

## CORONARY HEART DISEASE RISK ASSESSMENT IN KOCAELI REGION

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### KOCAELİ YÖRESİNDE KORONER KALP HASTALIĞI RİSK TAYİNİ

#### ÖZET

Çalışmamızın amacı Kocaeli Bölgesinde yaşayan insanların ateroskleroz riskini saptamaktır. Bu yayının 448 kişinin sonuçlarını içeren çalışmanın birinci kısmını oluşturmaktadır. Çalışma grubumuz uzun vadede 5000 kişiyi kapsayacaktır. Total kolesterol, trigliserid, HDL-kolesterol, LDL-kolesterol, glukoz, albümin, ürik asit ve total bilirubin çalışma grubumuzda ölçülen parametrelerdir. Çalışmamızın çarpıcı sonuçları; düşük HDL-kolesterol, yüksek vücut kitle indeksi, yüksek bel kalça oranı, kadın ve erkek trigliserid düzeyleri arasında dikkate değer bir fark bulgularıdır.

Anahtar kelimeler: Lipitler, KKH risk faktörleri, HDL-kol, LDL-kol, kolesterol, Trigliserid

#### SUMMARY

The aim of the study was to assess the atherosclerosis risk of people living in Kocaeli Region. This article gives the results of 448 people that were screened and reports the first part of the study that has already been completed. Our screening group will include about 5000 people in the long run. Total cholesterol, triglyceride, HDL-cholesterol, LDL-cholesterol, glucose, albumin, uric acid and total bilirubin were measured in our study group. The striking results of our study were: low HDL-Cholesterol (HDL-C), high BMI, high waist to hip ratio (w/h), significant difference in the mean value for triglycerides between the men and the women

Key Words: Lipids, CHD risk factors, HDL-chol, LDL-chol, cholesterol, triglyceride

Cardiovascular disease remains as the primary cause of mortality in industrialized, and developing countries. The fact that no coronary heart disease (CHD) risk screening has been performed in Kocaeli Region before, led us to perform this study. The aim of our study was to screen and to assess CHD risk of the people living in Kocaeli Region. Some important risk factors for coronary artery disease (CAD) are elevated total cholesterol, low-density lipoprotein-cholesterol (LDL-C), small dense LDL, ox-LDL, Lp(a), decreased HDL-C, hypertension, genetic predisposition, smoking, age, male sex, sedentary life style, obesity, stress, diabetes mellitus, hyperuricemia, renal failure, postmenopausal state, hypothyroidism, and certain thrombogenic disorders, and free radicals (1). Some risk factors are unavoidable, such as race, genetic susceptibility, gender, and age. However many risk factors like high blood pressure, elevated serum TC, smoking,

sedentary life style are susceptible to modification. Individuals with HDL-C levels below 35 mg/dl have eight times the CHD rate as that of those with HDL-C levels of 65 mg/dl (1).

Levels of albumin, bilirubin, and uric acid were measured because of their functions as anti-oxidants (2-4). Antioxidants have beneficial effects against free radicals.

Lipoprotein (a) (Lp(a)) is a lipoprotein particle similar to LDL in terms of lipid content and composition; however the protein moiety consist of apolipoprotein (apo) B100 linked by a disulfide bridge to apo (a), a glycoprotein containing about %30 carbohydrate by weight (5-7).

Apo A1, Apo B and especially their ratios are of particular relevance to atherogenesis in the general population. Apo B serves as an essential structural component of VLDL, IDL, and LDL. As a ligand for the

Table-1 Mean values, and standard deviations for males and females.

