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The Smokeless Tobacco Induced Effect on Biochemical Parameters Levels in Type-2 Diabetes Mellitus Subjects.

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ABSTRACT

Diabetes mellitus is characterized by uncontrolled hyperglycemia, which leads to life threatening complication and may result from acute metabolic aberrations. Prevalence any kind current use of tobacco on average is 29.4% and 15.5% smoking and 13.9%smokeless.(ICMR prevalence survey data in Karnataka 2001) WHO 2011 report, 6 million people die every year is due to nicotine toxicity[2]. Hence research is planned to establish possible relation between the levels plasma Uric Acid, MDA, Amylase level with Lipid profile in (ST) tobacco user in type 2 diabetic subjects as compared with Non ST tobacco user Diabetic Subjects in Northern Karnataka Population with their Demographic life style of 62 diabetes patients and normal subjects attending BLDE University's Sri B.M.Patil Medical College Hospital for routine checkup. The results show significant alteration of lipid profile and uric acid levels ($P<0.001$) tobacco user Diabetes and Free radical MDA generation $P>0.001$ but not much alteration in serum Amylase. In this study positive correlation between Blood Glucose, serum MDA and Uric Acid levels indicating pre diabetic markers and early diabetic complication.

Keywords: Uric acid, MDA (Malonaldealdehyde), Smokeless tobacco (ST), Diabetes Mellitus.

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INTRODUCTION

Diabetes mellitus is the single most important chronic metabolic disease widely recognized worldwide as one of the leading cause of death and disability. The problem has reached pandemic proportions. Diabetes mellitus is characterized by uncontrolled hyperglycemia leads to acute metabolic aberrations; metabolic derangement is frequently associated with retinopathy, nephropathy and neuropathy. Smokeless tobacco chewing and smoking population is very common in northern part of Karnataka. Prevalence any kind current use of tobacco an average is 29.4% and 15.5% smoking and 13.9%smokeless. (ICMR prevalence survey data in Karnataka 2001) WHO 2011 report, 6 million people die every year in the worlds it will increase to 7.5 million by 2020 is due to nicotine toxicity[1-2]. The harmful health effects of tobacco smoke adversely target the cardiovascular system and there is also evidence that death rates are uniformly higher among smokers than non-smokers in both sexes and whatever the age at the death. In addition, reports [3-4] indicate that the excess mortality in smokers mainly affects smokers aged from 45 to 54 years .The lipid per oxidation of the biological system can be determined by Malondialdehyde, which is end product of the oxidation fatty acids, and alteration of Purine metabolism in ST(Smokeless tobacco) User diabetes patients which leads to increase blood glucose, MDA levels and some of uric acid levels ,Hence the present study was carried out to investigate the correlation and alteration of Serum Uric acid and MDA levels in ST User and Non ST User Diabetes Mellitus Subjects as compared control .

MATERIALS AND METHOD

The present cross section work carried out in the department Biochemistry of BLDE University's ShriB.M.Patil Medical College Bijapur for the screening Diabetic Subjects attending diabetic clinic for regular glycemic checkup in clinical biochemistry laboratory. Around 32 tobacco (ST) using type 2 diabetic subjects and 30 diabetic Non tobacco (ST) user subjects also 20 control subjects with other demographic parameter was recorded. All groups above age >35 between <60 and both sex matched.

Each Diabetic ST User, diabetic Non ST tobacco user and control group's venous 5 ml blood was collected in sterile plane and heparin bulb in the morning, after 8-10 hrs fasting and preserved the sample at-10 degree till it process at the earliest. Further written informed consent taken from the subject for the purpose of study and ethical committee consent was taken from the Institution. Blood Glucose, Uric acid serum Amylase, Lipid Profile analyzed by slandered kinetic methods and MDA was done by Spectro Photometerically. Observed results will be statistically determined and correlates the significations by applying students't' test,

Inclusion – Diabetic subjects with 5-10 Sachet Gutakha/day ST User, Non ST User and Control age above 35 and below 65years was included

Exclusion- Cigarette smoker, Alcoholic, Renal failure, Hormone therapy, Hypertensive and other infectious subjects excluded.

