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RELATIONSHIP OF CIGARETTE SMOKING WITH SERUM LIPIDS AND BLOOD PRESSURE İN TURKİSH ADULTS

TÜRK ERİŞKİNLERİNDE SİGARA İLE SERUM LİPİDLERİ VE KAN BASINCI ARASINDAKİ İLİŞKİ

Aymelek GÖNENÇ, Cengiz KARDEŞ, Meral TORUN

Gazi University,Faculty of Pharmacy, Department of Biochemistry,
06330, Hipodrom- Ankara, TURKEY.

ABSTRACT

The purpose of the study was to assess the effects of smoking on serum lipids and blood pressure in Turkish Adults. Serum total cholesterol, HDL-cholesterol, smoking and blood pressure are established as majör risk factors for coronary heart disease. Turkey, a developing country, has a high cardiovascular morbidity and mortality, despite low levels ofplasma cholesterol.

The relations between smoking, serum lipids and blood pressure was examined in pilot study of 301 women and men aged 25 to 75 years from Middle Region of Anatolia (Aksaray-Ortaköy). Eighty individuals has coronary heart disease and the other 221 subjects were healthy. Serum lipid levels were measured enzymatically.

The impact ofcigarette smoking on serum lipid levels was assessed by comparing smokers (n=53), ex-smokers {n-24) and non-smokers (n-224). Serum total cholesterol levels in smoker's group was higher than those of the other groups, but differences were insignificant ($p>0.05$). Serum HDL-cholesterol, LDL-cholesterol, triglyceride and blood pressure levels were not statistically different between smoker, ex-smoker and non-smoker groups ($p>0.05$). Effect of age, sex, presence of heart disease or not, quetelet index (kg/m^2), and nutritional habits on the serum lipid profile were also statistically investigated. When blood pressure (systolic and diastolic) was compared according to age, blood pressure in young people (under 45) was found lower than that of people who are above 45 years old ($p<0.01$).

Key Words: *cigarette smoking, serum lipids, systolic pressure, diastolic pressure.*

ÖZET

Çalışmanın amacı Türk Erişkinlerinde sigaranın serum lipidleri ve kan basıncı üzerine olan etkilerini araştırmaktır. Serum total kolesterol, HDL-kolesterol, sigara ve kan basıncı koroner kalp hastalığı için en önemli risk faktörleri olarak kabul edilmektedir. Gelişmekte olan bir ülke olarak Türkiye yüksek kardiovasküler morbidite ve mortaliteye sahiptir.

Çalışmada sigara ile serum lipidleri ve kan basıncı arasındaki ilişki İç Anadolu bölgesindeki 25-75 yaşları arasındaki kadın ve erkek 301 kişiden oluşan pilot çalışma ile araştırılmıştır. 80 kişi koroner kalp hastası ve kalan 221 kişi sağlıklı idi. Serum lipid düzeyleri enzimatik olarak ölçülmüştür.

Serum lipid düzeyleri üzerine sigaranın etkisi sigara içenler (n=53), sigarayı bırakanlar (n=24) ve sigara içmeyenler (n-224) karşılaştırılmak suretiyle değerlendirilmiştir. Sigara içen grubun serum total kolesterol düzeyleri diğer gruplara göre daha yüksekti, fakat anlamlı bir farklılık yoktu (p>0.05). Serum HDL-kolesterol, LDL-kolesterol, trigliserid ve kan basıncı düzeyleri açısından sigara içen, sigarayı bırakan ve sigara içmeyen gruplarda istatistiksel olarak anlamlı bir farklılık bulunmadı (P>0.05). Serum lipid profiline yaşın, cinsiyetin, kalp hastalığı olmasının veya olmamasının, kuetelet indeksinin (kg/m^2) ve beslenme alışkanlığının etkisi de istatistiksel olarak araştırılmıştır. Yaşa göre kan basıncı (sistolik ve diyastolik) karşılaştırıldığında, kan basıncı genç erişkinlerde (45 yaşın altı) 45 yaşın üstündeki erişkinlere göre daha düşük bulunmuştur (p<0.01).

