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Original Research Article

A Case Control Assessment of LFT and Haemoglobin and Plasma Glucose Levels between Alcoholic and Non-Alcoholics

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Abstract

Aim: The aim of the present study was to compare anthropometric measurements, liver function tests, haemoglobin and plasma glucose levels in individuals with alcohol abuse and normal population.

Material & Methods: The study was carried out in the Department of General Medicine in between the duration of 24 months. The study included 100 individuals with alcohol abuse recruited from department of General Medicine. A total of 50 patients, age, sex, height and weight matched healthy individuals were taken as controls.

Results: The mean age of the individuals with alcohol abuse was 42.8 years and mean age of controls (non-alcoholics) was 41.09 years. This difference was not statistically significant with respect to the age of the cases and controls. About 42% of the individuals with alcohol abuse belonged to 31-40 years and 38% belonged to 41-50 years. About 44% of the non-alcoholics belonged to 41-50 years and 42% belonged to 31-40 years. About 16% of the individuals with alcohol abuse had hypertension, 2% had Dyslipidemia, 1% had Prolapse intervertebral disc, 1% had obesity and 80% had no comorbidy. About 8% of the non-alcoholics had hypertension. There were 30% of the individuals with alcohol abuse had the history of binge drinking in this study which was statistically significant. The difference was not statistically significant between the cases and controls in terms of anthropometric measurements. The mean post prandial glucose among the individuals with alcohol abuse was 116.8 mg/dl and among the controls was 121.1 mg/dl. The difference was statistically significant.

Conclusion: The individuals with alcohol abuse have raised serum bilirubin, AST and ALT levels compared to the non-alcoholics. Prevalence of hypertension is higher in the individuals with alcohol abuse compared to normal population.

Keywords: Fasting Blood sugar, Post parandial Blood Sugar, Body Surface Area, Body Mass Index. Alcohol abuse, Liver function tests, Plasma glucose

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Introduction

Alcohol is known for hepato-toxic, commonly consumed globally leads multiple hepatic complications. The report also states that in 2012, about 3.3 million deaths or 5.9% of all global deaths were attributable to alcohol consumption. Including cirrhosis fibrosis hepatic failure etc. Apart from these effects of alcohol on the insulin – glucose axis can't be ignored [1] Alcohol is a hepatotoxin that is commonly consumed worldwide and is associated with a spectrum of liver injury including simple steatosis or fatty liver, alcoholic hepatitis, fibrosis and cirrhosis. Alcoholic liver disease is a general term used to refer to this spectrum of alcohol related liver injuries. [2,3] Numerous studies have shown that regular light to moderate drinking can have impact on morbidity and mortality for ischemic heart disease and ischemic stroke whereas excessive alcohol intake or binge drinking has detrimental effect on cardiovascular system

Excessive drinking has been linked to the metabolic syndrome, a cluster of conditions, including obesity, hypertension, and T2DM. [4] Several recent studies have shown that alcohol consumption is inversely associated with HbA1c. [5,6,7] Acutely alcohol impairs insulin sensitivity in chronic alcoholics [8] especially adiposity [9] and atherosclerosis but it has negative correlation with BMI with alcohol intake.

Excessive alcohol consumption is also associated with alcoholic cardio myopathy characterised by enlargement of heart, increased left ventricular mass ventricular dysfunction mainly in DM.2 patients. [10] Moreover alcohol intake has been associated with hypertension which also contributes to alteration of cardiac structure and function ultimately leads risk of coronary artery disease (CAD) and risk of heart failure (HF).

The absolute level of liver enzyme elevation does not correlate well with the severity of alcoholic liver disease, however, the pattern of elevation in transaminases is helpful in making a diagnosis of liver injury due to alcohol as AST is typically two to three times greater than ALT in alcoholic liver injury. [11] They will also typically have an elevated serum gammaglutamyltranspeptidase (GGT). [12] It is adipose tissue-derived hormone and is thought to play an important role in the regulation of insulin sensitivity and glucose/lipid metabolism. Plasma levels of adiponectin are positively associated with insulin sensitivity and are inversely associated with impaired glucose metabolism. Joosten et al in their study on postmenopausal women showed that moderate alcohol consumption improves insulin sensitivity, adiponectin levels and lipid profile through transcriptional mechanism. [13]

Hence attempt was made to compare anthropometric measurements, liver function tests, hemoglobin and plasma glucose levels in individuals with alcohol abuse and healthy controls.

