Original Article

Comparative study of lipid profile in smokers, tobacco chewers and diabetic patients

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Background: Smoking, tobacco chewing and Diabetes mellitus have been well recognized risk factors for arteriosclerosis. This study was conducted to find out the effect of these factors on lipid profile in Nepal.
Method: Serum lipid profile was Studied In 29 smokers, 13 tobacco chewers,, 22 diabetic patients and 29 controls le. non smokers, non tobacco chewers and non diabetic individuals.
Results: The mean serum total cholesterol (4.8±0.9 mmol/ltr) was significantly higher in smokers than in non smokers ($p<0.01$). Mean low density lipoprotein (LDL) cholesterol (3.2±0.8mmol/itr) and triglyceride (2.0±0.9mmol/itr) were significantly higher in smokers ($p<0.005$, $p<0.05$ respectively) whereas mean high density lipoprotein (HDL) cholesterol (0.77±0.18mmol/Itr) was significantly lower ($p<0.05$). Tobacco chewing was related to higher total cholesterol ($p<0.005$), higher LDL cholesterol ($p<0.05$) and higher triglyceride ($p<0.05$) levels. There was no significant difference in HDL cholesterol level, The diabetics had higher values of total cholesterol (5.0±0.9mmol/Itr) and triglyceride (2.1±0.8mmol/Itr) levels ($p=0.000$ and $p<0.01$ respectively) than controls. However, there were no significant differences in HDL cholesterol and LDL cholesterol levels.
Conclusion: A moderate portion of the effect of cigarette smoking, tobacco chewing and Diabetes mellitus on risk of cardiovascular risk may be explained by an adverse effect of these on blood lipids.

Introduction

Arteriosclerosis is a major risk factor of coronary heart disease and cerebrovascular disease. According to representative data, arteriosclerotic changes of the coronary artery are responsible for approximately 48% of deaths in U.S.A. (Centre for Disease Control. 1984). It is believed that a variety of lifestyle and physiological factors play pathophysiological roles in the atherosclerotic deterioration of blood vessels. This study shows that life style variables such as alcohol consumption, smoking, tobacco chewing, lack of exercise and stress are risk factors for arteriosclerosis. Similarly, physiological variables such as obesity, high serum lipid level (cholesterol, TG, HDL C, LDLQ and high blood pressure are also reported to be risk factors.1 3 Diabetes mellitus is a proven risk factor in the occurrence of coronary artery disease . It has been reported that the death rate in U.S.A. between 1968 and 1976 was reduced by some 62.5%, which was attributed to overall reductions in population serum cholesterol (30%), smoking rate (24%) and. hypertension (8.5 %)[5].

Each of these risk factors predisposes the individual to arteriosclerosis, but risk factors acting in concert, which alter risk substantially because of their combined effects, are considered to be multiplicative. Therefore, persons with a number of risk factors are considered as high risk subjects. For this reason, the interrelationships between risk factors is as important as investigating the independent effects of

individual risk factors. We approached this issue by evaluating the effects of smoking and tobacco chewing and diabetes mellitus oil blood lipids.

Material and Methods

Twenty nine healthy individuals, aged 30 60 years, who had no complaint or any major illness in recent past, were included in the study as controls. They were laboratory staffs of Tribhuvan University Teaching Hospital (TUTH) and close relatives of the patients accompanying them during their Out patient Department (OPD) visit. The study included age and sex matched twenty nine smokers, thirteen tobacco chewers, and twenty two diabetic patients visiting OPD in TUTH. Patients receiving lipid lowering agents, those having renal, hepatic or thyroid disorders, and patients who were taking non cardiac drugs that affect the lipid profile were excluded from the study. Diabetes mellitus was diagnosed to be present if a patient had a definite history of diabetes mellitus with records of treatment, or fasting plasma glucose ~~ 126mg% or two hour post load glucose ~!200mg%, based on the guidelines of the American Diabetes Association, 2000. A smoker was defined as a person regularly smoking cigarettes or who had stopped smoking within the past one month. Similarly, tobacco chewer was defined as a person who regularly chews tobacco or who had stopped doing so within the past one month.

Sample collection, preservation and processing

Blood samples were collected from the subjects after a 12 hour fast. Samples were centrifuged; serum was collected and stored at 20'C until analyzed.

Analytical procedures

Lipid profile includes TC, HDL C, LDL C and TG. TC, HDL C and TG were analyzed on SEAC SLIM model Radium group analyzer, by using respective reagents, manufactured by Human. The serum was added to the reagent according to the method described in the kits. The concentrations of cholesterol and TG in the samples were directly proportional to the intensity of the red complex (red quinon), which was measured a 505nm. For HDL C measurement, the chylomicron, VLDL and LDL subtractions were precipitated by addition of phosphotungstic acid and magnesium chloride. After centrifugation, the cholesterol in the HDL fraction, which remains in he supernatant was assayed using the Human cholesterol reagent. LDL cholesterol was estimated by the method of Friedewald et al.[6]

LDL- cholesterol = Total cholesterol – HDL cholesterol $\frac{TG}{2.2}$

Statistical analysis

All data were entered prospectively in a computerized database. Analysis was done with the EPI INFO statistipal software. Student's t test was performed to compare mean values of the parameters. The "p" value <0.05 was considered to be statistically significant. All values are expressed as mean ± standard deviation.

Result

The result of the study on the relationship between smoking and serum lipid is represented in *table 1.* The mean TC was 4.8±0.9 mmol/ltr v/s 4.2±0.7 mmol/ltr (p=0.006), HDL C 0.77±0.18 v/s 0.9±0.2 mmol/ltr (p = 0.011), LDL C 3.2±0.8 v/s 2.6±0.7 mmol/ltr (p=0.003), and TG 2.0±0.9 v/s 1.4±0.6 mmol/ltr (p=0.040) in smoker and controls, respectively. Thus, lipid fractions viz. TC, HDL C, LDL C and TG were significantly higher in smokers.

