Prevalence of dyslipidemia and its association with glycemic control in adolescents and young adults with type 1 diabetes

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Introduction

Hyperglycemia and dyslipidemia are metabolic abnormalities commonly found in young patients with type 1 diabetes, and both increase the risk of cardiovascular disease, the leading the leading cause of mortality in this population. Several studies have demonstrated serum lipid abnormalities in children with type 1 diabetes as well as an association between elevated HbA1c and serum lipid levels.

We aimed to investigate the prevalance of dyslipidemia and its association with glycemic control in adolescents and young adults with type 1 diabetes.

Patients and methods

This cross-sectional study included 29 Korean young adults and adolescents with type 1 diabetes. The median age was 17 years (range, 10–25) and 18 (62.1%) were female. We compared the lipid profiles of patients with dyslipidemia and those without dyslipidemia. Correlations between glycosylated hemoglobin (HbA1c) and lipid profiles (total cholesterol [TC]; low-density lipoprotein cholesterol [LDL-C]; high-density lipoprotein cholesterol [HDL-C]; and triglyceride [TG]) were determined by linear regression analysis (Table 1).

Table 1. Clinical and laboratory variables in type 1 diabetic patients without and with dyslipidemia.

Characteristic	All patients (n = 29)	Patients without dyslipidemia (n = 18)	Patients with dyslipidemia (n = 11)	*P* value
Female gender, no. (%)	18 (62)	9 (50.0)	9 (81.8)	0.18
Age at visit, year	17 (10–25)	16.2 (10–24.2)	17.6 (11–25)	0.38
Duration of disease, year	7.5 (0.2–15.6)	7.7 (0.2–15.6)	6.9 (1.5–11.4)	0.67
HbA1c, %	8.1 (6.6–13.3)	7.9 (6.6–9.9)	9.5 (7.5–13.3)	0.001
BMI, z score	0.03 (-2.5–2.6)	-0.4 (-2.5–2.2)	0.7 (-0.57–2.6)	0.02
Lipid profiles				
TC, mg/dL	167 (120–256)	158 (120–189)	213 (154–256)	<0.001
LDL-C, mg/dL	94 (50–159)	78 (50–101)	119 (78–159)	<0.001
HDL-C, mg/dL	51 (28–108)	48 (38–88)	52 (28–108)	0.81
TG, mg/dL	82 (36–187)	58 (36–104)	102 (61–187)	<0.001

Results

Median values for fasting lipid measures at the initial visit were TC 167 mg/dL (range, 120–256), LDL-C 94 mg/dL (range, 50–159), HDL-C 51 mg/dL (range, 28–108) and TG 82 mg/dL (range, 36–187). Median HbA1c level of the patients was 8.1 % (range, 6.6–13.3) (Table 1).

Of the 29 patients, 11 (37.9%) were classified as having dyslipidemia due to following lipid abnormality: TC ≥200 mg/dL in 27.6% (8/29) patients, LDL-C ≥130 mg/dL in 14.8% (4/27) patients, HDL-C ≤35 mg/dL in 7.1% (2/28) patients, and TG ≥150 mg/dL in 14.3% (4/28) patients) (Fig. 1).

Univariate analysis indicated HbA1c and BMI z score was associated with dyslipidemia.

HbA1c of patients without dyslipidemia was lower than that of patients with dyslipidemia (7.9% [range: 6.6–9.9] vs. 9.5% [range: 7.5–13.3]; P=0.001).

Figure 1. Prevalence of dyslipidemia of patients with type 1 diabetes is shown.

