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Effect of an Indigenous Drug Liv.52 against Alcohol-induced Hepatic Damage – A Biochemical Study

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ABSTRACT

Fat storage is the prevailing type of alcoholic liver damage. It runs the entire scale from a few droplets to massive participation of almost all liver cells. The extent of hepatic damage depends on the alcohol content of the beverage, the amount and the duration of drinking. The present investigation has been undertaken to study the effect of ethanol on serum cholesterol and the cholesterol and glycogen content of the liver of albino rats. Previously Subbarao and Gupta (1974a) and Subbarao et al. (1974b) reported hepatoprotective actions of an indigenous drug Liv.52 against carbon tetrachloride-induced hepatotoxicity; therefore, it is planned to investigate whether this drug could also offer protection against ethanol-induced hepatic damage.

Administration of 25% ethanol 5 ml for 45 days resulted in a significant increase of serum and liver cholesterol with a reduction of liver glycogen content. However, the group, which had been, administered Liv.52 syrup 5 ml daily in addition to ethanol feeding showed no significant alteration of serum cholesterol and liver cholesterol and glycogen content and their range remained almost at the control level. These results indicate that this indigenous product offered protection to the hepatic tissue, prevented alcohol-induced hypercholesterolaemia. From this work it is therefore suggested that this indigenous drug could be safely recommended in correcting alcohol-induced hepatic damage and hypercholesterolaemia.

INTRODUCTION

The liver is the prime organ concerned with various metabolic and physiologic homeostasis of the organism. Alcohol could damage the hepatic tissue in several ways and the damage depends on the alcoholic content of the beverage, the amount and duration of its consumption. Continuous ingestion over the tolerable dose of 0.24 g/100 g body weight per day of alcohol results in fatty liver (Schulman *et al.,* 1957; Lieber *et al.,* 1959; Horning *et al.,* 1960; Reboucas and Isselbacher, 1961; Lieber and Davidson, 1962 and Decarli and Lieber, 1967) hypercholesterolaemia in man and dog (Grande *et al.,* 1960) and in rats (Gottlieb *et al.*, 1959) has been reported. As early as 1949 Ashworth reported fatty infiltration of the liver with 25% ethanol when fed to rats for eight weeks at 2.4 ml/kg wt. and this change was unaffected by various diets used. However, Best *et al.* (1949) showed that large doses of choline could prevent the fatty changes and prehepatic fibrosis induced by 15% ethyl alcohol

and Klatskin *et al.* (1954) confirmed this finding. In spite of the hepatic damage by alcohol, alcohol consumption in one form or the other has become almost a routine in the hectic modern world. Hundreds of millions of people drink liquor, beer or wine for enjoyment, solace and tranquility. Yet, today, as it has been throughout histony, alcohol is troubling mankind. After heart disease and cancer, alcoholism is the world's biggest health problem and most deaths attributed to alcoholism are caused by cirrhosis of the liver.

Considering the above, we felt the need to explore the availability of a drug, which could protect against hepatic damage due to ethanol. An indigenous drug, Liv.52 (The Himalaya Drug Company Private Ltd., Bombay, India) has been proved to be very useful in several cases of hepatic involvement and previously Subbarao and Gupta (1974a) and also other investigators (Joglekar *et al.,* 1963; Karandikar *et al.,* 1963) have reported the protective action of this indigenous drug against carbon tetrachloride-induced hepatic damage, therefore an attempt has been made in this study to find out whether Liv.52 could offer protection against ethanol-induced hepatic damage and the assessment has been made by some biochemical investigations.

MATERIALS AND METHODS

Experiments have been performed on 32 male adult albino rats weighing between 150 to 200 grams. They were fed with wheat flour, Bengal gram and casein *ad libitum.* These were divided into four groups of eight each. The first group served as control group, the second group was forced-fed daily with 5 ml of 25% ethanol by gastric intubation for 45 days. The third group was similarly fed with ethanol and in addition it was administered Liv.52 syrup 5 ml daily for the same duration. The fourth group was administered only Liv.52 syrup 5 ml daily for 45 days.

The composition of each 5 ml of Liv.52 syrup is as follows:

Exts.	*Capparis spinose*	34 mg
	Cichorium intybus	34 mg
	Solanum nigrum	16 mg
	Cassia occidentalis	8 mg
	Terminalia arjuna	16 mg
	Achillea millefolium	8 mg
	Tamarix gallica	8 mg

(Prepared in the juices and decoctions of various hepatic stimulants).

After the experimental period, the animals were sacrificed by cervical dislocation. The hepatic damage was assessed by histological examination of the liver tissue by staining with haematoxylin and eosin and also the damage has been further assessed by the following investigations:

(a) Serum cholesterol by the method of Schoenhimer and Sperry (1958).
(b) Liver cholesterol by the method of Sperry and Webb (1950).
(c) Liver glycogen by the method of Kemp and Kits (1954).

