

Original article:

Study of lipid profile and fibrinogen levels in smokers and non-smokers

¹Pallavi G. Misalwad, ²Abdul Mubashir Siddiqui, ³H N Khan, ⁴G S Manoorkar

⁵A. B. Warade, ⁶S A Patel

¹Junior Resident, Dept. of Biochemistry, Dr. SCGMC, Nanded

² Associate Professor, Dept. of Biochemistry, GMC, Osmanabad

³ Professor and Head, Dept. of Biochemistry, Dr. SCGMC, Nanded

⁴ Associate Professor, Dept. of Biochemistry, Dr. SCGMC, Nanded

^{5,6} Assistant Professor, Dept. of Biochemistry, Dr. SCGMC, Nanded

Corresponding Author Dr. Pallavi G Misalwad



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Date of submission: 28 January 2023

Date of Final acceptance: 11 March 2023

Date of Publication: 30 March 2023

Source of support: Nil

Conflict of interest: Nil

Abstract:

Introduction: The World Health Organization (WHO) has named tobacco one of the greatest public health threats of the twenty-first century. Tobacco smoking is an escalating public health problem especially in a developing country like India.

Material and methods: This is a Case control study was carried out in Department of Biochemistry on 159 cases(smokers) 159 controls(non-smokers) patients those fulfilling inclusion / exclusion criteria and attended the outpatient and in patients Department of Medicine. A Comparative case-control study with 159 chronic smokers and 159 non-smokers is undertaken to study the changes in lipid profile and fibrinogen levels in chronic smokers.

Results: The mean serum triglycerides levels in non-smokers and smokers were 130.68±19.54 and 300.93±63.51 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 83.74±14.73 mg/dl and 26.03±4.04 mg/dl respectively. But these values were significantly higher in smokers (LDL-C=149.74±17.68 mg/dl, VLDL-C =61.72±13.32 mg/dl) as compared to those of non-smokers.

The mean HDL-C in non-smokers was 52.00±6.26 and 43.94±2.28 in smokers respectively (p value <0.001) This finding is similar to that of Rosenson 67 who reported that there is fall in HDL-C level by 3-5 mg/dl in smokers. Bai-Mei-He 68 Cigarette smoking is associated with reduced HDL cholesterol levels.

Conclusion: 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.

Keywords: lipid profile , fibrinogen , smokers , non-smokers

Introduction:

The World Health Organization (WHO) has named tobacco one of the greatest public health threats of the twenty-first century. Tobacco smoking is an escalating public health problem especially in a developing country like India. The prevalence of smoking in India varies from about 15% to over 50% among men with physical and/or psychological dependence.¹ Smoking is the inhalation of the smoke of burning tobacco encased in cigarettes, pipes, and cigars. Smoker is a person who smokes. Smokers are classified based on pack years.² The pack-year is a unit for measuring the amount a person has smoked over a long period of time. It is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked.² To compare the effects of smoking on lipid profile and fibrinogen levels on the aspects of duration and quantity of smoking. Hyperlipidemia and hyperfibrinogenemia being 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.^{3,4,5}

Material and methods:

This is a Case control study was carried out in Department of Biochemistry on 159 cases(smokers) 159 controls(non-smokers) patients those fulfilling inclusion / exclusion criteria and attended the outpatient and inpatients Department of Medicine.

Study design: The Case Control study.

Place and duration: The study is done in Tertiary care Hospital from outpatient and inpatient departments.

Study period –January 2021 to December 2022.

Inclusion criteria :

Total population = 318, out of that total cases are cases 159 out of that ,

- Mild smokers (pack years-10 to 14) = 53
- Moderate smokers (pack years -15 to 19) =59
- Heavy smokers (pack years -more than 20)=47 and 159 are controls who never smoked in whole life .
- Subjects in both groups are healthy adults , having no history of disease like DM ,HTN ,Hepatic impairment ,renal disease and obesity ,and are neither on drugs like beta-blockers , lipid lowering drugs , or thiazide diuretics
- Pack years = no. of packs of cigarettes/beedis smoked per day x the number of years the person has smoked

Exclusion criteria:

Females, Male (smokers and non-smokers) having history of diseases like DM, HTN, hepatic impairment, renal disease , obesity and those on drugs like beta-blockers, lipid lowering drugs ,or thiazide diuretics .

Patient not willing to participate in study .

