Effectiveness of lipid-lowering therapy among a sample of patients in Colombia

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ABSTRACT

Objective. *To determine the effectiveness of lipid-lowering therapy in a sample of patients affiliated with the Sistema General de Seguridad Social en Salud (the Colombian health system).*

Methods. *A cross-sectional study was conducted from 1 January 2010–30 June 2011. From a total of 8 316 patients in 10 cities, a random sample of 600 was stratified according to dyslipidemia. Information on sociodemographic and anthropometric characteristics, risk factors, and pharmacological and laboratory variables were obtained from medical records.*

Results. *Subjects were predominantly female (56.2%), with a mean age of 65.1 ± 11.5 years; 93.2% had hypertension; 29.0%, diabetes mellitus; and 10.2%, a history of myocardial infarction. The patients were being treated with lovastatin (84.1%) or gemfibrozil (12.3%)—both at doses below what is recommended—or atorvastatin (1.8%). In patients with high cardiovascular risk, 38.6% achieved goals for low-density lipoprotein cholesterol (LDL-C) levels (<100 mg/dL). Among those at moderate risk, 49.4% reached the target level (< 130 mg/dL). On average, there was a 4.9% reduction in LDL-C. Sex, age, history of cardiovascular disease and/or diabetes mellitus, use of hydrochlorothiazide, and poor therapy adherence were statistically associated with a lack of dyslipidemia control.*

Conclusions. *Because a lack LDL-C control occurred in patients with two or more of the following variables: male, more than 55 years of age, diabetes and/or a history of cardiovascular disease, received lower doses of lovastatin, or non-adherent to treatment, it is recommended that medication be increased based on clearly-defined therapeutic goals and that comorbidities be assessed and effectively treated.*

Key words Dyslipidemias; anticholesteremic agents, efficacy; cardiovascular diseases; lovastatin; gemfibrozil; Colombia.

When life expectancy and income increase among a population, so does the prevalence of noncommunicable diseases (NCDs), such as hypertension, obesity, dyslipidemia, and diabetes. Worldwide, heart disease and stroke represent the two most common causes of death, with dyslipidemia being a primary risk factor (1, 2).

In Colombia, the mortality rate due to cardiovascular disease (CVD) ranks first among women, and second among men. Several epidemiological studies have found that the CVD risk profile of a population in Colombia is similar to that of developed countries, thereby highlighting the high prevalence of hypercholesterolemia (3–6).

Under these circumstances, strategies aimed at identifying individuals with dyslipidemia and implementing primary and secondary CVD preventive measures have become health priorities. To provide physicians with tools for dyslipidemia detection, assessment, and treatment, several panels of experts have developed clinical guidelines (7, 8). In addition to "lifestyle changes," the Adult Treatment Panel III (ATP

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III) recommends drug therapy for some conditions associated with cardiovascular risk and lipoprotein values (9), as discussed in the Methods section below. The goal of the ATP III is for the Framingham score to quantify each patient´s "absolute risk of coronary heart disease over 10 years" during routine medical consultation (7, 9). When these recommendations have been rigorously implemented, the results are fewer cardiovascular events, improved quality of life, and lower dyslipidemia sequelae-related costs (10).

A major challenge facing the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS) is the need for improved dyslipidemia detection, treatment access, and control rates. Colombia has adopted an essential drugs list into the Plan Obligatorio de Salud (Mandatory Health Plan, POS); initially it included three generic agents for dyslipidemia management: lovastatin, gemfibrozil, and cholestyramine (11). In 2012, atorvastatin was added to the list (12). To access other dyslipidemia control medications, the prescribing physician makes a special request through each Empresa Promotora de Salud (health services provider, EPS) to the Scientific Technical Committee (CTC) (11, 13). Patients also have the legal right to request access to a drug not on the list.

The present study evaluated the effectiveness of lipid-lowering therapies in dislipidemic patients affiliated with the SGSSS. Several associated factors were also examined: laboratory reference values; sociodemographic data; clinical background; and lipid-lowering regimens, adherence, and comorbidities.