RESULTS

The results of this study showed hypercholesterolaemia and also significant elevation of liver cholesterol content in the ethanol-fed group while the group, which was fed Liv.52 in addition to alcohol showed the cholesterol level almost near the control group (Figs. 1 and 2). The results also showed a reduction in the liver glycogen content in the alcohol-fed group when compared to the rest of the groups (Fig. 3).

Microscopic examination of the liver tissue revealed initial fibrotic changes with fatty infiltration in the ethanol-fed group while such changes were not apparent in the rest of the groups.

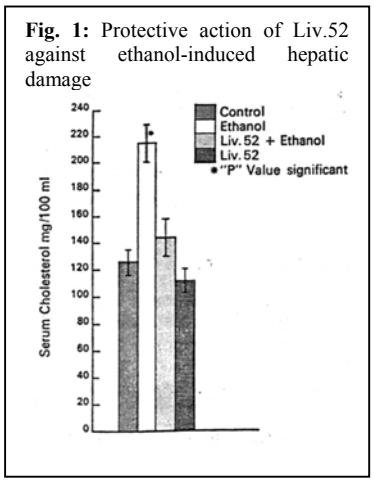

Fig. 1: Protective action of Liv.52 against ethanol-induced hepatic damage

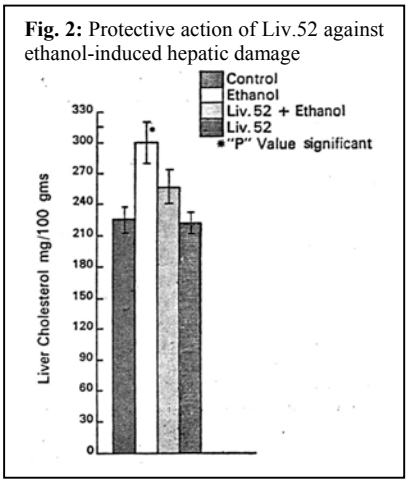

Fig. 2: Protective action of Liv.52 against ethanol-induced hepatic damage

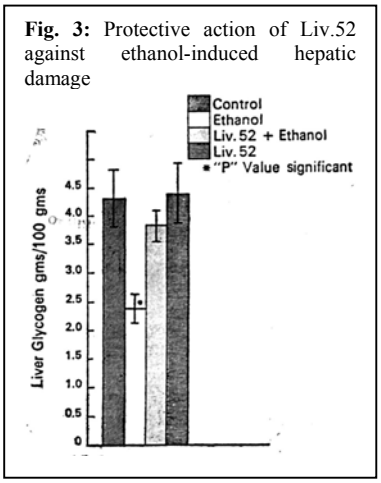

Fig. 3: Protective action of Liv.52 against ethanol-induced hepatic damage

DISCUSSION

The observations of this study have indicated that ethanol administration not only caused morphologic damage of the liver but also induced significant metabolic derangement of carbohydrates and fat. It is known that alcoholism leads to fat accumulation in the liver and ultimately cirrhosis, and the finding of the present study is in agreement with this fact as in this study also the cholesterol content of the liver tissue increased significantly. The exact mechanism of alcohol in this respect is still a matter of speculation. Whether or not free fatty acid mobilization plays some part in causing the accumulation of fat is not clear. It is possible that increased triglyceride synthesis may be partly responsible and the liver is the chief site of cholesterol synthesis and cholesterol, which competes for available essential fatty acids can also cause fatty livers. The reason for fatty liver could be explained with the view of Lieber *et al.,* (1959) and Reboucas and Isselbacher (1960), who also ascribed it to be due to increased synthesis of fat and diminished oxidation of fat. Since the liver has been proved to be the chief organ concerned with the synthesis and regulation of cholesterol, the hypercholesterolaemia due to ethanol feeding could be explained on the basis of the hepatic lesions caused by ethanol. From this observation the elevated serum cholesterol is presumably due to faulty systems of absorption, storage and transportation in this experimental situation. Therefore, it can be overruled that humans consuming large doses of

alcoholic beverages for prolonged periods might also develop hypercholesterolaemia by the same mechanism. Our observations also reveal that when the indigenous drug Liv.52 was administered along with ethanol no significant alterations in the serum or tissue cholesterol or glycogen were seen and also the morphology and architecture of the liver were well retained. The mechanism by which this indigenous preparation offered protection against ethanol-induced hepatic damage is again speculative. It is possible that it is due to the capacity of Liv.52 to improve the functional activity of the liver by acting as a powerful hepatic stimulant and also causing an increase in liver cell population restoring quicker regeneration. It is also expected that the ingredients might be helping to restrict the transportation of fatty acids from the depot tissue to the liver and also the synthesis of fat.

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