A comparative study on lipid profile and uric acid among smokers and non-smokers

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Abstract

Introduction: Smoking cigarette/beedi leads to increased concentration of serum total cholesterol, triglyceride, low density lipoprotein and very low density lipoprotein, decreased in level of anti atherogenic high density lipoproteins and uric acid levels.

Material & Methods: The study was carried out in 50 healthy male smokers and 50 healthy male non-smokers selected from volunteers from general public, patient attendants and hospital staff of Owaisi Hospital Santosh Nagar, Hyderabad. The data was analyzed using SPSS software version 17.0. Descriptive results were expressed as mean and standard deviation (SD) of various parameters in different groups.

Results: Levels of triglycerides, LDL, VLDL, and TC were significantly higher among smokers compared to non-smokers. Anti atherogenic HDL and uric acid levels were lower among smokers.

Conclusions: The alteration of lipid profile and uric acid level in smokers have raised serious medical concern with respect to atherogenic risk and recommendation for counseling the smokers to quit smoking and routine evaluation of serum lipid profile in uric acid has been suggested.

Keywords: Lipid profile, Uric acid, Smokers, Non-smokers, Atherogenic

Introduction

Tobacco is a serious threat to health and a proven killer and ranks second as a cause of death in the world, taking its toll by killing some 5 million people globally[1]. In India tobacco kills 8–10 lakh people each year and majority of these deaths occur in very young people. It has been estimated that an average of five-and-a-half minutes of life is lost for each cigarette smoked[2].

A large number of risk factors which predispose to atherosclerosis and coronary artery diseases have been identified. These include modifiable ones like hypertension, dyslipidemia, smoking, diabetes mellitus, changing lifestyle and non-modifiable ones like age and sex. As the number of risk factors in an individual increases, the risk of developing atherosclerosis and its complications mainly as coronary artery diseases (CAD)[3].

Smoking which is recognized as a major risk factor for the development of ischaemic heart disease may lead to alter the normal plasma lipoprotein pattern. Incidence of developing CHD is directly related to the number of cigarette smoked[4]. Sudden death is 2-4 times more often in heavy smokers than non-smokers[5]. Smoking also produces oxidative stress in the body and this leads to decreased uric acid level which is an important antioxidant[6].

Smoking cigarette/beedi leads to increase in concentration of serum total cholesterol, triglyceride, low density lipoprotein and very low density lipoprotein and fall in levels of anti atherogenic high density lipoprotein as reported by various workers[7-8]. There is a dose response relationship between number of cigarettes/beedis smoked and cardiovascular morbidity and mortality[9]. It leads to altered physiological factors which include altered coagulation state, damaged vascular wall and alteration in lipid and lipoprotein content.

Aim

The aim of the present study is to compare lipid profile and uric acid levels in smokers and nonsmokers and to see whether there is any significant difference in the above parameters in these groups.

Materials and Methods

Methods of collection of data: The study was carried out in 50 healthy male smokers and 50 healthy male non-smokers selected from volunteers from general public, patient attendants and hospital staff of Owaisi Hospital, Santosh Nagar, Hyderabad.

After obtaining written informed consent, detailed history and physical examination was done in all subjects. Inclusion criteria for smokers and non-smokers:

1. The subjects were divided into 2 groups
   a. Non- smokers: subjects who have never smoked were taken as controls
   b. Smokers: subjects who have smoked more than 20 cigarettes or 30 beedis / day for at least 5 yrs or more.
2. The subject's were chosen in age groups of 20 – 60 yrs of age
3. The subjects were taking vegetarian or non-vegetarian or mixed Indian diet.

Chronic diseases like hypertension and diabetes mellitus were excluded.

After overnight fasting following laboratory investigations were done in all subjects:

- Serum total cholesterol (TC)
- Serum high density lipoprotein (HDL)
- Serum low density lipoprotein (LDL)
- Serum very low density lipoprotein (VLDL)
- Serum triglyceride (TGL)
- Serum uric acid
- The total cholesterol, plasma triglycerides and plasma HDL cholesterol were estimated by the enzymatic method with Endpoint colorimetry.
- Estimation of LDL cholesterol was done by using the formula below based on Friedewald's equation:

LDL Cholesterol =

$$\text{Total cholesterol} - \frac{\text{Triglycerides}}{5} - \text{HDL cholesterol}$$

- Estimation of VLDL cholesterol was done by using the formula VLDL= TG/5
- Estimation of uric acid by Enzymatic (Uricase / Trinder), endpoint colorimetry

The data was analyzed using SPSS software version 17.0. Descriptive results were expressed as mean and standard deviation (SD) of various parameters in different groups. Independent t test was used to calculate significance (p value) in between the groups. P value less than 0.05 is considered as significant and value above 0.05 was considered as non-significant.