Anahtar kelimeler: *sigara, serum lipidleri, sistolik basınç, diyastolik basınç.*

INTRODUCTION

Epidemiological studies have demonstrated a strong association between cigarette smoking and several diseases[1"4]. This association is present in ali groups över 35 years of age, but is proportionately larger in the 45-54 age group. Coronary heart disease is the leading cause of smoking-related mortality. A dose response mortality is observed betvveen smoking and excess mortality. Conversely, cessation of smoking decreases the excess mortality, suggesting a causal relationship[4-7].

Several studies have shown differences betvveen smokers and non-smokers. Smokers are thir.ner and their heart rate is faster than that of non-smokers[8"10]. They show higher white blood celi count, higher serum cholesterol, lower HDL-cholesterol and lower plasma vitamin C levels[11"14]. Part of these modifications may be explained by the behavioural changes observed in smokers. Indeed, assessment of dietary habits has demonstrated clear differences between smokers and non-smokers in food choices, daily energy, and vitamin and nutrient intakes. Smokers drink more alcohol, coffee and tea and consume less fruit, vegetables and cereals than non-smokers". Since both cigarette smoking and nutritional habits affect lipid and lipoprotein levels, these factors could interact with their plasma circulating levels. Several clinical trials have shown that smoking lovvers high-density lipoprotein levels, resulting in an increased risk of coronary heart disease (CHD). Mortality from CHD is substantially higher in cigarette smokers than in nonsmokers[3"711"15].

Turkish people has distinctively low levels of total and HDL-cholesterol, associated with high levels of hepatic lipase and fasting triglycerides. Levels of total, low-density lipoprotein (LDL)- and high-density lipoprotein (HDL)-cholesterol are low, and those of triglycerides as well as of the total/HDL-cholesterol ratio are high in Turkish adults when serum lipids is compared with German and American populations[1617].

in this study, the impact of cigarette smoking, age, sex, presence of heart disease or not, quetelet index (kg/m^2), and nutritional habits as a cardiovascular risk factors on serum lipids was studied prospectively in healthy adults and in a group of patients with coronary heart disease.

MATERIAL AND METHODS

Serum lipid profile has studied in 301 women and men aged 25 to 75 years from Middle Region of Anatolia (Aksaray-Ortaköy). 80 patients with coronary heart disease and 221 healthy subjects were included in this study. Individuals filled out a questionnaire containing questions on the following: age, smoking status, smoking habits, quetelet index, dietary habits (meat/vegetable&fruit/milk-dairies/all of it), presence of heart disease or not. Serum total cholesterol, systolic and diastolic pressure were measured in all subjects. Serum lipoprotein and triglyceride level were only measured in individuals having high level of total cholesterol (n=92).

Blood samples were obtained in the morning after an overnight fast for individuals. Serum total cholesterol was measured by the cholesterolesterase/cholesterol oxidase technique using Sclavo Diagnostic kits (Siena, Italy). Likewise, triglycerides were measured enzymatically (Sclavo Diagnostic). HDL-cholesterol was determined after precipitation of lower density lipoproteins by a phosphotungustic reagent (Sclavo Diagnostic). LDL-cholesterol levels were calculated by using the Friedewald formula. Systolic and diastolic blood pressures were measured twice with the patient in the sitting position after 4 minutes' rest. The lower values were used in this analysis.

Statistical analysis of the results was performed using SPSS for Windows. Student's t, Mann-Whitney U and Kruskal-Wallis tests were used to compare the results between the groups.

RESULTS AND DISCUSSION

The characterictics of pilot study group are presented in Table 1. Comparison of smoking in control and coronary heart disease groups is shown in Table 2 and effects of smoking status on serum lipid profile are shown in Table 3.

