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ENZYMATIC STUDY ON PATIENTS SUFFERING FROM ALCOHOLIC LIVER DISEASE (ALD) FROM PUNJAB (INDIA)

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Enzymes have an emence diagnostic value for variety of disorders. In this study two of the transaminases *i.e.* serum glutamic oxaloacetic (S-GOT) and serum glutamic pyruvic transaminase (S-GPT) and alkaline phosphatase (ALP) have been included to asertain their relationship with type, quantity and duration of alcohol consumed in the patients suffering from alcholic liver disease (ALD). All the enzymes studied were found to be significantly higher in concentration when compared to the control group. S-GOT and S-GPT were raised maximally in the patients with alcoholic hepatitis (AH), while the increase in ALP concentration followed the progressive increase in severity of ALD. Concentration of all enzymes was raised to its maximum level in the cases consuming home distilled liquor regularly, while the rise in values for S-GPT and ALP was low in individuals using English (IMFL) liquor in excess, the differences in concentration however, being insignificant.

INTRODUCTION

Alcohol consumption is steadily increasing in Punjab, one of the richest states of India, with a parallel increase in the prevalence of alcohol related diseases. Some studies show that in normal population there is a slight association between serum GOT activity and alcohol consumption (Chan yeung *et al.*, 1980; Morgan *et al.*, 1981; Diehl, 1989; Sharpe *et al.*, 1996). While others demonstrate that elevated GOT values are found in alcoholics with the history of alcoholism exceeding 10 years (Skude & Wadstein, 1972: Smith, 1995). Higher levels of S-GPT in heavier and regular drinkers than in occasional ones or non-drinkers have been observed (Rosman & Lieber, 1992 ; Sillanaukee *et al.*, 1993).

The most characteristic finding in favour of the alcoholic etiology of the liver injury is an inverted S-GOT/S-GPT ratio (Cohen & Kaplan, 1979; Goldberg & Irvin, 1996 ; Sharpe *et al.*, 1996). The available reports on ALP in alcoholic patients or heavy drinkers are very scarce. Some studies show the diagnostic usefulness of ALP in heavy drinkers and hypertensive patients (Ramsay, 1977; Perillow *et al.*, 1978) and others do not show any apparent effect of alcohol on ALP (Chan-yeung *et al.*, 1981).

MATERIALS AND METHODS

The work has been performed on 220 patients admitted to Dayanand Medical College & Hospital, Ludhiana and Rajindra Medical College and Hospital, Patiala (Punjab). The diagnosis of ALD for all the patients was based on history of alcohol consumption, clinical features and biochemical findings. Particular emphasis was based on the history of alcohol consumption and information was gathered on the quantity and type of alcoholic beverage consumed each day and duration of alcohol consumption in years. 30 normal healthy individuals free from any chronic disease, were taken for comparison between the normal and diseased groups. The method of Reitman & Frankel (1957) was used for the estimation of S-GOT and S-GPT activity from human serum. Alkaline phosphatase activity from human serum was estimated according to the method of Bessey *et al.* (1946).

RESULTS AND DISCUSSION

In the patients suffering from ALD the mean activities of S-GOT, S-GPT and ALP were found to be significantly higher when compared with the control group and differences were significant for S-GOT and S-GPT and insignificant for ALP when controls were compared with the patients of different stages of ALD. The levels of both S-GOT and S-GPT were found to be higher in AH, a condition characterised by inflammation, cell infiltration in the liver parenchyma and hepatic necrosis and decreased to some extent in AC (Table I). Both S-GOT and S-GPT are intracellular enzymes and are involved in amino acid or carbohydrate metabolism. Elevation of concentration of these enzymes in the blood indicate necrosis. AH is mainly characterised by hepatic necrosis where the membranes are getting weak and cell death occurs.

Table I : Enzyme activity in partients suffering from ALD of varying severity.

Enzyme	N Control (n=30)	O Overall diseased (n=220)	A Alcoholic fatty liver (n=56)	B Alcoholic hepatitis (n=48)	C Alcoholic cirrhosis (n=116)
S-GOT	14.03	38.29	33.54	55.87	35.87
(1. U/L)	± 4.70	± 28.21***	± 22.28	± 41.49	± 26.73
Range	4 - 21	5 - 147	7 - 125	9 - 147	5 - 130
S-GPT	10.4	30.39	30.77	45.29	26.76
(1. U/L)	± 3.82	± 27.12***	± 37.48	± 38.45	± 22.93
Range	2 - 16	3 - 142	3 - 122	6 - 142	16 - 142
ALP	7.00	12.19	10.05	12.33	13.16
(K.A.units/dl)	± 2.77	± 7.53	± 6.10	± 6.18	± 8.40
Range	3 -11	3 -50	4 - 45	5 - 30	3 - 50

Table II : Enzyme distribution in different age groups in the patients suffering from ALD.

Enzyme	20-29 yrs. (n=19)	30-39 yrs (n=50)	40-49 yrs (n=85)	50-59 yrs (n=50)	≥ 60 (n=16)	below 30 yrs (n=19)	above 50 yrs (n=66)
S-GOT	36.79	40.98	41.72	39.34	28.88	36.79	36.38
	± 33.01	± 29.80	± 31.30	± 36.45	± 14.15	± 33.01	± 30.19
S-GPT	36.05	28.40	35.54	30.42	22.06	36.05	28.39
	± 35.80	± 21.04	± 38.56	± 29.38	± 12.67	± 35.80	± 26.56
ALP	11.32	11.02	12.91	12.72	12.00	11.32	12.55
	± 07.51	± 05.48	± 07.46	± 09.65	± 06.78	± 07.51	± 09.04

Similarly ALP values, are also maximally activated in AC. Sherlock (1984) confirmed the liver cells as the major source of ALP in serum of healthy adult and reported marked increase in cholestasis and AH. While Chan-yeung *et al.* (1980) did not observe any apparent effect of alcohol on ALP.

