

# Hypertension, dyslipidaemia, and cardiovascular risk in HIV-infected adults in Poland

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## Abstract

**Background:** The prevalence of cardiovascular diseases (CVD) in HIV-infected patients increases with aging and duration of the disease. Hypertension, high cholesterol level obesity, diabetes, tobacco exposure, and use of alcohol are among the traditional risk factors that contribute to CVD.

**Aim:** The aim of the study was to determine the incidence of hypertension, lipid disturbances, and CVD risk in dependence on clinical, viral, and biochemical factors.

**Methods:** A total of 417 HIV-infected Caucasian adult patients from the four clinical centres in Poland were enrolled and analysed on the basis of available medical data from the years 2013–2015.

**Results:** Hypertension was diagnosed in 28% of all patients and in the age ranges: < 40 years, 41–60 years and > 60 years in 18%, 43%, and 53%, respectively. The percentage of optimal, normal, and high normal blood pressure was: 28%, 14%, and 30%, respectively. Hypertension grade 1, 2, and 3 was observed in 58%, 35%, and 7% of patients, respectively. Factors associated with hypertension were: increasing age, male sex, increased body mass index, hypercholesterolaemia, hypo-high density lipoprotein (HDL), hypertriglyceridaemia and duration of HIV infection more than 10 years. Hypercholesterolaemia, suboptimal level of HDL, elevated low-density lipoprotein, and hypertriglyceridaemia were observed in 37%, 20.5%, 31%, and 52%, respectively. Hypertriglyceridaemia was associated with protease inhibitor-based highly active antiretroviral therapy. HCV infection was negatively associated with hypercholesterolaemia. Cigarette smoking was reported in 55% of cases.

**Conclusions:** Incidence of hypertension in particular age groups of HIV infected people is higher than in the general Polish population. Hypertension is influenced by traditional risk factors and duration of HIV infection but not antiretroviral treatment. HIV/HCV coinfection appears to be protective against hypercholesterolaemia.

**Key words:** HIV, HCV, hypertension, dyslipidaemia, cardiovascular disease

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## INTRODUCTION

In the era of highly active antiretroviral therapy (HAART) the prognosis for patients infected with human immunodeficiency virus (HIV) has improved significantly with the life expectancy close to the general population. Therefore, the prevalence of cardiovascular diseases (CVD) in HIV-infected patients increases with growing age and duration of the disease. Elevated cardiovascular (CV) risk profile and direct consequence of HIV infection itself are major factors re-

viewed as responsible for the increase of CV morbidity in the HIV-infected population [1].

Hypertension is among the traditional risk factors that contribute to CVD as well as high cholesterol levels, obesity, diabetes, tobacco exposure, and harmful use of alcohol. Classic risk factors for hypertension in the HIV-positive population are older age, male sex, African-American race, and higher body mass index (BMI). Associations between hypertension, dyslipidaemia, and HIV are inconclusive, with some studies

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pointing out the influence of duration of HIV infection and HAART initiation and duration [2].

The aim of our study was to determinate the incidence of hypertension and lipid disturbances in HIV-infected adults in Poland along with the evaluation of the association of these parameters with clinical, viral, and biochemical features. Moreover, the Pol-SCORE and the Framingham risk score (FRS) were used to estimate the 10-year risk of developing CVD.

## METHODS

A total of 417 HIV infected Caucasian adult patients (mean age: 38 years, interquartile range [IQR]: 20–71; 301 men and 116 women) from four clinical HIV/AIDS outpatient departments (Białystok, Szczecin, Ostroda, Lublin) in Poland were enrolled, including 200 (48%) — HIV monoinfected and 217 (52%) — HIV/HCV coinfecting individuals. The average time from the diagnosis of HIV infection was 9.3 years (IQR: 2–27). Three hundred and eighty (91%) patients were treated with antiretroviral drugs and the average duration of the therapy was 6.7 years (IQR: 1–21). Therapeutic schemes were based on protease inhibitors (PI), non-nucleoside reverse transcriptase inhibitors (NNRTI), or other drugs in 61%, 18%, and 21%, respectively. Blood pressure, lipid profile, and general characteristics of the study group compared across genders are presented in Table 1.

