre-hypertensive and hypertensive patients with HIV/AIDS

Variables	Hypertensive		Pre-hypertensive		p value
	n	(%)	n	(%)	
Gender (male)	23/41	56.1	34/62	54.8	<0.001
Level of education (years)					
1 to 9	28/41	68.3	37/62	59.7	<0.001
10 to 12	9/41	22	20/62	32.2	<0.01
13 to 19	4/41	9.7	5/62	8.1	<0.001
Daily consumption (yes)					
Vegetables	26/41	63.4	42/62	67.7	<0.001
Fruits	24/41	58.5	38/62	61.3	<0.05
Alcohol consumption					
Abstainer	28/41	68.3	43/62	69.4	<0.001
Light drinker	8/41	19.5	11/62	17.7	<0.001
Heavy drinker/alcohol dependent	5/41	12.2	8/62	12.9	<0.01
Smoking					
Smoker	13/41	31.7	22/62	35.5	<0.001
Former smoker	9/41	22	12/62	19.4	<0.05
Non-smoker	19/41	46.3	28/62	45.1	<0.001
Illicit drugs					
Cocaine (previous or current use)	3/41	7.3	6/62	9.7	<0.01
Crack (previous or current use)	1/41	2.4	3/62	4.8	<0.001
Medication for high blood pressure (yes)	22/41	53.6	13/62	21	<0.001
Physical activity level					
High	7/41	17.1	15/62	24.2	<0.001
Moderate	9/41	21.9	11/62	17.7	<0.001
Low	25/41	61	36/62	58.1	<0.01
Diagnosed with hypertension (yes)					
Before being diagnosed with HIV	9/21	42.9	8/29	27.5	<0.001
After being diagnosed with HIV	11/19	57.9	14/28	50	<0.001
Personal History (yes)					
Diabetes mellitus	3/41	7.3	4/62	4.8	<0.001
Angina pectoris	2/41	4.9	2/62	3.2	<0.01
Myocardial infarction	1/41	2.4	1/62	1.6	<0.001
Stroke	1/41	2.4	1/62	1.6	<0.05
Family history of hypertension (yes)	29/41	70.7	38/62	61.3	<0.001

Source: Authors

Fourteen (14) patients (40.0%) had lipodystrophy, 11 (28.2%) were overweight; and 6 (15.4%) were obese. The waist circumference was increased, according to criteria of NCEP-ATP III, in 11 (28.2%) patients. Table 2 shows that, in relation to dyslipidemia, the total cholesterol level was > 200 mg% in 6 (30.0%) patients, the LDL-cholesterol level was ≥ 130 mg% in 4 (20.0%), the HDL-cholesterol level was < 40 mg% in 11 (55.0%), the triglyceride level was ≥ 150 mg% in 11 (55.0%) and the glucose levels were ≥ 110 mg/dl in two patients (4.9%) (Table 2).

A comparison between hypertensive and prehypertensive patients showed similarity in most risk factors, except for the fact that hypertensive patients were older, they had more cases of hypertension in their families, their waist circumference was larger, and their body mass index and triglyceride levels were higher. The physical activity of prehypertensive patients was more intense (Figure 2 and Tables 1, 2 and 3). With respect to the parameters related to HIV infection and treatment, such as viral load, CD4 lymphocyte counts, the use of antiretroviral drugs, the type of antiretroviral regimen and duration of use, there was no difference between hypertensive and prehypertensive patients (Table 3).

Discussion

This study included 287 HIV-infected individuals, most of whom were patients that had been previously diagnosed with AIDS and who had used antiretroviral drugs for more than 24 months. The study also revealed prevalence of 14.3% of hypertension and 21.6% of pre-hypertension. Even though most patients included in the study had already developed AIDS, the average CD4 lymphocyte count was 470 cells, and great number of patients had a low or undetectable viral load. These data strongly suggest the effective use of antiretroviral drugs. Conversely, in relation to hypertension, the AH was controlled in only 12.2% of hypertensive patients.

The newest edition of JNC 7 categorized blood pressure into normal, prehypertension, “stage 1” hypertension and “stage 2” hypertension. The new “prehypertension” category is a warning to physicians and patients, because it was found that the cardiovascular morbidity and mortality begin with these values or even at lower values (Chobanian et al., 2003). In our research, the blood pressure level of a average quantity of individuals living with HIV/AIDS, i.e., 62 (21.6%), was within the pre-hypertension range, which indicates the importance of providing this population with guidance on how to lead a healthy lifestyle.