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RESULTS

Table 1 gives Fasting plasma glucose levels as well as serum levels of Total Triacyle glycerol (TAG), serum levels of Total cholesterol (TL), HDL Cholesterol (HDLC), LDL Cholesterol (LDLC), and VLDL Cholesterol (VLDLC) in normal subjects and diabetic subjects. It is evident from the table, all these parameters except HDLC are significantly raised in diabetic subjects and tobacco user subjects as compared to normal subjects where as HDLC is significantly lowered in diabetics as compared to normal subjects. However more p>0.001 significant result seen in tobacco user diabetes subjects as compared to Non tobacco user diabetes subjects These results suggest a possible stimulation on alteration of Cholesterol turn over in diabetic subjects with tobacco and lipid profile metabolism due to more generation of free radicals.

Table-1:Table Showing Fasting Plasma Glucose Level and Serum Levels of TAG, cholesterol profile Levels in Normal and Diabetic subjects

Parameters	Normal Subjects (20)	Diabetic Subjects Non Tobacco user(30)	Diabetic Subjects (32) Tobacco user
Fasting plasma Glucose mg/dl	85.54 ± 13.65	156.20 ± 35.31***	146.20 ± 32.61***
Triacylglycerol mg/dl	108.95 ± 20.14	235.29 ± 31.66***	246.22 ± 34.35***
Total Cholesterol mg/dl	144.22 ± 26.12	253.58 ± 35.90. ***	270.28 ± 45.60. ***
HDL Cholesterol mg/dl	41.38 ± 9.36	37.37 ± 5.65	27.32 ± 4.75
LDL Cholesterol mg/dl	117.41 ± 23.90	123.83 ± 39.20. ***	142.63 ± 34.06 ***
VLDL Cholesterol mg/dl	22.13 ± 5.61	46.25 ± 8.51. ***	58.15 ± 7.41. ***

Table-2: Showing Fasting Plasma Glucose Level and Serum Levels of amylase, MDA Levels and uric acid Levels in Normal and Diabetic ST User/Non ST User subjects

Parameters	Normal Subjects (20)	Diabetic Subjects Non Tobacco user(30)	Diabetic Subjects (32) Tobacco user
Fasting plasma Glucose mg/dl	85.54 ± 13.65	156.20 ± 35.31***	146.20 ± 32.61***
Uric Acid mg/dl	4.5 ± 1.9	7.7± 3.9***	8.4 ± 1.65***
Amylase mg/dl	44.00 ± 23.02	55.25 ± 24.51	60.14 ± 27.1
MDA µmol/L	2.41+ 0.85	3.53+0.72***	4.54+0.72***

Note: 1) The number in parenthesis shows the number of subjects.
2) Values are expressed as their Mean ± SD
3) P value * P<00.02. ** P<0.01. *** P<0.001

Table 2 gives Fasting plasma glucose levels as well as serum levels of Uric Acid, and serum levels of Amylase in normal subjects and diabetic subjects. It is evident from the table, all these parameters except amylase are significantly raised in diabetic subjects as compared to normal subjects where as uric acid is significantly increased in tobacco user diabetics as compared to diabetes without tobacco user and normal subjects. However more significant result seen in tobacco user diabetes subjects as compared to Non tobacco user diabetes subjects These results suggest a possible alteration in purine metabolism and uric acid p<0-001

level is pre diabetic indicator in diabetic tobacco users subjects also tobacco composition might have interferes in insulin metabolism. However no much significant alteration seen serum amylase level in diabetic subjects as compared to normal .MDA P< 0.001 levels significantly Increase in tobacco User and correlates with Blood Glucose in diabetes subjects

DISCUSSION

Diabetes mellitus is a chronic syndrome involving not only disturbance in glucose metabolism, but also disturbances in lipid and purine metabolism, resulting in varied life threatening complication like nephropathy, cardiopathy, retinopathy etc. (2). Lipid alteration has been observed by many workers. [24]

The results obtained in the present studies, which are narrated in table 1 -2 are analyzed and discussed as under.