MATERIAL AND METHODS

Study design and sample

This was a cross-sectional retrospective study of patients who were: more than 20 years of age, affiliated with the SGSSS, and being treated with lipid-lowering drugs. The study was conducted from 1 January 2010–30 June 2011 and included the following 10 cities: Barranquilla, Bogotá, Bucaramanga, Cali, Cartagena, Ibagué, Manizales, Medellín, Pereira, and Santa Marta. These cities were selected for convenience because they had relevant and reliable databases available.

Based on a previously described formula (14), the minimum sample size was defined as 600 patients, which yielded a weighted proportion of 44% of patients with dyslipidemia and a permissible error rate of 5% (15). Statistical software was used to select 600 subjects in a stratified random sampling, by city, from among the 8 316 patients receiving lipid-lowering drugs out of a total of 3.8 million SGSSS members in the database.

Data collection

The quality of the patient records was reviewed by two physicians. Any incomplete record was replaced by the complete record of another randomized patient from the same city and of the same sex and age group. Patient information was reviewed systematically by a physician using a designated data collection form to obtain the following study variables from the medical records:

1. Sociodemographic characteristics: age; sex; educational level, either "low" (illiterate or primary school only) or "high" (completion of secondary school); and, city of residence.
2. Anthropometric characteristics: weight, size, body mass index (BMI), and abdominal perimeter.
3. Comorbidity/risk factors: arterial hypertension; smoking; low high-density lipoprotein (HDL) cholesterol (HDL-C) (< 40 mg/dL); family history of premature coronary heart disease (CHD) in first degree relative (< 55 years of age for male relative and < 65 years for a female); age (≥ 55 years of age for males and ≥ 65 for females); and, history of myocardial infarction (MI) or stroke (diabetes is considered a risk equivalent of coronary heart disease). Additionally, high HDL-C (≥ 60 mg/dL) was considered a negative risk factor (protective).
4. Lipid-lowering drug—use and prescription, including defined daily doses (DDDs): (a) statins, (b) fibrates, (c) cholestyramine, and (d) ezetimibe.
5. Comorbidity medication: (a) antihypertensive drugs, i.e., diuretics, beta-blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), and calcium channel blockers (CCBs); (b) antiplatelet therapies, i.e., acetyl salicylic acid, clopidogrel, and cilostazol; (c) antidiabetic drugs, i.e., biguanides (metformin), sulfonylureas (glibenclamide or gliclazide), insulin, and thiazolidinediones; and, (d) nonsteroidal anti-inflammatory drugs.
6. Monitoring: measuring systolic blood pressure (SBP) and diastolic blood pressure (DBP) during the most recent medical consultation, counseling on lifestyle changes, and therapy or treatment modifications, if therapeutic goal was difficult to reach. Therapy adherence was determined by the degree to which the patient complied with the recommendations recorded by the doctor in the medical record.

Definition of effectiveness

The effectiveness of lipid-lowering therapies was established based on the following groups, defined according to the ATP III goal set and whether it was achieved or not:

- Risk group 1: Total cholesterol (total-C) < 200 mg/dL and low-density lipoprotein (LDL) cholesterol (LDL-C) < 100 mg/dL, if the patient had coronary heart disease and risk equivalents (10-year risk ≥ 20%).
- Risk group 2: LDL-C < 130 mg/dL, if the patient had 2 or more risk factors (10-year risk 10-20%).
- Risk group 3: LDL-C < 160 mg/dL, if the patient had two or more risk factors, but a 10-year risk < 10%.
- Risk group 4: Patients with 0–1 risk factors and LDL-C < 160 mg/dL.
- Risk group 5: Patients with triglycerides < 200 mg/dL (9, 15).

The study protocol was reviewed and approved by the bioethics committee of the Universidad Tecnológica de Pereira, Pereira, Colombia.

Data analysis

The study data were stored, processed, and analyzed using IBM SPSS Statistics version 20 (SPSS Inc., an IBM company, Chicago, Illinois, United States). The chi-square test was used to establish associations between variables based on the risk subgroup. Mean differences were determined by a nonparametric test (i.e., the Wilcoxon test). Models of binary logistic regression were applied using the LDL-C and triglyceride levels as the dependent variable, and variables that were significantly-associated with

the dependent variable were considered covariables in the bivariate analysis. Statistical significance was predetermined to be $P < 0.05$ (95 % confidence interval).

