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TO STUDY THE EFFECT OF CIGARETTE SMOKING ON DIFFERENT BIOCHEMICAL PARAMETERS

Biochemistry

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ABSTRACT

Smoking causes coronary heart disease, abdominal aortic aneurysm; lung, mouth and throat cancer, nerve and blood vessel damage. Hence the present study was undertaken to observe the effect of cigarette smoking on Serum lipid Profile and Fasting Blood Sugar level. A cross sectional study involving 100 Non-Smokers healthy individuals and 100 Smokers of same age group was planned. Result of the present study shows significantly higher value of fasting blood sugar, serum Cholesterol, Triglyceride and Very Low density lipoprotein with significant lower value of serum High density lipoprotein in smokers as compared to non smokers. This study concluded that, cigarette smoking induces dyslipidaemia and increase fasting blood sugar level in the direction of increased risk for coronary artery disease. So it is strongly recommended to avoid smoking for the benefit of cardiac health.

KEYWORDS

INTRODUCTION

According to the Center of Disease Control[1] and the United States Department of Health and Human Services,[2] cigarette smoking is linked to various preventable illnesses and continues to contribute to mortality rates in the U.S. About 444,000 people die each year due to smoking-related illnesses such as cancer, cardiovascular disease, and emphysema.[3,4]

In India tobacco kills 8–10 lacs people each year and many of these deaths will occur in people who are very young. It has been estimated that an average of five-and- half minutes of life is lost for each cigarette smoked. Deaths attributable to tobacco are expected to rise from 1.4% of all deaths in 1990 to 13.3% in 2020. India, as per WHO projection, will have the highest rate of rise in tobacco-related deaths during this period compared to all other countries/regions.[5]

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 non2 modifiable ones like age and sex. As the number of risk factors in an individual increases, so does the risk of developing atherosclerosis and its complications mainly coronary artery diseases (CAD).[6]

Nicotine is one of the toxins present in tobacco smoke.[7] It is found to have effect on person's catecholamine & cortisol secretion.[8,9] Nicotine and other toxic substances from tobacco smoke are absorbed through the lungs into the blood stream and are circulated throughout the body. These substances narrow or damage the blood vessel walls, which allow plaques to form at a faster rate than they would in a nonsmoker.[10]

Elevated catecholamine and cortisol can alter carbohydrate and lipid metabolism in such person.[11,12] Alteration in lipid metabolism may lead to dyslipidemic changes which may become a predisposing factor for atherosclerosis and ischemic heart disease leading to increased morbidity and mortality in smokers.[13]

Increases in plasma catecholamines have been known to cause increased hepatic glycolysis and gluconeogenesis and decreased pancreatic insulin secretion in humans, leading to increased plasma glucose.[14,15] The present study was undertaken to observe the effect of cigarette smoking on Fasting Blood Sugar level and serum Lipid Profile.

MATERIALAND METHOD

The cross sectional study is being carried out in 100 healthy male smokers and 100 healthy male non smokers selected from general public of Jaipur city after obtaining written consent.

Inclusion criteria for smokers and non-smokers:

1. The subjects were divided into two groups

a) Non- smokers: subjects who have never smoked.

b) Chronic smokers: Subjects who smokes from atleast 3 yrs or more.

2. The subject's were chosen in age groups of 18 - 40 yrs of age.
3. The subject's BMI were less than 28.

Exclusion criteria for smokers and non- smokers:

1. Subjects having diseases mentioned to influence blood lipids and Blood sugar level were excluded from the study like Nephrotic syndrome, Diabetes mellitus and Hypertension.
2. Subjects who were on following drugs: HMG CoA reductase inhibitors, Fibric acid derivatives, Nicotinic acid and Beta blockers.

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

1. Fasting blood sugar (FBS)
2. Serum total cholesterol
3. Serum high density lipoprotein (HDL)
4. Serum very low density lipoprotein (VLDL)
5. Serum triglyceride (TGL)

Data analysis:

Data were expressed as mean ± standard deviation (SD). The means were compared using Independent sample t-test. Analysis was two-tailed and a p-value ≤ 0.05 was considered as statistically significant.

