

A study on the serum levels of fibrinogen among smokers and its correlation with the duration and amount of smoking

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Abstract

Background: According to many studies, serum level of fibrinogen is found to be higher in smokers than in nonsmokers. This may contribute to increase in the incidence of myocardial infarction and cerebrovascular accidents in future. **Aim of The Study:** To find out the levels of serum fibrinogen in smokers and nonsmokers and compare the levels of serum fibrinogen in smokers according to their type, amount and duration of smoking. **Materials and Methods:** 100 patients and their attendees, who did not fit into the exclusion criteria, were taken as the study population. The control group had 50 participants. The serum fibrinogen levels were measured using the claus method. **Results:** Out of the 100 cases smokers and 50 nonsmokers, smokers have higher levels of serum fibrinogen than nonsmokers. The levels of serum fibrinogen were also higher in persons who smoked for many years and higher pack years. **Conclusion:** In this study, smokers have higher levels of serum fibrinogen than nonsmokers. The levels of serum fibrinogen were also higher in persons who smoked for many years and higher pack years. The incidence of thromboembolic episodes was also more in smokers.

Key Words: serum fibrinogen, smoking, cigarette smoking, myocardial infarction.

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INTRODUCTION

Smoking produces a state of chronic inflammation which is mainly due to increased levels of free radicals. Free radicals produce oxidative stress which damages mainly the cardiovascular system. Blood vessels and the central nervous system are also affected. ¹ The cell damage and damage recycling process are done by antioxidants. In smokers, the antioxidants levels are reduced which causes improper cell repair and damage. Smoking causes

narrowing of airways which also affect pulmonary function test. Cigarettes also contain carcinogens.² This predisposes them to many cancers. Smoking is also associated with low levels of high-density lipoprotein.³ This increases the risk of atherosclerosis. Smoking is a mediator of inflammation. Therefore it increases the levels of acute-phase reactants. ⁴One among them is fibrinogen. Fibrinogen is synthesized by liver. Apart from its major role in coagulation cascade, it is also produced in various inflammatory conditions as an acute phase reactant.⁵ Smoking as a main cause of chronic inflammation increases the levels of serum fibrinogen. Increased fibrinogen keeps the blood in a hyper coagulated state. ⁶Since hypercoagulation causes arterial and venous thrombosis increased fibrinogen is associated with major Cerebro and cardiovascular events. Our aim of study is to measure the levels of serum fibrinogen among the smokers and comparing the level of fibrinogen in smokers based on their duration, amount and type of smoking ⁷

