Suboptimal Management of Coronary Risk in Daily Clinical Practice: Results from a Mediterranean Cohort of HIV-Infected Patients With Myocardial Infarction.

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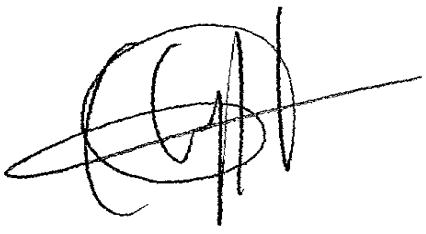

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ABSTRACT

Background: The incidence of cardiovascular events in HIV-infected patients has fallen, although modifiable cardiovascular risk factors (CVRF) are not sufficiently well managed in these patients.

Methods: We identified 81 patients with a history of coronary events from 2 hospitals in Spain to evaluate management of CVRF in clinical practice before and after the event.

Results: The prevalence of coronary events was 2.15%. At the time of the coronary event, CVRF were highly prevalent (60.5% hypertension, 48.1% dyslipidemia, 16% diabetes); 12.2%, 23.1%, and 11.4% of patients requiring therapy for these conditions did not receive it. Other CVRF were not routinely assessed. A significant decrease in total cholesterol (*P*=0.025) and LDL-cholesterol (*P*=0.004) was observed after the event. LDL-cholesterol and HDL-cholesterol were determined in an increasing percentage of patients (from 18.5% before treatment to 73% at the last visit); however, the percentage of patients who maintained LDL-cholesterol >100 mg/dL remained stable (from 46% to 41%). The percentage of patients using PI with an unfavorable lipid profile decreased over time.

Conclusions: The prevalence of heart disease in our cohort was low. Although CVRF were highly prevalent in patients with coronary events, a significant decrease in total cholesterol and LDL-cholesterol was observed after the event. These were associated with more metabolically favorable antiretroviral agents. However, many patients did not achieve the recommended objectives in lipid parameters. Furthermore, physicians in our setting did not regularly monitor other cardiovascular risk factors. More aggressive interventions should be implemented to diminish cardiovascular risk in HIV-infected patients.

RESUM

Introducció: La incidència de les malalties cardiovasculars a pacients infectats per VIH han disminuït, encara que els Factors de Risc Cardiovascular modificables (FRCV) no han estat suficientment ben gestionades en aquests pacients.

Mètodes: Vam identificar 81 pacients amb un historial de malalties coronaris de 2 hospitals a Espanya per avaluar la gestió dels FRCV a la pràctica clínica abans i després de l'esdeveniment.

Resultats: La prevalència de les malalties coronaries va ser del 2,15%. A la vegada que la malaltia coronaria, els FRCV era molt freqüent (60,5% hipertensió, 48,1% dislipèmia, 16% diabetis); 12.2%, 23.1%, i 11.4% dels pacients que requerien teràpia per aquestes condicions no la van rebre. Altres FRCV no eren determinats rutinàriament. Després de la malaltia coronaria es va observar una significant disminució en colesterol total (*P*=0.025) i LDL-colesterol (*P*=0.004). LDL-colesterol i HDL-colesterol es van determinar en un percentatge creixent de pacients (del 18.5% abans del tractament fins al 73% a la darrera visita); amb tot, el percentatge de pacients amb LDL-colesterol >100 mg/dL es va mantenir estable (del 46% al 41%). El percentatge de pacients que van utilitzar PI amb un perfil lipídic desfavorable va decréixer en el darrer període.

Conclusions: La prevalència de les malalties coronaris a la nostra cohort va ser baixa. Encara que els FRCV era molt freqüent als pacients amb problemes coronaris, es va observar una significant disminució del colesterol total i del LDL-colesterol després de la malaltia coronaria. Aquests estaven associats amb l'ús d'agents antiretrovirals amb millor perfil metabòlic. Amb tot, molts pacients no van aconseguir els objectius recomanats en els paràmetres lipídics. A més, els metges no van monitoritzar regularment altres factors de risc cardiovascular. S'hauria d'implementar intervencions més agressives per tal de disminuir el risc cardiovascular en pacients infectats per VIH.

