Journal of Clinical Lipidology (2010) 4, 478–482

Journal of Clinical Lipidology

Original Articles

Dyslipidemia and lipoprotein profiles in patients with inflammatory bowel disease

Raja Shekhar R. Sappati Biyyani, MD*, Brian S. Putka, MD, Kevin D. Mullen, MD

Division of Gastroenterology, Department of Medicine, MetroHealth Medical Center, 2500 MetroHealth Drive, Case Western Reserve University, Cleveland, OH 44109, USA (Drs. Sappati Biyyani, Putka, and Mullen)

KEYWORDS:
Lipoprotein profiles;
Dyslipidemia;
Infammatory bowel disease;
Systemic lupus erythematosus;
NECP-ATIII

BACKGROUND: Dyslipidemia is a major risk factor for developing coronary artery disease. An increase in inflammatory cytokines may result in a decrease in lipoprotein lipase (LPL) enzyme activity, leading to a characteristic lipoprotein profile with increased triglycerides and decreased high-density lipoprotein (HDL) levels as seen in patients with systemic lupus erythematosus (SLE). Similar to SLE, patients with IBD have high circulatory levels of inflammatory cytokines. However, in these patients characteristic lipoprotein profiles have not been reported.

OBJECTIVES: The purpose of this study is to identify and describe dyslipidemia and lipoprotein profiles in an IBD patient population.

METHODS: Medical records of patients diagnosed with IBD (Crohn's disease [CD] and ulcerative colitis [UC]) at an academic medical center between 2000 and 2007 were retrospectively reviewed for lipoprotein lipid measurements, serum albumin levels, risk factors, and treatment to modify lipoprotein concentrations. The lipoprotein guidelines and risk factors are based on the Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Only patients with documented IBD diagnosis and lipoprotein profiles are included in the study. National Health and Nutrition Examination Survey (NHANES) 2005–2006 population database was used for control values.

RESULTS: A total of 393 patients (152 men and 241 women) diagnosed with IBD (188 CD and 205 UC) who were not on statins qualified for the study. Patients were grouped on the basis of gender (male and female) and IBD disease type (CD and UC). Compared with the male NHANES samples (with similar mean age and body mass index), total cholesterol and HDL-C were significantly lower and low-density lipoprotein cholesterol (LDL-C) and triglycerides were significantly greater in male patients with IBD. In female patients with IBD, the mean values for total cholesterol, HDL-C, and triglycerides were significantly lower and LDL-C significantly greater compared with the female NHANES samples.

CONCLUSION: Given low levels of HDL-C and increased levels of LDL-C, a more aggressive approach in profiling and treating dyslipidemia seems warranted in patients with IBD.

The Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (NCEP-ATP III) proposed guidelines to diagnose and treat dyslipidemia.[1,2] Dyslipidemia is defined by elevation in total plasma cholesterol, an increase in low-density lipoprotein cholesterol (LDL-C), elevation in triglycerides, and a decrease in high-density lipoprotein cholesterol (HDL-C). Dyslipidemia secondary to diseases including metabolic abnormalities have been discussed in these guidelines and in related documents. However, much less attention has

* Corresponding author.
E-mail address: rsappati@hotmail.com
Submitted November 13, 2009. Accepted for publication August 18, 2010.

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doi:10.1016/j.jacl.2010.08.021

Table 1 IBD patients not receiving statins

Characteristics	Men	Women	*P* values
Number	152	241	
Age, years ± SD	49.6 ± 13	49.3 ± 14	.85
Race, n (%)			
Non-Hispanic white	121 (79.6)	145 (60.2)	Pearson $\chi^2 = 17.93$
African American	21 (13.8)	81 (33.6)	.000
Others	10 (6.6)	15 (6.2)	
Crohn's disease, n (%)	78 (51.3)	111 (46.1)	Pearson $\chi^2 = 1.17$
Ulcerative colitis, n (%)	74 (48.7)	131 (54.4)	.280
Hypertension, n (%)	35 (23)	76 (31.5)	Pearson $\chi^2 = 2.95$ .086
Diabetes mellitus, n (%)	7 (4.6)	17 (7.1)	Pearson $\chi^2 = 1.633$ .201
Smoking status, n (%)			
Current	39 (25.7 %)	61 (25.3 %)	
Never	79 (52 %)	120 (49.8 %)	Pearson $\chi^2 = .40$
Former	34 (22.3 %)	60 (24.9 %)	.820
Albumin, mg/dL	4.01 ± 0.5	3.8 ± 0.5	.005
Total cholesterol, mg/dL	181.4 ± 38.9	179.8 ± 41.7	.685
HDL cholesterol, mg/dL	44.9 ± 13	51.4 ± 13.7	.000
LDL cholesterol, mg/dL	120.7 ± 29.9	113.2 ± 35.4	.049
Triglycerides, mg/dL	132.5 ± 83.7	111.7 ± 81.7	.023
Non-HDL cholesterol, mg/dL	135.6 ± 36.7	128.5 ± 36.6	.589

P values are shown unless otherwise noted.
HDL, high-density lipoprotein; IBD, inflammatory bowel disease; LDL, low-density lipoprotein; SD, standard deviation.

been given to inflammatory disorders that affect lipoprotein changes.

Infection and chronic inflammation impair and alter lipoprotein metabolism and cause a variety of changes in plasma concentrations of lipids and lipoproteins.[3,4] Systemic lupus erythematosus (SLE) one such chronic inflammatory disease with the presence of proinflammatory cytokines and autoantibodies against lipoprotein lipase, a key enzyme in lipoprotein metabolism, results in a characteristic "lupus pattern" of lipoproteins that includes increased triglycerides and decreased HDL levels.[3,4]

Inflammatory bowel disease (IBD), which includes Crohn's disease (CD) and ulcerative colitis (UC), is characterized by mucosal immune system dysregulation, leading to an inappropriate and ongoing activation of intestinal mucosal inflammation. This dysregulation leads to the presence of excess proinflammatory cytokines similar to SLE. However, lipoprotein alterations of patients with IBD have not been characterized in significant numbers or reported in the literature.

Methods

Patient selection

Electronic medical charts of patients treated at MetroHealth Medical Center between January of 2000 and December of 2007 were reviewed retrospectively for the diagnosis of IBD (CD and UC). The diagnosis of IBD was confirmed after review of admission notes, gastroenterology consultation notes, and diagnostic studies, including endoscopy and pathology reports.

A total of 393 patients with confirmed diagnosis of IBD, recorded measurements of lipoprotein lipids and plasma albumin values, and who were not currently prescribed HMG coenzyme A reductase inhibitor (statin) therapy were included in the study. Of 393 patients, 241 were women and 152 men. CD was present in 188 patients (110 women, 78 men) and ulcerative colitis in 205 (131 women and 74 men). Patients with unclear documentation of IBD, who were being prescribed statins; who were missing values on total cholesterol, HDL-C, LDL-C, or triglycerides; or who were dead were excluded from the study. In patients with serum triglycerides greater than 400 mg/dL, directly measured LDL-C values were included.

In patients with multiple lipid profiles and serum albumin, the latest recorded was selected for data analysis. Diagnosis of dyslipidemia followed the current NCEP-ATPIII guidelines.[1] Abnormal values were defined as total cholesterol greater than 200 mg/dL, triglycerides greater than 150 mg/dL, HDL-C less than 40 mg/dL in men and less than 50 mg/dL in women, and LDL-C more than 130 mg/dL.

Risk factors

NCEP–ATP III provides comprehensive recommendations on the risk factors that modify LDL-C treatment goals