

Study Of Lipid Profile And Levels Of Fibrinogen In Smokers And Non-Smokers

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Abstract

Introduction: The tobacco epidemic is currently one of the biggest public health threat in the world which kills about 6 millions of people every year and more than 5 million deaths among them are due to direct consumption of tobacco. Fibrinogen is a plasma glycoprotein that is produced by hepatocytes in response to interleukin -1, interleukin-6 and tumor necrosis factor- α during acute severe infections and inflammation. It has been found that higher plasma fibrinogen levels and dyslipidemia leads to increase in incidence and severity of coronary heart disease.

Material & methods: This study was done in M.B Govt. Hospital of RNT Medical College Udaipur on indoor as well as outdoor patients during the period August 2019 to November 2020 after getting institutional ethical committee clearance. All these subjects were subjected to medical examination as per a fixed proforma. Descriptive and inferential statistical analysis was carried out in the present study.

Results: Mean Levels of serum total cholesterol, triglycerides, LDL-C and VLDL-C were high while HDL-C levels were low in smokers as compared to non-smokers. The mean plasma fibrinogen levels was significantly higher in smokers than non-smokers.

Conclusion: There is elevations in both lipid parameters and fibrinogen levels in chronic smokers compared with non-smokers, so they can be used to assess the prognosis in chronic smokers and hence reduce morbidity and mortality associated with hyperlipidemia and hyperfibrinogenemia.

Keywords: Lipid profile, Fibrinogen, Coronary heart disease.

Introduction:

The tobacco epidemic is currently one of the biggest public health threat in the world which kills about 6 millions of people every year and more than 5 million deaths among them are due to direct consumption of tobacco.

The World Health Organisation (WHO) has named tobacco as one of the greatest public health threats of the twenty-first century.

Among more than 1 billion of smokers worldwide, nearly 80% lives in low and middle income countries¹.

The risk of mortality by cardio vascular diseases in smokers is about double as compared to persons who have never smoked in their life.

Risk of diseases due to smoking is not just limited to active smokers but also to passive smokers and persons exposed to environmental tobacco smoke.

It has also been found that smokers have somewhat different lifestyle then non-smokers, as they usually consume more fat and less of fibres, fruits and useful oilseeds which predisposes them to atherosclerosis and coronary artery diseases².

Many studies confirm that smoking leads to increase in level of inflammatory marker is in blood like fibrinogen and C- reactive proteins³.

Smokers have been found with higher levels of total cholesterol and LDL cholesterol and with low levels of HDL cholesterol which aggravates the risk of myocardial infection, sudden cardiac death, stroke and peripheral vascular diseases⁴.

It has been found that most of the actions of smoking which causes proatherogenic effect like interference with blood coagulation, induction of endothelial dysfunction and enhancement of lipid peroxidation, reverses shortly after quitting of smoking⁵.

Fibrinogen is a plasma glycoprotein that is produced by hepatocytes in response to interleukin -1, interleukin-6 and tumor necrosis factor- α during acute severe infarctions and inflammation.

It has been found that higher plasma fibrinogen concentration leads to increase in incidence and severity of coronary heart disease⁶.

Materials and Methods:

This study was done in M.B Govt. Hospital of RNT Medical College Udaipur on indoor as well as outdoor patients during the period August 2019 to November 2020 after getting institutional ethical committee clearance. In our study Test subjects were male patients of age 30-60 yrs who are chronic smokers for at least 10 years. Control subjects were males of age 30-60years with no history of smoking. All these subjects were subjected to medical examination as per a fixed Proforma.

Descriptive and inferential statistical analysis was carried out in the present study.

Student 't' test (two tailed, independent) used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. And Student t test (two tailed, dependent) used to find the significance of study parameters on continuous scale within each group. Chi-square / Fisher Exact test used to find the

significance of study parameters on categorical scale between two or more groups.