INTRODUCTION

The increased life expectancy of the HIV-1-infected population means that physicians have recently been observing previously unrecognized comorbid conditions and antiretroviral-related complications. Atherosclerosis and cardiovascular events, loss of renal function, osteopenia/osteoporosis, and non–AIDS-defining cancers are some of the emerging conditions observed in large observational cohorts, and their incidence seems to be higher than in the general population.[1, 2]

Several studies, including the Data Collection on Adverse Events of Anti-HIV Drugs (D.A.D.) study, have demonstrated an increased rate of premature cardiovascular events, including myocardial infarction, in HIV-1-infected individuals.[3,4,5] Traditional risk factors have a similar impact on cardiovascular disease (CVD) in this population as they do in the general population.[6] However, both HIV replication and antiretroviral therapy may contribute independently to an increased risk of CVD.[3,7,8,9,10] Several hypotheses have been formulated to explain premature aging and the high incidence of coronary events in these patients. Some mechanisms are related to antiretroviral therapy, such as the mitochondrial dysfunction and oxidative stress induced by thymidine analogues[11,12,13,14] or protease inhibitor (PI)–related dyslipemia[14,15,16], while the virus itself contributes to increased cardiovascular risk by a chronic inflammatory effect or a direct effect on endothelial and other cells.[17,18] These factors, together with the increased incidence of traditional cardiovascular risk factors in HIV-1-infected patients, could explain the high incidence of coronary events.[5,7,19,20].

Encouraging data suggest that the incidence of ischemic heart disease has diminished in HIV-1-infected patients in recent years[21], due to a more aggressive approach to CVD by health professionals, better management of risk factors, and the use of new antiretroviral regimens with more favorable lipid profiles. However, the number of HIV-1-infected patients who suffer myocardial

infarction continues to be higher than in the non-infected population, and optimal control of modifiable risk factors, specifically dyslipidemia, is still poor[22].

Risk assessment for CVD should be a part of routine HIV care, and interventions to address modifiable risk factors should be implemented and evaluated. Such an approach should include intervention in the case of laboratory abnormalities and should address other risk factors (smoking, lack of exercise, family history of CVD, etc).

Based on the hypothesis that modifiable cardiovascular risk factors are not sufficiently well managed to diminish cardiovascular risk and the rate of coronary events in HIV-1-infected patients, we evaluated management of these factors in our clinical practice before and after a coronary event.

METHODS

Study design and population

We performed a retrospective descriptive study to determine the prevalence of coronary events in a Mediterranean cohort of HIV-1-infected patients and to evaluate the management of cardiovascular risk factors over time in those patients who had presented a coronary event.

HIV-1-infected patients with a previous coronary event were identified from the database of the HIV care unit and cardiology department of two hospitals in Barcelona, Spain (Sant Pau University Hospital and Germans Trias i Pujol University Hospital) The database contained information on 3,760 HIV-1-infected patients.

The inclusion criteria were as follows: definite or probable acute myocardial infarction or re-infarction, angina, percutaneous coronary angioplasty/stenting, bypass surgery, target vessel revascularization for restenosis, stent thrombosis, and death from coronary disease.

Acute myocardial infarction was defined according to the *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes 042 (and all subtypes), 043, 044.9, 079.53, and V08. Cases of myocardial infarction were categorized as fatal or non-fatal according to the criteria of the World Health Organization Multinational Monitoring of Trends and Determinants in Cardiovascular Disease Project (MONICA).[23]

Study objectives and endpoints

We determined the prevalence of coronary events in our cohort by assessing the number of persons per 1000 inhabitants who presented a coronary event between the date of HIV diagnosis and the present.

