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Original Research Article

Comparative study of anthropometric measurements, liver function tests, hemoglobin and plasma glucose levels between individuals with alcohol abuse and controls

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ABSTRACT

Background: Alcohol abuse is global burden to families as well as society. On the 'years of life lost scale', which is based on alcohol attributable years of life lost, India has been rated 4 on a scale of 1 to 5. This implies that the alcohol consuming population of our country loses most of the years of their life because of drinking and its consequences. The aim of this research is to compare anthropometric measurements, liver function tests, haemoglobin and plasma glucose levels in individuals with alcohol abuse and normal population.
Methods: The study was conducted in the Department of General Medicine, Civil Hospital, Aizawl. 84 cases of individuals with alcohol abuse (as per DSM-IV criteria) within the age group of 18-70 years and 70 age, sex, height and weight matched lifetime abstainers, healthy individuals were taken as controls from medicine department. They underwent a detailed clinical examination, anthropometric measurements, liver function tests, haemoglobin and plasma glucose levels.
Results: 15.5% of the individuals with alcohol abuse had hypertension. The mean post prandial glucose among the individuals with alcohol abuse was 116.8±12.3 mg/dl and among the controls was 121.1±11.0 mg/dl. Mean serum bilirubin 1.1 mg/dl, AST 79 IU/l & ALT was 79.6 in alcoholics. The mean serum bilirubin 0.8 mg/dl, AST 27.2 IU/l and ALT was 29.4 in non-alcoholics.
Conclusions: 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: Alcohol abuse, Body Mass Index, Liver function tests, Plasma glucose

INTRODUCTION

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.[1,2] 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. According to WHO report on alcohol and health 2014; alcohol consumption also contributes to about 10%

of the disease burden due to tuberculosis, epilepsy, hemorrhagic stroke and hypertensive heart disease in the world.[3] The report also states that in 2012, about 3.3 million deaths or 5.9% of all global deaths were attributable to alcohol consumption.

Diagnostic and statistical manual IV (DSM IV) defines alcohol abuse as a maladaptive pattern of abuse, leading to clinically significant impairment or distress, as manifested by one or more of the following, occurring within a 12-month period:

- Recurrent alcohol use resulting in failure to fulfil major role obligations at work, school or home (e.g: repeated absences or poor work performance related to substance use; substance-related absences, suspensions or expulsions from school; or neglect of children or household).
- Recurrent alcohol use in situations in which it is physically hazardous (e.g driving an automobile or operating a machine).
- Recurrent alcohol-related legal problems (e.g arrests for alcohol-related disorderly conduct).4 Continued alcohol use despite persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol (e.g: arguments with spouse about consequences of intoxication or physical fights).

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.[4] They will also typically have an elevated serum gamma-glutamyltranspeptidase (GGT).[5] In 1915 Lian et al described the association of hypertension with alcohol intake, noting a higher prevalence in French army officers with the greatest alcohol consumption (> 3 litres of wine/day).[6] The Joint National Committee 7 on detection, evaluation and treatment of high blood pressure also listed excess alcohol intake as a cause of resistant hypertension and had recommended that men should limit alcohol consumption to 2 drinks per day, women and light weight people limit intake to 1 drink per day.[7] Recently studies have been done regarding effect of alcohol on adiponectin. 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.[8]

Aim of the study is to compare anthropometric measurements, liver function tests, hemoglobin and plasma glucose levels in individuals with alcohol abuse and healthy controls.

METHODS

The study was carried out in the Department of Medicine in Civil Hospital, Aizawl. Ethical committee approval was taken before carrying out the study. The study was conducted between August 2015 to February 2017. Cases and controls were enrolled after meeting inclusion and exclusion criteria and after taking written, informed consent by all participants. The study included 84 individuals with alcohol abuse recruited from department of General Medicine. A total of 70, 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.

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

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: $\geq 25 Kg/m^2$

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

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

The mean age of the individuals with alcohol abuse was 40.9 years and mean age of controls (non-alcoholics) was 40.04 years. This difference was not statistically significant with respect to the age of the cases and controls. About 41.7% of the individuals with alcohol abuse belonged to 31-40 years and 38.1% belonged to 41-50 years. About 44.3% of the non-alcoholics belonged to 41-50 years and 41.4% belonged to 31-40 years.

Table 1: Distribution of the study groups according to age.

Age Group	Cases n (%)	Controls n (%)
Less than 30 years	7 (8.3)	6 (8.6)
31-40 years	35 (41.7)	29 (41.4)
41-50 years	32 (38.1)	31 (44.3)
More than 50 years	10 (11.9)	4 (5.7)
Total	84 (100)	70 (100)
Mean ± SD	40.9±7.94	40.04±7.27
P value	0.499	

About 15.5% of the individuals with alcohol abuse had hypertension, 1.2% had Dyslipidemia, 1.2% had Prolapse intervertebral disc, 1.2% had obesity and 84.5% had no comorbidy. About 7.1% of the non-alcoholics had hypertension.

Table 2: Distribution of the study groups according to comorbidities.

Comorbidities	Cases n (%)	Controls n (%)
Hypertension	13 (15.5)	5 (7.1)
Dyslipidemia	1 (1.2)	0
Prolapse intervertebral disc	1 (1.2)	0
Obesity	1 (1.2)	0
Absent	71 (84.5)	65 (92.9)

There were 31% of the individuals with alcohol abuse had the history of binge drinking in this study which was statistically significant.