In an Italian study that included 287 HIV-positive patients, who were on HAART, there was prevalence of 34.2% against 11.9% in patients in the control group ($p < 0.0001$) (Thiébaut et al., 2005). In the study called Data Collection on Adverse Events of Anti-HIV Drugs (DAD, 2005), a leading international cohort, it was concluded that high blood pressure in HIV-infected individuals is associated with traditional risk factors for hypertension (Thiébaut et al., 2005). There was no evidence of a risk associated with any of the classes of antiretroviral drugs (Thiébaut et al., 2005), although the use of NNRTI is “traditionally” associated with a low risk of developing hypertension. In the African study (Women’s Interagency HIV Study, 2007) (Khalsa et al., 2007) conducted with a cohort composed of only HIV positive women, the prevalence of hypertension in 1,266 HIV-positive women was similar to the prevalence of hypertension in 368 HIV-negative women (26 versus 28%, $p = 0.3800$). In a recent study conducted in 2008 (Baekken, Os, Sandvik & Oektedalen, 2008), in a Norwegian cohort of 542 individuals with HIV/AIDS, hypertension was prevalent in 36.5% of the individuals, which is similar to the general population. A study in Spain (Coloma Conde et al., 2008) detected high prevalence of hypertension in the HIV group (25% versus 15%, $p < 0.001$) when compared to HIV-negative control patients.

Table 2: Characteristics related to presence of lipodystrophy, waist circumference, body mass index (BMI), levels of total cholesterol, HDL cholesterol, LDL-cholesterol, triglycerides, dyslipidemia and glucose in pre-hypertensive or hypertensive patients with HIV/AIDS

Variables	Hypertensive		Pre-hypertensive		p value
	n	(%)	n	(%)	
Lipodystrophy (self-reported)	14/35	40	22/52	42.3	<0.001
Waist circumference					
NCEP-ATPIII (Increased)	11/39	28.2	10/51	19.6	<0.01
Body mass index (kg/m2)					
< 25	22/39	56.4	32/51	62.7	<0.001
≥ 25 and < 30	11/39	28.2	15/51	29.4	<0.001
≥ 30	6/39	15.4	4/51	7.8	<0.05
Total cholesterol (mg/dl) (> 200)	6/20	30	7/26	26.9	<0.001
HDL-cholesterol (mg/dl) (< 40)	11/20	55	14/26	53.8	<0.01
LDL-cholesterol (mg/dl) (> 130)	4/20	20	4/26	15.4	<0.001
Triglycerides (mg/dl)					
< 150	8/20	40	15/26	57.6	<0.001
150 to 500	11/20	55	11/26	42.3	<0.01
> 500	1/20	5	1/26	3.8	<0.05
Blood glucose (mg/dl)					
American Diabetes Association (< 126)	2/41	4.9	1/62	1.6	<0.001

Source: Authors

With respect to the treatment of HIV infection in this study, it was found that the prevalence of PI-containing regimens in hypertensive patients was 41.7%, and the prevalence of regimens without PI was 44.4%. With respect to the type of antiretroviral regimens (containing PI or NNRTI) involved in the genesis of the AH, even though the proportion of use of PI was greater among hypertensive patients than in the general population infected, the study design used does not allow reaching conclusions about the theme. It was also possible to notice that the use of different antiviral regimens, i.e. simple or complex regimens, does not preclude adherence to antiretroviral therapy, whereas the treatment of hypertension, in general, arouses less interest of the patient and even of the assistant physician, which explains why the hypertension was controlled in only 12.2% of the patients.

Several lifestyle factors are likely to have a direct influence on blood pressure levels, both from the perspective of individuals and from the perspective of the population. Among these, the most important lifestyle factors are excess body fat (overweight/obesity), alcohol consumption, insufficient physical activity, smoking, stress and a variety of dietary components (Dusek et al., 2008), such as inadequate consumption of fruits and vegetables (Yusuf et al., 2004).

