



A COMPARATIVE STUDY OF SERUM NON HDL-CHOLESTEROL IN SMOKER AND NONSMOKER HEALTHY ADULTS

Biochemistry

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ABSTRACT

Introduction: Tobacco smoking is most common habit in humans which leads to increase in concentration of serum non HDL cholesterol which is most strongly related to risk for atherosclerosis & coronary artery disease. The purpose of this study was to spread awareness in smokers, to prevent hazards of smoking & discourage tobacco smoking.

Methodology: An observational, cross sectional study was conducted on 50 smokers and 50 nonsmokers aged 18 to 45 years and BMI ≤ 25 . Serum non-HDL-C was compared and correlated with number of cigarettes/beedis smoked per day and duration of smoking.

Results: There was statistically significant difference among smokers and nonsmokers with respect to non HDL cholesterol which had positive correlation with number of cigarettes/beedis smoking per day and duration of smoking.

Conclusion: These data indicate that smoking has positive correlation with non HDL cholesterol which leads to health hazards.

KEYWORDS

Smoking, non HDL-C, Cardiovascular disease.

INTRODUCTION

Tobacco smoking epidemic is one of the biggest public health threats the world has ever faced, killing more than 7 million peoples in a year. More than 6 million deaths of these are the results of direct tobacco smoking use while around 1 million are the results of nonsmokers being exposed to second hand smokers. Tobacco smoking users who die prematurely deprive their families of income, raise the cost of health care and hinder economic development¹.

Tobacco smoking use is a leading cause of premature, non-communicable diseases associated morbidity and mortality, and a growing public health challenge, while many people are aware that tobacco use increases the risk of cancer, there is alarming gaps in knowledge of the cardiovascular risks of tobacco use. According to the world health organization, more than half of adult Indians don't know smoking can cause strokes².

It has been estimated that an average of five & half minutes of life is lost for each cigarette smoked, if current trend continues smoking will kill more than 09 million people annually³ by 2030.

Smoking cigarette/beedi leads to alteration of serum non HDL cholesterol which is a progressing parameter, includes all potentially atherogenic Apo-B containing lipoprotein particles including LDL-C, small dense LDL-C, IDL-C, VLDL-C, VLDL remnant-C. It is most strongly related to risk for atherosclerosis of coronary heart disease^{4,5}.

There is a direct dose relationship between number of cigarettes/beedis smoked per day and cardiovascular morbidity & mortality; it leads to altered physiological factors which include altered coagulation state, damage vascular wall and alteration in lipid & lipoprotein contents⁶.

Most of the studies have been on the effect of cigarette/beedi smoking on lipid profile. Only very few studies have been on the association of cigarette/beedi smoking and non HDL-C in India. As there is wide spread habit of smoking cigarette/beedi among in India as well as population of Udaipur district and surrounding areas, hence it was crucial to study the effect of cigarette/beedi smoking on the non HDL-C of healthy adults.

METHODS

Present study was done in 50 healthy smokers and 50 healthy nonsmokers, an observational cross sectional study conducted in

clinical lab the department of Biochemistry R.N.T. medical college Udaipur, Rajasthan, India.

The inclusion criteria, for smoker and nonsmokers aged 18 to 45 years, both sex, BMI < 25 and average Indian diets. The subjects were divided (according no. of cigarettes/beedis per day) into 4 groups

- Nonsmokers: subjects who have never smoked and those who left at least more than 05 years smoking taken as controls
- Mild smokers: 01-10 cigarettes/beedis per day for at least 05 years or more
- Moderate smokers: 11-20 cigarettes/beedis per day for at least 05 years or more
- Heavy smokers: more than 20 cigarettes/beedis per day for at least 05 years or more And divided them 3 groups (according to duration of smoking), group 1(5- 10 years), group 2 (11-15 years) and group3 (>15 years).

The exclusion criteria was age below 18 years and above 45 years, Medical conditions related to this (diabetes mellitus, nephrotic syndrome, alcoholism and hypertension), subjects who were on taking statins, fibric acids derivatives, nicotinic acid, beta blockers, diuretics and steroids), subjects who were on diet restriction and history of chronic respiratory disease. An informed written consent was obtained from all the study subjects who participate in our study. Proper history of each subject was recorded & anthropometric parameters like height, weight and body mass index (BMI) was taken. A detailed physical examination of the subjects of both groups was done. Venous sample was collected in plain vial 12 hours after overnight fasting. Serum was separated by centrifugation and used for estimation of total cholesterol by cholesterol oxidase peroxidase and HDL-cholesterol by accelerated detergent method, fasting glucose by hexokinase, serum creatinine by modified jaffes, the tests were carried out in RxL max Siemens fully auto analyzer. Further non HDL-cholesterol calculated by total cholesterol - HDL-cholesterol. Urine albumin and sugar by reagent strip method in cobas u 411 urine analyzer.

Data analysis:

Results were analyzed using the statistical package for social science software system (SPSS, VERSION 20). Data were described using the mean and standard deviation for the significant differences between groups. t test was used to compared the difference of non HDL cholesterol between smokers and nonsmokers. in addition ANOVA test was performed to find the differences of these parameter among three group of smoking intensity. Furthermore, the chi square test was

used to evaluate the association between variables. All statistical tests were considered significant in p value of <0.05 with a confidence level of 95%.

