EFFECT OF CAPSella Bursa-Pastoris ON LIVER CATALASE ACTIVITY IN RATS FED 3'-METHYL-4-(DIMETHYLAMINO)AZOBENZENE

Capsella bursa-pastoris (Japanese name "Na-zuna") (Cruciferae) has been eaten and used medicinally in China and Japan for many centuries, and we showed that the herb extract has various kinds of pharmacological activities including anti-ulcer and anti-inflammatory actions. Recently, we found that the administration of the herb extract produced a complete inhibition of hepatoma induction in rats fed 3'-methyl-4-(dimethylamino)azo-benzene (3'-Me-DAB). In this communication, we report the effect of the herb extract on the liver catalase activity in the rats fed the azo dye hepatocarcinogen, for the liver catalase activity was suggested to have some implication in the prevention of azo dye carcinogenesis.

The herb of Capsella bursa-pastoris that had been harvested in spring and dried in the shade was decocted with boiling water for 24 hr. The aqueous extract was filtered and the filtrate was concentrated in a rotary evaporator to a brown tarry liquid. This extract was diluted to 0.2% with water and given to rats as a drinking water. Male Donryu rats, 2 months of age and weighing 200-250 g, were fed a diet containing 0.06% 3'-Me-DAB until they consumed 0.5 g of the hepatocarcinogen which was sufficient for the induction of hepatoma in high incidence. Thereafter, the animals were maintained on basal diet, CE-2 (CLEA Japan Inc., Tokyo), for 335 days. The rats of Group 1 were given ordinary water to drink throughout the feeding schedule, and the rats of Group 2 were given water containing 0.2% herb extract while they were maintained on basal diet. The 3rd control group were not given either 3'-Me-DAB or the herb extract. At the end of feeding schedule, all the animals were sacrificed by decapitation. Nodules of hepatomas were found in 8 of 10 animals of Group 1 and in none of Group 2. This finding confirmed our previous observations that the administration of the herb extract inhibited the induction of hepatoma in rats fed 3'-Me-DAB. Catalase activity of the liver was determined by the titanyl sulfate method. One gram of the non-nodular part of the liver was homogenized in 30 ml of ice-cold water in a Dounce homogenizer, and 4 ml of the homogenate was diluted with 30 ml of ice-cold water. This was used for the analysis of protein content and catalase activity of the liver. The substrate solution was prepared by diluting 0.1 ml of 30% H₂O₂ solution with 200 ml of 1mM phosphate buffer (pH 7.0). The liver homogenate (0.01 ml) was added to 1 ml of the substrate solution in a test tube placed on ice. The reaction was carried out at 0°C for 0.5, 1, and 2 min, and stopped by the addition of 4 ml of titanyl sulfate solution. After 60 min, the absorbance of this solution was determined at 415 nm. Catalase activity was expressed by the value of reaction constant, K, obtained from the equation: 

\[ K = \frac{1}{t} \log \frac{a_0}{a_t} \]

where \( t \), \( a_0 \), and \( a_t \) represent reaction time in minutes, initial substrate concentration, and residual substrate concentration, respectively. The \( K \) value for zero time is determined by extrapolation.

In Table I are summarized the protein content and catalase activity of the liver from three groups of rats. In Group 1, which was given 0.5 g of 3'-Me-DAB and ordinary water to drink, a considerable reduction of the liver catalase activity was seen, compared with Group 3 (Control). Administration of the
herb extract with water to drink prevented the reduction of liver catalase activity (Group 2), in spite of the fact that the animals of this group ingested the same amount of 3'-Me-DAB as those in Group 1. The present findings on liver catalase activity is in good agreement with the histopathological observations that the herb extract effectively prevented the induction of hepatomas in rats fed 3'-Me-DAB. Further studies are under progress to identify the active components in this herb extract.

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