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Research Article

To study the Effect of Duration of Smoking on Lipid Parameters in Otherwise Healthy Subjects

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Abstract
Background: *India is one of the largest consumers of tobacco worldwide. Addiction of tobacco smoking is related with many health hazards. Nicotine of tobacco can be attributed to changes in lipid profile and its atherogenic complications.*
Aims and Objectives: *To study and compare lipid levels with severity and duration of smoking in healthy subjects.*
Materials and Methods: *Fifty current regular smoker subjects were studied in JA Group of Hospitals and GR Medical College, Gwalior from June 2014 to October 2015.Depending on severity of smoking subjects were classified as mild smokers (regularly between 1-10 cigarettes or bidis/day), moderate smokers (regularly between 11-20 cigarettes or bidis/day and heavy smokers (regularly > 20 cigarettes or bidis/day. Depending on duration of smoking subjects were classified as those between 1-10 years of duration, between 11-20 years of duration and >20 years of smoking duration. All the subjects underwent estimation of total cholesterol (TC), triglycerides (TG), low density lipoproteins (LDL), high density lipoproteins (HDL) and HDL / TC ratio.*
Results: *Mean TC in smoker and non smoker was 202.2± 26.7 vs 162.2± 22.2 (p < 0.001), mean TG was 195.2±46.3 vs. 145.1±24.1 (p<0.001), mean LDL was128.0 ±28.3 vs. 92.5±20.9 (p<0.001) and mean HDL was34.2±5 vs. 42.2±4.6 (p<0.001) mg/dl respectively. TC (235.7±0.56 vs. 209.6±22.6 vs. 178.9±20.0 respectively), TG (198.6±4.4 vs. 197.1±48.8 vs. 191.3±34.9 respectively) and LDL (170.7±7.7 vs. 136.7±24.3 vs. 107.3±22.9 respectively) were higher in heavy smokers compared to moderate and mild smokers, whereas HDL (32.3±.21 vs. 33.4±4.4 vs. 39.9±6.2 respectively) was lower in heavy smokers compared to moderate and mild smokers.*
Conclusion: *A direct relationship exists between severity and duration of smoking with an increase in Total Cholesterol, Triglycerides and Low Density Lipoproteins.*
Keywords: *Smoking severity, duration of smoking, lipid abnormality, CHD.*

Introduction

India is one of largest producer and exporter of tobacco in the world. Tons of tobacco is grown every year in India. Approximately half of the production is released for local consumption. [1] Tobacco is consumed in many ways such as chewing, smoking, etc.[2]

Tobacco smoking is one of the well known modifiable risk factor for atherosclerosis, coronary heart diseases (CHD), lung and oral cancers, chronic obstructive pulmonary diseases (COPD), etc.[3] In India, tobacco kills 8-10 lakh people every year and most of these deaths occur in young age. An estimate says that an average of five-and-a-half minutes of life is lost for each cigarette smoked.[4]

Nicotine is one of the main toxin present in tobacco smoke. [5] It is found to have effect on person's catecholamine and cortisol secretion. [6] Elevated catecholamine and cortisol can alter carbohydrate and lipid metabolism in such person. [7,8] Alteration in lipid metabolism may lead to dyslipidemia, which may become a predisposing factor for atherosclerosis and ischemic heart disease leading to increased morbidity and mortality in smokers. [9] This study was done to find the effect of duration and quantity of smoking on various lipid parameters.

Materials and Methods

Present study was done including 50 subjects, who are current regular smoker, attending JA Group of Hospitals and GR Medical College, Gwalior between June 2014 to October 2015. Depending on severity of smoking, subjectswere classified as mild smokers (regularly between 1-10 cigarettes or bidis/day), moderate smokers (regularly between 11-20 cigarettes or bidis/day and heavy smokers (regularly > 20 cigarettes or bidis/day. Depending on duration of smoking subjects were classified as those between 1-10 years of duration, between 11-20 years of duration and >20 years of smoking duration.

