Decrease of Serum AST, ALT, and GGT among Male Alcohol Drinkers with Coffee Consumption Habit.

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Summary :

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Background: *Alcohol is the most important causes of liver cirrhosis. Many of the factors underlying the development of alcoholic liver diseases remain unknown. Recently, some epidemiological studies showed beneficial effects of coffee against the occurrence of alcoholic liver cirrhosis and upon serum liver enzymes level. These observations have been examined in this work.*

Patients and Methods: *The relation of coffee drinking to serum GGT, AST and ALT activities were examined in 59 alcoholic male patients with or without habit of coffee consumption. 35 (59.3%) out of 59 patients were alcoholic drinkers without coffee consumption habit, and 24(40.7%) were alcohol drinkers with coffee consumption. In addition to 24 healthy persons as a control group.*

Results: *Highly significant decrease in GGT ($p<0.001$), AST ($p<0.001$) and ALT ($p<0.001$) activities were found in alcoholic patients with coffee consumption habit as compared with alcoholic patients or with healthy control group.*

Conclusion: *The result of this research suggested that coffee consumption may inhibit the induction of GGT in the liver by alcohol consumption, and may possibly protect against liver cell damage due to alcohol.*

Keywords: *AST, ALT, GGT, Alcoholic, liver cirrhosis, coffee consumption.*

Introduction

Alcoholism represents one of the most serious world-wide socioeconomic and health problems. In one study carried out in Catalonia, for example, about 4.8% of mortality in 1997 was related to excessive alcohol consumption. Furthermore, mortality was higher in men than in women [1]. Alcohol drinkers are more likely to die after acute cardiac events than smoker or non-drinker population [2]. Chronic heavy alcohol use has been incriminated in the geneses of cardiac arrhythmias in human [3].

The diseases caused by alcohol drinking are variable and depends on a variety of factors including genetic predisposition, malnutrition and concomitant viral infection of the liver (viral-hepatitis). In 1997, liver cirrhosis was the tenth leading cause of death in US [4]. Alcoholic liver cirrhosis and alcohol dependence accounted for 42% of all estimated alcohol- caused death in 1997 [5].

Alcohol consumption is usually expressed in units of alcohol consumed per week. Consumption can be measured as the amount of alcohol expressed in grams. This measure is precise and useful for scientific work, but is difficult for many people to relate to everyday measures, for this reason, the concept of a unit of alcohol has been introduced for use in health education. A unit can be related to everyday measures for it corresponds to half a pint of beer, one glass of sherry or port, and one single bar measure of spirits. It can also be related to amounts of alcohol, thus measure a can of beer (450ml) contains nearly 1.5 units, pottle of table wine contains about 7 units, pottle of spirits about 30 units, and 1 unit is about 8 gram of alcohol. In general consumption of alcohol beverages above a threshold of 40 glasses per week increases the risk of hepatocellular carcinoma [6].

Several laboratory tests have been used as diagnostic tools to confirm the excess consumption of ethanol [7-9], serum gamma-glutamyltransferase (GGT) has been shown to be readily inducible by a variety of compounds inducing ethanol [10]. Plasma

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aspartate amino transferase (AST) and plasma alanine amino transferase (ALT) are less often increases at this stage.

Plasma GGT activity measurements have been used widely used as a pointer to the diagnosis of chronic alcohol abuse [11]. Although GGT is widely distributed in human organ, an increase in its activity in serum is almost specifically an indicator of disease of hepatobiliary tract or of hepatic involvement in the primary illness [12]. GGT is microsomal enzyme, it increased by microsomal enzyme–inducing agents such as alcohol and various drugs. increased GGT activities is used to detect and follow alcohol abuse in patients with little or no other abnormality of liver function provided they are not taking enzyme–inducing drugs[13]. Explanations for this minimal response to injury are inadequate. Because pyridoxal phosphate is required for transamination reaction, deficiency in pyridoxine may in some alcoholics contribute to the diminished response [14]. Lower levels of serum GGT associated with coffee drinking were more evident among heavier alcohol drinkers and also among heavier smokers. The findings suggest that coffee may inhibit the inducing effects of alcohol and possibly of smoking upon GGT in the liver [15]. A study carried out by Carrao *et al* (2001) showed that coffee, but not beverages containing caffeine, may inhibit the onset of alcoholic and nonalcoholic liver cirrhosis [16]. Another study carried in Japan in (2001) revealed that, among heavy alcohol drinkers population without liver inflammation (ALT, AST < 40 U/L), the serum AST and ALT were inversely associated with coffee consumption, and alcohol-related rise in AST was attenuated with coffee drinking. These findings suggest coffee may have an effect on suppressing the rise of serum aminotransferases, partly by inhibiting the alcohol-related elevation [17].

