Serum lipid and apolipoprotein concentrations in type II diabetics with and without microalbuminuria

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The relationship between serum lipid apolipoprotein levels and microalbuminuria were investigated in 35 (19 F/16 M) type II diabetics and healthy control subjects. In the normoalbuminuric (20 <\ig/min) and microalbuminuric (>20 ng/min) diabetic patients serum HDL-cholesterol, apolipoprotein A 1(Apo-A 1) and Apo A1/B ratio were lower and total cholesterol levels were higher than control subjects (p<0.01). Serum triglyceride, and apolipoprotein B levels were higher in only microalbuminuric patients than controls (p<0.01). There were not significant correlation between microalbuminuria and Apo-A 1, Apo-B, HDL-cholesterol levels. These results indicate microalbuminuria related differences in serum lipid and apolipoprotein levels in type II diabetic patients, which may contribute to an increased risk of cardiovascular disease. [Turk J Med Res 1994; 12(5): 214-216]

Key Words: Lipid, Apolipoprotein, Microalbuminuria, Type II diabetes

Many studies have shown that diabetes is consistently associated with changes in plasma lipids and lipoproteins (1-3). These alterations are important rise factors for coronary heart disease (2). Microvascular disease is the major cause of death in 75-80 % of diabetic people (4). In well - controlled patients with insulin - dependent diabetes mellitus, the lipoprotein abnormalities are minimal except in patients with nephropathy (5). On contrast, the lipoprotein profiles of patients with noninsulin - dependent (type II) diabetics are frequently characterized by increased levels VLDL, decreased levels of HDL and normal or near normal levels of LDL (1-3). Some reports have suggested that lipoprotein concentrations are changed in type I diabetics with microalbuminuria (6-8). To our knowledge, there isn't any reports cited in the literature related with serum lipids and apolipoproteins in type II diabetic patients with normo-and microalbuminuria.

This study was conducted to investigate possible alterations in serum lipid and apolipoprotein A1 (Apo-A1) and B (Apo-B) levels in type II diabetic patients with early renal lesions as indicated by microalbuminuria and normoalbuminuria.

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MATERIALS AND METHODS

Thirtyfive type II diabetic patients, 19 females and 16 males were involved in this study. Their mean age was 54.8 year (38-74 years) and duration of diabetes above 5 yr. Age and sex matched control subjects (n:10 5 F/5 M) were recruited from volunteered healthy subjects.

Peripheral venous blood samples for the lipid and apolipoprotein analysis were drawn after a 12-h fasting state. Serum samples were separeted and lipid and apolipoproteins were determined. We measured serum Apo-A1, and Apo-B levels with immunochemistry method (Orion kit), triglyceride, cholesterol, BUN, creatinine with Technicon autoanalyser (Biotrol kit). Erythrocyte Hb A1c levels were determined with Biotrol kit. Serum HDL-cholesterol were measured by sodium phosphotungstate- Mg^{++} method (9). We examined urine (24 hr) microalbumine levels with DPC Doube Antibody RIA kit.

Microalbuminuria (ng/min) results were calculated using the formula

$$\frac{\text{ng/ml x Volume of urine}}{\text{time (minutes)}} \quad \text{fig/min microalbuminuria}$$

Two groups of diabetics were investigated (8)

Group A) Microalbuminuria 19 type II diabetics with microalbuminuria. Patients with urinary albumine concentrations above 20 pg/min were deemed positive microalbuminuria.

Group B) Normoalbuminuric: 16 type II diabetics with normal albuminuria (Microalbuminuria less than 29 ug/min).

Results are expressed as mean SD for normally distributed data. Student's t test was used in our statistical analysis. Linear regression analysis was used to calculate correlation coefficients.

RESULTS

The mean±SD values of serum parameters of diabetics and controls are summarized in Table 1. The serum concentrations of Apo-A1, Apo-B and lipids are given in Table 2.

Serum Apo-A1, HDL-cholesterol, Apo A1/B ratio were significantly lower and serum total triglyceride, total cholesterol, Apo-B levels higher in diabetics with microalbuminuria compared with controls.

Serum Apo-A1, HDL-cholesterol, Apo A1/B ratio were lower also in normoalbuminuric patients but only total cholesterol levels were higher than controls. Total triglyceride and Apo-B values were not significantly different from controls.

There were not statisticaly significant correlation between microalbuminuria and Apo-A1, Apo-B, HDL-cholesterol levels.

DISCUSSION

In people with diabetes, the concentration of an individual lipoprotein or apolipoprotein can bo highly variable and is totally different in the two major forms of the disease (3,5,10). Alterations in the concentrations of major lipids and lipoproteins are well characterized in both type I and type II diabetics (10). Type I diabetic patients with microalbuminuria show atherogenic changes of lipoproteins and have elevated levels of Lp (a), which is a risk factor of coronary artery disease (10).