To evaluate changes in modifiable coronary risk factors before and after the coronary event, we compared the prevalence of modifiable cardiovascular risk factors in the clinical history (metabolic abnormalities and antiretroviral combinations) at three time points: before initiating antiretroviral therapy, at the time of the coronary event, and after the event (the last available visit).

Finally, we compared the Framingham risk score at the time of the coronary event and the at last available visit.

Assessments

We recorded the following information at the time of the coronary event: sociodemographic features (age, gender, race), HIV-related data (time since HIV diagnosis, risk behavior, previous AIDS diagnosis defined according to the Centers for Disease Control and Prevention category C,[24] time on antiretroviral therapy, time on HAART, nadir CD4 T cells, cumulative exposure to antiretroviral drugs such as nonnucleoside reverse transcriptase inhibitors [NNRTI], the nucleoside reverse transcriptase inhibitor [NRTI] abacavir, and PIs), personal and family history of hypertension, diabetes mellitus, dyslipidemia, previous cardiovascular events, nephropathy, body mass index, hepatitis coinfection, concomitant therapies (treatment for dyslipidemia, hypertension, and diabetes), smoking, alcohol consumption, and lack of exercise.

In addition, at each of the three time points mentioned above, we recorded laboratory data (plasma HIV-1 RNA levels, lymphocyte CD4 T-cell count, total cholesterol, low-density lipoprotein [LDL] cholesterol, high-density lipoprotein [HDL] cholesterol, triglycerides, glomerular filtration rate, and glucose level) and the Framingham risk score. Cardiovascular risk was classified according to the Framingham score as low (<10%), moderate (10%-20%), or high (≥20%).

Detection and evaluation of high blood cholesterol in adults (Adult Treatment Panel III) was defined using the criteria of the National Cholesterol Education Program guidelines[25]; hypertension was defined as systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or the need for antihypertensive drugs and/or angiotensin converting enzyme inhibitors. Patients were considered to have dyslipidemia if they were taking lipid-lowering drugs or when the total cholesterol level was >200 mg/dL and/or LDL cholesterol level was >100 mg/dL and/or triglycerides >150 mg/dL.

Statistical analysis

We assessed the prevalence of coronary events among HIV-1-infected patients.

Demographic and clinical parameters were expressed as mean (SD), median and interquartile range (IQR), or frequency and percentage, as appropriate.

Continuous repeated measurements were compared using the *t* test, Wilcoxon test, or Friedman test; proportions were compared using the McNemar test or Cochran test.

Univariate *P* values <0.05 were considered significant. All statistical analyses were performed using SPSS software version 15.0.0 (SPSS Inc, Chicago, Illinois, USA).

RESULTS

We identified 108 HIV-1-infected patients who had experienced a coronary event. However, 27 were excluded from the analysis because they did not fulfill the selection criteria. Finally, data were collected for 81 patients from the 3,760 patients in the database (prevalence of 2.15%).

Coronary event

The coronary event was fatal in 2.5% of the patients analyzed. The most frequent event was acute myocardial infarction (82.7%), followed by angor pectoris (12%), and re-infarction or angor following acute myocardial infarction (5.3%). Medical treatment was administered during the coronary event in 86.4% of patients, percutaneous angioplasty in 51.9%, bypass surgery in 3.7%, and vessel revascularization for re-stenosis and stent thrombosis in 1.2%. Coronary angiography revealed stenosis in 43 (53.1%) patients, with single vessel involvement in 19 (41.9%) and 2 or more vessels in 25 (58.1%).

Patient data at the time of the coronary event

Overall, 86.1% of patients were male and the median age was 48 (40-57) years; 64% were aged 35 to 55 years and 5.3% were younger than 35 years. The median time from diagnosis of HIV-1-infection was 14.9 (10.4-19.2) years, median time on antiretroviral treatment was 8 (5-12) years, and cumulative exposure to antiretroviral therapy and to protease inhibitors was 12.7 (9.3-16.2) years and 5 (0.7-8) years, respectively. Table 1 shows the traditional risk factors and the epidemiologic and HIV-related characteristics of the patients at the time of the coronary event.