On the other hand, recent epidemiological studies have suggest unexpected, possibly beneficial effects of coffee consumption on the occurrence of alcoholic cirrhosis [18], and upon serum liver enzyme levels [19], particularly GGT activity [20] which is closely related to alcohol consumption [19-21]. Kono *et al*, found that inverse association of coffee mostly instant or filtered with serum GGT was more evident among heavier alcohol drinkers [15].

Patients and Methods:

This is an observational study, conducted on patients admitted to Baghdad Medical City, and mainly in special nursing units. Those who are included in the study were; alcohol drinker males with or without habit of coffee consumption aged equal or above 40 years. The patients were proved clinically free from hepatic disease.

Those who excluded from the study were; females, non-alcohol drinkers and patients with hepatic diseases or patients who are failed to be followed up or with incomplete data due to their reason.

The total number of patients who were tested and included in the study was (91) patients, those excluded from the total were: 19 patients who have incomplete related data, 7 patients were discharged from hospital on their responsibility before completeness of data, and 6 patients were died before complete assessment. The remaining 59 patients were representing the study sample, which are fully assessed clinically and laboratory.

Classification of patients depending on alcohol intake by units/week into the following groups:

1-(0-21) units\week: ⟶ those are low risk of health problem.

2-(22-50) units\week: ⟶ these are having increased risk to have health problem.

3-(>50) units\week: ⟶ those who are particularly having high risk of health problem. Blood samples of venous circulation were taken from every patient for the determination of liver enzymes and other biochemical measurement.

Serum GGT concentration was assayed based on the modified kinetic method recommended by Scandinavian Society for Clinical Chemistry (SSCC) using carboxylated substrate (L-gammaglutamyl-3-carboxyl-4-nitroanilide) in a Tris buffer.

Serum AST and ALT concentration were assayed based on dinitrophenyl hydrazone coupling calorimetric method (Reitman-Frankel method) using this technique, normal ranges was established as;

(1)GGT = 0-40 U/L; (2) AST =10-30 U /L; and (3) ALT = 8-20 U /L

Student t-test was used for the statistical analysis; p-value of less than (0.05) is considered the level of significant.

Results:

Out of (59) patients, there were (35) patients (59.3%) who are alcohol drinkers without coffee consumption habit, and (24) patients, (40.7%) were alcohol drinkers and coffee consumers. Table (1) showed the distribution of both groups, the (mean age ± SD) of alcohol group was (48.5±17.8) and the range was (41-58) years, while that of alcoholic with coffee consumption was (47.1±19.2) years and the range (40-60) years, the difference was statistically not significant (p>0.4).

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

Age (Years)	Alcoholic		Alcoholic with Coffee Consumption Habit	
	Number	%	Number	%
40-50	19	54.3	13	54.2
51-60	16	45.7	11	45.8
Total	35	100%	24	100%

Table (2) revealed the duration of alcohol drinking and the duration of alcohol drinking with coffee consumption.

The mean of the duration of alcohol drinking was (18.9±11.7) years, range (7-24), while the duration of alcohol drinking with coffee consumption was (20.2±7.3) range (12-25) years, the difference was statistically not significant (p>0.6).

Table (2): Distribution of both groups according to the duration of drinking.