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

Binge drinking	Cases n (%)	Controls n (%)
No	58 (69.0)	70 (100)
Yes	26 (31.0)	0
Total	84 (100)	70 (100)

$\chi 2$ value = 26.068 df =1 P value = 0.000, Sig

The mean height of the individuals with alcohol abuse was 165.2 cm and non-alcoholic was 159.8 cm. The difference in the heights of cases and controls was statistically significant. The mean weight of the individuals with alcohol abuse was 59.2 kg and controls were 57.9 kg. The difference was not statistically significant. The mean BMI of the individuals with alcohol abuse was 21.9 kg/m^2 and 22.7 kg/m^2 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 1.73m^2 and among the non-alcoholics was 1.7m^2. The difference was not statistically significant between the cases and controls.

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

Mean±SD	Cases	Controls	T value	P value
Height (cm)	165.2±7.99	159.8±6.3	4.606	0.000, Sig
Weight (kg)	59.2±3.1	57.9±5.7	1.489	0.138, NS
BMI kg/m^2	21.9±3.1	22.7±2.6	1.848	0.066, NS
BSA (in m^2)	1.73±0.1	1.7±0.09	1.745	0.083, NS

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

Mean ±SD	Cases	Controls	T value	P value
Haemo -globin	13.6±1.2	13.8±0.9	1.131	0.26, NS
FBS	85.4±13.5	84.2±14.4	0.518	0.605, NS
PPBS	116.8±12.3	121.1±11.0	2.277	0.024, Sig

The mean serum bilirubin among the individuals with alcohol abuse was 1.1 mg/dl and among the non-alcoholics was 0.8 mg/dl, which was statistically significant. The mean Aspartate Transaminease (AST)

among the individuals with alcohol abuse was 79 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 79.6 IU/l and 29.4 IU/l among the non-alcoholics, which was statistically significant.

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

Mean±SD	Cases	Controls	T value	P value
Serum bilirubin	1.1±12.3	0.8±0.3	5.573	0.000, Sig
AST	79.0±41.1	27.2±6.5	10.422	0.000, Sig
ALT	79.6±37.4	29.4±8.8	10.986	0.000, Sig

DISCUSSION

Worldwide, approximately 20% - 30% of patients who present in primary care settings engage in hazardous or harmful alcohol drinking.[9] This study was mainly undertaken to evaluate the comparison between alcohol abuse individuals and healthy controls in relation to anthropometry, haemoglobin, liver function tests and plasma glucose. A total of 154 participants from Civil Hospital, Aizawl were included for the study. Out of 154, 84 cases of individuals with alcohol abuse and 70 control non-alcoholic subjects were evaluated. The mean age of the individuals with alcohol abuse was 40.9±7.94 years ranging from 24 to 58 years and mean age of controls was 40.04 ± 7.27 years ranging from 26 to 59 years. In a similar study by Lazarevic et al, the mean age of patients with alcohol abuse was 45 years and controls was 44 years.[10] In a study by Bell et al, the mean age of nondrinkers 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.[11] (Table 1). In our study 15.5% of the individuals with alcohol abuse had hypertension (Table 2). A study by Ceccanti M et al reported prevalence of hypertension in 55% cases of chronic alcohol consumer group during early stage of abstinence.[12] Lazarevic et al also noted hypertension in 50% of patients with history of chronic alcohol intake.[10]

Binge drinking: Consumption of 5 drinks or more by males and 4 drinks or more for females, on the same occasion on at least one day in the past month. Binge drinking history was positive in 31% of the individuals with alcohol abuse (Table 3). In this study the prevalence of binge drinking among alcohol abusers was similar to other studies. Girish et al in their study on pattern of alcohol use, also found that 29% of alcohol consuming subjects in urban areas had history of binge drinking.[13]

This study has shown that there was a statistically significant difference in the height of the individuals with alcohol abuse and controls. The mean height, weight, BMI and body surface area (BSA) was 165.8 cm, 57.2 kg, 21.9 kg/m^2 and 1.73m^2 in the cases and 159.8cm, 57.9 kg, 22.7 kg/m^2 and 1.7m^2 in the controls (Table 4). In a study by Lazaveric et al, the mean body surface area of controls was 2.0 m^2 and 1.9m^2 among the alcoholics.[10]

The mean haemoglobin level of the individuals with alcohol abuse was 13.6 gm% and 13.8 gm% among the non-alcoholics. In a study by Kino et al, the mean haemoglobin level among the heavy drinkers was 14.4 gm% and among the moderate drinkers was 14.9 gm%.[14] The mean fasting plasma glucose among the individuals with alcohol abuse was 85.4 mg/dl and among the non-alcoholics was 84.2 mg/dl. The mean post prandial glucose among the cases was 116.8 mg/dl and among the controls was 121.1 mg/dl (Table 5). Kiechi S et al 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.[15] Paulson QX et al in their study concluded that alcohol induces increase in insulin sensitivity by up-regulating the anti-inflammatory genes.[16] Zilkens RR et al concluded that alcohol did not change insulin sensitivity in healthy men.[17]

The mean serum bilirubin, AST and ALT among the individuals with alcohol abuse was 1.1 mg/dl, 79 IU/L and 79.6 IU/L respectively and among the controls was 0.8 mg/dl, 27 IU/L and 29.6 IU/L respectively (Table 6).

This study had shown raised serum bilirubin, AST and ALT levels in the individuals with alcohol abuse as compared to non-alcoholics. Lazaveric et al 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.10 Patients with alcoholic hepatitis will typically have moderately elevated aminotransferases (less than 500 IU/mL, an AST:ALT ratio of two or greater and elevated serum bilirubin (greater than 5 mg/dl), which is in concordance with our study.[18,19]

CONCLUSION

Mean age of the individuals with alcohol abuse was 40.9 years. Binge drinking history was positive in 31% 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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