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ROLE OF ASCORBIC ACID ON TRANSAMINASE ACTIVITIES IN SOME METABOLICALLY ACTIVE TISSUES OF ASPIRIN TREATED RATS

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Abstract : Aspartate amino transferase (GOT) and alanine amino transferase (GPT) activities were studied in plasma, liver and kidney of aspirin treated and ascorbic acid supplemented groups for a period of seven days. GOT and GPT activities were increased in plasma but decreased significantly in liver and kidney in aspirin treated animals. Ascorbic acid supplemented groups showed no significant change of GOT and GPT in plasma and liver. In case of kidney, GOT activity remained unchange but GPT activity showed significant change in ascorbic acid supplemented group. The results clearly indicate that aspirin is a potent hepatotoxic and nephrotoxic drug but supplementation of ascorbic acid in High doses to rats fed aspirin can restore enzyme activities to the normal level.

Key words : aspartate amino transferase, ascorbic acid, liver and kidney, alanine amino transferase

INTRODUCTION

For hundred years aspirin (acetylsalicylic acid) has retained its preeminent position in the treatment of arthritis, osteoarthritis and other musculo-skeletal disorders. As a cyclooxygenase inhibitor aspirin is a potential pain killer. But aspirin induce hepatotoxicity and nephrotoxicity have already been reported (1). We have reported earlier that high dose of ascorbic acid supplementation can restore the acid and alkaline phosphatases activities in liver and kidney of aspirin treated rats (2). The present study was carried out to see the effect of supplementation of ascorbic acid on transaminase activities in the plasma, liver and kidney of aspirin treated rats.

METHODS

Thirty adult male wistar rats of 160 ± 5g.b.wt. were used in the present study. The rats were divided into three group of 10 animals in each. Group I served

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as control, the group II received daily 36mg/100g.b.wt., of aspirin in a single dose orally for 7 days (3). The Group III received aspirin (36 mg/100.g.b.wt.,orally) with ascorbic acid at a dose of 500mg/d orally (4), also for 7 days. All the animals were fed with standard laboratory stock diet and water *ad libitum*. The animals ere maintained at 20-22°c with natural lighting schedule. i.e. 12 hr light and 12 hr dark. After completion of treatment, all the groups of animals were fasted overnight and killed by decapitation between 09:00 and 11:00 hr to avoid possible diurnal variation. Blood was collected in heparinized tubes, plasma separated by centrifugation immediately. Liver and kidney were dissected out and adhering blood and tissue fluid were removed by blotting. Plasma and tissue were frozen at -20°c prior to enzyme asay. Each tissue was weighed and homogenized in a glass homogenizer, maintained at 0-4°C. Activities of Aspartate amino transferase (GOT) and Alanine amino transferase (GPT) were estimated by the method of Bergmeyer and Bernt (5). Data were statistically analysed by one way analysis of variance and Duncan's multiple range test (6).

RESULTS

Table I shows that a significant increase in GOT and GPT activities occured in plasma of aspirin treated group (Group II) as compared with the control (Group I). The GOT and GPT activities in plasma of Group III (aspirin+ ascorbic acid) show no significant changes as compared with the control. It is evident from the results of Table I that GOT and GPT activities in liver and kidney have been decreased significantly in aspirin treated group (Group II) as compared with the control (Group I). GOT activities in liver and kidney of Group III rats show no significant alteration when compared with the control. In Group III, liver GPT activity does not show any Significant change in comparison with the control while kidney GPT activity decrease significantly both in Group II and Group III but the decrement is less in Group III (Table I).

TABLE I : Alteration in transaminase activities following the treatment with aspirin alone and in combination with ascorbic acid (means ± SEM, n=10).

	Group of animals		
	I	*II*	*III*
A. Aspartate amino transferase			
Plasma (mg. of keto acid formed/ml)	0.28±0.02[a]	0.48±0.02[b]	0.31±0.03[a]
Liver (mg of Keto acid formed/mg of protein)	2.31±0.01[a]	1.74±0.02[b]	2.11±0.02[a]
Kidney (mg of Keto acid formed/mg of protein)	2.04±0.02[a]	1.58±0.01[b]	1.89±0.01[a]
B. Alanine amino transferase			
Plasma (mg of Keto acid formed/ml)	0.08±0.04[a]	0.19±0.02[b]	0.10±0.02[a]
Liver (mg of Keto acid formed/mg of Protein)	3.34±0.02[a]	2.54±0.01[b]	3.08±0.02[a]
Kidney (mg of Keto acid formed/mg of Protein)	1.84±0.02[a]	1.45±0.04[b]	1.52±0.03[b]

Group I = control, Group II = Aspirin, Group III = Aspirin + Ascorbic acid. On each horizantal row value with different superscirpts were significantly different from each other ($P<0.05$)

DISCUSSION

Transaminase activity is closely related to liver function. In liver disease, large quantities of transaminase usually enter into the blood compartment (7). It is reported that toxic damage to liver results in extreme hypertransaminasemia (8). Aspirin induced fall of GOT and GPT level in liver associated with rise in plasma suggests the extent of liver damage and release of these enzymes from the damaged liver cells and disruption of cellular integrity. The concommitant increase of plasma GOT and GPT in aspirin treated rats also support the hypothesis of hepatocellular necrosis. In Group III (Aspirin +Ascorbic acid) insignificant alteration of the GOT and GPT activities in plasma and liver indicate the beneficial effect of ascorbic acid as protective agent against aspirin induced hepatotoxicity.

A significant reduction in level of kidney GOT and GPT of aspirin treated groups (Group II) reflect that aspirin may be a potent nephrotoxic drug too but in Aspirin and Ascorbic acid exposed group (Group III); the noticiable improvement of GOT and GPT activities also suggest that ascorbic acid is a protective agent against aspirin induced nephrotoxicity. It may be concluded from the present study that aspirin adversely affects the liver and kidney of rats but treatment with ascorbic acid prevents these deleterious effect. Possibly ascorbic acid, a potential antioxidant helps to stabilize cell membrane of liver and kidney and prevent cell disruption.

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