Laboratory and clinical parameters were obtained from the routine medical records from the years 2013–2015. Blood pressure and weight were measured at each patient's visit in the clinic. Hypertension was diagnosed when the patient had repeatedly (three times or more) systolic blood pressure above 140 mm Hg and/or diastolic blood pressure above 90 mm Hg or history of hypertension or when antihypertensive medication was reported. Incidental hypertension was excluded.

Analysis of the blood pressure was based on the European Society of Hypertension (ESH) and European Society of Cardiology (ESC) guidelines from 2013 and has been as follows: optimal < 120 mm Hg and < 80 mm Hg; normal 120–129 mm Hg and/or 80–84 mm Hg; high normal 130–139 mm Hg and/or 85–89 mm Hg; grade 1 hypertension 140–159 mm Hg and/or 90–99 mm Hg; grade 2 hypertension 160–179 mm Hg and/or 100–109 mm Hg; grade 3 hypertension  $\geq$  180 mm Hg and/or  $\geq$  110 mm Hg; and isolated systolic hypertension  $\geq$  140 mm Hg and < 90 mm Hg [3].

Framingham Risk Score, taking into account: age, gender, smoking, systolic blood pressure, diabetes, high-density lipoprotein (HDL), and total cholesterol levels, was referred as low risk when less than 10%, 10–20% as intermediate, and more than 20% as high risk of CVD. Risk of death from cardiovascular disease (CVD DEATH) was low when < 1%, intermediate and high when 1–5% and > 5%, respectively.

Risk of CVD was also assessed by Pol-SCORE scale, taking into account: age, gender, smoking, systolic blood pressure, and low-density lipoprotein (LDL) and was referred as low risk

when less than 1%, between 1% to less than 5% as intermediate risk, between 5% to less than 10% as high risk, and 10% and more as very high risk [4]. Patients with diabetes were included to the adequate risk range. There were no patients with chronic kidney disease as well as those with diagnosed or clinically evident CVD. However, electrocardiograms or any other CV tests or procedures were not performed routinely in every patient, which is a limitation of the study and can result in underestimation of the very high risk population.

LDL was defined as optimal when < 115 mg/dL, < 100 mg/dL and < 70 mg/dL for patients with low or intermediate, high, and very high CV risk, respectively, according to SCORE scale [5]. Total cholesterol (TC) < 190 mg/dL, triglyceride (TG) < 115 mg/dL and HDL > 40 mg/dL in men and > 50 mg/dL in woman were defined as optimal [6]. Hypercholesterolaemia, hyper-LDL, hypertriglyceridaemia, and hypo-HDL were defined as exceeding the optimal value.

## Statistical analysis

Statistical analysis was performed on licensed software Statistica, version 12.0 and Windows 10 operating system, using the U Mann-Whitney and  $\chi^2$  tests. The Spearman test was used for correlation analyses. Stepwise multivariate logistic regression was performed. P values less than 0.05 were considered statistically significant.

## RESULTS

### Hypertension

Percentage of patients with optimal, normal, and high normal blood pressure were 28%, 14%, and 30%, respectively. Hypertension was diagnosed in 116 (28%) patients, including grade 1, grade 2, and grade 3 hypertension in 58%, 35%, and 7% of patients, respectively. Isolated systolic hypertension was observed in 10 (2%) patients and was included to the adequate group of hypertension grade. Hypertension was more common in males than females (31% vs. 20%,  $p = 0.02$ ), mainly observed in the group of patients with grade 1 hypertension (19% vs. 9.5%,  $p = 0.01$ ). Comparison of patients with hypertension and with optimal/normal values of blood pressure revealed increasing incidence of hypertension with age (Fig. 1). Hypertension was diagnosed in 18% of patients < 40 years old, 43% of patients between 40 and 60 years old, and in 53% of patients 60+ years old. Higher BMI values were observed in the hypertension group (mean 24.6, IQR 23.1–28.0,  $p < 0.005$ ). TC above optimal value was more common in patients with hypertension than in patients with normal blood pressure (51% vs. 32%,  $p = 0.0003$ ). There was no difference between patients with and without hypertension regarding HDL level, but LDL and TG values exceeding optimal levels were more common in the hypertension group (37% vs. 27%,  $p = 0.05$  and 60% vs. 49%,  $p = 0.04$ , respectively). There were no differences in T CD4 cells absolute count and nadir T CD4 cells in patients with and without hypertension. Sys-