Table 1. Clinical characterictics of the subjects participating in the study.

	n	X±S.E.
Age (years)	301	48.52±0.66
Quetelet index (kg/m^2)	301	26.10±0.23
Total cholesterol (mg/dL)	301	170.18±1.54
Total cholesterol (mg/dL)	92	198.30±1.69
HDL-cholesterol (mg/dL)	92	34.88±0.60
LDL-cholesterol (mg/dL)	92	123.65±1.50
VLDL-cholesterol (mg/dL)	92	39.28±0.33
Triglycerides (mg/dL)	92	196.41 ±1.65
Systolic pressure (mmHg)	301	130.80±1.29
Diastolic pressure (mm Hg)	301	81.96±0.79

Cigarette smoking is widely accepted as a major risk factor for the development of cardiovascular disease. Several possible explanations have been proposed for this association, including altered blood coagulation, impaired integrity of the arterial wall, and changes in blood lipid concentrations[2,4,15,18,19]. The impact of cigarette smoking on serum lipid levels was assessed by comparing smokers (n=53), non-smokers (n=224) and ex-smokers (n=24), in this study. Serum total cholesterol levels in smoker's group was higher than those of the other groups, but differences were insignificant (p>0.05). Serum HDL-cholesterol, LDL-cholesterol, triglyceride levels and blood pressure were not different between smoker, non-smoker and ex-smoker groups (p>0.05). When serum lipid values were divided in two groups as a normal (low/average risk) and high (high risk), significant differences were found between groups according to smoking. When total cholesterol levels were compared in smoking groups, there was a significant differences between group of <200 mg/dL and > 200 mg/dL (p<0.01). When LDL-cholesterol levels were compared in non-smoker and ex-smoker groups, there was also a significant difference between <150 mg/dL group and > 150 mg/dL group (p<0.05). In smoking groups, a significant differences were found between <35 mg/dL and > 35 mg/dL according to HDL-cholesterol (p<0.01)(Table 3). Triglycerides levels were not evaluated statistically between smoking groups, because this lipid values were higher than 180 mg/dL.

Table 2. Comparison of smoking groups.

SMOKER	%	NON-SMOKER %	EX-SMOKER %	TOTAL
CONTROL	17.6	76,9	5.5	221
CORONARY HEART DISEASE	17.5	67.5	15.0	**80**

Table 3. Serum lipid profile according to smoking status.

	Total Cholesterol (mg/dL)		LDL-Cholesterol (mg/dL)		HDL-Cholesterol (mg/dL)		Triglycerides (mg/dL)	
	<200	≥ 200	< 150	≥ 150	<35	≥ 35	<180	≥ 180
Smoker	n=50	n=3	n=16	-	n=7	n=9	-	n=16
	170.16±2.49	205.33±3.18*	119.00±2.95		30.86±0.96	39.22±2.01[c]		190.31±2.21
Non-smoker	n=198	n=26	n=63	n=3	n=38	n=28	-	n=66
	163.90±1.61	214.15±3.51[a]	122.63±1.32	168.33±9.28[b]	30.42±0.29	40.18±0.65[c]		197.73±2.00
Ex-smoker	n=19	n=5	n=9	n=1	n=5	n=5	-	n=10
	158.64±6.48	212.40±9.93"	119.78±4.31	163.00[b]	30.60±0.60	41.2ftt2.92[c]		19750±6.46

"significant difference from group of < 200 (p<0.01) , [b] significant difference from group of <150 (p<0.05), [c] significant difference from group of <35 (p<0.01).