Observation

RESULT

Table:1 Comparison of Lipid Profile among Smoker and Non-smokers

S. No.	Parameters	Non smokers (Mean ± SD)	Smokers (Mean ± SD)	p value
1.	Fasting blood sugar (mg/dl)	80.20 ±15.10	86.24± 18.32	0.0117
2.	Serum total cholesterol (mg/dl)	148.54 ± 27.19	168.77± 29.11	0.0001

3.	Serum high density lipoprotein (mg/dl)	55.14 ±12.80	47.28 ± 8.50	0.0001
4.	Serum very low density lipoprotein (mg/dl)	22.03± 5.63	30.44± 6.05	0.0001
5.	Serum triglyceride (mg/dl)	110.15± 28.17	152.22 ± 30.25	0.0001

Fasting Blood Sugar: According to table 1, Smokers had higher Blood Sugar levels compared to Non-smokers (86.24 and 80.20) this difference was statistically significant.

Serum Lipid Profile: The mean ± SD values for serum total cholesterol, HDL, V LDL and TG are given in Table 1. All the components of lipid profile studied (cholesterol, VLDL and TG) were found significantly increased for smokers compared to the healthy control non-smoking subjects. And significantly lower value of HDL was found in smokers than Non- smokers.

DISCUSSION

An approximately 120 million Indian adults smoked, which made India second to China in quantity of smokers. Previously bidis, locally made cigarettes with tobacco wrapped inside a Tendu leaf were used as smoked tobacco so present study were carried out for observe the effect of cigarette smoking on Serum lipid Profile and Fasting Blood Sugar level.

Cigarette smoking has been established as an independent risk factor for coronary heart disease, the mechanism by which it increases the risk of coronary heart disease are unclear. The possible reason for this may be, the increased carbonmonoxide in the blood of cigarette smokers may damage the endothelium and accelerate the entry of cholesterol into the wall of the artery promoting the development of atherosclerosis, thrombosis, The formation of carboxyhemoglobin creates relative anoxemia in the tissue, including the myocardium, Smoking enhances the platelet aggregation, and The nicotine absorbed from cigarette smoke may induce cardiac arrhythmias through its pharmacologic action.[16-18]

In our study serum triglycerides, LDL cholesterol and serum VLDL were significantly elevated among smokers compared to non-smokers and the results were in accordance with studies done by Sharma P et al, Mouhamed DH et al and Fariduddin JM et al.[19-31]

Dyslipidaemia in smokers is due to nicotine, which leads to lipolysis and release of free fatty acids into the blood stream via activation of adenyl cyclase in adipose tissue by nicotine stimulated secretion of catecholamines. These increased free fatty acids in liver give rise to increased hepatic Triglyceride and VLDL synthesis, thus increasing the concentration of Triglyceride and VLDL-C in blood. Thus, the risk of coronary artery disease is more in smokers compared to non-smokers.

Several studies reported high levels of plasma Homocysteine in chronic smokers.[22] Plasma Homocysteine is negatively correlated with HDL-C and Apo A-I. Increase levels of Homocysteine may lead to decrease level of HDL-C by several mechanisms. Further decrease in HDL-C in chronic smokers may also be explained by smoking induced increase catecholamine release, causing increase in VLDL-C and decrease in HDL-C concentrations.[23]

SUMMARY AND CONCLUSION

The present cross sectional study was carried out on 100 healthy non smokers and 100 healthy smokers. Fasting Blood sugar and Serum lipid profile were observed among both the groups. Our present study showed that significantly higher value of fasting blood sugar, serum Cholesterol, Triglyceride and Very Low density lipoprotein with significantly lower value of serum High density lipoprotein level in smokers as compared to non smokers. Dyslipidaemia is a well-established risk factor for the development of coronary artery disease. Our study demonstrated presence of dyslipidemia in chronic smokers.

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