LETTER TO THE EDITOR

HYPOGLYCEMIC AND HYPOLIPIDAEMIC EFFECTS OF GARLIC IN SUCROSE FED RABBITS

Sir,

The hypoglycemic and hypolipidaemic effects of garlic (*Allium sativum* Linn) have been reported by a number of workers (4,7,14,16,18) and this vegetable commonly used for many ailments is claimed to have beneficial effects even in fibrinolysis (6), heart disease and arteriosclerosis (21). Sucrose is known to have atherogenic effects (5,12) and in a previous study (22), its prolonged intake significantly increased serum and issue triglycerides in normal rabbits, but a simultaneous oral administration of onion extract counteracted the hypertriglyceridaemic effects of sucrose. Garlic is very similar in its chemical composition to onion (11,15). In order to study whether garlic, just like onion has also any counter action on the lipid raising effects of sucrose, the present study was planned and carried out as described here.

The extract of garlic was prepared as follows. Cloves of garlic were cut into slices and homogenised with cold distilled water (1:3 by weight). It was pressed through cheese cloth and centrifuged at 3000 r.p.m. for 15 min. The supernatant was used for feeding purposes. Young albino rabbits of average weight 500 g were selected and fed *ad libitum* with laboratory rabbit feed. The animals were then divided into two groups and one group received a test dose of garlic extract 10 *ml/kg* body weight/day and the other an equal amount of water in the same way. All the animals received sucrose 10 *g/kg*/day in distilled water and were fed *ad libitum* with the normal diet. After feeding the extract and sucrose daily for two months, the animals in both groups were weighed and their fasting blood sugar was estimated by the method of Asatoor and King (3) using low alkaline copper reagent (26). The animals were then killed by decapitation, blood was collected and serum, liver and aorta were separated for determination of the following (a) Serum: protein (Lowry's method using Folin Ciocalteu reagent) (17,13); cholesterol (9); triglycerides (27) and phophoslipids (1). (b) Liver: glycogen (10); protein (13,17); free amino acids (20); cholesterol (9); triglycerides (27) and phospholipids (1). (c) Aorta: phospholipids (1); cholesterol (9); triglycerides (27).

Administration of garlic extract significantly increased liver glycogen and free aminoacids ($P<0.001$) and significantly decreased fasting blood sugar, serum, liver and aorta triglycerides ($P<0.001$) and liver and serum proteins ($P<0.01$) as compared to those of sucrose fed group. The data are given in Table I. The increase in weight of the garlic group

was only 2/3 of the that observed in sucrose fed group. Administration of gralic extract however did not affect serum, liver and aorta phospholipids and cholesterol.

TABLE I : The hypoglycaemic and hypolipidaemic effects of garlic in sucrose–fed rabbits. Values are the means ± S.E. of five rabbits.

	Sucrose fed group	*Sucrose garlic extract fed group*
Fasting blood sugar *mg*/100 *ml*	124 ± 5	96 ± 3*
Serum protein *g*/100 *ml*	6.8 ± 0.1	6.5 ± 0.1*
Serum triglyceride glycerol *mg*/100 *ml*	11.5 ± 0.2	8.5 ± 0.3**
Liver protein *g*/100 *g*	17.3 ± 1.0	13.0 ± 0.5*
Liver glycogen *mg*/100 *g*	150 ± 5.0	205 ± 6.0**
Liver triglyceride glycerol *mg*/100 *g*	538 ± 12	465 ± 10.0**
Aorta triglyceride glycerol *mg*/100 *g*	813 ± 20	200 ± 10.0**
Liver free amino acids *mg*/100 *g*	7.6 ± 0.2	9.0 ± 0.1**

Students 't' test was performed for determining the significant values.

* $P<0.01$

** $P<0.001$

The adverse effects of cholesterol and triglycerides in precipitating ischaemic heart disease are known (2,8). The atherogenic effect of sucrose is ascribed to its lipid raising effect on prolonged use (23). Sucrose feeding produces only hypertriglyceridaemia and no hypercholestrolaemia in normal animals (5,23). The significant hypolipidaemic effect of garlic observed in sucrose-fed rabbits due to the fall in triglyceride has been d.m strated in the present study. Another significant effect of garlic observed was on the levels of protein and amino acids. Feeding the extract of garlic significantly increased the liver amino acids and decreased the serum and liver proteins. The latter effects may be considered as a disadvantage for the use of garlic. The increase in free amino acids may be due to the reduction in protein synthesis. The blood sugar lowering and liver glycogen raising effects of garlic may explain its therapeutic use against diabetes (14,19).

Garlic contains diallyldisulphide and its monooxide, allicin (11) both of which could react with cysteine (25). Such reactions involving thiol disul hide exchange and oxidation of thiols may take place between garlic sulphur compounds and cysteine of animal body, either present free or as parts of tissue proteins and enzymes and possibly bring about some of the changes in the quantities of glycogen, lipid and protein synthesised. Another possible

action of sulphur compounds found in garlic is also known and that is the oxidation of NADPH which is necessary for lipid synthesis. Only NADPH could supply hydrogen for the reductive steps of lipid synthesis and if NADPH is oxidised to NADP by any system that would prevent lipid production. The type of unsaturated disulphides and their oxides found in garlic could oxidize NADPH (24) and it may also account for the hypolipidaemic action of garlic. The present findings highlight the medicinal value of garlic as observed previously in the case of onion (22) both of which are abundant in organic disulphides and their oxides (15,19). However, the results warrant further study.

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