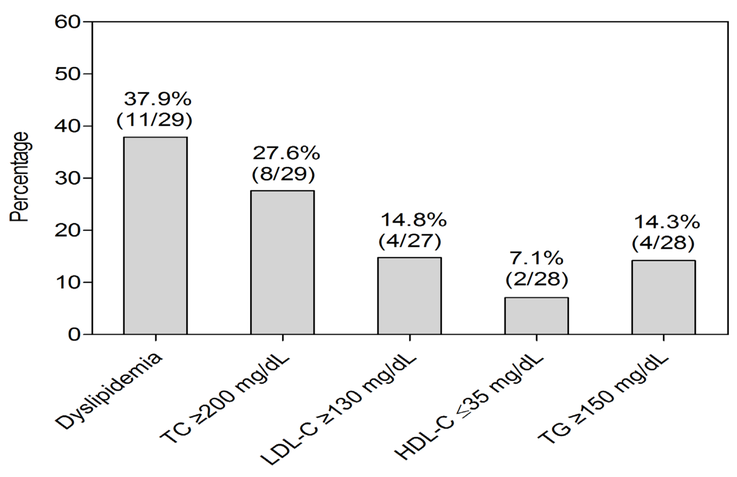
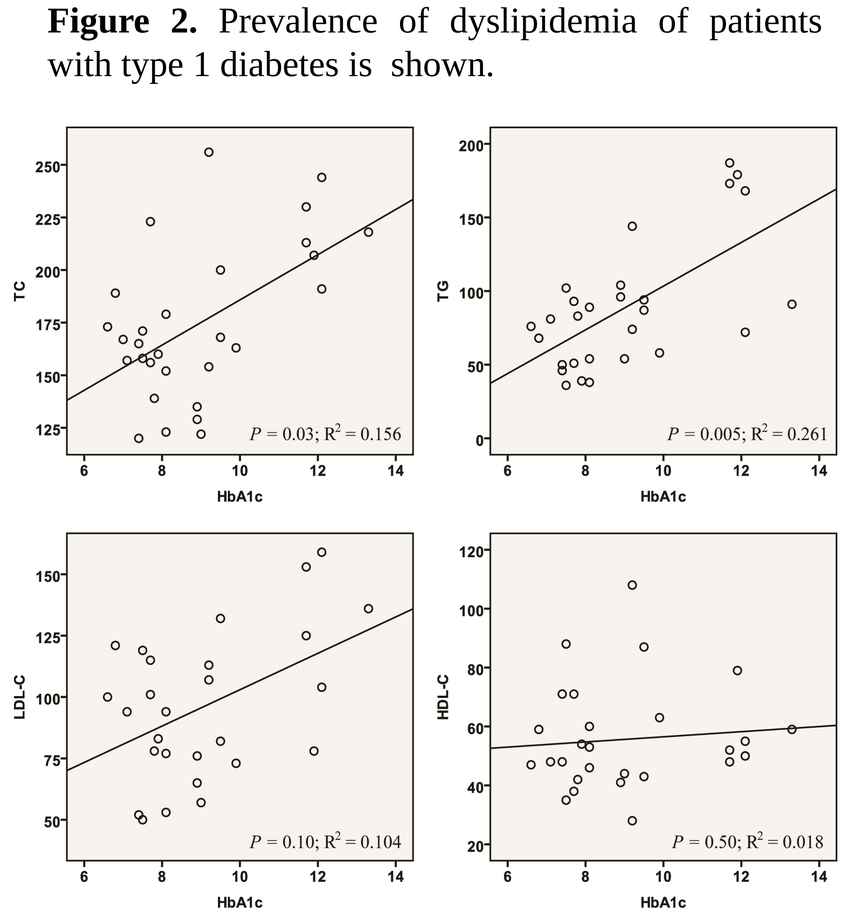


Figure 2. Prevalence of dyslipidemia of patients with type 1 diabetes is shown.



Results

Multivariate analysis indicated that HbA1c was the only independent risk factor for dyslipidemia (adjusted odds ratio, 3.09; 95% CI, 1.35–7.11; P <0.005).

A significant positive correlation was found between HbA1c and TC (P = 0.03; R2 = 0.156), TG (P = 0.005; R2 = 0.261). HbA1c showed no correlation with LDL-C or HDL-C(Fig. 2).

Patients with HbA1c ≥8.5% was more likely to have dyslipidemia compared with those with HbA1c <8.5% (64.3% [9/15] vs. 13.3% [2/15]; P=0.008) (table 2).

Table 2. Lipid profiles according to glycemic control in patients with type 1 diabetes.

Variable	HbA1c (%) <8.5 (n = 15)	HbA1c (%) ≥8.5 (n = 14)	*P* value
Age	14.8 (10.8–24.2)	18.8 (10–25)	0.14
Female gender, no. (%)	9 (60)	9 (64.3)	0.81
BMI, z-score	-0.4 (-1.3–2.2)	0.18 (-2.5–2.6)	0.32
Disease duration, years	8.6 (0.2–15.6)	6.8 (1.5–11.4)	0.68
Lipid profiles			
Total cholesterol ≥200 mg/dL	1/15 (6.7)	7/14 (50.0)	0.01
LDL cholesterol ≥130 mg/dL	0/14 (0)	4/14 (28.6)	0.098
HDL cholesterol ≤35 mg/dL	1/14 (7.1)	1/14 (7.1)	>0.99
Triglycerides, ≥150 mg/dL	0/14 (0)	4/14 (28.6)	0.098
Dyslipidemia (any of above abnormalities)	2/15 (13.3)	9/15 (64.3)	0.008

Conclusion

Our study is the first report of lipid data in Korean adolescents and young adults with type 1 diabetes. A substantial proportion of adolescents and young adults with type 1 diabetes had dyslipidemia.

We found a correlation between poor glycemic control and poor lipid profiles in those patients.