RESULTS

The characteristics of the population analyzed are shown in Table 1. In this sample of 600 dyslipidemia patients from 10 cities in Colombia, there was a predominance of female individuals > 60 years of age who were overweight or obese, with a low level of education, and who, on average, had been on treatment for 20.5 months (range: 2.9–35.9 months).

The use of lipid-lowering drugs was examined, and the number of patients receiving monotherapy was as follows: lovastatin, 504 patients; gemfibrozil, 75; atorvastatin, 11; simvastatin/ezetimibe, 2; and cholestyramine, 2. Additionally, only 2.0% of patients showed an association between statins and fibrate or resin binding. The mean doses that were used were: 26.6 mg/day of lovastatin (0.6 DDD; mode: 20 mg / day); 827 mg/day of gemfibrozil (0.7 DDD; mode: 600 mg/day); or 32.7 mg/day of atorvastatin (1.6 DDD; mode: 40 mg/day). The main comorbidities and co-medications used to manage these and other risk factors are shown in Table 1.

TABLE 1. Sociodemographic, anthropometric, pharmacologic, and risk factor characteristics of 600 patients with dyslipidemia treated by the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS) across 10 cities, 2010–2011

Characteristic	Patients (n = 600)
Sociodemographic	
Age (mean ± SD,[a] years)	65.1 ± 11.5
Sex (female/male, %)	56.2/43.8
Marital status (single/in a partnership,%)	17.9/82.1
Education (low/high/lost, %)[b]	54.3/41.3/4.4
Anthropometric	
Weight (mean ± SD, kg)	70.3 ± 12.9
BMI (mean ± SD, kg/m^2)	27.6 ± 4.3
Overweight (BMI[c]: 25–29.9, %)	45
Obesity (BMI: > 30) (%)	25.2
Abdominal perimeter (mean ± SD, centimeters)	99.3 ± 5.8
Other risk factor	
Hypertension (%)	93.2
Smoking (%)	6.3
Diabetes mellitus (%)	29.0
≥ 55 years (males, %)	217/82.5
≥ 65 years (females, %)	169/50.1
Family history of coronary heart disease	16.5
History of acute myocardial infarction (%)	10.2
Stroke (%)	5.3
High HDL-C[d] (%)	11.5
Low HDL-C (%)	37.7
Pharmacologic	
Aspirin (antiplatelet therapy) (% using)	62.8
Lipid-lowering monotherapy (% using)	98.8
Lovastatin (DDD[e] ± SD, % of DDD)	(59.2 ± 22.8)
Gemfibrozil (DDD ± SD, % of DDD)	(68.0 ± 25.4)
Atorvastatin (DDD ± SD, % of DDD)	(163.6 ± 50.5)
Lipid-lowering drugs (% using)	
Lovastatin	84.1
Gemfibrozil	12.3
Atorvastatin	1.8
Others	1.7
Comorbidity drugs (% using)	100.0
Losartan	50.2
Hydrochlorothiazide	39.2
Metoprolol	34.5
Enalapril	31.2
Amlodipine	20.5
Verapamil	10.5
Furosemide	14.8
Metformine	26.0
Glibenclamide	11.5
Insulins	10.7
Levotiroxin	12.8
Omeprazole	27.5
Fluoxetin	4.7

[a] Standard deviation.
[b] Low = illiterate or primary schooling; high = secondary schooling or more.
[c] Body Mass Index.
[d] High-density lipoprotein.
[e] Defined daily dose.

In 442 cases (73.6%), the patient's total-C at time of treatment initiation was available in their records; the mean among these was 206.3 mg/dL (standard deviation [SD]: 46.4; range: 81–434). In 493 cases (82.1%), a total-C measurement for the 6 months preceding the study period was also available, and the end mean was 196.1 mg/dL (SD: 42.1; range: 90–411), a reduction of 4.9%. Using a nonparametric test (Wilcoxon test), significant differences were found between the beginning and ending measurements of the mean total-C ($P < 0.001$).

Measurements of LDL-C at treatment initiation were found for 402 patients (67.0%); the initial LDL-C mean was 123.7 mg/dL (SD: 39.9; range: 43–249). LDL-C measurements taken in the 6 months prior to the study were available for 456 cases (76.0%), and the end mean was 117.6 mg/dL (SD: 34.9; range: 39–243), a reduction of 4.9%. Using a nonparametric test, statistically-significant differences were observed between the initial and final mean LDL-C levels ($P = 0.027$). Additionally, differences between the initial (mean: 206.9 mg/dL; SD: 137.5) and final triglycerides (mean: 181.9 mg/dL; SD: 110.2) ($P < 0.001$) showed an average reduction of 12.0%.

