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RESEARCH ARTICLE

EVALUATION OF RENAL FUNCTION IN APPARENTLY HEALTHY ASYMPTOMATIC CHRONIC ALCOHOLICS

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ABSTRACT

Background: Association between alcohol consumption and impairment of renal function is a well-documented fact. But, limited data is available on effect of quantity of alcohol consumption on renal function. As alcoholism is also associated with other organ damage, the present study was conducted to find out the correlation between quantity of alcohol consumption and renal function.
Methods: Sample:30 light,30 moderate,30 heavy alcoholic male subjects and 30 age matched non alcoholics of age between 25 & 45 years.Details about amount, type & frequency of alcohol intake and diet were gathered by history given by subjects. Blood samples were collected within 24 hours of last drink and serum creatinine, serum bilirubin, SGPT & SGOT were estimated.Creatinine clearance was calculated using Cockcroft-Gault equation.
Results: Creatinine clearance showed negative correlation with quantity of alcohol intake that is significant ($P<0.001$) only in heavy alcoholics. Serum bilirubin, SGOT and SGPT showed variable correlation with quantity of alcohol intake that is statistically insignificant and only marginally significant in light alcoholics.
Conclusion: Increasing alcohol intake up to moderate quantity does not impair renal function. But, when the alcohol intake exceed above 50g/d, there is definite evidence of impaired renal function even though there is no evidence of liver damage.This indicates that with increasing alcohol intake impairment of renal function occurs even before hepatic impairment.

INTRODUCTION

Alcoholism is a worldwide medical and social problem.Alcohol consumption can give rise to psychological as well as medical problems involving virtually every system. [1] Association between alcohol consumption and impairment of hepatic and renal function is a well-documented fact. But, limited data is available on effect of quantity of alcohol consumption on renal function.As alcoholism is also associated with other organ damage, the present study was conducted to find out the correlation between quantity of alcohol consumption and renal function.

MATERIAL AND METHODS

***Selection of subjects*:** Present study was conducted in four groups: light (n=30), moderate(n=30), heavy alcoholics(n=30) taking absolute alcohol regularly for at least one year and non-alcoholics(n=30) as controls of age between 25 & 45 years. Only males were selected for the present study, as it was difficult to get females as regular drinkers in light, moderate and heavy quantities. Also the level of drinking to call it as light, moderate and heavy has not been clearly defined for women. It is known that higher levels of alcohol are achieved in females than in males for the same dose of ethanol due to less gastric dehydrogenase and less volume of distribution in females as compared to males. That is why same criteria could not be applied for males and females. Among the alcoholic groups, people consuming any type of alcoholic beverage were taken as subjects, because it was the absolute ethanol intake which was taken into the consideration (irrespective of type of beverage) and not the amount of beverage. A criterion for dividing the drinkers in different groups is based on amount of absolute ethanol taken in grams per day according to British Heart Foundation and The Royal College.[2,3] Thus, different alcoholic groups are :

Light alcoholic group: intake of < 30 g/d of absolute ethanol.
Moderate alcoholic group: intake of 30 - 50 g/d of absolute ethanol.
Heavy alcoholic group: intake of > 50 g/d of absolute ethanol.

Patients suffering from or on treatment for diabetes and hypertension were excluded from the study. The subjects taking illicit liquor were excluded, as this type of liquor is not licensed by the government and because of the lack of standardization, it was not possible to calculate the intake of ethanol in grams per day for these beverages.

***Study protocol*:** The study was conducted at the B J Medical College & Sasoon General Hospital, Pune, Maharashtra, India.
Written informed consent was taken from each subject.
All the information about the alcohol intake, diet, any major illnesses, recent operations or accidents was noted in the form of history in a questionnaire.

Absolute ethanol intake was calculated as follows

A) Malted liquors[4]: alcohol content is low (3 – 6% v/v) eg Beers, Stout.
B) Wines[4]:
Light wines: Alcohol content 9 – 12% v/v. eg Cider, Claret.
Fortified wines: Alcohol content 16 – 22% v/v. eg Port, Sherry.
Effervescent wines: Alcohol content 12 – 16% v/v. eg Champagne.

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C) Spirits[4]: Though the alcohol content can vary from 40 – 55% v/v in India (and almost internationally) for all licensed brands it is standardized to 42.8% v/v or 37%w/w. eg Rum, Gin, Whisky, Brandy, Vodka etc.