Standard statistical methods were used to analyse the data. Patients characteristics were expressed as mean \pm SD for continuous variables and they were compared using Chi square test.

Inclusion Criteria:

Test Subjects: 100 males who are Smokers for >10 yrs from M.B. Govt. Hospital, Udaipur of age between 30-60yrs.

Control Subjects: 100 males who are Non-Smokers from M.B. Govt. Hospital, Udaipur of age 30-60 yrs.

Subjects in both groups were in the age range of 30-60yrs., having no history of diseases like diabetes mellitus, hypertension, hepatic impairment, renal disease, and obesity, and are neither on drugs like β -blockers, lipid lowering drugs, or thiazide diuretics.

Exclusion Criteria: Females, male (smokers and non smokers) having history of diseases like diabetes mellitus, hypertension, hepatic impairment, renal disease, and obesity, and those on drugs like β -blockers, lipid lowering drugs, or thiazide diuretics.

Results:

Mean serum total cholesterol in smokers was 265.92 \pm 38.22mg/dl, triglycerides level was 349.93 \pm 73.78mg/dl, HDL cholesterol level was 42.25 \pm 3.73mg/dl, LDL cholesterol was 153.92 \pm 27.98mg/dl and VLDL cholesterol level was 70.07 \pm 14.90 mg/dl.

Mean serum total cholesterol in non smokers was 161.31 \pm 13.40mg/dl, triglycerides level was 129.19 \pm 25.78mg/dl, HDL cholesterol level was 51.74 \pm 38.15mg/dl, LDL cholesterol was 82.7 \pm 16.29mg/dl and VLDL cholesterol level was 25.87 \pm 3.94mg/dl.

The mean plasma fibrinogen levels in non-smokers was 2.80 \pm 0.44g/l while it was significantly higher in smokers, i.e., 6.58 \pm 0.76g/l. There is a significant association between rise in plasma fibrinogen levels in smokers with p value <0.001.

Table 1. Comparison of lipid profile in two groups studied

Lipid profile	Smoker	Non-smoker	P value
Total cholesterol	265.92±38.22	161.31±13.40	<0.001
TG	349.93±73.78	129.19±25.78	<0.001
HDL-C	42.25±3.73	51.74±38.15	<0.001
LDL-C	153.92±27.98	82.7±16.29	<0.001
VLDL-C	70.07±14.90	25.87±3.94	<0.001