Material & Methods

The study was carried out in the Department of General Medicine, Lord Buddha Koshi Medical College and Hospital ,Saharsa , Bihar, India in between the duration of 24 months. The study included 100 individuals with alcohol abuse recruited from department of General Medicine. A total of 50 patients, age, sex, height and weight matched healthy individuals were taken as controls. All the controls were taken from medicine outpatient department where they had reported for routine annual medical examination. Cases and controls were enrolled after meeting inclusion and exclusion criteria and after taking written, informed consent by all participants.

Inclusion Criteria

• 84 cases of individuals with alcohol abuse (as per DSM-IV criteria) within the age group of 18-70 years

Exclusion Criteria

• Patients with history of rheumatic/valvular heart disease, ischemic heart disease, congenital heart disease, diabetes mellitus, smoking and tobacco use

Procedure:

All the cases and controls underwent a detailed clinical examination, anthropometric measurements, blood pressure, haemoglobin, FBS, PPBS, serum bilirubin, AST and ALT. Blood pressure was measured in the arm after a five minute rest in sitting position, using mercury sphygmomanometer with standard cuff size (to the nearest 2 mmHg). Hypertension: >140/>90 mmHg. Weight was measured (to the nearest 0.5 Kg) with the participant standing motionless on the weighing machine. Height was measured (to the nearest 0.1 cm) using a standard non-elastic tape, measured with the participant standing erect against a wall, without shoes and the head looking straight.

Body mass index (BMI) classified as per BMI criteria for Indians:

• Normal BMI: 18.5-22.99

• Overweight BMI: 23-24.99

• Obesity BMI: ≥ 25Kg/m2

Under aseptic precautions venous blood samples were collected from cases & controls for above mentioned biochemical investigations.

Statistical Analysis:

The data collected was compiled and analysed using statistical package for social services (SPSS 20). The quantitative variables were presented as mean ± SD. The categorical variables were presented as frequency and percentages. Statistical analysis of data was made using Chi-square test. P value of < 0.05 was considered to be significant.

Results

Table 1: Distribution of the study groups according to age

Age Group	Cases n (%)	Controls n (%)
Less than 30 years	8 (8)	4 (8)
31-40 years	42 (42)	21 (42)
41-50 years	38 (38)	22 (44)
More than 50years	12 (12)	3 (6)
Total	100 (100)	50 (100)
Mean ± SD	42.8±8.92	41.09±8.32
P value	0.512	

The mean age of the individuals with alcohol abuse was 42.8 years and mean age of controls (non-alcoholics) was 41.09 years. This difference was not statistically significant with respect to the age of the cases and controls. About 42% of the individuals with alcohol abuse belonged to 31-40 years and 38% belonged to 41- 50 years. About 44% of the non-alcoholics belonged to 41-50 years and 42% belonged to 31-40 years.

Table 2: Distribution of the study groups according to comorbidities

Comorbidities	Cases n (%)	Controls n (%)
Hypertension	16 (16)	4 (8)
Dyslipidemia	2 (2)	0
Prolapse intervertebral disc	1 (1)	0
Obesity	1 (1)	0
Absent	80 (80)	46 (92)

About 16% of the individuals with alcohol abuse had hypertension, 2% had Dyslipidemia, 1% had Prolapse intervertebral disc, 1% had obesity and 80% had no comorbidy. About 8% of the non-alcoholics had hypertension.

Table 3: Distribution of the study groups according to Binge drinking

Binge drinking	Cases n (%)	Controls n (%)
No	70 (70)	50 (100)
Yes	30 (30)	0
Total	100 (100)	50 (100)

There were 30% of the individuals with alcohol abuse had the history of binge drinking in this study which was statistically significant.

