Effect of Chronic Smoking on Plasma Lipid Profile in male Smokers of Kurnool District

MOHAMMED GHOUSE S1, MADHUSUDHAN KV2, AND MEER ALTAF AHMED3

1Department of Zoology, Osmania College, Kurnool, Andhra Pradesh, India.
2Department of Botany, Government College for Men, Kurnool, Andhra Pradesh, India.
3Department of Chemistry, Osmania College, Kurnool, Andhra Pradesh, India.

ABSTRACT

The aim of the present study was to assess the association between smoking and the alteration in plasma concentration of lipid profile. Smoking is an escalating health problem especially in developing countries such as India. By 2030, if current trends continue, smoking will kill more than 9 million people annually. Every cigarette reduces the life span by about 5 minutes. In the present study male subjects were divided into different groups and their lipid profile have been estimated by various tests i.e. Cholesterol, Triglyceride, HDL-C, LDLC, VLDL-C. It was observed that in cigarette smokers HDL-C level decreased and cholesterol, triglyceride, LDL-C, VLDL-C level increased as compared to the control i.e. non- cigarette smokers. The variation in the level of lipid profile from normal values causes several diseases such heart disease, and stroke and has numerous immediate health effects on the brain and on the respiratory, cardiovascular, gastrointestinal, immune systems.

Key words: Smoking , HDL- cholesterol, , Triglycerides, health effects

Introduction

Cigarette smoking is the serious health problems and most important avoidable cause of death in world. Every cigarette reduces the life span by about 5 minutes. Cigarette smoking remains the most important cause of the preventable morbidity and the early mortality. Nicotine is highly addictive, it raises the brain levels of dopamine and it produces withdrawal symptoms on its discontinuation. Smoking in different forms is a major risk factor for atherosclerosis and coronary heart disease,[1-3]. A one to threefold increase in risk of myocardial infraction (MI) has generally been noted among current cigarette smokers [4]. A lipid profile is a direct measure of three blood components: cholesterol, triglycerides, and high-density lipoproteins (HDLs). Cholesterol is a vital substance that your body uses to produce such things as digestion-aiding material, hormones, and cell membranes. Cigarette/bidi leads to increase in the concentration of serum total cholesterol, triglycerides, LDL-cholesterol, VLDL-cholesterol and fall in the levels of antiatherogenic HDL cholesterol, as reported by various workers [5-7]. Tobacco is patho-genetically a cholesterol dependent risk factor and it acts synergistically with other risk factors for the causation of coronary heart disease. Thus, a strong synergistic interaction exists between hyper cholesterololaemia and tobacco consumption in the genesis of coronary heart disease. Tobacco smoke also contains various types of nitrosamines. The most important nitrosamines are: N-Nitroso nor nicotine (NNN), 4-(Methyl nitroso amino) –1-(3 Pyridyl)-1 (Butanone (NNK), Nitrosoanatabine, Nitrosoanabasine. All these nitrosamines are formed from various alkaloids which are present in tobacco, i.e., nicotine, nornicotine, anabasine and anatabine by nitrozation. These nitrosamines are potential carcinogenic substances and they are capable of alkylating the DNA. The actual content of nicotine in tobacco varies between 1-2%. The aim of the study was to find out differences in the serum lipid profile between young smokers and nonsmokers in the fasting state. While cholesterol is necessary for various bodily functions, too much cholesterol is harmful, since excess cholesterol can be deposited in blood vessel walls. These fat deposits can lead to atherosclerosis, or hardening of the arteries, and cardiovascular disease. High levels of triglycerides are also associated with an increased risk of heart disease. Plasma lipoprotein abnormalities are said to be the underlying major risk factors and may even be essential for the common occurrence of atherosclerotic vascular diseases [8].

Material and Methods

40 healthy male smokers in the age group of 19-39 years were recruited for the study in Kurnool district, Andhra Pradesh, India after obtaining written informed con-
sent (group I). 40 healthy non-obese, non-smokers, age and weight matched selected from the patients attendants and hospital staff were recruited as controls (group II). Group I (smokers) were divided into two different categories according to the number of cigarettes/bidis/ smoked per day and the duration of smoking. A detailed physical examination of the subjects of both groups was done.

The blood samples are collected after an overnight fasting for about 14 hours. 5 ml. of whole blood was collected from each subject and the serum was separated. The serum lipid profiles were studied and the lipid levels were calculated. The readings which were obtained are shown in the tables. The complete lipid profile measures the serum total cholesterol, HDL and the triglycerides. The persons abusing alcohol, ex-smokers, diabetes mellitus, hypertension, renal disease, hepatic impairment, endocrine disorders and obesity and on drugs like β-blockers, lipid lowering drugs, and thiazide diuretics are excluded from the study.