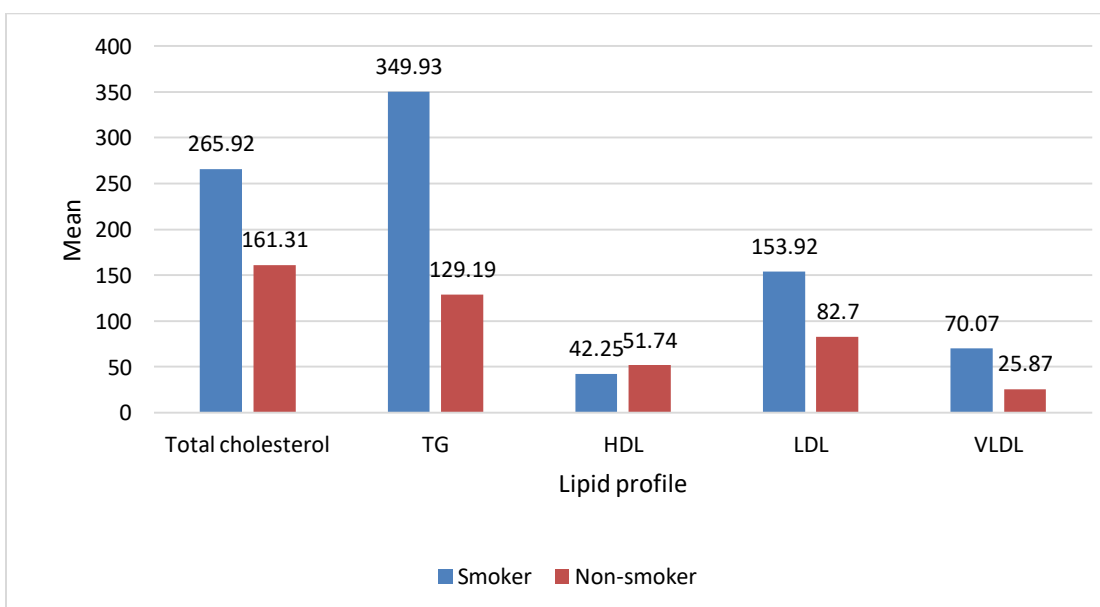


Fig.1: Comparison of lipid profile in two groups studied

Table 2. Comparison of fibrinogen level in two groups studied

	Smoker	Non-smoker	P value
Fibrinogen	6.58±0.76	2.80±0.44	<.001

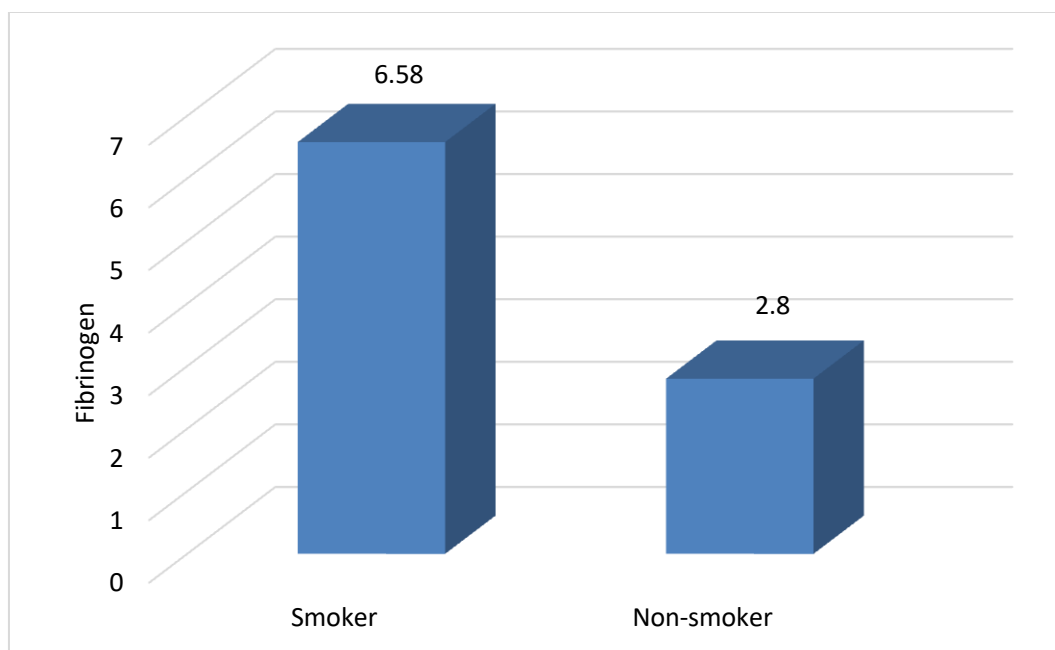


Fig.2: Comparison of fibrinogen levels in two groups studied

Table 3. Comparison of lipid profile according to pack years in smokers

Lipid profile	Pack years			P value
	11-20	21-30	>30	
Total cholesterol	204.50±12.76	249.17±18.51	290.25±26.42	<0.001
TG	251.86±21.58	312.27±41.42	394.63±59.35	<0.001
HDL-C	47.50±1.59	44.60±1.96	39.68±2.39	<0.001
LDL-C	107.00±12.36	142.33±13.91	171.86±17.65	<0.001
VLDL-C	50.35±4.31	62.43±8.29	79.09±12.05	<0.001