Table 4: Distribution of the study groups according to anthropometric measurements

Mean±SD	Cases	Controls	P value
Height (cm)	166.4±8.92	158.6±6.4	0.000
Weight (kg)	60.4±3.2	58.6±5.5	0.165
BMI ($kg/m^{2)}$	22.8±3.2	23.8±2.8	0.072
BSA (in m^2)	1.72±0.1	1.8±0.08	0.092

The mean height of the individuals with alcohol abuse was 166.4 cm and non-alcoholic was 158.6 cm. The difference in the heights of cases and controls was statistically significant. The mean weight of the individuals with alcohol abuse was 60.4 kg and controls were 58.6 kg. The difference was not statistically significant. The mean BMI of the individuals with alcohol abuse was 22.8 kg/m2 and 23.8 kg/m2 among the non-alcoholics. There was no statistically significant difference between the BMI of the cases and controls. The mean BSA among the individuals with alcohol abuse was 1.72 m2 and among the non-alcoholics was 1.8 m2. The difference was not statistically significant between the cases and controls in terms of anthropometric measurements.

Table 5: Distribution of the study groups according to haemoglobin levels, fasting plasma glucose and post prandial glucose

Mean±SD	Cases	Controls	P- value
Haemoglobin	13.6±1.2	13.8±0.9	0.28
FBS	85.4±13.5	84.2±14.4	0.713
PPBS	116.8±12.3	121.1±11.0	0.022

The mean hemoglobin level of the individuals with alcohol abuse was 13.6 gm% and among the controls was 13.8 gm%. The difference was not statistically significant. The mean fasting plasma glucose among the individuals with alcohol was 85.4 mg/dl and among the non-alcoholics was 84.2 mg/dl. The difference was not statistically significant. The mean post prandial glucose among the individuals with alcohol abuse was 116.8 mg/dl and among the controls was 121.1 mg/dl. The difference was statistically significant.

Table 6: Distribution of the study groups according to serum bilirubin, AST & ALT (liver function tests)

Mean±SD	Cases	Controls	P value
Serum bilirubin	1.1±12.3	0.7±0.3	0.000
AST	78.0±40.2	28.2±6.4	0.000
ALT	78.4±36.4	28.4±8.8	0.000

The mean serum bilirubin among the individuals with alcohol abuse was 1.1 mg/dl and among the non- alcoholics was 0.7 mg/dl, which was statistically significant. The mean Aspartate Transaminease (AST) among the individuals with alcohol abuse was 78 IU/l and among the controls was 27.2 IU/l. This difference was statistically significant. The mean Alanine Transaminase (ALT) among the individuals with alcohol abuse was 78.4 IU/l and 28.4 IU/l among the non- alcoholics, which was statistically significant.

Discussion

Type 2 diabetes was previously defined using fasting plasma glucose (FPG) and 2-hour plasma glucose (PPG) level measured during an oral glucose tolerance test (OGTT). Glycated hemoglobin (HbA1c) has been used as a glycemic marker of diabetes treatment. In June 2009, the International Expert Committee recommended the use of the HbA1c test with a threshold ≥6.5% to diagnose diabetes, which has since been adopted by the American Diabetes Association. [14,15]

The mean age of the individuals with alcohol abuse was 42.8 years and mean age of controls (non-alcoholics) was 41.09 years. This difference was not statistically significant with respect to the age of the cases and controls. About 42% of the individuals with alcohol abuse belonged to 31-40 years and 38% belonged to 41- 50 years. About 44% of the non-alcoholics belonged to 41-50 years and 42% belonged to 31-40 years. In a similar study by Lazarevic et al [16] the mean age of patients with alcohol abuse was 45 years and controls was 44 years. In a study by Bell et al [17] the mean age of non-drinkers was 48.5 years, former drinker was 49.5 years, occasional drinkers was 48.1 years, moderate drinkers was 45.8 years, heavy drinker was 45.8 years. Alcohol is also known dose dependent cardiac toxin but myocardial damage may be consequence of direct toxic effects of alcohol or its metabolites by ethanol induced apoptosis associated hypertension. [18] Alcoholic cardiomyopathy is character by enlargement of heart increased LV mass and ventricular dysfunction. It is reported that, moderate to heavy alcoholics subjects would result in reduced insulin sensitivity which leads to hyperglycemias10 and reduce the influence of hepatic enzyme induction Alcoholic liver disease (ALD) particularly cirrhosis has been one of the most prevalent and devastating conditions caused by alcohol consumption and one of the leading causes of alcohol related death. The pathogenesis of ALD is multi factorial.