Hypertension was present in 60.5% of patients, dyslipidemia in 48.1%, and diabetes in 16%. Overall, 12.2%, 23.1%, and 11.4% of patients, respectively, did not receive any treatment to control these conditions.

The prevalence of smokers in our population was 44%; 16% were ex-smokers. The information in the medical records revealed that only 3 patients (3.7%) were questioned about physical exercise and that only 1 (1.7%) reported taking regular physical exercise. Twenty-one percent had a family history of cardiovascular events. According to the Framingham equation, 8.3% of the patients were defined as high-risk.

Changes in modifiable cardiovascular risk factors at the three time points

Changes in smoking habit, exercise, body mass index, use of lipid-lowering drugs, antihypertensive and oral antidiabetic drugs/insulin were not evaluated, since this information was not available in the clinical history of several patients, except at the time of the coronary event. Similarly, in most cases it was not possible to evaluate variations in Framingham score, as the information necessary to calculate the score (eg, determination of HDL-cholesterol levels and blood pressure at the first time point, namely, before starting antiretroviral therapy) was not available. Metabolic parameters at the three time points are summarized in Table 2.

No significant differences were observed between HDL-cholesterol, triglyceride levels and glycemia. Levels of LDL- and HDL-cholesterol were only determined in 18.5% of subjects at the baseline visit (previous antiretroviral therapy); 46% of these patients had an LDL-cholesterol level of >100 mg/dL. At time of the coronary event, an LDL-cholesterol determination was available for 47% of patients, and in 45% this was >100 mg/dL. Finally, at the last available visit (after the coronary event), an LDL-cholesterol determination was available for 73% of patients, and in 41% this was >100 mg/dL.

A significant decrease from the time of the coronary event to the last visit was observed in total cholesterol (from 182 [50.3] mg/dL to 174 [50.3], P=0.025) and LDL-cholesterol (from 104 [44.8] mg/dL to 95 [30.9], P=0.004).

Fewer patients are currently taking a PI with an unfavorable lipid profile (21%) than at the time of coronary event (31.5%), whereas more metabolically favorable PIs are increasingly used (from 20.4% at the time of the coronary event to 31% at the last visit). A similar percentage of patients was receiving an NNRTI (efavirenz or nevirapine) at the time of the coronary event and at the last visit (48.1% and 47.9%) (Table 3).

DISCUSSION

The prevalence of coronary events in our cohort of HIV-1-infected subjects was lower than that observed by other groups (2.15%). Traditional risk factors for CVD were highly prevalent in patients with a history of coronary heart disease at the time of the event, although a significant decrease in total and LDL-cholesterol levels were observed after the event. This was associated with the use of antiretrovirals with a more favorable lipid profile. Nevertheless, many patients did not achieve the recommended objective in lipid parameters. Additionally, during recent years, physicians in our setting did not regularly assess control of other cardiovascular risk factors such as smoking, lack of exercise, or hypertension.

HIV-1-infected individuals receiving HAART have a higher risk of ischemic heart disease than the general population[6,26]. Previous studies report incidence rates ranging from 0.032 to 5.9 cases per 1000 person-years.[20,23,26,27] In addition, large observational studies have proved that this increased rate of premature cardiovascular events rises progressively with prolonged exposure to antiretroviral therapy, particularly in patients on a PI-containing regimen.[3,9,11,12,13,15,28,29]

Cardiovascular morbidity in the general population is not well documented in Spain, due to the lack of exhaustive and reliable data sources. Consequently, it is difficult to know the real prevalence of acute myocardial infarction. However, a meta-analysis including 19 studies evaluating cardiovascular and cerebrovascular events in our area showed that the prevalence of angina in Spain was about 7%.[26,27] In our HIV-1-infected population, on the other hand, the prevalence of coronary events was very low (2.15%). An explanation for this low rate could be the effect of a Mediterranean diet. As well, although the search was exhaustive, it could be the possibility that not all patients were recorded due to the retrospective design of the study.