Jones et al (6) showed that concentrations of LDL and VLDL-cholesterol and total, VLDL-triglyceride and Apo-B were significantly higher in the type I diabetics with microalbuminuria compared with controls.

Retrospective studies of patients with type II diabetes have suggested that microalbuminuria predicts early all-cause (mainly cardiovascular) mortality (11,12). These findings have been confirmed in prospective studies. Metlock et al (13) suggested that microalbuminuria is a significant risk marker for mortality in NIDDM, independent of the other risk factors.

Microalbuminuria was associated with significantly increased fasting serum triglyceride, total cholesterol, LDL chosterol (13), VLDL-cholesterol and decreased concentration of HDL as the typical lipoprotein abnormalities in patients with type II diabetes mellitus (14).

Our results showed that serum Apo-A1, HDL-cholesterol, Apo A1/B ratio were lower and total triglyceride, Apo-B levels higher in the group of microalbuminuric than control groups. Also, Apo-A1, HDL-cholesterol, Apo A1/B ratio were lower in normoalbuminuric group than controls, But Apo-B and total triglyceride levels were not significantly different than control in this group. Our results suggested that microalbuminuria is not only an independet risk factor for cardiovascular disease but it is also related to lipid and apolipoprotein abnormalities in type II diabetics.

A comparison of plasma lipid and apolipoprotein patterns between diabetic patients with or without clinically diagnosed vascular disease shows that the typical abnormalities in the composition and concentrations of triglyceride rich lipoproteins are more pronounced in affected than nonaffected patients (15). Total lipoprotein mass of VLDL and Apo-B were higher

Table 1. Serum parameters of diabetics and controls.

	Diabetics	Controls
n	35	10
BUN	15±4	14±3
Creatinine	1.5±0.2	1±0.2
HbAiC	10.3+3.3	4.77+1.5

Table 2. Serum concentrations of lipids and apolipoproteins in diabetic groups and controls

	Group A Microalbuminuria	Group B Normomicroalbuminuria	Group C Control
	19	16	10
Total triglyceride	144±51[a]	110±43[a]	113±20[a]
Total cholesterol	162±26[a]	169±27[a]	136±14[a]
HDL-cholesterol	39±17[a]	39+11[a]	48±17[a]
Apo-A1	103±31[a]	96±30[a]	127±40[a]
Apo-B	105±31[a]	98±36[a]	83±27[a]
ApoA1/B	1.0±0.3[a]	1.1±0.3[a]	1.6±0.5[a]

a : $p<0.01$ from c

and HDL and Apo-A significantly lower in type II diabetic than nondiabetic control subjects (16). But microalbuminuria was not measured in the diabetics.

Wald et al (17) suggested that serum Apo-B is the most strongly associated apolipoprotein with ischemic heart disease (IHD) risk; a decrease in Apo-B of 10 % was associated with 22 % lower risk of IHD. Special determination of Apo-B as a risk factor may be a useful index to predict the high risk group for macrovascular complications (18). These results supports that lipid and apolipoprotein abnormalities are increased in microalbuminuric patients with type II diabetes.

The mechanism of the link between microalbuminuria and cardiovascular mortality is not clear. However increased urinary albumin loss has been postulated to be a marker of increase vascular permeability, which might predispose to greater penetration into the arterial wall of atherogenic lipoprotein particles (19).

In conclusion, micro-and normoalbuminuric type II diabetic patients display multiple changes in lipid and apolipoprotein levels, and microalbuminuric diabetics have more atherosclerotic risk than normoalbuminuric diabetics.

Mikroalbuminüri olan ve olmayan tip II diabetlilerde serum lipid ve apolipoprotein değerleri

Serum lipid, apolipoprotein ve mikroalbuminüri değerleri 35 (19 K/16 E) tip II diabetik hastada ve sağlıklı kontrol grubunda incelendi. Normoalbuminürili (<20 ng/min) ve mikroalbuminürili (>ng/min) diabetiklerde serum HDL-kolesterol, apolipoprotein A1 (Apo A1)ve Apo A1/B oran kontrol grubuna göre düşük, tora*l kolesterol yüksekti (p<0.01). Mikroalbuminürili kişilerde serum trigliserid ve Apo-B değerleri kontrollerden yüksekti (p<0.01). Apo-A1, Apo-B, HDL-kolesterol değerleri ile mikroalbuminüri değerleri arasında önemli korelasyon yoktu. Bu sonuçlar tip II diabetlilerde serum lipid ve apolipoprotein değerlerinin mikroalbuminüri ile ilişkili olduğunu ve kardiyovasküler hastalık riskini artırabileceğini göstermektedir. [Türk J Med Res 1994; 12(5):214-216]*

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