

## A COMPARATIVE STUDY OF EFFECTS OF SMOKING ON LIPID PROFILE AMONG HEALTHY SMOKERS AND NON-SMOKERS

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### ABSTRACT

#### BACKGROUND

Coronary artery disease forms a major non-communicable disease in both developed and developing countries. In western countries, older age groups are affected whereas in our country India, it is common among younger age group. Many risk factors have been evaluated. Cigarette smoking contributes for major risk factor for coronary artery disease, atherosclerosis and peripheral vascular disorders. Mechanism of causing coronary artery disease is multifactorial, it has major adverse effects on lipid profile and homocysteine levels which are again risk factors for coronary artery disease. Hence, this study was undertaken to compare the effects of smoking cigarettes/beedis on lipid profile among smokers and non-smokers.

#### MATERIALS AND METHODS

It was a case - control study carried out on 50 healthy smokers and 50 healthy age and weight matched non-smokers attending the medicine OPD of Basaveshwara Medical College, Chitradurga from January to April 2017. Subjects in both groups were in the age range of 25-35 yrs., with no history of alcohol abuse, diabetes mellitus, hypertension, hepatic impairment, renal disease or history of drug intake which alter the lipid profile.

#### RESULTS

The mean serum total cholesterol, serum triglycerides, serum LDL- cholesterol & serum VLDL-cholesterol were significantly higher while antiatherogenic serum HDL cholesterol were significantly lower in smokers when compared with non-smokers and it was statistically significant ( $p < 0.001$ ).

#### CONCLUSION

Present study shows a statistically significant relationship between cigarette smoking and increased lipid profile. Thus, chronic smokers are at the significant risk of developing Coronary Heart Disease. So, smokers should be counselled and encouraged to quit smoking and adopt a healthier life style.

#### KEYWORDS

Cholesterol, Smoking, Cigarette, Atherosclerosis.

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#### BACKGROUND

Smoking is one of the most prevalent addictive habits and it is increasing rapidly throughout the world. India is one of the largest producers of tobacco globally and approximately half of it is used for local consumption.<sup>1</sup> Smoking of tobacco is done in many forms like cigar, cigarette, beedi, hukka etc. In India smoking Beedi and cigarette is highly prevalent in both rural and urban areas.<sup>2</sup> Tobacco continues to be the second major cause of death in the world.<sup>3</sup>

It is estimated that tobacco smoke is a complex mixture containing 5,000 chemicals which can harm various aspects of our body via different mechanisms.<sup>4</sup> Smoking is an important modifiable risk factor for various diseases like atherosclerosis, coronary heart diseases, lung & oral

cancers, chronic obstructive pulmonary diseases, etc..<sup>5</sup> Around 8–10 lakh people each year in India due to smoking.<sup>6</sup>

Many studies have shown that smoking cigarettes or beedis results in increase in the concentration of atherogenic serum total cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol and decrease in the levels of anti-atherogenic HDL cholesterol.<sup>7-10</sup>

Nicotine a toxin present in tobacco smoke is found to have effect on catecholamine & cortisol secretion.<sup>11,12</sup> which in turn can alter carbohydrate and lipid metabolism.<sup>13</sup> This alteration in lipid metabolism may result in dyslipidemic changes. Thus, this study was undertaken to compare the effects of smoking cigarettes/beedis on lipid profile among smokers and compared with non-smokers.

Adam D et al did prospective randomized study to evaluate effect of smoking and smoking cessation on lipid profile. In their study, they found that smoking cessation improved HDL levels even inspite of gaining weight, this association was stronger in women. But, there was no change in LDL level. But increased HDL may result in decreased cardiovascular diseases.<sup>14</sup>

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Deepa Singh did a case – control study on 300 subjects among which 150 were chronic smokers who had smoked for more than 20 years, taken as cases and 150 healthy non-smokers taken as controls. Lipid profile done on all subjects and they found that Total cholesterol, Triglycerides, Low density protein (LDL), Very low-density protein were significantly elevated in smokers compared to non-smokers. High density protein was significant higher in non- smokers compared to smokers.<sup>15</sup>

Shenoi AS et al. did case control study on 50 smokers taken as cases and 50 non-smokers with age, weight and dietary habits matched individuals were taken as controls. On evaluation of lipid profile, it was found that total cholesterol, triglycerides, LDL were significantly higher among cases compared to controls. HDL was lower in smokers.<sup>16</sup>

### Aims and Objectives

To study effect of smoking on lipid profile and compare with age matched healthy non-smokers

### MATERIALS AND METHODS

**Inclusion Criteria-** It was a case - control study which was carried out on 50 healthy smokers and compared with 50 healthy age and weight matched non-smokers attending medicine OPD of Basaveshwara Medical College, Chitradurga from January to April 2017. Subjects in either groups were in the age group of 25-35 years.

