April-June 1980
Ind. J. Physiol. Pharmac.
Administration of garlic extract may be that 1 in 50,000 
ketting capacity or it was more 
the site of action. The difficulty 
It was also found that for sub-
and quicker, for the same reason. 
solution, at 26 min 45 sec. The 
the response. Thus the maximum 
by the addition of hyaluronidase. 
ene at the concentration of 1 U per 
hyaluronidase F calculated (16.6) 
F calculated (14.5) was grea 
e a significant difference existed 
hyaluronidase.

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ology, 4th edition, Lange Medical Publi-
English Language Book Society and 
the Method of Medical Practice, Indian Edition, 

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 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 phos-
pholipids (1). (b) Liver: glycogen (10); protein (13,17); free amino acids (20); cho-
lesterol (9); triglycerides (27) and phospholipids (1). (c) Aorta: phospholipids (1); 
cholesterol (9); triglycerides (27).

Administration of garlic extract significantly increased liver glycogen and free ami-
oacids (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
Garlic contains diallyldisulphide and its monooxide, allicin (11), both of which could react with cysteine (25). Such reactions involving thiol disulhide 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 is the reductive steps of lipid peroxidation that would prevent lipid peroxidation found in garlic could oxidize NADPH, which is necessary for the reductive steps of lipid peroxidation. The present study was only 2/3 of that observed in sucrose-fed group. Administration of garlic 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.

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

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 hypercholesterolaemia in normal animals (5,23). The significant hypolipidaemic effect of garlic observed in sucrose-fed rabbits due to the fall in triglyceride has been demonstrated 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 disulhide 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.


The authors are grateful to the staff of the Biochemical Laboratory, St. Thomas College, Palai, for their assistance.

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Administration of garlic extract fed rabbits. 

<table>
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<tbody>
<tr>
<td>96 ± 3*</td>
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<td>8.5 ± 0.1*</td>
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In precipitating ischaemic heart disease was ascribed to its lipid raising action and significant hypolipidaemic effect has been observed was on the levels of liver glycogen. Another possible explanation (11) both of which could bring about some beneficial effects. However, the results warrant further study.

ACKNOWLEDGEMENTS

The authors are grateful to Prof. K.J. Scaria, Head of the Department of Chemistry, St Thomas College, Palai, for his valuable help to carry out this work.

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REFERENCES