Parameters	Mean Value		SD	
	Male (237)	Female (211)	Male	Female
Cholesterol (mg/dl)	183.3	187.0	18.7	38.0
Triglyceride (mg/dl)	171.4 ***	122.3	158.92	68.3
HDL-C (mg/dl)	35.5 **	38.0	11.2	10.5
LDL-C (mg/dl)	114.5 **	123.8	38.66	34.1
VLDL-C(mg/dl)	31.03 ***	24.5	19.52	13.6
Glucose(mg/dl)	91.7	90.4	18.7	10.4
Diastolic Pressure (mmHg)	74.6	73.3	11.2	9.5
Systolic Pressure (mmHg)	113.3 ***	108.5	12.6	9.4
Wai/Hip	0.89 ***	0.77	0.07	0.05
Age	38.8	38.7	13.0	8.7
BMI	26.2	26.4	3.4	5.1
LDL-C/HDL-C	3.43	26.4	3.4	5.1
TC/HDL-C	5.49	5.31	1.94	1.92
Uric Acid(mg/dl)	4.29 ***	2.89	1.05	0.78
Albumin(g/dl)	4.36 ***	4.13	0.29	0.31
Total Bilirubin(mg/dl)	0.58 ***	0.37	0.27	0.16
ApoA1 (n=62) (mg/dl)	180.8-	-	56.2-	
ApoB (n=61) (mg/dl)	129.8	-	55.3	-
Fibrinogen (n=61) (mg/dl)	309	-	90.8	-
Lp(a) (n=91) (mg/dl)	22.5	-	25.4	-

\*\* p<0.01 \*\*\*p<0.001

LDL receptor, Apo B facilitates cholesterol delivery to tissues (8). In addition, Apo B promotes cholesterol accumulation in the arterial tissue through, being modified by oxidation and specifically binding to extracellular matrix proteoglycans (9,10). In contrast, Apo A1, the structural constituent of HDL-C, mediates efflux of cholesterol from the membrane of peripheral cells (11). Thus, plasma concentrations of lipoproteins and their relative proportion may reflect cholesterol transport to and from the peripheral tissues including the arterial wall (12).

Fibrinogen is a soluble glycoprotein made by the liver. Fibrinogen serves as a substrate for the coagulation enzyme thrombin. Fibrinogen is also an acute-phase protein. Fibrinogen is decreased during disseminated intravascular coagulation, in liver disease, or in

hereditary afibrinogenemias(13). Elevated fibrinogen is a CAD risk factor.

Plasma triglyceride level may be more predictive in women compared to men. It may also be more important risk factor in DM (14)

#### MATERIALS and METHODS

Our study group consisted of 448 healthy males (237) and females (211), aged between 16 and 77 with no hypertension, DM and systemic disease. A questionnaire was filled out for each participant inquiring about the family history of CHD or other diseases, eating habits, alcohol consumption, weekly exercise hours, education status and yearly income. Weight, height, waist and hip measurements were taken and blood pressure was measured after 10 minutes of sitting. Our study group consisted of responders to our advertisements that indicated our specifications. Venous blood was taken in the morning after a

12-14 hours of fasting and after 10 minutes of resting. 15 ml blood was collected to plain tubes and tubes with citrate. The samples were centrifuged at 3000 rpm for 5 minutes in order to separate the plasma and sera. Fibrinogen was assayed in plasma. Apo B, Apo A1 and Lp(a) total cholesterol, triglyceride, glucose, HDL-C, albumin, uric acid, bilirubin were measured in the serum. Total cholesterol, triglyceride and glucose concentrations were assayed with enzymatic colorimetric methods (Biotrol kits) applied to autoanalyzer (Technicon RA-XT). HDL-C was measured after precipitation of apoB containing particles with phosphotungstic acid and magnesium chloride, LDL-C levels were calculated according to the Friedewald formula for those whose triglycerides were below 400 mg/dl. ApoB, apoA1 and fibrinogen were quantified by Behring turbidimetric method. Lp(a) was assayed with the Biopool Tint Eliza kit. In this study, total cholesterol was measured in 443, HDL-C in 442, triglyceride in 443, glucose in 435, Apo A1 in 61, Apo B in 60, fibrinogen in 58, Lp(a) in 89, albumin in 239, total bilirubin in 239, uric acid in 239 individuals.

### RESULTS

Mean and standard deviations for all the parameters measured are given in Table 1. Age related increases are seen in cholesterol, glucose, LDL-C, triglyceride, systolic and diastolic pressure and w/h ratio. Both systolic and diastolic pressure are found to have a positive relation with cholesterol. w/h ratio is found to be related positively with total cholesterol, triglyceride, diastolic pressure and systolic pressure but negatively with HDL-C.