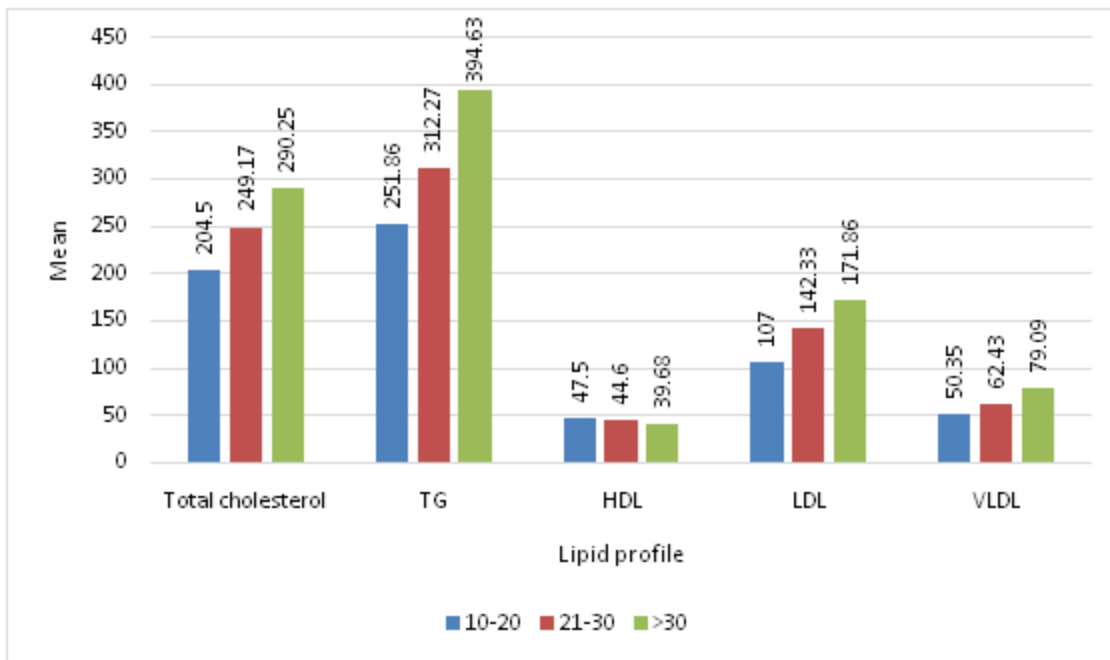


Fig.3: Comparison of lipid profile according to pack years in smokers

Table 4. Comparison of fibrinogen levels according to pack years in smokers

	Pack years			P value
	10-20	21-30	>30	
Fibrinogen	5.33±0.28	6.21±0.41	7.08±0.45	0.000