The pathogenic mechanism of premature atherosclerosis in HIV-1-infected individuals has not been clearly defined, although it is generally considered a multifactorial process. HIV infection and antiretroviral therapy may accelerate atherogenesis[10,18,30], as do traditional risk factors. First, a chronic systemic inflammatory state, endothelial dysfunction, and prothrombotic state caused by the virus itself contribute to the pathogenesis of coronary heart disease[17,18,19]; therefore, viral suppression should be maintained to reduce vascular damage.[9,17] The higher prevalence of coronary atherosclerosis in young asymptomatic men with long-standing HIV infection in comparison with non-HIV-1-infected subjects supports the role of the virus.[21] Second, although seemingly paradoxical, antiretroviral therapy could also increase the risk of CVD[3,5,10,12-16,31]. Prolonged exposure to PIs is associated with an increased risk of myocardial infarction, especially in the case of lopinavir and indinavir, [3,31,32] and this can be partly explained by PI-related metabolic changes. Additionally, the risk of infarction in individuals recently exposed to abacavir or didanosine was higher than in patients not exposed to these agents, although these data are very controversial.[3,31] In this case, the increased risk would be explained by mechanisms other than metabolic disorders. Moreover, antiretroviral-related lipodystrophy, which is frequent in very experienced patients, is often associated with proatherogenic metabolic changes.[32-35] Nevertheless, the absolute risk of cardiovascular complications remains low and must be balanced against the high risk of HIV progression in patients who do not receive antiretroviral therapy. Thus, the benefits of antiretroviral therapy clearly outweigh any associated risk of antiretroviral-related CVD.[3,9]

Finally, traditional cardiovascular risk factors (eg, dyslipidemia, hypertension, insulin resistance, and diabetes mellitus) are more common in HIV-1-infected individuals than in the general population, [6,36] as are smoking, cocaine use, or coinfection with hepatitis C virus, all of which are proatherogenic factors. The very high rates of smoking, hypertension, dyslipidemia, and diabetes we observed in our group were consistent with those of other cohorts of HIV-1-infected patients with myocardial infarction.[37] Other authors have also shown the prevalence of cardiovascular risk factors to be high among non–HIV-1-infected patients with stable coronary heart disease from Mediterranean

countries.[38] These data indicate that adequate control of cardiovascular risk factors before the coronary event would have reduced the incidence of ischemic events.

Fortunately, the incidence of cardiovascular events in the HIV-1-infected population has fallen in recent years,[6,21] possibly as a result of more aggressive management of the risk of CVD. Administration of new and more potent antiretroviral agents that maintain viral suppression in almost all HIV-1-infected patients in our setting has limited the damage of viral replication in the vascular system. In addition, changes in antiretroviral combinations containing metabolically more favorable drugs are helping to mitigate the consequences of antiretroviral-related metabolic disorders. The percentage of patients in our cohort receiving antiretrovirals with a negative effect on lipid metabolism has decreased over time, and most patients currently take antiretroviral combinations with a more favorable metabolic profile, such as NNRTI- or new PI-containing regimens.

Nevertheless, two urgent concerns emerge from our and previous data. First, many modifiable risk factors, mainly metabolic disorders and hypertension, are not sufficiently well managed, even after they are diagnosed.[22] Surprisingly, in our cohort, the number of patients who were receiving treatment for concomitant conditions (lipid-lowering agents, antihypertensive drugs, or antidiabetic drugs) was extremely high. Only 11.4% of patients requiring lipid-lowering agents were not treated. Similarly, LDL- and HDL-cholesterol were more frequently determined during recent years, indicating interest in achieving better control of lipid metabolism. However, treatment was suboptimal in most cases, and the desired lipid levels were not reached. Lipid levels improved after the coronary event, although almost half (41%) of the patients maintained an LDL-cholesterol level >100 mg/dL after the coronary event, a rate that is similar to that before the event. Second, other cardiovascular risk factors, such as smoking, hypertension, lack of exercise, and body mass index, are not routinely assessed. These data were not available in the clinical histories of most of our patients, reflecting poor monitoring of these risk factors in our clinical practice.