In the 309 patients comprising risk group 1, 38.6% achieved the goal of an LDL-C level < 100 mg/dL, while 66.1% had a total-C level < 200 mg/dL by the final lipid profile. Of the 214 patients in risk group 2, the goal of a LDL-C < 130 mg/dL was achieved by 49.4%, and a total-C level < 200 mg/dL by 40.3%. Of the 25 patients in risk group 3, 70.0% achieved the LDL-C goal of <160 mg/dL and 36.4% a total-C level of < 200 mg/dL. In risk group 4, with 15 patients, an LDL-C goal < 160 mg/dL was achieved by 100.0% of patients, and a total-C level < 200 mg/dL was obtained by 76.9%. Finally, of the 37 patients in risk group 5, the goal of a triglyceride level < 200 mg/dL was achieved by 37.9% and a total-C level < 200 mg/dL by 80.0%. Notably,

the therapy was changed in 38.7% of patients when the therapy could not sufficiently reduce LDL-C and triglyceride levels, and 70.0% of cases reported an adherence to LDL-C and triglyceride level management.

Controlled versus uncontrolled dyslipidemic patients

For risk group 1, the average dose of lovastatin was higher in the controlled patients than in the uncontrolled (74 vs. 181 patients; 27.1±10.1 vs. 25.7±9.0 mg/day, respectively; $P = 0.016$). In risk group 2, the average dose of lovastatin was lower in the controlled patients than in the uncontrolled (62 vs. 128 patients; 24.3±8.3 vs. 25.9±9.7 mg/day, respectively; $P = 0.012$). None of the other three groups showed statistically-significant differences between doses of lovastatin. In risk group 5, the average dose of gemfibrozil was greater in the controlled patients than in the uncontrolled (2 vs. 9 patients; 1 000 mg/day vs. 600 mg/day, respectively; $P = 0.001$).

Table 2 shows the results of the bivariate analysis that compared the subgroup of patients whose total-C was controlled versus the uncontrolled subgroup. A significant association was found between the rate of total-C control and the following variables: sex, diabetes mellitus, no personal history of stroke, the use of beta-blockers, non-adherence to treatment, lack of behavior modification because of a therapeutic failure, and city of treatment.

Table 3 presents the results of the bivariate analysis that compared a subgroup of patients with controlled dyslipidemia with a subgroup of patients with uncontrolled dyslipidemia belonging to risk group 1. A statistically significant association was found between the rate of dyslipidemia control and the following variables: sex, age, diabetes mellitus, high HDL-C, history of MI and stroke, use of hydrochlorothiazide or ACE inhibitors/ARBs, non-adherence to treatment, and the dose of lovastatin. There was no statistical significance with the following variables: city, education level, weight, blood pressure, hypertension, smoking status, family history of MI or stroke, use of beta-blockers, metformin or levothyroxine, or recommended lifestyle changes.

Table 4 shows the results of the bivariate analysis comparing the subgroup of patients with controlled dyslipidemia to the uncontrolled subgroup, belonging to risk group 2. A statistically-significant association was found between the rate of dyslipidemia control and the following variables: sex, age, suffering from high blood pressure, high HDL-C, use of metformin or fibrates, non-adherence to treatment, dose of lovastatin, and city of treatment. There was no statistically-significant association with education, weight, diabetes mellitus, smoking status, family history of MI or stroke, use of beta-blockers or ACE inhibitors/ARBs, or recommended lifestyle changes.

The analysis comparing the subgroup of patients with controlled dyslipidemia versus the uncontrolled subgroup, belonging to risk group 3 showed statistically-significant associations between the rate of controlled dyslipidemia and hypertension ($P < 0.001$), hypothyroidism ($P = 0.002$), high HDL-C ($P = 0.04$), and a family history of MI/stroke ($P < 0.001$). The analysis comparing the subgroup of patients with controlled dyslipidemia *versus* the uncontrolled subgroup belonging to risk group 4, showed statistically-significant associations between the rate of controlled dyslipidemia and sex ($P = 0.04$), women > 65 years ($P < 0.001$), and behavior modifications when the therapy could not sufficiently reduce LDL-C ($P = 0.01$). The analysis comparing the subgroup of patients with controlled hypertriglyceridemia versus the uncontrolled subgroup of risk group 5 showed statistically significant associations between the rate of control and being overweight ($P = 0.04$), no family history of MI/stroke ($P = 0.02$), and the use of statins ($P < 0.001$) and gemfibrozil ($P < 0.001$).