**Exclusion Criteria-** Persons with history of hypertension, diabetes mellitus, alcoholism, liver, cardiac or renal diseases or any other major illness and who are on medications which can alter serum lipid profile level were excluded from the study.

**Sample Collection-** 3 ml of venous blood was collected after 12 hours overnight fasting. Serum was separated by centrifugation and used for serum lipid profile estimation.

**Statistical Analysis-** Values were presented as mean  $\pm$  SD and the statistical analysis was done using SPSS 17.0 software. Student's unpaired t-test was used for comparison of parameters between two groups. The p-value of less than 0.05 was considered as statistically significant.

### RESULTS

Table 1 shows that the parameters of lipid profile such as Total Cholesterol, Triglyceride, VLDL-Cholesterol, LDL-Cholesterol were statistically significantly higher in smokers as compared to non-smokers. HDL-Cholesterol was significantly lower in smokers than in non-smokers.

In our study total cholesterol was elevated in cases (168.26  $\pm$  41.56) compared to controls (117.16  $\pm$  36.32) which was statistically significant. Triglycerides and LDL cholesterol were significantly elevated in smokers (199.71  $\pm$  32.11, 187.68  $\pm$  9.56) compared to non-smokers (115.11  $\pm$  55.40, 108.71  $\pm$  14.68) respectively.

Anti-atherogenic HDL- Cholesterol was significantly decreased in smokers (36.26  $\pm$  7.23) compared to non-smokers (46.36  $\pm$  7.63).

Parameters	Control (Mean $\pm$ S.D.)	Cases (Mean $\pm$ S.D.)	P value
Total cholesterol (mg/dL)	117.16 $\pm$ 36.32	199 $\pm$ 28.10	<0.001
Triglyceride mg/dl	115.11 $\pm$ 55.40	199.71 $\pm$ 32.11	<0.001
Serum HDL (mg/dL)	46.36 $\pm$ 7.63	36.26 $\pm$ 7.23	<0.001
LDL- Cholesterol	108.71 $\pm$ 14.68	187.68 $\pm$ 9.56	<0.001
Serum VLDL	22.12 $\pm$ 6.96	33.91 $\pm$ 8.25	<0.001

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

### DISCUSSION

Smoking has been practiced since many centuries dating back to 6000 BC. Cigarette smoke contains more than 4000 chemicals which has adverse effect on health. One of the biochemical changes observed due to smoking is deranged lipid profile which again increases risk for cardiovascular diseases. Hence, risk for coronary heart disease is more in cigarette smokers than non-smokers.

Many studies have shown that triglycerides, LDL-Cholesterol, VLDL- Cholesterol, Total Cholesterol were significantly higher in smokers as compared to non-smokers.<sup>17,18</sup> In our study mean serum total cholesterol in non-smokers was 117.16  $\pm$  41.56 mg/dl and it was significantly higher in smokers, 199  $\pm$  28.10 mg/dl, similar observations were obtained in other studies.

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<sup>19</sup>, Mouhamed DH et al<sup>20</sup> and Fariduddin JM et al<sup>21</sup>.

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.

Our study also demonstrated significant fall in of HDL cholesterol levels (p<0.05) in smokers compared to non-smokers (Table 1). Several studies reported high levels of plasma Homocysteine in chronic smokers.<sup>22</sup> 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.

With all the above mechanisms smoking promotes atherosclerosis by lowering the anti-atherogenic HDL-Cholesterol and increasing the atherogenic lipoproteins LDL-C which further leads to coronary artery disease.

### CONCLUSION

Smoking is one of the most important preventable causes of cardiovascular morbidity and mortality in India. Smoking is associated with increased serum TC, TG, LDL & VLDL and decreased serum HDL- cholesterol. Present study shows a statistically significant relationship between cigarette smoking and increased lipid profile. Thus, chronic smokers are at significant risk of developing Coronary Heart Disease. So, they should be routinely screen for dyslipidaemia to assess the risk for cardiovascular diseases. Smokers should be counselled and encouraged to quit smoking and adopt a healthier life style.

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