**Table 1.** Characteristics of the study population (n = 417) compared across genders

	Woman		Man		P
	n	%	n	%	
Age [years]:					
< 30	23	20	45	15	NS
30–40	59	51	144	48	NS
41–50	19	16	88	29	0.007
> 50	15	13	24	8	NS
Cigarettes smoking	51	44	177	59	0.005
Alcohol addiction	8	7	50	17	0.01
Drug addiction	15	13	65	21.5	0.04
HCV infection	53	46	166	55	NS
HIV diagnosis [years]:					
< 10	62	54	167	56	NS
10–20	49	43	116	39	NS
> 20	4	3	14	5	NS
Antiretroviral treatment [years]:	104	90	276	92	NS
< 5	38	37	113	41	NS
5–10	39	37.5	97	35	NS
11–15	25	30	59	21	NS
> 15	2	2	7	2.5	NS
Viral load (HIV-RNA): < 50 copies/mL	72	62	172	57	NS
Nadir CD4 [cells/mm <sup>3</sup> ]:					
< 100	25	22	90	30	NS
100–350	56	49	132	44.5	NS
> 350	34	29.5	74	25	NS
Body mass index [m/kg <sup>2</sup> ]:					
< 18.5	7	6	13	4	NS
18.5–24.9	73	64	171	57	NS
25–29.9	27	24	88	29	NS
≥ 30	7	6	26	9	NS
Blood pressure [mm Hg]:					
Optimal: < 120 and < 80	42	36.5	72	24	0.01
Normal: 120–129 and/or 80–84	18	16	41	14	NS
High normal: 130–139 and/or 85–89	32	28	93	31	NS
Hypertension:	23	20	93	31	0.02
Grade 1: 140–159 and/or 90–99	11	9.5	57	19	0.01
Grade 2: 160–179 and/or 100–109	11	9.5	30	10	NS
Grade 3: ≥ 180 and/or ≥ 110	1	1	7	2	NS
Isolated systolic hypertension*: ≥ 140 and < 90	3	3	7	2	NS
Framingham Risk Score (%)					
10-year risk of cardiovascular disease:					
Low: < 10	87	88	203	79	0.04
Intermediate: 10–20	8	8	32	12	NS
High: > 20	4	4	22	8.5	NS
10-year risk of death from cardiovascular disease:					
Low: < 1	88	89	200	77.5	0.01
Intermediate: 1–5	10	10	47	18	NS
High: > 5	1	1	11	4	NS
SCORE (%)					
10-year risk of cardiovascular disease:					
Low: < 1	87	78	0	0	< 0.005
Intermediate: ≥ 1 – < 5	16	14	270	93	
High: ≥ 5 – < 10	9	8	15	5	
Very high: ≥ 10	0	0	5	2	
Lipid profile [mg/dL]					
Total cholesterol: > 190	49	43	103	35	NS
HDL: < 40 in men and < 50 in woman	23	23	51	20	NS
LDL:					
< 115 or < 100 or < 70**	75	72	189	73	NS
> 135	13	13	38	15	NS
Triglycerides:					
< 115	61	55	131	45	0.05
115–150	16	14.5	54	18	NS
> 150	33	30	108	37	NS
Fasting glucose level [mg%]: ≥ 100	18	15.5	67	22	NS
Diabetes	4	3	9	3	NS
Liver tests [IU/l]:					
ALT > 40	22	19	130	43	0.0007
GGT > 100	14	12	83	27.5	0.0007

\*Isolated systolic hypertension was graded 1, 2, or 3 according to systolic blood pressure values and included to the number of patients from each group; \*\*Optimal LDL value depending on cardiovascular risk according to SCORE scale [5].

ALT — alanine aminotransferase; GGT — gamma glutamyl transferase; HDL — high-density lipoprotein; LDL — low-density lipoprotein