Education status of our group is given in Table 2. It is seen that 89 % of males and 54 % of females have high school or higher education. 5% of the females had no education while 41 % of them had only elementary school education. 23.7 % had CHD in their parents, 75 % had their lipids measured for the first time.

Table-2 The percentage distribution of education of our study group.

Education	Males%	Females%
Females%	39	28
High-School	50	26
Elementary School	11	41

No Education

Table-3 Spearman Correlation Test Results.

Parameters	r	p
Age -Cholesterol	0.3728	0.000
Age -Diastolic Pressure	0.1549	0.004
Age -Glucose	0.3487	0.000
Age -LDL-C	0.3050	0.000
Age -Systolic Pressure	0.1460	0.007
Age -Triglyceride	0.3355	0.000
Age -Wai/Hip	0.2349	0.000
Cholesterol -Diastolic Pressure	0.1934	0.000
Cholesterol -HDL-C	0.1127	0.001
Cholesterol -Glucose	0.1918	0.000
LDL-C -Cholesterol	0.8620	0.000
LDL-C -Diastolic Pressure	0.1624	0.002
LDL-C -Glucose	0.1367	0.005
Systolic Pressure -Cholesterol	0.1430	0.007
Systolic Pressure -Diastolic P.	0.4462	0.000
Triglyceride -Glucose	0.1321	0.006
Triglyceride -HDL-C	-0.2694	0.000
Triglyceride -LDL-C	0.1030	0.030
Wai/Hip -Cholesterol	0.1624	0.002
Wai/Hip -Diastolic Pressure	0.1099	0.004
Wai/Hip -HDL-C	0.1362	0.011
Wai/Hip -Systolic Pressure	0.2911	0.000
Wai/Hip -Triglyceride	0.2853	0.000

#### Expected--Normal Values

Cholesterol	140-200 mg/dl
Triglyceride	60-150 mg/dl
HDL-C	>35 mg/dl
LDL-C	<130 mg/dl
Glucose	75-110 mg/dl
Uric Acid	2.6-7.2 mg/dl
Albumin	3.5-5.0 mg/dl
T. Bilirubin	0.2-1.1 mg/dl
Apo A1	M 79-155 mg/dl F 83-187 mg/dl
Apo B	M 40-174 mg/dl F 46-142 mg/dl
Fibrinogen	200-400 mg/dl
Lp(a)	<30 mg/dl

Average weekly exercise time for women and men were found as 30 min and 45 min/week respectively or 4.3 and 6.4 min/day.

## DISCUSSION

Very significant correlations (Table 3) were found between age and cholesterol diastolic and systolic pressure, glucose, LDL-C, triglyceride, w/h ratio which definitely points out the increase in CAD risk as age increases. It is also clearly seen that a high waist, to hip ratio in other words central obesity is associated with increased CHD risk. Negative correlation between triglyceride and HDL-cholesterol is due to catabolism defects of triglyceride rich lipoproteins.

Striking results of this study are low HDL-C and a significant difference between men and women in the mean values for triglyceride, LDL-C, HDL-C levels. The HDL-C levels for the study group as a whole, men, and women are as follows,  $36.7 \pm 10.2$ ,  $35.5 \pm 11.2$ ,  $38.0 \pm 10.5$  mg/dl. Low HDL-C values were also found by Turkish Heart Study (15), in a previous study by Hergenç et al (16), and by PROCAM study (Turkish people living in Germany)(17).

Although 448 people are not enough to evaluate a nation or people living in a region, Turkish people seem to be at high CHD risk when the lipid profiles and inactive life style are taken into account. It is important to point out that the mean age of our study group is about 39 but the average waist to hip ratio and BMI were found to be above the normal levels for both men and women. This may be due to inactive life style and carbohydrate rich diets both of which can be modified. Considering the high rate of smoking in Turkey; the CAD risk seems to be even higher. We are also screening people in Kocaeli Region for smoking status and our aim is to screen the CHD risk in at least 5000 people, and to initiate extensive education programs that aim to improve life style habits in order to reduce CAD risk.

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