RESULTS

(Table I & Table II)

There was significant increase in the mean values of total cholesterol LDL-C VLDL-C and triglycerides: while there was significant fall in mean HDL-C in smokers as compared to that in non-smokers.

Discussion

Smoking, or if we say more carefully, tobacco, has a very bad influence on the total health system of the human beings, not only effecting the arteries or the lung but almost all the functional systems of the body, from cell to cell. It has long been established that tobacco contains nicotine and it has a considerable influence on increasing the level of lipids in the blood. Smokers have significantly higher triglycerides, LDL-C, VLDL-C, TC in comparison with the non smokers. The mean serum triglycerides levels in non-smokers and smokers were 127.10 ± 32.60 mg/dl and 175 ± 55.65 mg/dl respectively. The total cholesterol were higher in smokers i.e serum concentration 184 ± 28.10 mg/dl in comparision with the non smokers i.e 162.1 ± 20.26 mg/dl. The mean LDL-C and VLDL-C values in nonsmokers were 89 ± 17.80 mg/dl and 18.3 ± 1.5 mg/dl respectively. But these values were significantly higher in subjects smoking. The mean HDL-C in non-smokers was 47.65 ± 4.18 and 42.8 ± 4.12 in smokers respectively. Smoking causes an increase in oxidised LDL-cholesterol level which plays the key role for atherosclerotic process [9]. A high level of LDL-C, VLDL-C and triglyceride are strongly associated with development of coronary artery disease while a low level of HDL-C remains a significant independent predictor of coronary artery disease.

### Table I

**Showing distribution of smokers in relation to duration and no. of cigarettes/ bidis smoked/day**

<table>
<thead>
<tr>
<th>Duration In yrs.</th>
<th>Mean</th>
<th>No. of cigarettes/bidis smoked per day</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>10%</td>
</tr>
<tr>
<td>1-5</td>
<td>3</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>6-10</td>
<td>8</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>11-15</td>
<td>13</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>27</td>
<td>40</td>
</tr>
</tbody>
</table>

*Most of the smokers (36) had been smoking for a mean duration of 8 yrs as shown in table I*

### Table II

**Showing lipid profile in non-smokers and smokers**

<table>
<thead>
<tr>
<th>Lipid profile Values (mg/dl)</th>
<th>Non-smokers (n = 40)</th>
<th>Smokers (n = 40)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean HDL-C</td>
<td>47.65 ± 4.18</td>
<td>42.8 ± 4.12</td>
<td>&lt; 0.01 **</td>
</tr>
<tr>
<td>Mean LDL-C</td>
<td>89 ± 17.80</td>
<td>102.7 ± 29.16</td>
<td>&lt; 0.05’</td>
</tr>
<tr>
<td>Mean VLDL-C</td>
<td>18.3 ± 1.5</td>
<td>26.7 ± 3.1</td>
<td>&lt; 0.05’</td>
</tr>
<tr>
<td>Mean TC</td>
<td>162.1 ± 20.26</td>
<td>184 ± 28.10</td>
<td>&lt; 0.05’</td>
</tr>
<tr>
<td>Mean TG</td>
<td>127.10 ± 32.60</td>
<td>175 ± 55.65</td>
<td>&lt; 0.01 **</td>
</tr>
</tbody>
</table>

* Significant, ** Highly significant
Conclusion

Once again, let us remember that old is gold; that prevention is better than cure. This has a very applicable role as far as smoking is concerned. The nicotine in tobacco causes a decrease in the HDL cholesterol level (good cholesterol) with an increase in the LDL cholesterol level (bad cholesterol) and also an increase in the VLDL cholesterol level, with an accumulation of lipids in the arterial wall. This is responsible for the greater risk of developing atherosclerosis in the tobacco users than in the non-tobacco users. To conclude smoking causes alteration in lipid profile. Cigarette smoking has been found to increase the concentrations of triglycerides and lowers the concentration of HDL cholesterol [10, 11]. Amount and duration of smoking also influences dyslipidaemia. Smokers excrete more ascorbic acid in urine as compared to nonsmokers. Low plasma ascorbic acid in smokers might be due to increased excretion of ascorbic acid in urine. Increased amount and duration of smoking causes more of dyslipidaemia. The serum anti-atherogenic HDL-C level is significantly low in chronic smokers irrespective of the number of cigarettes smoked. The serum level of total cholesterol, LDL-C and VLDL-C and TG are significantly increased in persons smoking in comparison with non-smokers therefore raising the cardiovascular disease risk.

References