RESULTS

There was a significant difference in the mean of serum non HDL-C between smokers than nonsmokers (141.96±18.96) mg/dl versus (92.03±19.96) mg/dl, p value <0.05

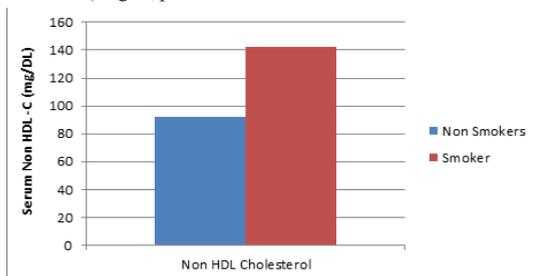


Figure (1): Serum Non HDL levels in smokers and non-smokers

Table 1: Parameter in relation to number of cigarette or beedis smoked per day in smokers as compared to non-smokers

Parameter	Non smokers n=50	Mild n=24 1-10 Cigarettes/ beedis/day	Moderate n=22 11-20 cigarettes /beedis/day	Heavy n=4 >20 cigarettes/ beedis/day	p value
Non HDL-Cholesterol	92.03±19.96	132.75±16.25	146.00±14.65	175.00±9.5	<0.05

Values are mean± standard deviation in mg/dl& p value <0.05 are significant.

There was significant positive correlation with numbers of cigarettes/beedis per day (P<0.05).

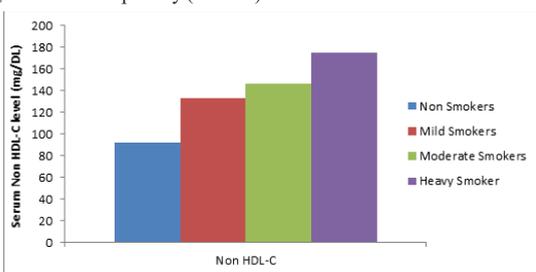


Figure 2: Serum Non HDL-C level among smokers and different group of smokers

Table 2: Parameters in relation to duration of smoking in smokers as compared to nonsmokers

Parameter	Non smokers	Group1 5-10 years	Group 2 11-15 years	Group 3 >15 years	P Value
Non HDL-C	92.03±19.96	137.96±19.3	141.57±17.90	152.90±16.50	<0.05

There was significant positive correlation among duration of smoking and serum non HDL cholesterol (p value<0.05)

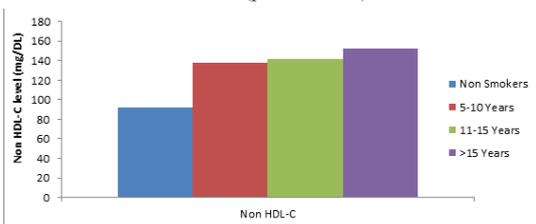


Figure (3): Non HDL-C level among nonsmokers and different duration group of smokers

DISCUSSION

Present study showed comparison of serum non HDL-C among smokers and nonsmokers. Tobacco smoke contains many toxic compounds and free radicals which can aggravate the situation and lead to serious health hazards.

Smoking is also independent risk factor and modifiable risk factor for

development of pulmonary disease, cancers, cerebrovascular diseases, peripheral vascular diseases etc. Risk of complications is directly proportional to amount of smoking. Therefore; smokers should be counseled regarding health hazards to them as well as to people around them who becomes victims due to passive smoking.

They should be encouraged to quit smoking and adopt healthy lifestyle to reduce the risk of developing health related problem.

The non HDL fraction which is considered as a strong predictor for risk of CHD has increased in smokers as compared to nonsmokers with a highly significant difference. This indicates the presence of higher level of atherogenic lipoprotein particles in smokers as compared to nonsmokers. This indicator can be used to evaluate the morbidity risk among cigarettes/beedis smokers especially because it can be estimated at any time without the fasting sample.

Several studies have been showed an association between cigarettes/beedis and alter serum lipid and lipoprotein concentration but relatively less studies have been done in non-HDL-C in smokers by combining the results of individual studies in the present analysis. we can say conclusively that smoking cigarettes /beedis is associated with significant higher level of non HDL cholesterol and this association is dose dependent. To our knowledge the data relevant to changes in serum non HDL-C associated with degree of exposure to cigarette/beedis smoke have not previously compiled and reviewed in Rajasthan in India.

In support of these clinical observations Brischetto et al¹³ proposed (a) mechanism to explain the link between smoking and some of the observed changes in serum lipid and lipoprotein concentration as nicotine stimulates the release of adrenaline by the adrenal cortex, leading to the increased serum concentration of free fatty acids observed in smokers (b) free fatty acids is a well-known stimulant of hepatic secretion of VLDL (c) HDL-C concentration in serum. Complementary to this mechanism is the finding that free fatty acids also stimulate hepatic synthesis and secretion of cholesterol.

In our study we found that mean total cholesterol was significant higher in smokers than nonsmokers and this difference between smokers than nonsmokers was statistically significant (p value <0.05) and these result were in consistent with studies by Mohammed et al¹⁴ and Puspatti et al¹⁵.

There was direct relationship between smoking (number of cigarettes/beedis smoked per day and duration of smoking) and non HDL-C which showed significant positive correlation (p value <0.05).

CONCLUSIONS

It may be concluded that, cigarettes/beedis smoking in young adults increased atherogenic non HDL-C which increased the risk for coronary artery disease. So it is strongly recommended to avoid smoking for the benefits of overall health and a need of an educational program about the risk of smoking.

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