Ethical clearance was obtained from the Institutional Ethical Committee before starting the study.

Both cigarette smokers and bidi smokers were included in the study. The parameters including Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoproteins (LDL), High Density Lipoproteins (HDL) and HDL / TC ratio were estimated.

All the data analysis was performed using IBM SPSS ver. 20 software. The mean levels of various variables were correlated with basal reference for normal individuals. Relevant statistical methods like student 't' test and whenever required Mann-Whitney test was used to see the significance of difference in mean values between groups and to know there correlation between inter and intra group variations.

Results

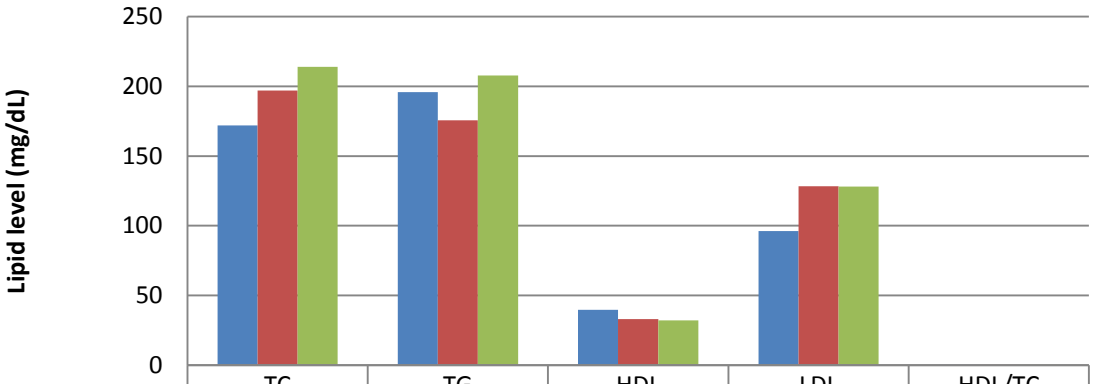
Mean age of subjects in study cohort was 36.45 ±62.22 years.Majority of the subjects were in the age group of 31-40 (n=15).The various lipid parameters in smokers as par the severity and duration are shown in table 1.

Table 1: Showing lipid profile in smokers depending on severity and duration of smoking.

Parameters		TC	TG	HDL	LDL
Smoking severity*	Mild	178.9±20.0	191.3±34.9	39.9±6.2	107.3±22.9
	Moderate	209.6±22.6	197.1±48.8	33.4±4.4	136.7±24.3
	Heavy	235.7±0.56	198.6±4.4	32.3±.21	170.7±7.7
Duration of Smoking*	<10	172.0±13.4	195.9±43.5	39.6±6.1	96.1±14.4
	10-20	197.1±2.3	175.6±44.7	33.7±3.6	128.3±24.8
	>20	214.1±22.5	207.9±38.	32.2±3.9	141.1±24.7

Data is expressed as mean± SD, TC; total cholesterol, TG; triglyceride, LDL; low density lipoprotein. P value <0.05 is considered as significant. * p value between non smoker and smokers with respect to all lipid parameter is <0.001.

Graph 1: Showing lipid level in study cohort based on duration ofcigarette smoking



	TC	TG	HDL	LDL	HDL/TC
1-10 (n=10)	172	195.9	39.6	96.2	0.22
11-20 (n=16)	197.1	175.6	33.1	128.3	0.17
>20 (n=24)	214.1	207.9	32.2	128	0.15

Discussion

Cigarette smoking substantially increases the risk of coronary heart disease and ischemic stroke. [8] In present study lipid levels were higher in subjects with smoking. The serum TC levels showed a steady increase from mild to severe smokers in present study. Joshi et al reported that TC values in subjects smoking 1-10 cigarettes/bidis per day was 185.61 mg/dl and those smoking 11-20 cigarettes/bidis per day was 192.12, whereas in smokers with >20 cigarettes/bidis per day was 205.5 mg/dl. [10] Present study finding are in accordance with those of Muscat et al [11].Nekiet al reported that the TC values in subjects smoking 1-10 cigarettes/bidis per day was 176.45±29.17 mg/dl and those smoking 11-20 cigarettes/bidis per day was 186.15±34.19 mg/dl [12].