Better monitoring of metabolic and non-metabolic parameters would help to diminish cardiovascular risk in HIV-1-infected individuals. Thus, cardiovascular risk should be assessed on a regular basis, especially after initiating or switching antiretroviral treatment. Appropriate lifestyle measures (smoking cessation, dietary changes, and aerobic physical exercise) are essential if modifiable risk factors are to be reverted. In addition, antiretroviral agents should be switched to design a more metabolically favorable combination, especially in high-risk individuals. Finally, if lifestyle modifications and switching therapy prove ineffective or cannot be applied, adequate pharmacological treatment of dyslipidemia, hyperglycemia, and hypertension should be administered. The fact that our patients are attended at least twice per year at clinical centers should make it easier to control risk factors.

The retrospective design of our study did not enable us to determine the real rate of some risk factors (eg, smoking, lack of exercise, hypertension, increased LDL-cholesterol levels) and thus evaluate changes over time. However, the retrospective nature of the study did provide us with a clear picture of clinical practice. In addition, despite performing an exhaustive search, we cannot exclude the possibility of coronary events attended at other centers and not reported in our database. A prospective study is necessary to determine the real prevalence of coronary events in HIV-1-infected patients in our area.

In summary, despite suboptimal monitoring of cardiovascular risk factors in our cohort, we observed a low rate of coronary events among HIV-1-infected individuals in our area. However, as this group is aging, we expect a progressive increase in the incidence of CVD. Therefore, cardiovascular health plans are a priority if this increase is to be curbed. We must monitor CVD to assess the effectiveness of such plans. Optimal selection of antiretroviral treatment, together with aggressive management of other modifiable risk factors, will diminish cardiovascular risk in HIV-1-infected patients.

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APPENDIX

Table 1. Patient Characteristics at the Time of the Coronary Event

Age, years (median [IQR])	48 (40, 57)
Patients <35 years (%)	5.3%
Gender (male) (%)	86.1%
Body mass index >30 (median [IQR])	0
Men who have sex with men (%)	38.6%
HCV coinfection (%)	4.9%
HBV coinfection (%)	12.3%
HIV-related characteristics	
Time since diagnosis of HIV-infection, years (median [IQR])	14.9 (10.4, 19.2)
Never exposed to antiretroviral therapy (%)	3.7%
Cumulative exposure to antiretrovirals (median [IQR])	12.7 (9.3, 16.2)
Cumulative exposure to PIs (median [IQR])	5 (0.7, 8)
Cumulative exposure to NNRTIs (median [IQR])	3 (0.1, 7)
Cumulative exposure to abacavir (median [IQR])	0.1 (0, 3.5)
CD4 cells count/µL (median [IQR])	224 (89, 422)
HIV-RNA ≤50 copies/mL (median [IQR]) HIV-RNA ≤400 copies/mL (median [IQR])	29 (35.8%) 46 (56.8%)
Antiretroviral combinations used (%) EFV, FTC, TDF NVP, AZT, 3TC LPV/r, ABC, 3TC IDV, D4T, 3TC	 14.8% 4.9% 4.9% 4.9%
Lipodystrophy (including lipoatrophy) (%)	36.1%
Cardiovascular risk factors	
Family history of coronary heart disease (%)	17 (20.5%)
Smoking (%)	36 (44%)
Cumulative exposure to tobacco smoke, years (mean [SD])	23 (9.4)
Hypertension (%)	49 (60.5%)
Use of antihypertensive treatment (%)	43(87.8%)
Diabetes mellitus (%)	13 (16%)
Use of antidiabetic treatment (%)	10 (76.9%)
Dyslipidemia (%)	44 (48.1%)
Serum total cholesterol, mg/dL (median [IQR])	182 (152, 230)
Serum HDL-cholesterol, mg/dL (median [IQR])	41 (31, 43)
Serum LDL-cholesterol, mg/dL (median, [IQR])	93 (77, 143)
Serum triglycerides, mg/dL (median, [IQR])	168(106, 248)
Use of lipid-lowering agents (%)	39 (88.6%)