TABLE 2. Bivariate analysis of sociodemographic, pharmacologic, and risk factor characteristics of 600 patients with dyslipidemia treated by the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS) across 10 cities, by subgroup of C-total, 2010–2011

Characteristic	Controlled lipid-lowering therapy[a]		Uncontrolled lipid-lowering therapy		P[b]
	No.	%	No.	%	
Sex					
Female	138	49.3	142	50.7	< 0.001
Male	140	65.7	73	34.3	
Clinical					
Diabetes mellitus	93	66.4	47	33.6	
No diabetic	185	52.4	168	47.6	0.01
High HDL-C[c]	31	51.7	29	48.3	0.43
Normal or low HDL-C	247	57.0	186	43.0	
Personal history of acute myocardial infarction	29	63.0	17	37.0	0.33
Personal history of stroke	18	78.3	5	21.7	
No personal history of stroke	260	55.3	210	44.7	0.03
Pharmacologic					
Use of statins	243	58.1	175	41.9	0.07
Other hipolipemic agents	35	46.7	40	53.3	
Use of β blockers	113	64.9	61	35.1	0.005
Other anti-hypertensive agents	165	51.7	154	48.3	
Poor adherence	66	44.3	83	55.7	0.01
Good adherence	210	61.4	132	38.6	
Modified pharmacologic therapy	182	64.1	102	35.9	
No modified pharmacologic therapy	96	45.9	113	64.1	< 0.001
City					0.02
Cali	29	74.4	10	23.6	
Ibagué	41	68.3	19	31.7	
Cartagena	21	61.8	13	38.2	
Medellín	42	60.9	27	39.1	
Manizales	37	58.7	26	41.3	
Bucaramanga	5	55.6	4	44.4	
Pereira	28	58.3	20	51.7	
Barranquilla	21	47.7	23	52.3	
Bogotá	53	45.7	63	54.3	
Santa Marta	1	9.1	10	90.9	

[a] Level of total-C: < 200 mg/dL.
[b] Based on the chi-square test.
[c] High-density lipoprotein.

Multivariate analysis

In the multivariate analysis, the dependent variable was uncontrolled dys-

TABLE 3. Bivariate analysis of sociodemographic, pharmacologic, and risk factor characteristics of 309 patients with dyslipidemia and high risk (risk at 10 years > 20%) treated by the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS) across 10 cities, by risk group 1, 2010–2011

Characteristic	Controlled lipid-lowering therapy[a]		Uncontrolled lipid-lowering therapy		P^b
	No.	%	No.	%	
Sex					
Female	38	29.0	93	71.0	
Male	47	26.4	131	73.6	< 0.001
Age (years)					
Male < 55 years	5	29.4	12	70.6	
Male ≥ 55 years	42	26.1	119	73.9	< 0.001
Clinical					
Diabetes mellitus	51	29.3	123	70.7	
Non diabetic	34	25.2	101	74.8	< 0.001
High HDL-C[c]	11	57.9	8	42.1	
Normal or low HDL-C	74	25.5	216	74.5	< 0.001
Personal history of acute myocardial infarction	17	27.9	44	72.1	< 0.001
Personal history of stroke	8	25.0	24	75.0	< 0.001
Former smoker	16	34.8	30	65.2	0.05
Pharmacologic					
Use of hydrochlorothiazide	24	24.7	73	75.3	< 0.001
Use of anti-hypertensive agents	61	28.8	151	71.2	
Use of ACE[d]	67	25.6	195	74.4	0.02
Other anti-hypertensive agents	18	38.3	29	61.7	
Poor adherence	16	22.5	55	77.5	0.01
Good adherence	69	29.0	169	71.0	
Lovastatine 20 mg/day	49	31.6	106	68.4	< 0.001
Lovastatine 40 mg/day	24	25.0	72	75.0	0.02