The serum high density lipoprotein cholesterol levels showed a steady decrease from mild (35.9mg/dL) to severe smokers (32.3mgldL). The value in severe smokers was not statistically significant even though it was low because of less number of patients in this group. In moderate smokers, also it was low p<0.001. Mild smokers showed decreased levels of HDL (p<0.001). A study by Joshi et al reported that subjects smoking 1-10 cigarettes/bidis per day had significantly higher HDL-C (48.61 mg/dl) as compared to those who smoked 11-20 cigarettes/bidis per day, 46.43 mg/dl and 46.75 mg/dl in those who smoked > 20 cigarettes/bidis per day. [10] Similar findings have been reported by Brischetto et al.[13] Neki et al also reported that the subjects smoking 11-20 cigarettes/bidis per day had significantly low HDL-C (41.2 ± 5.80 mg/dl) as compared to those who smoked 1-10 cigarettes/bidis per day (44.6 ± 6.09 mg/dl) [12] which is in agreement with the present study findings.

In present study TG showed a dose response relationship with severity of smoking. The values in non-smokers were 144.0±26.8mgldL, mild smokers 184.3±39.9 mg/dL, moderate smokers 194.9±51.0 mg/dL and in severe smokers it was 200.6mg/dI. In a similar study done by Joshi et al on 100 subjects, reported that the mean values of TG were significantly higher in those subjects smoking 11- 20 cigarettes/bidis per day as compared to those smoking 1-10 cigarettes/ bidis per day and even higher in case of those who smoked >20 cigarettes/bidis per day. [10] Present study findings are also similar to those of Rustogi et al. [14] The reduced lipoprotein lipase activity in smokers as observed by Freeman et al [15] may explain impaired triglyceride metabolism and higher triglyceride levels. Neki also reported that the values of TG and TC were significantly higher

in those subjects smoking 11- 20 cigarettes/bidis per day as compared to those smoking 1-10 cigarettes/bidis per day. [12] In this study it was observed that the mean value of HDL/TC ratio was low in smokers and showed an inverse relationship with severity of smoking ($p<0.001$).

In present study the values of TG, TC and LDL were higher in those subjects who smoked for more than 10 years. A rising trend of mean values was seen with increase in duration of smoking but the differences were not statistically significant. It clearly shows that duration of smoking directly affects lipoprotein value in smokers suggesting increase in cardiovascular risk. The serum HDL cholesterol showed a steady decrease in values from 39.6 ± 6.1mg/dL in first group (>10 years of duration), 33.7 ± 3.6 mg/dL in second group (11-20 years of duration) ($p<0.001$), 32.3 ± 3.9 g/dL ($p<0.001$) in the third group (>20 years of duration). The decrease was less in smokers who smoked between 1-10 years when compared to that of non-smokers (42.2 ± 4.6mg/dL). Similar reports were shown byJoshi et al which reported that the values of TG, TC and VLDL were higher in those subjects smoking cigarettes/bidis for more than 15 years as compared to those who smoked for 10-15 years, 5-10 years and 1-5 years. [10] The HDL/TC ratio of smokers was low among smokers with duration of smoking more than 10 years.

Conclusion

The serum anti-atherogenic HDL level is significantly low in chronic smokers irrespective of the number of cigarettes smoked. The serum level of TC, LDL and TG are significantly increased in persons smoking 11-20 cigarettes/bidis per day as compared to those smoking <10 cigarettes/ bidis per day and therefore raising the cardiovascular disease risk.

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