Dyslipidemia in diabetes mellitus:

The lipid abnormalities associated with diabetes mellitus are better termed as' dyslipoproteinemia' or 'dyslipidemia' because there may be alterations in both the quantity of the lipids or lipoproteins but also in the quality It seen from table 1 , serum total cholesterol, significantly raised in diabetic subjects as compared to normal subjects TC ($p < 0.001$), TAG ($p < 0.001$) This in agreement with earlier studies [5,6,9].The observed evaluation in TC may be due to an increase in availability of more acetyl COA concentration, favoring fatty acid, and cholesterol synthesis. Thus elevates serum TAG, and serum TC in diabetic subjects as compared to normal subjects This is in part due to non-availability of glucose for energy purpose and Increased fatty acid oxidation is responsible to increase cellular free radical generation in tobacco user diabetes subjects, hence early degenerative complication seen in tobacco user diabetes subjects as compared to diabetes subjects without tobacco but long standing uncontrolled diabetes subjects also gets late complication than the normal subjects.

The plasma enzyme, LP lipase, is insulin sensitive and activity enhanced by insulin favoring the clearance of chylomicron, VLDL from circulating plasma. The cholesterol is principally transported in plasma by lipoproteins, LDL and HDL. It is evident from the Table 1 total cholesterol (P< 0.001) VLDL-C (P<0.01) and LDL-C (P< 0.001) are significantly raised in diabetic subjects as compared normal subjects, suggesting cholesterol synthesis as well as transport may be abnormal in diabetes mellitus. Table 1 indicating an alteration in different lipo protein as well as total cholesterol in diabetic subjects as compared to normal subjects clearly indicates an alteration in cholesterol transport which is in agreement with [22]. These observed alteration, may be in part due to alteration in Apo protein synthesis as Insulin, has got a role in Apo protein metabolism. And also agreement with the reports of [23]. Table 2 results indicating increase Uric Acid and MDA in diabetes subjects as compared normal but higher values seen in diabetes with tobacco user which clearly suggest the free radical generation effect on diabetes subjects and might have interferes Purin metabolism, hence MDA and Uric acid levels might be pre diabetic marker, whereas no much alteration seen in serum amylase activity in diabetic

subjects as compared to normal. The concentration of MDA highly significant in tobacco User diabetes subjects which correlates with increase glucose levels. The increases per oxidation of lipids by generation of free radicals that may leads to pancreatic and renal cell degenerative changes.[24,25,26]

CONCLUSIONS

The present study was under taken to establish the effect of tobacco on serum lipid Profile, MDA levels and Uric acid levels. The present study results imply that the disturbance in lipid metabolism but also effect on purin catabolism and MDA Levels suggesting that a lipid exchange might occur between plasma lipids and membrane lipids. Such an increase altered serum lipid composition may induce certain changes in membrane lipids in type 2 diabetic subjects with tobacco users, which may be due to more generation of free radicals. The change in orientation of intra membrane particles in such way that they are susceptible for oxidative stress, which is lead to an alteration in the structure and function of the membrane in tobacco User diabetes as compared to diabetes without tobacco User or any biological membrane early microangiopathy such as cardio vascular Disease, neuropathy, nephropathy, retinopathy etc.

The studies in assessing the onset of diabetic early complications on diabetic subjects with tobacco user. MDA levels and Uric acid levels might be indicator to pre diabetic signal for precaution in prevntation of diabetic complication to mankind. The tobacco induced alteration in lipid profile susceptible for oxidative stress. Further research need to be carried out to rule out the membrane lipid composition to confirm exchange of lipid between serum and membrane.

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