[a] Level of Low-density lipoprotein-cholesterol: < 100 mg/dL
[b] Based on the chi-square test.
[c] High-density lipoprotein.
[d] Angiotensin-converting enzyme inhibitors.

lipidemia by risk group 1 and the independent variables were males more than 55 years of age, diabetes, high HDL-C, history of MI/stroke, being a former smoker, use of hydrochlorothiazide, use of ACE inhibitors/ARBs, non-adherence to treatment, and the dose of lovastatin (20 mg and 40 mg). After adjusting to find the best model based on individual steps, it was found that the independent variables associated with the risk of uncontrolled dyslipidemia were diabetes mellitus and being a former smoker, and the independent variable associated with the risk of controlled dyslipidemia was the use of ACE inhibitors/ARBs (Table 5).

DISCUSSION

CVD is the main cause of mortality worldwide, accounting for 29% of all deaths. Given that multiple studies have documented that hypercholesterolemia increases the risk of developing CVD, its control has become a goal of physicians (1). Various publications have found that the control rates for LDL-C in patients at high cardiovascular risk were 18%–67% (16–18), while triglyceride control was 50%–60% (18).

The present study, which showed that 38.6% of high cardiovascular risk patients have controlled LDL-C values, has only poor control rates compared to other studies (16–18). This is worrisome because the study sample was from a patient population with easy access to medication. Also of note is that the entire sample of patients received generic drugs. Additionally, the rate of triglyceride control was 37.9% for the patients in a poorly controlled group (18), while the total-C was controlled in 66.1% of the higher risk group; as a result, the present study's data show a higher success rate than data from other studies (17).

The frequency of use of different lipid-lowering drugs, e.g., lovastatin, in the present study (84.1%) differs from that reported by other studies (31%–42.1%) (19, 20). In this study the controlled patients received doses of lovastatin that were significantly higher than those administered to the uncontrolled patients, but all patients received DDDs lower than the recommended values, as has been reported elsewhere (19).

Most patients in the present study had other risk factors that increased the difficulty of dyslipidemia management and control, especially for asymptomatic diseases, such as hypertension, diabetes, and hypothyroidism; and the use of additional medications for each of these problems results in patients with polypharmacy, as reported by another study (17). It was found that the prevalence of aspirin use as a prophylaxis of cardiovascular risk was higher than that reported by other studies (62.8% vs. 35.9%–53.8%), but similar to one (66.1%) (3, 21).

In contrast to the findings of prior studies (22–24), no association was found between the degree of dyslipidemia control and the following variables: smoking status, family history of myocardial infarction and stroke, use of beta-blockers, metformin or levothyroxine, recommended lifestyle changes, educational level, body weight, and blood pressure.

It is disconcerting that only 76.0% of patients had had their lipid levels monitored during the 6 months prior to the study, especially since most of them were in the high cardiovascular risk group, but this finding is similar to that of a previous study in Colombia (76.8%), and lower than that of a previous study in North America (87.6%) (17, 21).

In cases where the target LDL-C level was not being met, and if all patients are considered to have complied with the adjustments, then therapy modifications were insufficient (19, 25). It has been shown that quality-of-care improvement programs for patients with metabolic disorders can achieve great changes and reduce complications through effective therapy (26). Unfortunately, dyslipidemia treatment meets the three conditions that are associated with poor adherence: it is preventative, long-term, and the disease it controls is asymptomatic—reported to be critical in failing to control levels. In this study, however, the proportion of patients who claim to have followed the correct treatment was relatively high, which is in contrast to the low rate of metabolic control (27). This can be correlated with a lack of knowledge on the part of many physicians around what is a desirable goal (based on the patient's risk) and what drug and dose should be prescribed to reach it (16). Furthermore, the impor-

TABLE 4. Bivariate analysis of sociodemographic, pharmacologic, and risk factor characteristics of 214 patients with dyslipidemia and high risk (risk at 10 years 10%–20%) treated by the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS) across 10 cities, by risk group 2, 2010–2011