Data collection:

After obtaining permission from the Institutional Ethical Committee patients visiting medicine OPD and IPD , those fulfilling the inclusion/exclusion criteria and those who are willing to give informed written consent will be included in the study .

All the relevant information will be recorded in the pre-tested case record form containing the demographic data , history and clinical data . Personal and family history with special attention to predisposed risk factor will be duly noted.

The Statistical software MedCalc 9.0.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Results:

A Comparative case-control study with 159 chronic smokers and 159 non-smokers is undertaken to study the changes in lipid profile and fibrinogen levels in chronic smokers.

Table 1 : Comparison of Lipid parameters and fibrinogen levels in two groupsstudied

Lipid parameters	Smoking	Non-Smoking	P value
Total cholesterol	258.13±23.73	160.87±14.71	<0.001**
TGL	300.93±63.51	130.68±19.54	<0.001**
HDL	43.94±2.28	52.00±6.26	<0.001**
LDL	149.74±17.68	83.74±14.73	<0.001**
VLDL	61.72±13.32	26.03±4.04	<0.001**
FIBRINOGEN	601.70±54.82	249.47±87.98	<0.001**

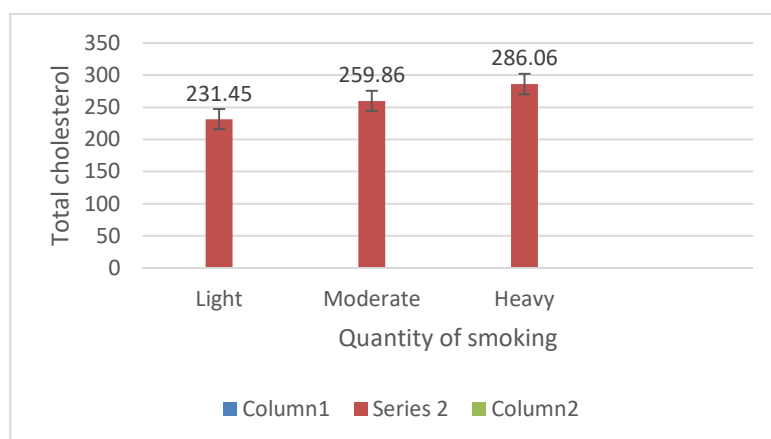
Table 2: comparison of lipid profile and fibrinogen in cases according to the duration

Lipid parameters	Duration of Smoking				P value
	5-10 years	11-20 years	21-30 years	>30 years	
Total cholesterol	230.73±8.66	258.06±10.35	279.22±20.42	284.45±8.13	<0.001***
TGL	237.97±7.10	293.13±28.49	357.14±71.86	370.00±31.19	<0.001**
HDL	46.54±0.49	44.24±1.13	41.71±1.50	41.1±0.83	<0.001**
LDL	129.76±5.92	148.20±9.07	167.37±12.10	169.35±7.65	<0.001**
VLDL	46.84±2.01	60.51±7.38	73.91±10.19	78.1±4.54	<0.001**
Fibrinogen	540.26±23.07	597.93±30.89	650.37±34.72	668.8±20.58	<0.001**

Table 3: comparison of lipid profile and fibrinogen in cases according to the quantity

	Quantity of Smoking			P value
	Light	Moderate	Heavy	
Total cholesterol	231.45±8.80	259.86±6.64	286.06±13.25	<0.001***
TGL	236.60±7.52	299.20±16.66	275.65±54.60	<0.001**
HDL	46.52±0.49	43.93±0.82	41.06±0.83	<0.001**
LDL	129.75±5.84	150.55±5.81	171.27±7.91	<0.001**
VLDL	46.88±2.02	61.74±6.29	78.42±4.36	<0.001**
Fibrinogen	539.54±22.52	604.93±21.00	667.74±17.67	<0.001**

Graph No.1: comparison of lipid profile and fibrinogen in cases according to the quantity



Discussion:

In the present study, 159 subjects who were chronic smokers were taken as cases and 159 subjects who are non-smokers were taken as controls and compared. The mean serum total cholesterol in non-smokers was 160.87±14.71 mg/dl while it was significantly higher in smokers, i.e., 258.13±23.73 mg/dl. There is a significant 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 (6) The mean serum triglycerides levels in non-smokers and smokers were 130.68±19.54 and 300.93±63.51 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 83.74±14.73 mg/dl and 26.03±4.04 mg/dl respectively. But these values were significantly higher in smokers (LDL-C=149.74±17.68 mg/dl ,VLDL-C =61.72±13.32 mg/dl) as compared to those of non-smokers. The mean HDL-C in non-smokers was 52.00±6.26

and 43.94 ± 2.28 in smokers respectively (p value < 0.001) This finding is similar to that of Rosenson 67 who reported that there is fall in HDL-C level by 3-5 mg/dl in smokers. Bai-Mei-He 68 Cigarette smoking is associated with reduced HDL cholesterol levels.