Duration of Drinking (Years)	Alcoholic		Alcoholic with Coffee Consumption Habit	
	Number	%	Number	%
5-10	2	5.7	0	0
11-15	5	14.3	3	12.5
16-20	19	54.3	14	58.3
>21	9	25.7	7	29.2
Total	35	100%	24	100%

Figure (1) represents the mean serum levels of GGT, ALT and AST in both groups, the levels in alcoholic groups were much higher than that of the other groups, (p<0.001) for all of them which is strongly statistically significant.

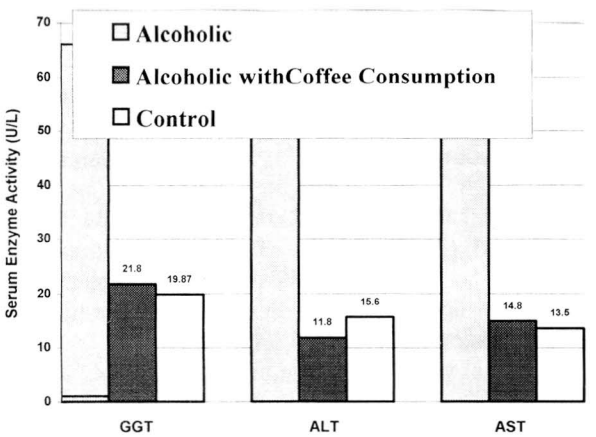

Figure (1): The mean serum levels of GGT, ALT and AST in alcoholic group, alcoholic with coffee consumption habit in comparing with control group.

Alcoholic group is subdivided into the following:

1. Low risk to have health problems (only two patients)
2. Increased risk to have health problems (12 patients)
3. High risk to have health problems (21 patients) these subdivisions are according to number of units of alcohol consumption.

The p-values and serum levels of GGT, ALT, and AST in alcoholic patients were shown in Table (3). The serum levels of GGT, ALT, and AST were much higher in high risk patients than those of high and increased risk of health problems.

Table (3): The mean±standard deviation of serum levels of GGT, ALT, and AST in addition to p-values according to the increased risk of health problems.

Enzyme	Low and increased risk group (n=14)	High risk group (n=21)	Significance
GGT	55.3±17.1	73.3±20.9	P<0.01
ALT	43.5±13.7	55.3±16.1	P<0.05
AST	46.5±11.6	61.4±12.5	P<0.001

Discussion

Our study provides further evidence that coffee drinking is associated with decreased serum GGT activity, particularly among alcoholic males. This in agreement with results from previous studies in Norway (22,23) those from the study denoted a strong inverse relation between coffee consumption and serum GGT. This inverse relation was largely due to the differentially lower levels of serum GGT only among heavier alcohol drinkers. Coffee consumption was independently inversely associated with the development of serum AST and/or ALT ≥ 40 U/L, and these results suggested that, coffee protect liver dysfunction in men (24).

To our knowledge, no specific foodstuff has been implicated as being strongly associated with serum GGT as to account for the coffee and GGT. Coffee intake, but not caffeine, correlated negatively with GGT, AST, ALT and other biological markers of heavy drinkers. The most likely hypothesis is that non-caffeine coffee fractions have protective effect on liver cells (25).

It is possible that the inverse association between coffee consumption and serum GGT could be attributable to a reduction of coffee use among individuals who had elevated serum GGT as a manifestation of their liver disease or liver dysfunction. However, we excluded subjects who had a history of liver disease. In one study, the increase in coffee consumption was found to be strongly independently associated with decrease GGT activity among males; the inverse association between coffee and serum GGT was more evident among heavier alcohol consumers and was absent among non-alcohol drinkers (26).

This study also showed a significant inverse relation between coffee use and serum levels of AST and ALT among males, this finding is in agreement with Nakamura et al (2000) (24) our key finding is the strong interaction between coffee and alcohol consumption on serum GGT among males, which is in agreement with Nakanishi et al (2000) (25).

The inverse association of coffee with serum GGT was progressively stronger with increasing alcohol consumption and was absent among non-alcohol drinkers. This finding is very consistent

with the previous observation by Kono et al (1994) (15). Further more, a similar interaction was observed for serum AST and ALT.

Our results suggest that coffee consumption may inhibit the elevation of GGT levels induced by alcohol consumption (27), and may possibly protect against liver cell damage due to alcohol

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