Differential effects of garlic oil and its three major organosulfur components on the hepatic detoxification system in rats.

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Abstract

The objective of this study was to compare the modulatory effect of garlic oil and its three organosulfur compounds, diallyl sulfide (DAS), diallyl disulfide (DADS), and diallyl trisulfide (DATS), on rat hepatic detoxification enzyme activity, and protein and mRNA expression. Rats were orally administered garlic oil (80 or 200 mg/kg bw), DAS (20 or 80 mg/kg bw), DADS (80 mg/kg bw), or DATS (70 mg/kg bw) three times a week for 6 weeks. Control rats received corn oil. According to the results, garlic oil and DAS in dosages of 200 and 80 mg/kg bw, respectively, significantly increased pentoxyresorufin O-dealkylase (PROD) activity as compared with the that of the control rats (P < 0.05). In contrast, N-nitrosodimethylamine demethylase activity in rats that received DADS and DATS was significantly lower than that in the control rats (P < 0.05). Ethoxyresorufin O-deethylase and erythromycin demethylase activities were not influenced by garlic oil, DAS, DADS, or DATS. To the phase II enzyme, garlic oil, DADS, and DATS significantly increased the glutathione S-transferase (GST) activity toward ethacrynic acid (P < 0.05). Immunoblot assay showed that the protein contents of cytochrome P450 1A1, 2B1, and 3A1 were increased by garlic oil and each of three allyl sulfides, and the change among the allyl sulfides was in the order of DAS > DADS > DATS. The placental form of GST (PGST) level was also increased by garlic oil and the three allyl sulfides, but the increase among the allyl sulfides was DATS congruent with DADS > DAS. P450 2E1, however, was suppressed by each garlic component. Northern blot results indicated that the changes in P450 1A1, 2B1, 3A1, and PGST mRNA levels by garlic components were similar to those noted in the protein levels. These results indicate that the modulatory effect of garlic oil on hepatic drug-metabolizing enzymes can be attributed to its three major allyl sulfide components DAS, DADS, and DATS. These three allyl sulfides vary in modulatory activity, and this variation is related to the number of sulfur atoms in the molecule.

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