Characteristic	Controlled lipid-lowering therapy[a]		Uncontrolled lipid-lowering therapy		P[b]
	No.	%	No.	%	
Sex					
Female	38	24.2	119	75.8	< 0.001
Male	28	49.1	29	50.9	
Age (years)					
Male < 55	6	37.5	10	62.5	0.03
Male ≥ 55	22	53.7	19	46.3	
Female ≥ 65	27	32.1	57	67.9	0.02
Female < 65	11	15.1	62	84.9	
Clinical					
Arterial hypertension	66	31.4	144	68.6	
No arterial hypertension	0	0.0	4	100.0	< 0.001
High HDL-C[c]	9	25.7	26	74.3	0.02
Normal or low HDL-C	57	31.8	122	68.2	
BMI > 25[d]	53	33.1	107	66.9	0.15
BMI < 25	13	24.1	41	75.9	
Smoking	5	35.7	9	64.3	0.91
No smoking	61	30.5	139	69.5	
Pharmacologic					
Use of metformine	21	43.8	27	56.2	
No use of metformine	45	27.1	121	72.9	0.04
Use of statins	63	32.1	133	67.9	
Use of fibrates	3	16.7	15	83.3	0.01
Good adherence	51	38.6	81	61.4	< 0.001
Poor adherence	15	18.3	67	81.7	
Lovastatine 20 mg/day	48	34.0	93	66.0	< 0.001
Lovastatine 40 mg/day	13	28.3	33	71.7	0.28
City					
Cali	7	58.3	5	41.7	0.001
Ibagué	15	57.7	11	42.3	
Cartagena	7	36.8	12	63.2	
Medellín	7	30.4	16	69.6	
Pereira	7	36.9	12	73.1	
Bogotá	14	23.7	45	76.3	
Barranquilla	5	20.8	19	79.2	
Manizales	4	20.0	16	80.0	
Bucaramanga	0	0.0	3	100.0	
Santa Marta	0	0.0	9	100.0	

[a] Level of low-density lipoprotein-cholesterol: < 130 mg/dL
[b] Based on the chi-square test.
[c] High-density lipoprotein.
[d] Body Mass Index.

tance of the starting dose to the overall effectiveness of the therapy has been underscored by a study showing that the percentage reduction in LDL-C levels achieved with the initial dose of statins was strongly correlated with the proportion of patients who maintained their goals at 54 weeks; therefore, it is recommended that therapy start at a dose that should achieve the goal, and if insufficient, be increased significantly to achieve it (16).

Clinicians should proactively identify patients at high risk of heart disease and treat them aggressively according to the desired lipid level target, first with statins, and then by adding other drugs if necessary (16). There is also evidence that earlier interventions produce more cost-effective results (10). It has even been suggested that a suboptimal statin treatment may increase the risk of coronary events (28). However, despite the guidelines and the evidence of treatment benefits and safety, numerous studies have shown that a small proportion of dyslipidemic patients regularly use lipid-lowering drugs, and an even smaller percentage of people treated have serum cholesterol levels within the range recommended by international protocols (29).

A difference was found between the initial and final LDL-C levels despite the statistically-significant reduction percentages, which are lower than those reported for lovastatin by other studies (4.9% vs. 21.1%–31.3%) (19, 20). However, with high doses of this drug, the values are quite close to the results of one study (6.0%) (16). The reasons for this discrepancy may include using a lower dose than recommended, problems with treatment adherence, and a lack of medical management goals (19, 24, 25).

According to the results of the present study, the prevalent characteristics of

TABLE 5. Variables associated with control of dyslipidemia in a binary logistic regression model of 309 patients with dyslipidemia and high risk (risk at 10 years > 20%) treated by the Sistema General de Seguridad Social en Salud (Colombian health system, SGSSS), across 10 cities, 2010–2011

