Risk of type II diabetes mellitus in alcoholics: A hospital based cross-sectional study

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Abstract

Introduction: The rise in prevalence of diabetes in developing countries is due to industrialization, socio-economic development, urbanization and changing life style. One of the important causes is the excessive intake of alcohol. In Sikkim, nearly 35% of the population of > 21yrs of age is chronic alcoholic which is a much higher figure as compared to the national average.[2] As per data compiled by Health Ministry, the prevalence of Type II Diabetes Mellitus (Type- II DM) was highest in Sikkim. The present study will be to assess the burden of Type II Diabetes Mellitus (DM) among alcoholics and to see the co- relation of DM and alcohol drinking pattern in the study population from Gangtok, Sikkim.

Objective: To assess the burden of Type II Diabetes Mellitus(DM) among alcoholics, to see the co- relation of DM and alcohol drinking pattern and to see the lipid profile of the study participants.

Materials and Methods: This cross-sectional hospital based study was undertaken in Central Referral Hospital, a tertiary care centre under Sikkim Manipal Institute of Medical Sciences Tadong, Gangtok. A hundred patients above 30 years of age admitted in the Central Referral Hospital and diagnosed as alcoholic liver disease during the period 01- 07- 2012 to 31- 12-2012 were selected for the study. After taking a written informed consent, these patients were interviewed. Fasting and postprandial blood sugar, lipid profile and blood pressure were recorded from the case records. The collected data was analysed using INSTAT version 3 graph pad. The result is represented in tables. p<0.05 is considered significant.

Results: The occurrence of Diabetes in relation to number of drinks per week was found to be statistically significant (p<0.05). On assessing lipid profile of study participants, it was found that the mean cholesterol, triglycerides and high density lipoproteins were significantly different in alcoholic diabetics and alcoholic non-diabetics.

Conclusion: A definite association between alcohol consumption and Type II Diabetes Mellitus could not be established. However, there certainly appears to be some association between heavy alcohol consumption and Type-II DM. A reduction in alcohol intake by heavy drinkers may reduce their risk of developing Type-II DM.

Keywords: Alcoholics, Diabetes Mellitus, Non-alcoholics.

Introduction

Type 2 diabetes has become deadlier because of life style modification and adaptation in the modern world.[16] The disturbance in metabolic functions associated with Diabetes Mellitus results in a constellation of complications in multiple organs. This imposes a tremendous burden on the health care system. The rise in prevalence of diabetes in developing countries is due to industrialization, socio-economic development, urbanization and changing life style. Many mysteries about the disease has now been opened up because of the extensive study of its pathophysiology.[16] Apart from various other risk factors, one of the important causes is the excessive intake of alcohol which increases the risk of Diabetes by damaging the pancreas and liver and by promoting obesity.[1] In Sikkim, nearly 35% of the population of > 21yrs of age is chronic alcoholic which is a much higher figure as compared to the national average.[2] Also, Sikkim recorded the highest prevalence of diabetes at 14% as given by Silicon India News, 17.12.2012. As per the figures based on National Family Health Survey (NFHS), 2005- 06, the prevalence of Type II Diabetes Mellitus was highest in Kerala, Tripura, West Bengal, Goa and Sikkim. As per data compiled by Health Ministry, the prevalence of Type II Diabetes Mellitus (Type- II DM) was highest in Sikkim, with prevalence rate of 13.88%. The present study was done to find the relationship between alcoholism and Type- II DM and thus ascertaining the burden of Type II Diabetes Mellitus (DM) among alcoholics in the study population from Gangtok, Sikkim. The

alcohol drinking pattern and its correlation with DM was also studied.