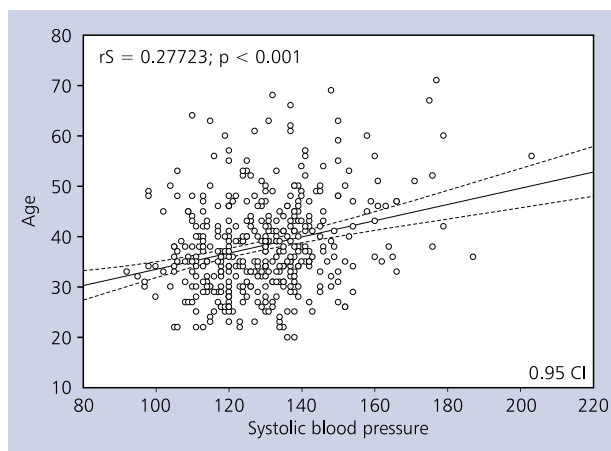


Figure 1. Correlation between systolic blood pressure and age

tolic blood pressure correlated with BMI value ( $rS = 0.2484$ ,  $p < 0.005$ ) as well as fasting glucose level ( $rS = 0.1357$ ,  $p = 0.02$ ). Addictions and HCV coinfection were equally common in both groups of patients: with and without hypertension. Patients with hypertension more commonly presented elevated alanine aminotransferase (ALT) and gamma glutamyl transferase (GGT) activity in comparison to patients without hypertension (47% vs. 32%,  $p = 0.005$  and 35% vs. 19%,  $p < 0.005$ , respectively). We observed increasing incidence of hypertension with duration of HIV infection as well as with duration of antiretroviral therapy.

However, in the stepwise multivariate logistic regression only increasing age (OR 2.54, 95% CI 1.00–6.42 for those 30–40 years old; OR 5.56, 95% CI 2.14–14.4 for those 41–50 years old and OR 12.8, 95% CI 4.26–38.75 for more than 50 years), male sex (OR 1.86, 95% CI 1.05–3.3), increased BMI (OR 9.7, 95% CI 1.15–82.31 for BMI 25–30 and OR 11.34, 95% CI 1.22–104.89 for BMI > 30), hypercholester-

olaemia (OR 0.5, 95% CI 0.34–0.94), hypo-HDL (OR 2.7, 95% CI 1.29–5.89), hypertriglyceridaemia (OR 0.1, 95% CI 0.04–0.48), and duration of HIV infection more than 10 years (OR 1.86, 95% CI 1.14–3.04) remained associated with hypertension when evaluated in the multivariate model.

### Lipid disturbances

TC level exceeding optimal value was observed in 37% of the study group, suboptimal level of HDL in 20.5%, and elevated LDL in 31% of patients. TG concentration exceeding optimal level was detected in 52% of patients, of which TG > 150 mg/dL in 35%. Mixed hyperlipidaemia (simultaneous increase of LDL and TG levels) was diagnosed in 21% of the patients. Lipid concentrations were similar for both sexes (Table 1), excluding optimal TG level, which was more often observed in females than males (55% vs. 45%,  $p = 0.05$ ). Percentage of the increased values of TC, LDL, and HDL in particular age groups are presented in Figure 2. Patients on HAART in comparison to treatment-naïve ones had higher levels of TC (mean 178, IQR 153.5–212.5,  $p = 0.0005$ ) and TG (mean 121, IQR 85–189,  $p = 0.001$ ).

Multivariate analysis revealed, however, that hypertriglyceridaemia (OR 2.83, 95% CI 1.04–7.71) was the only lipid abnormality associated with HAART, and further analysis revealed that elevated TG level was associated with PI-based treatment (OR 2.56, 95% CI 1.66–3.96). Cigarettes smoking was associated with hypercholesterolaemia ( $p = 0.03$ ), hypertriglyceridaemia ( $p = 0.01$ ), and mixed hyperlipidaemia ( $p = 0.04$ ). Hypercholesterolaemia and increased LDL concentration were associated with elevated ALT activity ( $p = 0.03$  and  $p = 0.007$ , respectively). It was also shown that mixed hyperlipidaemia was positively associated with T CD4 cell absolute count (OR 1.0, 95% CI 1.00–1.003).

Statistically significant differences in lipid levels in HIV/HCV coinfecting population in comparison to patients without HCV coinfection revealed lower concentrations of