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MATERIALS AND METHODS

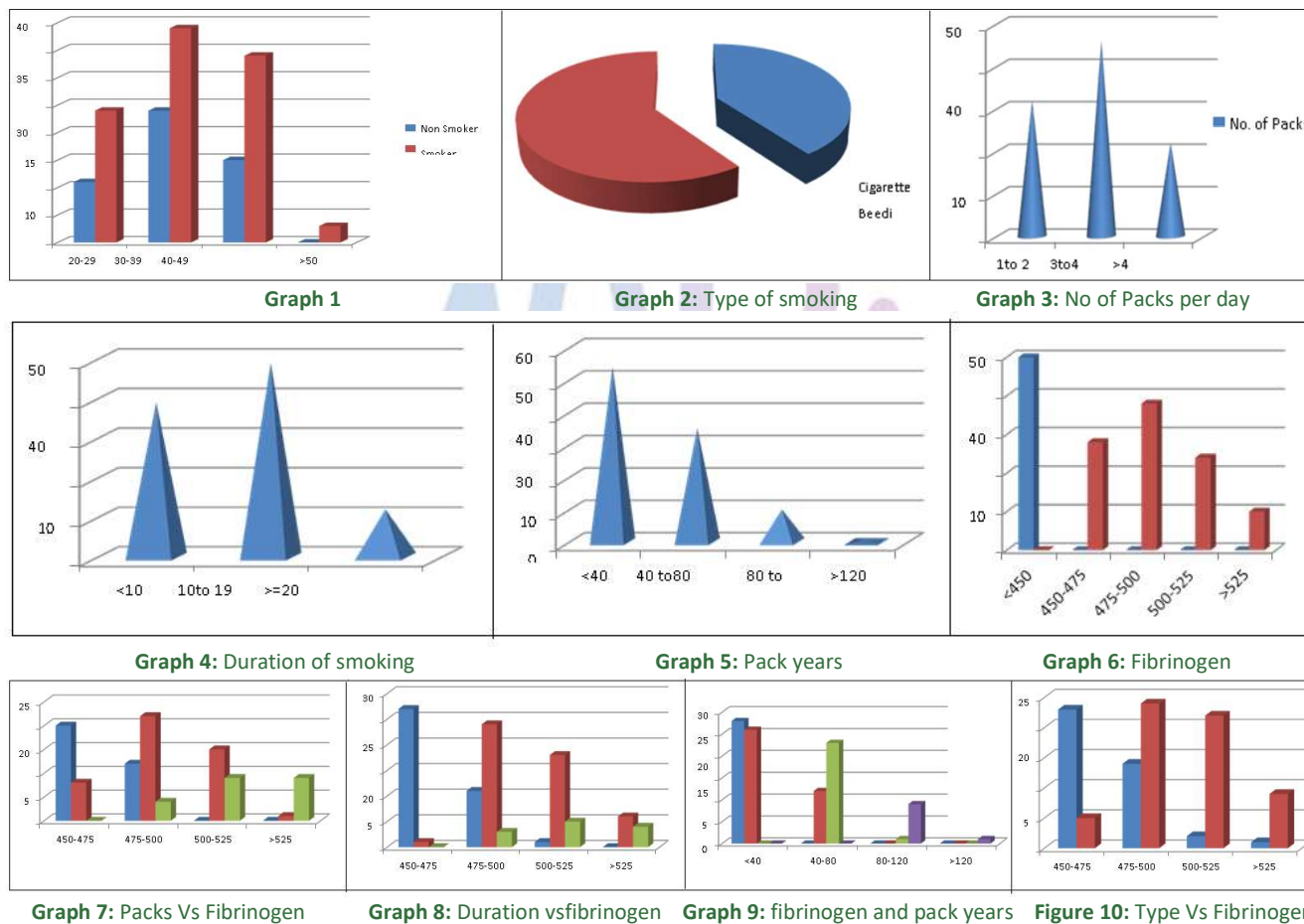
This study was conducted in Raja Muthiah Medical College and Hospital, Chidambaram. Patients recruited from medicals wards and IMCU. A total of about 160 patients were selected and 10 of them were excluded as per exclusion criteria used. The remaining 150 patients were included in the study. Among them 100 patients are smokers and 50 are nonsmokers Informed consent was obtained from all patients. Serum fibrinogen value was estimated in all 150 patients admitted in our hospital.

Inclusion Criteria: 1. Patients and Relatives of outpatients and inpatients in Raja Muthiah Medical

College and Hospital, Chidambaram 2. Healthy individuals between 20 to 60 years of age.

Exclusion criteria: 1. Patients with history of diabetes mellitus 2. Patients with history of hypertension 3. Patients having hyperlipidemia. 4. Patients having vascular disorder. Methodology: For all the 150 cases admitted, detailed clinical examination and history regarding smoking, alcohol, diabetes, hypertension, coronary heart disease, renal disease, any infection, surgery, and trauma are enquired. Blood sugar, ECG and routine investigation were done. Serum fibrinogen was measured in all these 150 patients who are included in the study and the values interpreted.

RESULTS



Graph: 1 Shows Persons in smoking criteria falls maximally in the age group between 30 to 39 years of age. The mean age of smokers is 37. The mean age of nonsmokers is 36. Maximal number of persons in both smoking and nonsmoking criteria falls between 30 to 39 years of age. P-value by chi-square method is 0.501 and

the symmetrical measure value is 0.078. This proves that simply classifying the people according to age group is of no significance.

Graph: 2 Shows the total numbers of beedi smokers in my study is 60. The total number of cigarette smoker is 40. Cigarette smoker contributes to 40% of the total 150

persons. Beedi smokers contribute to 26.7% of total 150 persons.

Graph: 3 SHOWS the maximal number of persons who smoke in my study smokes an average of 3 to 4 packs per day. The mean is 3.26 with a standard deviation of 1.440. The majority of smokers in my study smoke around 10 to 19 years. The mean value is 12.17 with a standard deviation of 6.17.

Graph: 5 Shows Maximal numbers of smokers 54% in my study smokes are having pack years of < 40 years. Only 1% of the smokers are having a pack-year of > 120. The mean pack-years is 41.74 with a standard deviation of 28.873.

Graph: 6 Shows All non-smokers have serum fibrinogen value <450 mg%. Whereas the majority of the smokers have a serum level of Fibrinogen between 475 to 500 mg% the mean serum fibrinogen value in non-smokers is 318 mg%. The mean serum fibrinogen value in smokers is 489 mg. P value is < 0.01. The symmetrical measure is 0.706 which proves that the level of serum fibrinogen in smokers are significant and a positive correlation between smoking and the levels of fibrinogen.