Objective

To assess the burden of Type II Diabetes Mellitus(DM) among alcoholics, to see the co-relation of DM and alcohol drinking pattern and to see the lipid profile of the study participants

Materials and Methods

This cross-sectional hospital based study was undertaken in Central Referral Hospital, a tertiary care centre under Sikkim Manipal institute of Medical Sciences Tadong, Gangtok. All the patients above 30 years of age admitted in the Central Referral Hospital and diagnosed as alcoholic liver disease during the period 01- 07- 2012 to 31- 12-2012 were taken and among these, one hundred alcoholics were selected for the study. Alcohol consumption of >30 drinks/week (each drink of 60ml) were taken as heavy alcoholics. After taking a written informed consent, these patients were interviewed regarding history of Diabetes, time of diagnosis, alcohol consumption behaviour, other co-morbid conditions and their demographic and social characteristics. Fasting and postprandial blood sugar, lipid profile and blood pressure were recorded from the case records. Diagnosis of Diabetes was made by ADA (American Diabetes Association) criteria. Critically ill patients, patients with family history of Type II Diabetes Mellitus and those who were diagnosed as diabetics prior to alcohol consumption behaviour were excluded from the study. The collected data was entered in excel spreadsheets and was analyzed using INSTAT version 3 graph pad and necessary statistical tests were applied .The result is represented in tables. $p<0.05$ is considered significant.

Results

A total of 100 alcoholics were studied, out of which 25% were diabetics and 75% were non-diabetics (table 1). In the study group, 81% were between the age group of 30-60 years and 19% were of the age > 60 years. 23.5% of the individuals in the age group of 30-60 years were diabetics whereas 21.1% were diabetics in the age group of > 60 years (table 2). Among the individuals taking > 30 drinks a week, majority (53.57%) were found to be diabetics (table 3). The occurrence of Diabetes in relation to number of drinks per week was found to be statistically significant ($p< 0.05$). Among the diabetics, 15.38% were in the habit of drinking alcohol for last 2-10 years, 31.25% were drinking for 11-20 years and 31.03% were drinking for >20 years (table 4). No significant difference was observed in terms of duration of drinking behaviour between the diabetics and non-diabetics. On assessing lipid profile of study participants, it was found that the mean cholesterol ($p<0.05$), triglycerides ($p<0.05$) and high density lipoproteins (HDL) ($p< 0.05$) were significantly different in alcoholic diabetics and alcoholic non-diabetics (table 5). However, low density lipoproteins (LDL) does not seem to differ significantly among diabetic and non-diabetic group.

Table1: Burden of diabetics among the study participants

Morbidity	Number	Percentage
Diabetic	25	25
Non diabetic	75	75
TOTAL	100	100

Table 2: Age distribution of the study participants

Age group	Total	Diabetic N (%)	Non Diabetic N (%)
30-60	81 (81)	19 (23.5)	62 (76.5)
61-80	19 (19)	4 (21.1)	15 (78.9)

Table 3: Diabetic status in relation to drinking

Diabetic status	No of drinks per week		Statistical analysis
	<30	>30	p < 0.05
Diabetic	10 (13.88%)	15(53.57%)	chi square =14.88 df 1
Non Diabetic	62 (86.11%)	13 (46.42%)	OR 0.14 CI- 0.051 to 0.38

Highly significant

Table 4: Diabetic status in relation to duration of drinking

Diabetic status	Duration of drinking in yrs			Statistical analysis
	2-10	11-20	>20	p> 0.05
Diabetic	6 (15.38%)	10 (31.25%)	9 (31.03%)	chi square =3.15 df 2
Non Diabetic	33 (84.62%)	22 (68.75%)	20 (68.97%)	
TOTAL	39	32	29	

Not Significant

Table 5: Lipid profile of the study participants

Lipid Profile	Diabetic	Non Diabetic	Statistical analysis
Cholesterol mean (SD) (mg/dl)	151 (50.27)	132(33.43)	p < 0.05 t =2.15 df 98
Triglyceride mean (SD) (mg/dl)	154.88 (57.75)	118.72 (26.11)	p < 0.05 t =4.29 df 98
HDL mean (SD) (mg/dl)	39.72 (8.37)	36.49 (6.49)	p < 0.05 t =1.99 df 98
LDL mean (SD) (mg/dl)	108.16 (38.91)	99.83(28.70)	p > 0.05 t =1.15 df 98

Discussion

Diabetes Mellitus is a syndrome of metabolic disorder and a number of environmental factors play a major role in its pathogenesis for example sedentary life style, dietary habits, obesity, stress, etc. Insulin resistance and ß cell Dysfunction are the two main effects that characterize Type II DM.