Blood pressure is established one of major risk factor for coronary heart disease. The relationship between cigarette smoking and blood pressure has been investigated in several studies[8,12,19,20,21]. It was reported that both systolic pressure and diastolic pressure were significantly lower in smokers than in non-smokers[8,12]. In agreement with previous studies, we found inverse correlation blood pressure and cigarette smoking in smokers and non-smokers below 45 years old, but there was insignificant difference. However, diastolic pressure was higher in non-smokers than smokers ($p<0.05$). Table 4 presents the mean blood pressure and total cholesterol in smoking groups according to age. When systolic and diastolic pressure were compared with age groups, old group values were higher than those of young group in smokers and non-smokers, in this study ($p<0.01$) (Table 4). In ex-smokers, only systolic pressure was higher in >45 years old group compared with <45 years old group and this value was highest in smoking groups ($p<0.01$). Moreover, in ex-smokers mean level of total cholesterol in old group was higher than that of young group ($p<0.05$) (Table 4).

Table 4. Blood pressure and total cholesterol levels in smoking groups according to age.

		< 45 years		>45 years	
		n	X±S.E.	n	X±S.E.
SMOKER	Systolic pressure	16	115.62+4.18	37	138.38+3.25[a]
	Diastolic pressure	16	70.62±2.66	37	85.67+2.41[a]
	Total cholesterol	16	166.06±4.25	37	174.78±3.19
NON-SMOKER	Systolic pressure	112	121.07±1.79	112	139.02±2.22[a]
	Diastolic pressure	112	77.05±1.09[c]	112	86.96±1.29[a]
	Total cholesterol	112	168.81±2.82	112	170.65±2.33
EX-SMOKER					
	Systolic pressure	9	122.22±4.00	15	144.67±3.22[a]
	Diastolic pressure	9	78.89±4.55	15	86.00±2.89
	Total cholesterol	9	147.67±12.70	15	183.40±6.51[b]

"Significant difference from group of < 45 years ($p<0.01$).
[b] Significant difference from group of < 45 years ($p<0.05$).
[c] Significant difference from smokers group ($p<0.05$).

In European Atherosclerosis Society Workshop on Low HDL in Cardiovascular Diseases, it was emphasized that Turkish people had several distinctive features with respect to coronary risk factors compared with other European populations including low levels of total cholesterol and high-density lipoprotein-cholesterol (HDL-C)[16]. In this study, total cholesterol and HDL-cholesterol levels were not different according to gender, but total/HDL-cholesterol ratio in men was higher than that of women (Table 5). The ratios in Turkish adults were higher than those of German and American populations[16,17].

Table 5. Comparison of ratio of total/HDL-cholesterol between Turkish men and women.

	n	MEN (X±S.E.)	n	WOMEN (X±S.E.)
TOTAL CHOLESTEROL	*29*	199.13+2.6]	63	168.52+1.88
HDL-CHOLESTEROL	29	33.93±1.13	63	35.32±0.71
TOTAL/HDL-CHOLESTEROL RATİO		5.12		4.80

in the Turkish Heart Study in which HDL-cholesterol levels were examined in Turkish adults, 53% of men and 26% of women had values <35 mg/dL. These strikingly low HDL-cholesterol levels were confirmed later in the Turkish Adult Risk Factor Study[1617]. in our study population, serum HDL-cholesterol was higher in female than in male non-smokers ($p<0.05$), but no significant difference was found in the other groups (Table 6). The present study, no significant differences could be identified with regard to quetelet index (kg/m^2), presence of heart disease or not, smoking cigarettes per day and dietary habits.

Table 6. HDL-cholesterol levels in smoking groups according to gender.

	WOMEN		MEN	
	n	X±S.E.	n	X±S.E.
SMOKER	9	36.44±2.46	7	34.43±1.91
NON-SMOKER	50	35.34±0.80	16	32.12+1.04"
EX-SMOKER	4	35.50±4.37	6	36.17±2.76

"Significant difference from group of women ($p<0.05$).

Finally, the present study revealed that Turks have low levels of HDL-cholesterol, high levels of total/HDL-cholesterol ratio and triglycerides. The use of cigarette smoking is seems to be associated with blood pressure, however it is not related levels of serum lipids.

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