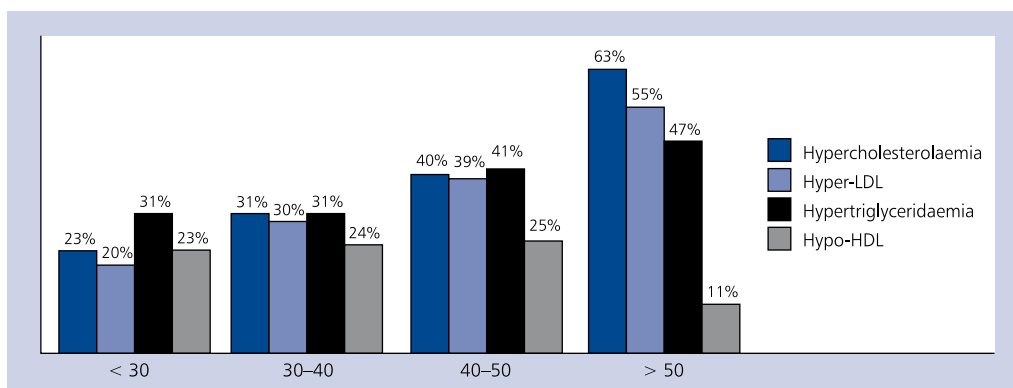


Figure 2. Levels of total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and triglycerides in particular age groups

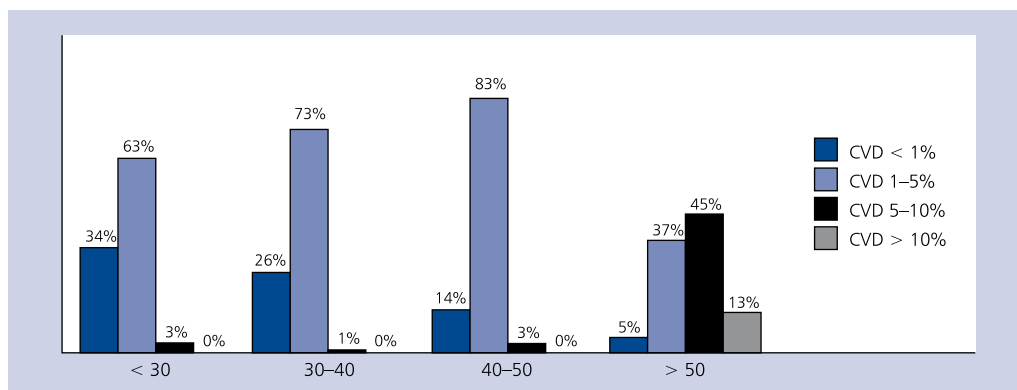


Figure 3. Risk of cardiovascular disease (CVD) in particular age groups according to SCORE scale

TC (mean 166, IQR 143–194,  $p < 0.005$ ) and LDL (mean 82.5, IQR 65–113,  $p < 0.005$ ), lower frequency of mixed hyperlipidaemia (13% vs. 28%,  $p < 0.005$ ), and fewer with TG levels exceeding 150 mg/dL (30% vs. 41%,  $p = 0.02$ ). However, in the multivariate analysis HCV infection was found to be negatively associated only with hypercholesterolaemia (OR 0.34, 95% CI 0.17–0.71).

### Cardiovascular risk

Addictions were more frequently observed in men than women (Table 1) — cigarette smoking (59% vs. 44%,  $p = 0.005$ ), drug addiction (21.5 vs. 13%,  $p = 0.04$ ), and alcohol addiction (17% vs. 7%,  $p = 0.01$ ). Thirteen (3%) patients in the study group were diabetics.

According to SCORE scale, low, intermediate, high, and very high risk of CVD was calculated to be 21%, 71%, 6%, and 2% of patients, respectively. Figure 3 shows CV risk in particular age groups. Using the Framingham scale, low, intermediate, and high risk of CVD was demonstrated for 290 (81%), 40 (11%), and 26 (7%) of patients, respectively. Low, intermediate, and high risk of CVD DEATH has been noted in 288 (80%), 57 (16%), and 12 (3%) patients, respectively. Low risk of CVD as well as low risk of CVD DEATH were more commonly seen in females (Table 1). Risk of CVD was higher in the population treated with antiretrovirals in comparison to the treatment-naïve group (mean 4.1, IQR 1.4–9.0,  $p = 0.001$ ) similarly to risk of CVD DEATH (mean 0.3, IQR 0.1–0.8,  $p = 0.05$ ).

However, in the stepwise multivariate logistic regression, HAART as well as duration of HIV infection were not associated with increased risk of CVD and CVD DEATH.

### DISCUSSION

It is estimated that annual global CV deaths will increase annually [7]. Introduction of effective antiretroviral therapy has significantly reduced AIDS-related mortality, and therefore the non-HIV related mortality has become increasingly important in the HIV-infected population [1].