Association of obesity and Type II DM is well known. Central obesity is more likely to be associated with insulin resistance than peripheral fat depots. Studies have shown that there is an inverse relation between free fatty acid and insulin sensitivity.

Chronic alcoholism increases lipogenesis and cholesterol synthesis from Acetyl Co A. This lipogenic activity of alcohol may be responsible for reduction in Insulin Sensitivity.

The increase in lipogenesis is because of certain biochemical alterations that occur due to metabolism of alcohol. Ethanol is oxidized to aldehyde by Alcohol Dehydrogenase. This Aldehyde is further oxidized to Acetate by Aldehyde Dehydrogenase. Both the steps of oxidation of alcohol produce NADH resulting in high NADH-NAD ratio. This reduces fatty acid oxidation. Moreover, high NADH favours conversion of Pyruvate to Lactate. This causes a reduction in the availability of Pyruvate which in turn results in decreased formation of Oxaloacetate. All these factors i.e., a decrease in Pyruvate, a decrease in Oxaloacetate and an increase in NADH suppresses Tricarboxylic acid cycle. There is increased formation of Acetyl Coenzyme A resulting in increased synthesis of fatty acid.[3] A majority of cases of chronic Pancreatitis occur as a result of persistent high alcohol consumption. About a fifth of these patients develop Diabetes mellitus.[4]

Alcohol use, at least on a social level, is wide spread among Diabetics as well as non-diabetics. There has been numerous studies to find a correlation between alcohol consumption an Type-II Diabetes Mellitus. Several prospective studies have reported a positive association[5-10] between alcohol consumption and risk of Type II DM. The meta- analysis done by Landol J Koppes[11] suggested that there is no reduction in the risk of Diabetes mellitus in heavy drinkers. Some of the studies have shown a non-linear relationship,[11-14] suggesting that moderate alcohol consumers may have reduced risk of Type-II DM as compared to the abstainers. However, even these studies agree that high alcohol consumption may increase the risk of Type-II DM. Some studies[6] have even suggested a negative association.

Though chronic ethanol consumption is known as an independent risk factor for Type 2 diabetes, there is a great deal of controversy concerning the relationships between alcohol consumption and the development of Type II diabetes. Reasons for the discrepancy may be the type of drink, the amount and duration of exposure to ethanol, the drinking pattern and behaviour. The protective effect of moderate alcohol consumption has been suspected to be due to increase in HDL, and some alcohol containing drinks like red wine may contain antioxidants.[15]

In our study, we could not find a definite relationship between alcohol consumption and Type II DM. However, there was a significant statistical difference among the two groups in terms of number of drinks per week. Among the

individuals taking > 30 drinks a week, majority (53.57%) were found to be diabetics (table 3). The occurrence of Diabetes in relation to number of drinks per week was found to bes statistically significant (p< 0.05).

Conclusion

Among the study population, 25% of the alcoholics were Diabetics and 60% of them were in the habit of drinking >30 drinks per week. A definite association between alcohol consumption and Type II Diabetes Mellitus could not be established. Further studies need to be done to establish this relation. However, there appears to be some association between heavy alcohol consumption in terms of number of drinks per week and Type-II DM. A reduction in alcohol intake by heavy drinkers may reduce their risk of developing Type-II DM. Though a few studies show that moderate alcohol consumption is associated with a lower risk of Diabetes Mellitus, introduction of alcohol consumption as a lifestyle measure for prevention of Diabetes cannot be advocated.

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