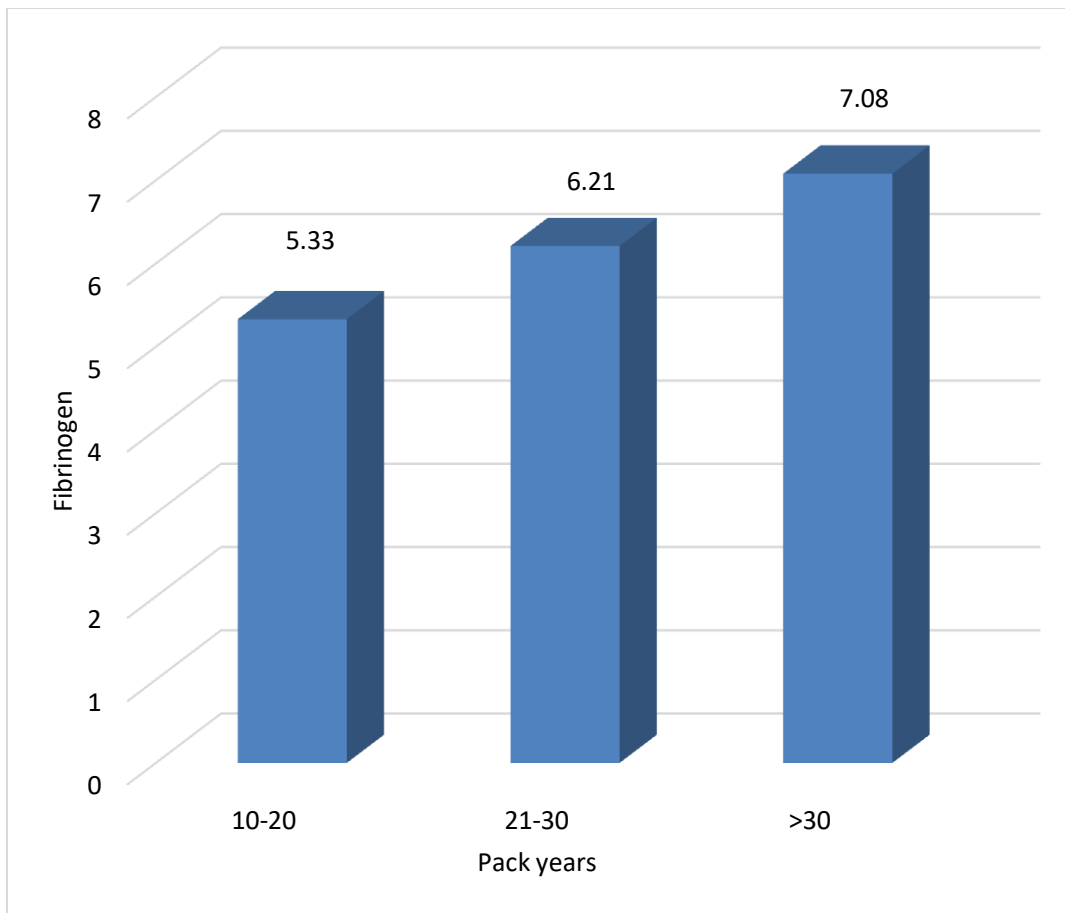


Fig.4: Comparison of fibrinogen levels according to pack years in smokers

Results shown that lipid profile levels and fibrinogen levels were directly proportional to the increase in the duration of smoking. Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean total cholesterol levels of 204.50 ± 12.76 , 249.17 ± 18.51 and 290.25 ± 26.42 mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean TG levels of 251.86 ± 21.58 , 312.27 ± 41.42 and 394.63 ± 59.35 mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean HDL levels of 47.50 ± 1.59 , 44.60 ± 1.96 and 39.68 ± 2.39 mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean LDL levels of 107.00 ± 12.36 , 142.33 ± 13.91 and 171.86 ± 17.65 mg/dl respectively.

Cases with smoking history 11-20 pack years, 21-30 pack years & >30 pack years had mean VLDL levels

of 50.35 ± 4.31 , 62.43 ± 8.29 and 79.09 ± 12.05 mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean fibrinogen levels of 5.33 ± 0.28 g/l, 6.21 ± 0.28 g/l and 7.08 ± 0.45 g/l respectively.

Discussion :

The mean serum total cholesterol in non-smokers was 161.30 ± 13.40 mg/dl while it was significantly higher in smokers, i.e., 265.92 ± 38.22 mg/dl. There is a significant association between rise in total cholesterol in smokers with p value < 0.001 . This finding is similar to the study done by Wendy Y Craig, Glenn E Palomaki, James E Haddow, they concluded that serum cholesterol concentrations were higher in smokers, leading to a significant overall increase of 3.0% ($p < 0.001$).

The mean serum triglycerides levels in non-smokers and smokers were 129.19 ± 25.78 and

349.93±73.78 respectively. There is a significant raise in triglycerides in smokers with p value <0.001.