Potential mechanisms for increased incidence of hypertension are: HIV-associated chronic inflammation, immune suppression, direct infection of arterial vascular smooth muscle cells by HIV, and endothelial activation and dysfunction [8, 9]. The prevalence of hypertension in the HIV-infected population in different studies ranges from 8% to 34% [8, 10, 11].

In the presented study, hypertension was diagnosed in 28% of patients, which is less than the incidence of hypertension in the general Polish population (33%) [12]. However, a percentage of patients with diagnosed hypertension in some specific age groups was higher than in the general population (18% vs. 11.2% for patients aged < 40 years and 43% vs. 39.3% for patients aged 40–60 years), but with the exception of patients aged 60+ years (53% vs. 67.7%). The findings are most probably linked to the younger age of patients in our sample, as the mentioned Polish population survey (NATPOL 2011) included patients aged 60–80 years in the last age range, while in our study only 25 patients were older than 60 years old, with just one aged 71 years. Analysis of the blood pressure in our study group in comparison to the general population also revealed less common optimal and normal blood pressure (28% vs. 36% and 14% vs. 18%, respectively) and more frequent occurrence of high normal blood pressure in the HIV-infected population (30% vs. 12.5%). Also, the proportion of people with more advanced grade of hypertension was greater in our study group than in the Polish population (grade 1: 58% vs. 79%, grade 2: 35% vs. 16%, grade 3: 7% vs. 4.5%).

Associations between antiretroviral treatment and hypertension are inconsistent [8, 13]. We did not confirm a connection between hypertension and antiretroviral drug use in our study. According to different studies, hypertension is more prevalent among men than women, patients with hypertension are older, have higher BMI, cholesterol, and LDL levels, and longer duration of HIV infection [8], which was also observed in our study. Manner et al. [14] noted increased risk of hypertension with lower nadir CD4 cell counts, which was not confirmed in the population studied by us.

Comparison of obtained lipid profiles with data concerning the general Polish population [15] revealed higher concentration of TG in men and woman (37% and 30% vs. 5.6% and 2.4%) and higher percentage of low HDL levels (20% and 23% vs. 5.1% and 7.3%). In the cited study, hypercholesterolaemia was diagnosed if TC and/or LDL were elevated, and it was detected in 70.3% of men and 64.3% of woman [15]. According to this definition, in our study, hypercholesterolaemia was present in 57% of patients and was less common than in the general Polish population, which may result from the younger age of patients studied by us.

It is considered that dyslipidaemia is a result of metabolic effects of HIV itself and the metabolic effects of HAART. In our study, patients on HAART in comparison to treatment-naïve people had higher levels of TG. It was associated with PI-based antiretroviral treatment, also confirmed in our prior study [16]. It should be noted that 60% of the studied group was treated with PIs, which is not consistent with the actual change in therapeutic strategy. According to Parczewski et al. [17], the percentage of Polish patients treated with PIs decreased actually to less than 40, and almost 25% of the studied group had been treated with metabolically safer integrase inhibitors (InI). As for cigarettes, 55% of the studied population reported smoking. It is more than twice the level in the general Polish population (27%) [12]. Cigarette smoking was associated with hypercholesterolaemia, hypertriglyceridaemia, and mixed hyperlipidaemia in our study.

The association between HIV infection and risk of CVD is inconclusive [18]. According to the meta-analysis of Islam et al. [19], risk of CVD for HIV-infected people receiving antiretroviral medications was found to be two times greater than the risk for treatment-naïve patients. Islam et al. [19] also found that the duration of exposure to antiretroviral treatment was an important contributor to the risk of acquiring CVD. Our results did not confirm this observation because neither exposure to HAART nor duration of HIV infection were associated with increased risk of CVD or CVD DEATH. Men from the studied group had higher TG concentration and smoked cigarettes more often, which probably resulted in higher CVD risk and risk of CVD DEATH.