Variable	B[a]	SE[b]	Wald	gl[c]	Sig[d]	Exp(B)[e]	95%CI EXP(B)[f] Lower	Upper
Males > 55 years of age	–0.238	0.558	0.182	1	0.670	0.788	0.264	2.354
Diabetes mellitus	–0.937	0.379	6.127	1	0.013	0.392	0.187	0.823
High HDL-C[g]	–0.421	0.936	0.202	1	0.653	0.657	0.105	4.114
Personal history of MI[h] or stroke	–22.540	28 411.421	0.000	1	0.999	0.000	0.000	
Personal history of MI	21.682	28 411.421	0.000	1	0.999	260	0.000	
Personal history of stroke	21.344	28 411.421	0.000	1	0.999	186	0.000	
Former smoker	–1.019	0.438	5.413	1	0.020	0.361	0.153	0.852
Use of hydrochlorothiazide	–0.015	0.399	0.001	1	0.969	0.985	0.451	2.151
Use of ACE inhibitors[i]	1.317	0.453	8.440	1	0.004	3.734	1.535	9.082
Poor adherence	0.700	0.489	2.048	1	0.152	2.013	0.772	5.247
Lovastatin 20 mg/day	–0.279	0.471	0.352	1	0.553	0.756	0.301	1.903
Lovastatin 40 mg/day	.037	0.533	0.005	1	0.944	1.038	0.365	2.951

[a] Regression coefficient.
[b] Standard error.
[c] Level of freedom.
[d] Significance level.
[e] Relative risk.
[f] Confidence interval of 95%.
[g] High-density lipoprotein.
[h] Myocardial Infarction.
[i] Angiotensin-converting enzyme.

patients in the high cardiovascular risk group with uncontrolled dyslipidemia are two or more of following variables: males, more than 55 years of age, with diabetes mellitus or a history of MI or stroke, former smoker, taking hydrochlorothiazide, treatment with lower doses of lovastatin, non-adherence to treatment, high HDL-C levels, and taking ACE/ARBs.

The above findings support increasing the dose of the lipid-lowering therapy based on clearly defined objectives (16, 25). Additionally, the presence of comorbidities, such as diabetes mellitus, which contribute to cardiovascular risk, should be evaluated for treatment with the drug of choice and at the appropriate dose (22). The physician must make decisions and modify patient management when achieving the therapeutic goal is difficult (19, 25). Conversely, it is recommended that insurance companies monitor treatment effectiveness, and even adjust the medication in question, or recommend that the clinician do so (21).

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RESUMEN

Eficacia del tratamiento hipolipemiante en una muestra de pacientes de Colombia

Objetivo. Determinar la eficacia del tratamiento hipolipemiante en una muestra de pacientes afiliados al Sistema General de Seguridad Social en Salud de Colombia.
Métodos. Se llevó a cabo un estudio transversal desde el 1 de enero del 2010 al 30 de junio del 2011. De un total de 8 316 pacientes de 10 ciudades seleccionadas, se estratificó una muestra aleatoria de 600 pacientes en función de la dislipidemia. A partir de los expedientes médicos, se obtuvo información sobre las características sociodemográficas y antropométricas, los factores de riesgo y las variables farmacológicas y de laboratorio.
Resultados. En la muestra predominaban las mujeres (56,2%) y la media de la edad era de 65,1 ± 11,5 años; 93,2% de los pacientes eran hipertensos; 29,0% eran diabéticos; y 10,2% tenían antecedentes de infarto de miocardio. Los pacientes recibían tratamiento con lovastatina (84,1%) o gemfibrozilo (12,3%) —ambos a dosis inferiores a las recomendadas— o atorvastatina (1,8%). El 38,6% de los pacientes con alto riesgo de enfermedad cardiovascular alcanzaron los objetivos de reducción de los niveles de colesterol unido a lipoproteínas de baja densidad (C-LDL) (< 100 mg/dL). El 49,4% de los pacientes que presentaban un riesgo moderado también alcanzaron los niveles fijados como objetivo (< 130 mg/dL). En promedio, hubo una reducción de 4,9% del C-LDL. El sexo, la edad, los antecedentes personales de enfermedad cardiovascular y diabetes, la administración de hidroclorotiazida y la deficiente adherencia al tratamiento se asociaron estadísticamente con una falta de control de la dislipidemia.
Conclusiones. Dado que se produjo un control deficitario del C-LDL en pacientes con dos o más de las siguientes variables: varones, mayores de 55 años, diabéticos o con antecedentes de enfermedad cardiovascular, que recibían dosis bajas de lovastatina, o mostraban falta de adherencia al tratamiento, se recomienda que se aumente la medicación con base en objetivos terapéuticos claramente definidos y que se evalúen y se traten eficazmente las comorbilidades.

Palabras clave Dislipidemias; anticolesterolemiantes; enfermedades cardiovasculares; lovastatina; gemfibrozilo; Colombia.