The mean LDL-C and VLDL-C values in non-smokers were 82.7±16.29mg/dl and 25.87±3.94mg/dl respectively. But these values were significantly higher in smokers (LDL-C=153.92±27.98mg/dl, VLDL-C =70.07±14.90mg/dl) as compared to those of non-smokers.

The mean HDL-C in non-smokers was 51.74±38.15 and 42.25±3.73 in smokers respectively (p value <0.001). This finding is similar to that of Rosenson⁷ who reported that there is fall in HDL-C level by 3-5 mg/dl in smokers. A recent meta-analysis has demonstrated accordingly that HDL cholesterol is about 6% lower in smokers. Similar findings have been reported by Brischetto *et al.*⁸

This finding is similar to the study done by Wendy Y Craig, Glenn E Palomaki, James E Hadow, they concluded that smoking was associated with significantly higher cholesterol, triglyceride, very low density lipoprotein cholesterol, and low density lipoprotein cholesterol concentrations and significantly lower high density lipoprotein cholesterol (all p <0001). Cigarette smoking has been found to alter the lipoprotein levels.

In smokers the levels of total cholesterol, LDL cholesterol, Non-HDL cholesterol were significantly elevated when compared with the controls.⁹

Total cholesterol, LDL cholesterol, Non-HDL cholesterol except HDL level were significantly increased in smokers while HDL level was significantly decreased, showing greater risk of these persons to atherosclerosis and coronary heart disease (CHD).¹⁰

The mean plasma fibrinogen levels in non-smokers was 2.80±0.44g/l while it was significantly higher in smokers, i.e., 6.58±0.76g/l. There is a significant association between rise in plasma fibrinogen levels in smokers with p value <0.001. This study is similar to the Framingham study, in this study results showed that plasma fibrinogen values were significantly higher in smokers than in non-smokers.

Cigarette smoking is strongly associated with increased plasma fibrinogen levels, and the adverse cardiovascular effects of smoking may partly be mediated through an increase in plasma fibrinogen

levels. Indeed, each cigarette smoked per day increases mean plasma fibrinogen by 0.35 g/l.¹¹

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean total cholesterol levels of 204.50±12.76, 249.17±18.51 and 290.25±26.42mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean TG levels of 251.86±21.58, 312.27±41.42 and 394.63±59.35mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean HDL levels of 47.50±1.59, 44.60±1.96 and 39.68±2.39mg/dl respectively.

Cases with smoking history of 11-20 pack years, 21-30 pack years & >30 pack years had mean LDL levels of 107.00±12.36, 142.33±13.91 and 171.86±17.65mg/dl respectively.

Cases with smoking history 11-20 pack years, 21-30 pack years & >30 pack years had mean VLDL levels of 50.35±4.31, 62.43±8.29 and 79.09±12.05mg/dl respectively.

Our findings are in accordance with the findings of many research workers. The change in the serum lipoprotein levels became more marked with the number of cigarettes smoked per day and duration of smoking in years. This finding has been substantiated by N S Neki.¹²

Conclusion:

In general populations, elevations in LDL cholesterol are correlated with increasing risk of coronary artery disease. Elevated serum triacylglycerol has been identified as an independent risk factor for cardiovascular disease. Heavy smoking beyond moderation is associated with increasing heart disease.

Our study showed an increase in the lipid parameters and fibrinogen levels with significant p values when compared between smokers and non smokers. Also showed significant rise in the lipid parameters and fibrinogen levels in heavy smokers compared with moderate smokers and light smokers, with the exception of HDL cholesterol which is decreased in all smokers compared to controls.

Hyperlipidemia and hyperfibrinogenemia is a common finding in chronic smokers and our study is also in supportive with elevations in both lipid parameters and fibrinogen levels in chronic smokers compared with non-smokers. Lipid parameters and

fibrinogen levels can be used to assess the prognosis in chronic smokers and hence reduce morbidity and mortality associated with hyperlipidemia and hyperfibrinogenemia.

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