S-GOT and S-GPT have been found to be more than five times the upper limit of normal in all the three stages of ALD, S-GOT rise being more than S-GPT rise. In 40% of the cases GOT/GPT ratio was observed to be more than 1.5 while in 18.18% of the cases the ratio was even more than 2. This characteristic feature in favour of alcoholic etiology of the liver disease has also been proved by Sherlock (1984), Nilssen *et al.* (1992), Sillanaukee *et al.* (1993) and Warner (1996).

Data analysis according to duration and quantity of alcohol consumption shows no significant differences in S-GOT and S-GPT levels. Duration of alcohol consumption illustrated that the values increased gradually upto 15-19 years of alcohol consumption and decreased in subsequent years. Increase in ALP activity was significant ($p < 0.05$) in the patients whose duration of alcohol consumption was more than 20 years compared to those who used it since less than 10 years (Table III & IV).

Table III : Enzyme distribution with regard to duration of alcohol consumption in the patients suffering from ALD.

Enzyme	< 10 yrs (n=27)	10-14 yrs (n=45)	15-19 yrs (n=59)	20-24 yrs (n=51)	25-29 yrs (n=24)	≥ 30 (n=14)	< 10 yrs (n=27)	> 20 yrs (n=89)
S-GOT	39.52 ± 31.79	35.31 ± 30.58	48.08 ± 35.67	34.18 ± 23.59	39.04 ± 33.51	39.29 ± 31.95	39.52 ± 31.72	38.30 ± 21.25
S-GPT	32.33 ± 29.40	32.02 ± 30.91	35.81 ± 33.83	23.92 ± 17.30	38.33 ± 49.84	30.64 ± 24.40	32.33 ± 29.40	30.08 ± 23.47
ALP	9.96 ± 3.54	12.62 ± 8.14	13.47 ± 8.99	12.63 ± 7.71	11.75 ± 5.88	8.79 ± 2.83	9.96 ± 3.54	11.85 ± 4.88

Table IV : Enzyme distribution with regard to quantity of alcohol consumption (in ml) in patients suffering from ALD.

Enzyme	< 187 (n=30)	187-374 (n=46)	375-560 (n=67)	561-749 (n=49)	≥ 750 (n=21)	< 187 (n=30)	> 375 (n=137)
S-GOT	38.49 ± 30.80	41.39 ± 35.32	49.08 ± 34.16	28.20 ± 13.86	32.25 ± 13.87	38.49 ± 30.80	37.05 ± 14.42
S-GPT	32.26 ± 34.99	36.09 ± 42.76	33.60 ± 30.42	23.80 ± 20.70	20.00 ± 6.18	32.26 ± 34.09	26.71 ± 18.77
ALD	11.25 ± 7.28	12.13 ± 7.48	14.68 ± 8.31	15.50 ± 7.93	11.13 ± 4.17	11.25 ± 7.28	12.92 ± 4.32

Table V : Enzyme concentrations with regard to type of alcoholic beverage consumed in patients suffering from ALD. (Mean ± S.D.).

Enzyme	English (IMFL) (n=72)	Country Liquor (n=37)	Home distilled (n=43)	Mixed (any type) (n=68)
S-GOT	40.00 ± 31.94	33.86 ± 23.58	43.65 ± 34.66	36.79 ± 22.85
S-GPT	24.59 ± 18.54	30.78 ± 18.56	39.00 ± 51.55	31.75 ± 26.37
ALD	11.13 ± 7.34	11.51 ± 5.91	12.79 ± 6.20	12.37 ± 8.32

When the data was analysed according to the type of liquor consumed, the maximum elevations both in S-GOT and S-GPT and also in ALP were observed in the cases who were in the to the liver due to the consumption of this staff. habit of taking home distilled liquor regularly (Table V). This may suggest an increased damage to the liver due to the consumption of this staff.

In the patients suffering from ALD the S-GOT activity has been found to be low in, who were chronic smokers. But values for S-GPT was usually as high as in other patients. This study is in favour of Fink & Rosalki (1978), Chan-yeung *et al.* (1981) and Smith (1995). However, Dales *et al.* (1974) and Morgan *et al.* (1981) could not find any consistent differences in S-GOT levels between smokers and non-smokers. Slight increase in both these transaminases in drug addicts and in patients with portal hypertension has been noticed but differences could not reach upto the level

Table VI : Enzyme concentrations in the patients of ALD, who were chronic smokers, drug addicts and who were also suffering from portal hypertension (PHT) and jaundice.

Enzyme	Overall diseased (n=220)	Smokers (n=46)	Drug addicts (n=19)	Patients with PHT (n=37)	Patients suffering from jaundice (n=16)
S-GOT	38.29 ± 28.21	33.81 ± 22.66	38.35 ± 29.77	44.68 ± 34.68	58.79 ± 38.25 ***
S-GPT	30.39 ± 27.12	30.65 ± 29.44	31.08 ± 27.47	36.19 ± 26.06	47.35 ± 35.13 ***
ALD	12.19 ± 7.53	12.44 ± 7.51	12.31 ± 6.69	14.11 ± 7.97	22.35 ± 7.13

* = $P < 0.05$ significant ; ** = $P < 0.01$ significant ; *** = $P < 0.001$ significant.

of significance. However the significantly raised levels ($P < 0.001$) for both S-GOT and S-GPT have been noticed in the patients suffering from jaundice alongwith ALD. But significantly lowered values of ALP have been detected among the patients suffering from jaundice (Table VI).

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