D) Country LIQUOR[5]: Ethanol content may vary from 11% to 45% v/v. Different types of drinks contain different percentage of ethanol. Beers range from 3 – 8% v/v of ethanol in their alcohol content i.e. on an average 5% v/v of ethanol. This means 5 ml of absolute alcohol (5 X 0.79 = 3.95 g of ethanol) per 100 ml of drink, the rest being water. Similarly, Wines contain on an average 12% of ethanol v/v i.e. 12 ml of absolute ethanol (corresponds to 9.48 g of ethanol) per 100 ml of wine. Spirits contain about 43% v/v of ethanol i.e. 43 ml of absolute ethanol (corresponds to about 33.97 g of absolute ethanol) per 100 ml of spirits[4]. So, one unit or drink which corresponds to ingestion of 10 g of absolute ethanol corresponds approximately to intake of 250 ml of beer, 30 ml of spirits and 105 ml of wine. Similarly unit for country liquor (28% of ethanol v/v i.e. 22.12 g of ethanol per 100 ml) was calculated according to the percentage of ethanol present in it[4]. Six to seven ml of blood was collected under all aseptic precautions by venepuncture using disposable syringes and needles. Care was taken to see that blood samples were collected within 24 hours of the last drink to avoid the waning off effect of alcohol on the blood parameters. Blood sample was taken into the plane bulb and serum obtained was used for manual estimation of serum bilirubin by "Malloy and Evelyn method"[6] and for estimating serum creatinine, SGPT and SGOT by autoanalyser of Super Stat 919 company. Creatinine clearance was calculated using Cockcroft-Gault equation [7]. Reduced renal function was defined as creatinine clearance (CrCl)< 60 ml/min. This cut-off point has been previously validated against insulin clearance [8]. This corresponds to the newly proposed National Kidney Foundation Kidney Dialysis Outcomes Quality Initiative (K/DOQI) guidelines for defining chronic kidney disease (CKD) stages 3 – 5 [9]. Levels of creatinine clearance, serum bilirubin, SGOT and SGPT were taken as tissue damage markers for kidney and liver respectively. Levels of these tissue damage markers were compared with age matched controls in different study groups. The experiment protocol was approved by the Research and Human Ethics Committee of B J Medical College & Sasoon General Hospital, University of Pune, Maharashtra, India.

***Statistical analyses*:** Analysis was done by Statistical Package for Social Sciences (SPSS) software version 16, by using't' test. A 'P' value of < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Comparison of creatinine clearance levels with quantity of alcohol intake per day revealed increasing negative correlation that is statistically significant (<0.001) only in heavy alcoholic group (Table 1).

Table 1. Correlation between quantity of alcohol intake and creatinine clearance in study groups

Group	Correlation (r)	P - Value
Light Alcoholic (n=30)	- 0.207	>0.05
Moderate Alcoholic (n=30)	- 0.253	>0.05
Heavy Alcoholic (n=30)	- 0.640	<0.001

It is seen that there is no statistically significant correlation between quantity of alcohol intake and serum bilirubin levels. In fact, the correlation is negative though insignificant in light and heavy alcoholic group (Table 2). There is a negative correlation between quantity of alcohol intake and SGPT and SGOT in light alcoholics. It's statistical significance is only marginal (<0.05). This means there is no increase in SGPT and SGOT levels with increasing alcohol intake. The correlation of quantity of alcohol intake with SGPT is negative and that with SGOT is positive in moderate alcoholics but both are statistically insignificant. Whereas the correlations between quantity of alcohol intake and SGPT and SGOT are positive in heavy alcoholics with no statistical significance (Table 3,4).

Table 2. Correlation between quantity of Alcohol Intake and Serum Bilirubin in alcoholic groups

Group	Correlation (r)	P-Value
Light alcoholic (n=30)	-0.12	>0.05
Moderate alcoholic (n=30)	0.18	>0.05
Heavy alcoholic (n=30)	-0.08	>0.05

Table 3. Correlation between quantity of Alcohol Intake and SGPT in alcoholic groups

Group	Correlation (r)	P-Value
Light alcoholic (n=30)	-0.37	<0.05
Moderate alcoholic (n=30)	-0.10	>0.05
Heavy alcoholic (n=30)	0.26	>0.05

Table 4. Correlation between quantity of Alcohol Intake and SGOT in alcoholic groups

Group	Correlation (r)	P-Value
Light alcoholic (n=30)	-0.37	<0.05
Moderate alcoholic (n=30)	0.10	>0.05
Heavy alcoholic (n=30)	0.34	>0.05

It is observed that increasing alcohol intake up to moderate quantity does not impair renal function. But, when the alcohol intake exceed above 50g/d, there is definite evidence of impaired renal function as indicated by decreased creatinine clearance levels even though there is no evidence of liver damage. This indicates that with increasing alcohol intake impairment of renal function occurs even before hepatic impairment. Although we got these results, we recognize that we should estimate our results carefully because of some limitations. 1) Information on alcohol consumption was obtained by an interview using a questionnaire without verification using biological markers. 2) Subjects reported only one beverage that they usually consumed. Many of the subjects might have consumed more than one kind of beverages.Also a prospective study with a larger population will be expected to investigate the association between the type of alcoholic beverage and renal function.

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