Table 2. Changes in Modifiable Cardiovascular Risk Factors and Framingham Score at the Three Time Points of the study

Characteristics	Before starting ARV	At the time of the coronary event	Last observation	*P* value (baseline to coronary event)	*P* value (event to present)
Laboratory Data					
CD4, cell/µL (median [IQR])	224 (89, 422)	497 (384, 776)	559 (375, 767)	**0.000**	0.201
HIV-RNA, log (median [IQR])	4.6 (3.6, 5.3)	1.8 (1.4, 2.7)	1.4 (1.3, 1.7)	**0.000**	**0.000**
Serum total cholesterol, mg/dL (median [IQR])	158(151, 213)	182(152, 230)	174 (147, 205)	0.402	**0.025**
Serum HDL-cholesterol, mg/dL (median [IQR])	41 (31, 43)	42 (35, 54.)	46 (35, 54)	0.155	0.974
Serum LDL-cholesterol, mg/dL (median [IQR])	97 (67, 135)	104 (77, 143)	95 (70, 112)	0.721	**0.004**
Serum triglycerides, mg/dL (median [IQR])	151 (106, 204)	168 (106, 248)	142(95, 204)	0.778	0.111
Glycemia, mg/dL (median [IQR])	90 (85, 103)	97 (88, 108)	95 (88, 108)	**0.040**	0.299
Glomerular filtration rate, mL/min (median [IQR])	60 (60, 60)	60 (60, 60)	60 (60, 60)	0.317	0.317
Serum total cholesterol >200 mg/dL (n, %)	18 (48.6)	29 (44.6)	25 (35.2)	0.738	0.265
Serum HDL-cholesterol <40 mg/dL (n, %)	73 (90.1)	21 (43.6)	25 (39.7)	1.000	**0.001**
Serum LDL-cholesterol >100 mg/dL (n, %)	7 (46%)	17 (45%)	25 (41%)	-	0.103
Serum triglycerides >150 mg/dL (n, %)	15 (40.5)	30 (37)	26 (32.1)	0.238	**0.022**
Serum triglycerides >500 mg/dL (n, %)	1 (2.7)	4 (6.3)	3 (4.1)	0.118	0.193
Glycemia >110 mg/dL (n, %)	5 (14.7)	15 (22.7)	17 (24.3)	0.052	**<0.001**
Framingham <10% (low) (n, %)	-	3 (3.7%)	-	**-**	**-**
Framingham 10%-20% (moderate) (n, %)	-	8 (66.7)	-	-	**-**
Framingham >20% (high) (n, %)	-	1 (8.3)	-	-	-

HDLc, high-density lipoprotein cholesterol; LDLc, low-density lipoprotein cholesterol.

Table 3. Antiretroviral Treatment According to Family During the Event and at the Last Visit

Antiretroviral Treatment	Event	Last Visit
Protease inhibitors with an unfavorable lipid profile (PI)		
Indinavir	6 (11.1%)	6 (5%)
Lopinavir /ritonavir	11 (20.4%)	17 (14.3%)
Fosamprenavir	0	2 (1.7%)
Protease inhibitors with a favorable lipid profile (PI 2)		
Saquinavir	2 (3.7%)	0
Atazanavir	6 (11.1%)	19 (16%)
Darunavir	3 (5.6%)	18 (15.1%)
Nonnucleoside reverse transcriptase inhibitors		
Nevirapine	11 (20.4%)	34 (28.6%)
Efavirenz	15 (27.7%)	23 (19.3%)
Total of patients with PI and NNRTI	54 (100%)	119 (100%)
Nucleoside reverse transcriptase inhibitor		
Abacavir	25 (33%)	14 (19%)