About 16% of the individuals with alcohol abuse had hypertension, 2% had Dyslipidemia, 1% had Prolapse intervertebral disc, 1% had obesity and 80% had no comorbidy. About 8% of the non-alcoholics had hypertension. A study by Ceccanti M et al [19] reported prevalence of hypertension in 55% cases of chronic alcohol consumer group during early stage of abstinence. There were 30% of the individuals with alcohol abuse had the history of binge drinking in this study which was statistically significant. Girish et al [20] in their study on pattern of alcohol use, also found that 29% of alcohol consuming subjects in urban areas had history of binge drinking. The mean height of the individuals with alcohol abuse was 166.4 cm and non-alcoholic was 158.6 cm. The difference in the heights of cases and controls was statistically significant. In a study by Lazaveric et al [16] the mean body surface area of controls was 2.0 m2 and 1.9m2 among the alcoholics.

The mean weight of the individuals with alcohol abuse was 60.4 kg and controls were 58.6 kg. The difference was not statistically significant. The mean BMI of the individuals with alcohol abuse was 22.8 kg/m2 and 23.8 kg/m2 among the non-alcoholics. There was no statistically significant difference between the BMI of the cases and controls. The mean BSA among the individuals with alcohol abuse was 1.72 m2 and among the non-alcoholics was 1.8 m2. The difference was not statistically significant between the cases and controls in terms of anthropometric measurements. The mean hemoglobin level of the individuals with alcohol abuse was 13.6 gm% and among the controls was 13.8 gm%. The difference was not statistically significant. In a study by Kino et al [21] the mean haemoglobin level among the heavy drinkers was 14.4 gm% and among the moderate drinkers was 14.9 gm%. The mean fasting plasma glucose among the individuals with alcohol was 85.4 mg/dl and among the non-alcoholics was 84.2 mg/dl. The difference was not statistically significant. The mean post prandial glucose among the individuals with alcohol abuse was 116.8 mg/dl and among the controls was 121.1 mg/dl. The difference was statistically significant. Kiechi S et al [22] in their study had concluded that low to moderate amount of regular alcohol consumption improves insulin sensitivity whereas serum insulin concentration decreases with the increase in the alcohol dose. Paulson QX et al [23] in their study concluded that alcohol induces increase in insulin sensitivity by up-regulating the anti-inflammatory genes. Zilkens RR et al [24] concluded that alcohol did not change insulin sensitivity in healthy men.

The mean serum bilirubin among the individuals with alcohol abuse was 1.1 mg/dl and among the non- alcoholics was 0.7 mg/dl, which was statistically significant. The mean Aspartate Transaminease (AST) among the individuals with alcohol abuse was 78 IU/l and among the controls was 27.2 IU/l. This difference was statistically significant. The mean Alanine Transaminase (ALT) among the individuals with alcohol abuse was 78.4

IU/l and 28.4 IU/l among the non- alcoholics, which was statistically significant. Lazaveric et al [16] reported that AST was 22 IU/L among the controls and 37 IU/L among the alcoholics. The mean ALT level was 31 IU/L in the controls and 40 IU/L among the alcoholics.

Conclusion

Binge drinking history was positive in 30% of alcoholics. Prevalence of hypertension is higher in the individuals with alcohol abuse compared to normal population. The individuals with alcohol abuse have raised serum bilirubin, AST and ALT levels compared to controls. Cessation of alcohol is strongly recommended in binge drinkers and individuals with alcohol abuse.

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