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**Effects of garlic (*Allium sativum*) on chemically-  
induced hepatocarcinogenesis in normal and  
hypercholesterolaemic Wistar rats**

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## ABSTRACT

Hepatocellular carcinoma is one of the most common cancers in the modern world and it is prevalent in Asia. Environmental and dietary factors play an major role in the development of many cancers. Dietary modification can also play important role in reducing the risk of cancer. Garlic (*Allium sativum*) is a well known medicinal herb and a food item that has been used all over the world since pre historic times. Previous studies using cancer cell lines and animal models have indicated that garlic and some of its sulfur compounds are potential anticarcinogens.

The present study was carried out to investigate the effects of a therapeutic dose (20mg /kg body wt./day) of garlic on chemically-induced hepatocarcinogenesis in normal and hypercholesterolaemic Wistar rats. In the first phase of this study the inhibitory effects of a therapeutic dose (20mg /kg body wt./day) of garlic on diethylnitrosamine (DEN)- induced neoplasia of the liver were examined in normal male Wistar rats. Medium-term Bio assay system of Ito based on the two step model of hepatocarcinogenesis was used as the assay method.

In phase II, the effects of garlic on hepatocarcinogenesis in hypercholesterolaemic Wistar rats were investigated. The selection of hypercholesterolaemic model was based on the available evidence for the relationship between dietary fat and the development of cancer. Hypercholesterolaemic model was developed by feeding rats with a 0.5% cholesterol-enriched diet for a period of two weeks. Rats having serum cholesterol level  $> 120$  mg/dl. were considered as hypercholesterolaemic ( normal range  $75 \pm 10$  mg/dl ) and the cholesterol-enriched diet was continued throughout the

experiment. Carcinogenic potential was scored by comparing the number and area of induced Glutathione S-transferase placental form positive (GST-P<sup>+</sup>) liver foci as well as histopathological examination of liver sections.

Daily treatment with garlic markedly reduced the number and area of GST-P<sup>+</sup> foci (48% inhibition and 49% inhibition respectively) as compared with the control group of animals receiving distilled water. Significant inhibition of induction of GST-P<sup>+</sup> foci (34%inhibition in number and 44% inhibition in area ) due to garlic treatment was also observed in the hypercholesterolaemic group of rats . However percentage inhibition was higher in garlic treated normal rats than garlic treated hypercholesterolaemic rats. Also it was evident from this study that hypercholesterolaemic rats are more susceptible to induction of liver GST-P<sup>+</sup> foci.

Results of GST-P<sup>+</sup> expression were supplemented by histopathological examination of liver sections of garlic treated normal as well as hypercholesterolaemic Wistar rats. Granular and vacuolar degeneration were used as parameters in assessing histopathological alterations. In normal rats, garlic treatment reduced the pathological alterations in liver sections caused by DEN. Similar results were obtained from experiments with hypercholesterolaemic rats.

Hence the results of this study provide strong supportive evidence for the anticarcinogenic activity of garlic.