A high proportion of studied individuals were coinfecting with HCV (52%). We found significantly lower concentrations of TC among them in comparison to HIV monoinfected patients. It resulted in lower CV risk in this population despite the fact that there was no difference in hypertension incidence in HIV and HIV/HCV infected groups. Observations of Butt et al. [20] performed on an HCV monoinfected population also confirm progressive decline of TC, LDL, and TG over time after HCV acquisition, independently of BMI and liver fibrosis. Direct interaction between HCV itself and host lipid metabolism was also confirmed in a retrospective analysis of 38 HIV-negative patients with acute HCV infection comparing pre- and post-infection lipid profiles [20]. Those with acute

HCV showed significant reduction in TC and LDL levels with rebound to levels at or above their pre-infection baseline after spontaneous or treatment-induced HCV clearance. The results of a recently published study conducted also on HCV-HIV coinfecting patients revealed an increase in TC levels after HCV elimination with either interferon-free or interferon-based therapy [21]. According to the current knowledge, HCV may alter cholesterol homeostasis in several pathways — through its interference with mevalonate pathway, PI3-K/AKT signalling pathway, or reduction in microsomal triglyceride transfer protein (MTTP) [22–25]. It was not confirmed in our study, but the results of recently published studies revealed that HCV co-infection is associated with a higher incidence of metabolic complications and probably with increased risk of CV events that might contribute to increased mortality in HIV [26, 27].

## CONCLUSIONS

Incidence of hypertension in particular age groups of HIV-infected people is higher than in the general Polish population. Hypertension is influenced by traditional risk factors and duration of HIV infection but not antiretroviral treatment. HIV/HCV coinfection appears to be protective against hypercholesterolaemia. Since 2016, integrase inhibitor-based antiretroviral therapy is recommended, which has a less damaging effect on the metabolism and may improve the metabolic condition of the patients. Arterial hypertension is partially responsible for the emergence of dementia, which in view of HIV-related brain injury seems to be very important and needs further study.

**Conflict of interest:** none declared

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# Nadciśnienie, dyslipidemia i ryzyko sercowo-naczyniowe u dorosłych osób z HIV w Polsce

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## Streszczenie

**Wstęp:** Częstość występowania choroby sercowo-naczyniowej wśród osób zakażonych HIV zwiększa się wraz z wiekiem i czasem trwania choroby. Klasycznymi czynnikami, które sprzyjają ich wystąpieniu, są: nadciśnienie tętnicze, wysokie stężenie cholesterolu, otyłość, cukrzyca, palenie tytoniu i nadużywanie alkoholu.

**Cel:** Celem niniejszej pracy było określenie częstości występowania nadciśnienia tętniczego, zaburzeń lipidowych i określenie ryzyka chorób sercowo-naczyniowych w odniesieniu do czynników klinicznych, wirusologicznych oraz biochemicznych.

**Metody:** Badaniem objęto 417 osób dorosłych rasy białej, pochodzących z czterech ośrodków klinicznych w Polsce. Analizowano dane pochodzące z lat 2013–2015.

**Wyniki:** Nadciśnienie tętnicze stwierdzono u 28% wszystkich pacjentów, natomiast w grupach wiekowych: < 40 lat, 41–60 lat i > 60 lat, odpowiednio u 18%, 43% i 53%. Odsetek osób z ciśnieniem optymalnym, prawidłowym i wysokim prawidłowym wynosił, odpowiednio: 28%, 14% i 30%. Stopień 1., 2. i 3. nadciśnienia stwierdzono odpowiednio w 58%, 35% i 7% przypadków. Czynniki związanymi z występowaniem nadciśnienia były: starszy wiek, płeć męska, wysoki wskaźnik masy ciała, hipercholesterolemia, hipo-HDL, hipertriglicerydemia i czas trwania zakażenia HIV powyżej 10 lat. Palenie tytoniu potwierdziło 55% badanych. Hipercholesterolemię, zbyt niskie stężenie HDL, wysokie stężenie LDL i hipertiglicydemie stwierdzono odpowiednio w 37%, 20,5%, 31% i 52% przypadków. Występowanie hipertriglicydemii wiązało się ze stosowaniem terapii antyretrowirusowej opartej na inhibitorach proteazy. U pacjentów z koinfekcją HCV rzadziej występowała hipercholesterolemia.

**Wnioski:** Częstość występowania nadciśnienia tętniczego w poszczególnych grupach wiekowych osób zakażonych HIV jest większa niż w ogólnej polskiej populacji. Na wystąpienie nadciśnienia tętniczego wpływają klasyczne czynniki ryzyka, jak również czas trwania zakażenia HIV, natomiast nie stwierdzono wpływu leczenia antyretrowirusowego. Koinfekcja HIV/HCV wydaje się być czynnikiem chroniącym przed wystąpieniem hipercholesterolemii.

**Słowa kluczowe:** HIV, HCV, nadciśnienie tętnicze, dyslipidemia, choroba sercowo-naczyniowa

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