Results

It is observed that the total cholesterol was significantly higher in the smokers when compared to non-smokers $p < 0.001$. (200.44 versus 170.48).

The serum triglycerides were significantly higher in smokers when compared to nonsmoker's $p < 0.001$. (169.4 versus 130.16).

The serum LDL was significantly higher in smokers when compared to non-smokers $p < 0.001$. (132.94 versus 104.36). The serum VLDL was significantly higher in smokers when compared to nonsmoker's $p < 0.001$. (32.5 versus 25.96).

The serum HDL was significantly lower in smokers compared to non-smokers $p < 0.001$. (34.74 versus 41.22). The serum uric acid was significantly lower in smokers compared to nonsmoker's $p < 0.001$. (3.61 versus 6.138).

Table 1: Lipid profile among non smokers & smokers

Lipid profile	Non-smokers (n = 50)		Smokers (n = 50)		t value	p value
	Mean	SD	Mean	SD		
Total cholesterol	170.48	29.17	200.44	33.47	4.771	<0.001
Serum triglycerides	130.16	35.57	169.4	53.43	4.323	<0.001
Serum HDL	41.22	3.3	34.74	6.22	6.501	<0.001
Serum LDL	104.36	27.04	132.94	34.55	4.605	<0.001
Serum VLDL	25.96	7.03	32.5	10.36	3.736	<0.001
Serum uric acid	6.138	0.65	3.61	0.936	15.576	<0.001

Table 2: Uric acid levels among non smokers & smokers

Lipid profile	Non-smokers (n = 50)		Smokers (n = 50)		t value	p value
	Mean	SD	Mean	SD		
Serum uric acid	6.138	0.65	3.61	0.936	15.576	<0.001

Discussion

Smoking in different forms is a major risk factor for atherosclerosis and coronary heart disease. In the present study 50 smokers and 50 nonsmokers were studied for their lipid profile and uric acid. Age, sex, obesity, alcohol, diet-these parameters were matched in smokers and non-smokers.

In our study it is revealed that triglycerides, LDL, VLDL, and TC were statistically significantly higher in smokers as compared to non smokers and HDL and Uric acid levels were lower in smokers as compared to non-smokers.

These findings are in concurrence with Joshi N et al, where the total serum cholesterol, LDL, VLDL and Triglyceride values were higher in smokers as compared to Non-smokers. These values increased with increase in number of Cigarette/bidis smoked. Serum levels of HDL are lower in smokers than the same in non-smokers. Serum HDL levels decrease with increase in number of Cigarette/bidis smoked. Association of HDL had inverse relationship with cigarettes/bidis smoked per day[10].

Similar findings were observed in Padmavathi P et al where a significant ($p < 0.05$) increase in serum cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol followed by a significant ($p < 0.05$) decrease in HDL cholesterol was found among cigarette smokers[11].

Another study by NS Neki et al found that serum total cholesterol was significantly higher among smokers ($p<0.001$) when compared to non smokers. The mean triglycerides levels were higher in smokers than non smokers and this difference was highly significant statistically ($p<0.001$). The mean LDL levels were higher in smokers than non smokers and this difference was statistically significant ($p<0.001$). The mean VLDL levels were higher in smokers than non smokers and this difference was statistically significant ($p<0.001$).The mean HDL levels were higher in non smokers than smokers and this difference was statistically highly significant ($p<0.001$)[12].

Tiwari A.K and his associates studied the effect of cigarette smoking on serum total cholesterol and HDL cholesterol in normal subject and coronary heart patients. The ratio of total cholesterol to HDL cholesterol was significantly higher in all normal and coronary heart disease smokers. Hence, the higher level of total cholesterol to high density lipoprotein cholesterol ratio approved toxic, one of the important parameter helps to ascertain the development of coronary heart disease in cigarette smoker[13].

A study of Khurana M[14] on lipid profile cigarette smoker and tobacco chewers showed lower HDL cholesterol in both the groups as compared to nonsmokers which is similar to the present study.

In the present study HDL & uric acid levels were decreased and LDL, TG and TC were increased among smokers. This study suggests increased dyslipidemia, lower uric acid levels among smokers as compared to nonsmokers which can predispose to coronary artery disease and various micro and macro vascular complications[15].

Hence it is necessary to persuade smoker to quit smoking as early as possible and timely measurement of lipid profile to detect dyslipidemia and prevent complication associated with dyslipidemia due to smoking.

Conclusions

The alteration of lipid profile and uric acid level in smokers have raised serious medical concern with respect to atherogenic risk and recommendation for counseling the smokers to quit smoking and routine evaluation of serum lipid profile in uric acid has been suggested.

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