Table 2 shows the lipid profile of tobacco chewers and non tobacco chewers. Tobacco chewers have significantly higher levels of TC, LDL C and TG than the controls, viz. TC 5±0.8 v/s 4.2±0.7 mmol/ltr (p=0.002), LDL C 3.2±0.9 v/s 2.6±0.7 mmol/ltr (p=0.023) and TG 2±0.8 v/s 1.4±0.6 mmol/ltr (p=0.009), respectively. However, there was no significant difference in HDL C levels between the two groups, viz. 0.83±0.12 mmol/ltr in tobacco chewers and 0.9±0.2 mmol/ltr (p=ns) in controls.

Table 3 shows the lipid profile of diabetic and non diabetic patients. Diabetic patients had significantly higher TC and TG levels than non diabetics, viz. TC 5±0.9 v/s 4.2±0.7 mmol/ltr (p=0.000), and TG 2.1±0.8 v/s 1.4±0.6 rni nol/ltr (p=0.009). However, there was no significant difference in the levels of HDL C, viz. 0.83±0.15 v/s 0.77±0.18 mmol/ltr (p=ns) and LDL C 3.0±0.8 v/s 2.6+ 0.7 mmol/Itr (p=ns) between diabetics and non diabetics.

Table 1 The relationship between smoking and serum lipid level.

	Smokers, n=29 (mmol/ltr, mean±SD)	control. n=29 (mmol/ltr, inean±SD)	p value
TC	4.8±0.9	4.2±0.7	0.006T
HDL C	0.77±0.18	0.9±0.2	0.01 IT
LDL C	3.2±0.8	2.6±0.7	0.003T
TG	2.0±0.9	1.4±0.6	0.040T

TC: Total cholesterol; HDL C: high density lipoprotein cholesterol: LDL C: low density lipoprotein cholesterol; TG: triglycerides; ns: not statistically significant.

Table 2 The relationship between tobacco chewing and serum lipid level.

	Tobacco chewers, n= 13. (mmol/ltr, mean±SD)	Control, n=29 (mmol/ltr, mean±SD)	p value
TC	5.0±0.8	4.2±0.7	0.002T
HDL C	0.83±0.12	0.9±0.2	0.249
LDL C	3.2±0.9	2.6±0.7	0.023T
TG	2.0±0.8	1.4±0.6	0.009T

TC: Total cholesterol; HDL C: high density lipoprotein cholesterol; LDL C: low density
Lipoprotein cholesterol; TG: triglycerides; ns: not statistically significant.

Table 3 The relationship between diabetes mellitus and serum lipid level

	DM, n=22 (mmol/Itr, mean±SD)	control. n=29 (mmol/Itr. mean±SD)	p value
TC	5.0±0.9	4.2±0.7	0.000T
HDL C	0.83±0.15	0.9±0.2	0.175
LDL C	3.0±0.8	2.6±0.7	0.060
TG	2.1±0.8	1.4±0.6	0.009T

TC: Total cholesterol; HDL C: high density lipoprotein cholesterol; LDL C: low density
Lipoprotein cholesterol; TG: triglycerides; ns: not statistically significant.

Discussion

Any epidemiological study on lipid levels and conventional risk factors for coronary artery disease in Nepalese people has not been published.

The results show that smoking is significantly and positively associated with serum total cholesterol, LDL C and triglyceride. In other words. total cholesterol, LDL C and triglyceride levels are increased by smoking. There was a significant tendency for the HDL cholesterol level to be lower in smokers. Similar results on the positive relationship between smoking and blood lipid levels have been reported in other countries.[7 11]

According to National Cholesterol Education Program (NCEP) classification, the desirable total cholesterol and LDL cholesterol values are <5. " and <3.3mmol/itr and HDL cholesterol below 0.9 mmol/ltr is considered as low. Similarly, according to NCEP Adult Treatment Panel (ATP) 11. the normal TG level is <2.3mmol/Itr. The mean values of total cholesterol, LDL C and TG obtained in smokers in my study are within normal. But the mean HDL C level in smokers is lower than normal and 62% of smokers had HDL C level less than 0.9mmol/Itr. It is not a surprising result because 40% of control subjects had FIDL C below normal level.

Tobacco chewing was positively associated with serum cholesterol, LDL C and triglyceride as observed by Khurana M et al .[7] In this case, the difference between mean values of HDL cholesterol in tobacco chewers and non chewers is not statistically significant though 53% of tobacco chewers had HDL C level below normal. This may be due to the small number of population study. Except HDL-C level, other lipid parameters: TC, LDL cholesterol and TG are within desirable range in tobacco chewers.

Diabetes was positively associated with lipid parameters: cholesterol and TG as reported by Ginsberg FfN" and Oki JC' The differences in mean HDL C and LDL C levels between diabetics and non diabetics were not statistically significant. The mean values of TC. LDL C and TG are within desirable range. In this case also, the mean HDL C level is below normal and 60% of diabetics had less than 0.9rnmol/Itr HDL C level.

Conclusion

The overall inter relationship of the arteriosclerotic risk factors: smoking tobacco chewing, diabetes mellitus and blood lipid level were significant in all cases, except in few cases in which there were low numbers of population study. There is significant increased in total cholesterol, LDL cholesterol and TG levels in smokers, tobacco chewers and diabetic patients as compared to controls. Half of the healthy individuals and two thirds of smokers, tobacco chewers and diabetics have low HDL cholesterol level.

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