Knowing that smoking is an established risk factor for hypertension, if one observes Table 1, one will see that there is 26.8% prevalence of smoking in the sample, which is close to values found in another study in the Uzbek population(Gilmore et al., 2004).Overall, 38.1% of men and 1.6% of women currently consumed tobacco products. Approximately 20% of Uzbekistan men smoke(WHO Report on the Global Tobacco Epidemic, 2013).

The high prevalence of overweightness (overweightness/obesity) (43.6%) in this population of hypertensive patients with HIV/AIDS is in line with the alarming rates of overweightness described in the literature, which showed the prevalence of 53.7 to 58% of individuals with BMI above 25 in different populations (Jenei et al., 2002). Based on National Health and Nutrition Examination Survey data, the prevalence of obesity in 2007–2008 was 32.2% among adult men and 35.5% among adult women. 5 Among adults, the prevalence of obesity increases with age in men (Flegal et al., 2010).

Table 3: Time of infection, history of immunodeficiency, type and duration of antiretroviral treatment, values of CD4 lymphocytes of prehypertensive or hypertensive patients with HIV/AIDS

Variables	**Hypertensive**		**Pre-hypertensive**		**p value**
	n	**(%)**	**n**	**(%)**	
Time patient has been diagnosed					
< 12 months	4/31	12.9	5/42	11.9	<0.01
12 to 24 months	3/31	9.7	6/42	14.3	<0.001
> 24 months	24/31	77.4	31/42	73.8	<0.01
AIDS (yes)	28/36	77.8	39/45	86.7	<0.001
Use of antiretroviral drugs (yes)	30/36	83.3	40/45	88.9	<0.05
Time patient has been on antiretroviral					
< 12 months	5/36	13.9	8/45	17.8	<0.001
12 to 24 months	4/36	11.1	6/45	13.3	<0.001
> 24 months	27/36	75	31/45	68.9	<0.01
Current antiretroviral regimen					
Without ARV	5/36	13.9	5/45	11.1	<0.001
With the use of PI	15/36	41.7	19/45	42.2	<0.001
Without the use of PI	16/36	44.4	21/45	46.7	<0.05
CD4 Lymphocytes (current) cells/mm3					
< 200	5/41	12.2	9/62	14.5	<0.001
201 to 350	10/41	24.4	12/62	19.3	<0.001
> 350	26/41	63.4	41/62	66.2	<0.01

Source: Authors

The guidelines of JNC 7 [Chobanian A.V. at al., 2003] recommend doing least thirty minutes of physical exercises on most days of the week. In our sample of 41 hypertensive patients, 25 of the respondents (61.0%) reported not doing physical exercises (inactive/ little active), and only 16 of the total (39.0%) reported doing physical exercises on a regular basis (high/moderate physical activity). In a study across nine European countries, only 30% of women and 50% of men were active or moderately active [Besson H. at al., 2009]. There was significant difference between the physical activity levels of hypertensive patients and the levels of prehypertensive patients in this study, indicating that physical activity could be protecting, also in this population, against the emergence of higher pressure levels.

In this study, alcohol dependence or heavy consumption of alcoholic beverages was reported by 5 of the hypertensive patients (12.5%) and 8 of the pre-hypertensive patients (12.9%), with no difference between the groups. The excessive consumption of alcoholic beverages is associated with AH, and the restriction of alcohol intake can lower blood pressure[Pickering T.G., 2003; Okubo Y. at al., 2001], which is a modification of lifestyle.

With respect to the time when the hypertension was diagnosed, more than half (57.9%) learned they had hypertension after the HIV diagnosis, and many (29.3%) did not know they had hypertension before this study was conducted. Moreover, only 20% of patients who knew they were hypertensive had their blood pressure levels adequately controlled. These findings seem to indicate that the patients were not warned by infectious disease specialists about the fact that they had hypertension, or that neither the patients nor the doctors had learned of the hypertension diagnosis. Or rather, the prolonged use of antiretroviral drugs could have been the determining factor for the onset of hypertension, which is an aspect that seems unlikely given the data presented here.

Conclusion

Among HIV-infected persons, 21.6% were considered prehypertensive, and 14.3% were considered hypertensive. It is important to warn clinicians who provide care to HIV/AIDS patients that such patients are not only individuals infected with a potentially fatal virus, but, despite the benefit of new antiretroviral therapies, they are also patients whose prognosis may be affected by comorbidities, such as hypertension.

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