This finding is similar to the study done by Wendy Y Craig, Glenn E Palomaki, James E Haddow, 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 $p < 0.001$) (6). Cigarette smoking has been found to alter the lipoprotein levels.⁷

By AV Reddy here was a significant increase in TC, TG, LDL, and VLDL and decrease in HDL in the smokers group when compared to the controls ($P < 0.05$) (8) . Lipid metabolism seems to be affected by smoking, with studies showing a correlation between this habit and high levels of triglycerides and low levels of high-density lipoprotein cholesterol (HDL-CHOL) (9)

The mean plasma fibrinogen levels in non-smokers was 249.47 ± 87.98 mg/dl while it was significantly higher in smokers, i.e., 601.70 ± 54.82 mg/dl . There is a significant 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.

Results show that lipid profile levels and fibrinogen levels increase proportionally with the increased quantity of smoke. The total cholesterol values in heavy smokers was 286.06 ± 13.25 mg/dl, in moderate smokers was 259.86 ± 6.64 mg/dl and those in light smokers was 231.45 ± 8.80 mg/dl. The TGL values in heavy smokers was 275.65 ± 54.60 mg/dl, in moderate smokers was 299.20 ± 16.66 mg/dl and those in light smokers was 236.60 ± 7.52 mg/dl. The HDL values in heavy smokers was 41.06 ± 0.83 mg/dl, in moderate smokers was 43.93 ± 0.82 mg/dl and those in light smokers was 46.52 ± 0.49 mg/dl. The LDL values in heavy smokers was 171.27 ± 7.91 mg/dl, in moderate smokers was 150.55 ± 5.81 mg/dl and those in light smokers was 129.75 ± 5.84 mg/dl. The VLDL values in heavy smokers was 78.42 ± 4.36 mg/dl, in moderate smokers was 61.74 ± 6.29 mg/dl and those in light smokers was 46.88 ± 2.02 mg/dl.

Our study results are similar to study done by Wendy Y Craig, Glenn E Palomaki, James E Haddow, where in the study they concluded that smoking is associated with significantly higher serum concentrations of total cholesterol, triglycerides, very low density lipoprotein cholesterol, and low density lipoprotein cholesterol and lower serum concentrations of high density lipoprotein cholesterol and that this association is dose dependent.^{7,8} The Fibrinogen values in heavy smokers was 667.74 ± 17.67 mg/dl, in moderate smokers was 604.93 ± 21.00 mg/dl and those in light smokers was 539.54 ± 22.52 mg/dl. The results were similar to the Framingham study where there was a dose-dependent increase with smoking in both sexes.

Conclusion:

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.

References:

1. Prevalence of tobacco use New Delhi: Ministry of Health and Family Welfare, Govt. of India 2004.
2. Kannel WB. Am Heart J :Update on the risk of cigarette smoking in coronary artery disease.101; 1981.319-28.
3. Wynder EL, Harris et al. Am Heart J: Population screening for plasma cholesterol. Community based results from Connecticut.117; 1989. 649-56.
4. Carlson LA, Bottiger LE, Ahfeldt PE. Risk factors for myocardial infarction in the Stockholm prospective study: A 14 year follow up on focusing on the role of plasma triglycerides and cholesterol.206: Acta Med Scand ;1979.315-60.
5. MJOS OD. Am Heart J :Lipid effects of smoking.115; 1988.272-5.
6. Coull BM, Beamer N, de Garmo P, Sexton G, Nordt F, Knox R, Seaman GV. Chronic blood hyperviscosity in subjects with acute stroke, transient ischemic attack, and risk factors for stroke. Stroke 1991; 22:162–8
7. Brischetto C, Connor W, Connor S, Matarazzo J: Plasma lipid and lipoprotein profiles of cigarette smokers from randomly selected families: enhancement of hyperlipidemia and depression of high-density lipoprotein. Am J Cardiol
8. Neki NS. Lipid profile in chronic smokers-A clinical Study. JIACM; 3:51-4,(2002)
9. <https://pubmed.ncbi.nlm.nih.gov/28182070/>