Graph: 7 Among the smoker who smoke less than 3 packs per day have serum fibrinogen levels between 450 to 475 mg%. Smokers who smoke more than 4 packs per day have serum fibrinogen levels between 500 and 525 mg% with a statistical significance of p0.000 which clearly proves that a strong correlation exists between serum fibrinogen levels and the amount of smoking per day.

Graph: 8 Among the smoker who have smoked less than 10 years have serum fibrinogen levels between 450 to 475 mg%. The persons who smoked > 10 years have serum fibrinogen levels between 500 to 525 mg% with a statistical significance of p0.000 which clearly proves that a strong correlation exists between serum fibrinogen levels and the duration of smoking.

Graph 9 Among the smoker with pack years less than 40 years have serum fibrinogen levels between 450 to 500 mg%. Smoker with pack years between 40 to 80 years has serum fibrinogen levels between 500 to 525 mg%. Smoker with pack years more than 80 years have serum fibrinogen levels more than 525 mg%.

Graph: 10 SHOWS Among the smoker who have serum fibrinogen levels between 450 to 475 mg% most of them are cigarette smokers. Among the smoker who have serum fibrinogen levels between 475 to >525 mg% most of them are beedi smokers. This result has a statistical significance of p value 0.000 which proves that the result is significant.

DISCUSSION

This study is mainly done because the habit of smoking is very common in our culture. Almost every men living in

my place had a habit of smoking. They are also more prone to the adverse effects of smoking. Along with Smoking they are also more prone to developing other habits like alcoholism and drug abuse. One of the main adverse effects of smoking is myocardial infarction. The main substance present in smoking responsible for producing the adverse effect of smoking is nicotine.⁸ The main way by which smoking produces smoking is by inflammation. One of the main substances that is produced during inflammation is fibrinogen. It is mainly responsible for the adverse effects of smoking like myocardial infarction, stroke and other thrombotic episodes. Fibrinogen concentrations vary widely among populations and it increases with aging.⁹ The levels are consistently higher in women than in men and rise after menopause. Smoking is the most important life-style that is found to correlate with fibrinogen. People with diabetes and hypertension have elevated fibrinogen levels, as do sedentary and obese individuals. Alcohol intake and estrogen replacement therapies are associated with lower fibrinogen levels. Most other CVD risk factors are correlated positively with fibrinogen. Serum fibrinogen value <45 mg%.¹⁰ Where as majority of the smokers has a serum level of Fibrinogen between 475 to 500 mg%. The mean serum fibrinogen value in non-smokers is 318 mg%. The mean serum fibrinogen value in smokers is 489 mg. P value is < 0.01. symmetrical measure is 0.706 which proves that the level of serum fibrinogen in smokers are significant and a positive correlation between smoking and the levels of fibrinogen. Increased fibrinogen synthesis in the liver, rather than decreased fibrinogen catabolism, has long been suspected, but there is a lack of published studies addressing this hypothesis. In the April issue of Clinical Science,¹¹ Krobot K, *et al.* report two studies of fibrinogen synthesis in male smokers. In the first study, current smokers had higher absolute fibrinogen synthesis rates than non-smokers, which were correlated with increased fibrinogen levels. In the second study, 2 weeks' abstention from smoking in current smokers reduced both absolute synthesis rates and plasma fibrinogen levels.¹² Elevated fibrinogen in adults is an independent risk factor for myocardial infarction and stroke. Even in the presence of other powerful cardiovascular risk factors like obesity, older age, hypertension or glucose intolerance, a fibrinogen value near the upper limit of normal has been associated with increased frequency of cardiovascular disease. Similarly, adults with obstructive sleep apnoea-hypopnoea are at an increased risk for systemic hypertension, coronary artery disease, congestive heart failure, and stroke.^{13,14,15}

CONCLUSION

Serum level of fibrinogen in smokers is significantly higher than in non smokers. Higher level of Smoking is associated with lower value of APTT. A higher level of smoking is associated with higher levels of CRP. Beedi smokers have higher levels of serum fibrinogen. Future studies of smoking, smoking cessation, and plasma fibrinogen are required to define their relationship to other acute-phase markers and inflammatory cytokines. Fibrin degradation products, such as D-dimer, may also play a role in fibrinogen synthesis and inflammatory reactions; D-dimer is also elevated in smokers and weakly related to plasma levels of fibrinogen and C-reactive protein.

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