

EFFECT OF ONION AND GARLIC ON BLOOD COAGULATION AND FIBRINOLYSIS *IN VITRO*

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Summary : The effects of aqueous extracts of onion and garlic as well as of garlic oil were studied on the process of blood coagulation and fibrinolysis *in vitro*. Only onion was found to exhibit anti-coagulant and fibrinolytic activity while garlic extract as well as garlic oil were inactive.

Key words : onion garlic coagulation fibrinolysis

INTRODUCTION

Onion and garlic have been shown to increase fibrinolytic activity (4,8,14,15,17) besides their varied empirical therapeutic applications. Odourless garlic oil pearls are in the market with claims of natural way to all round health. Lancet in a recent editorial (7), has placed high hopes on garlic and onion for stimulation of fibrinolysis. However, inconsistent reports regarding their fibrinolytic activity and effect on fibrinogen level and coagulation parameters have also appeared in the literature (2, 7, 11). The present communication describes the hitherto unreported effect of onion and garlic on blood coagulation and fibrinolysis.

MATERIAL AND METHODS

Test material :

Fresh onion and garlic bulbs obtained from the local market were extracted with saline. Twenty g of material was blended with 100 ml of normal saline for 10 min. The

mixture was allowed to stand for 2 hr at room temperature and then centrifuged to remove insoluble material. The clear supernatant was used for further study. Heat treated extracts were prepared by keeping the blended material in boiling water bath for 30 min. It was allowed to cool and was centrifuged to get clear supernatant. Garlic oil was obtained by breaking commercial garlic pearls (Ranbaxy Laboratories Ltd., New Delhi) which contain 0.25% w/w garlic oil.

Coagulation tests :

Recalcification time : 0.1 ml of test material or normal saline (control) was added to 1 ml of pooled citrated plasma. It was allowed to stand at 37°C for 20 min. To 0.5 ml of this treated plasma, 0.1 ml of M/4 calcium chloride was added and the resultant recalcification time determined.

Collagen recalcification time : 0.1 ml of test material or normal saline (control) was added to 1 ml of pooled citrated plasma containing 0.1 ml of 1% collagen solution. After stabilizing for 20 min at 37 C, 0.1 ml of M/4 calcium chloride was added to 0.5 ml of above reaction mixture and the resultant clotting time was determined.

Kaolin-cephalin recalcification time : 0.1 ml of test material or normal saline (control) was added to 1 ml of pooled citrated plasma, to which 0.1 ml of 2% cephalin and 0.1 ml of 4% kaolin was added. After 20 min at 37°C, 0.1 ml of M/4 calcium chloride was added to 0.5 ml of the above reaction mixture and the resultant clotting time was determined.

Prothrombin time : 0.1 ml of test material or normal saline (control) was added to 2.0 ml of citrated plasma to which 0.2 ml of thromboplastin reagent was added and the clotting time was determined.

Thrombin time : 0.1 ml of test material or normal saline (control) was added to 0.1 ml of fibrinogen solution. 0.1 ml of thrombin solution was then added and clotting time determined.

Fibrinolytic tests :

Fibrinolytic activity was measured by the method of Astrup and Mullertz (3) on fibrin plate; heated fibrin plates were prepared by the method of Lassen (12). 0.05 ml

of sample was applied on the desired fibrin plate and the area of lysis zone was measured after 20 hr at 37°C. The activity was expressed as the product of the two perpendicular diameters as mm². For each experiments, a test solution was run in triplicate.

RESULTS

Table I summarizes the results of various coagulation tests. Recalcification time was increased by 47% by onion extract and 39% by garlic extract while garlic oil produced no significant rise. Prothrombin time was markedly raised, viz. by 80% in the case of onion extract, while there was no change in thrombin time. Garlic extract or garlic oil had no such effect. Heated extracts also had no major effect in coagulation tests.

TABLE I : Effect of onion and garlic on blood coagulation parameters.
(Time in seconds: test/control)

<i>Material*</i>	<i>Recalcification time</i>	<i>Collagen **RC time</i>	<i>kaolin Cephalin **RC time</i>	<i>Prothrombin time</i>	<i>Thrombin time</i>
Onion extract	205/140	173/112	96/88	47/26	9.5/9.5
Garlic extract	130/94	144/118	102/92	34/28	11/10
Garlic oil	137/125	110/103	107/96	24/22	9/9.5
Heat treated onion extract	170/120	160/108	88/85	41/26	10.5/10.5
Heat treated garlic extract	160/134	136/120	97/92	30/26	10.5/11

* See, methods for preparation of aqueous extracts.
All figures are means of 3 independent experiments.

** RC recalcification time.

Onion extract produced a zone of lysis of $87.3 \pm 9.0 \text{ mm}^2$ while with the heat-treated onion extract the zone was $69.7 \pm 9.0 \text{ mm}^2$. Garlic extract as well as garlic oil

did not exhibit any lysis on fibrin plate. No lysis was observed on heated plates wherein plate. N lysis was observed on heated plates wherein the heat labile plasminogen was denatured at 80°C (12).

DISCUSSION

Onion increased fibrinolytic activity and reduced plasma fibrinogen level in rabbits (16). Inconsistent findings were observed with plasma fibrinogen level and no change in clotting time and prothrombin time was observed in volunteers kept on fatty diet and onion (10). Menon *et al.* (14) and Gupta *et al.* (8) observed increased fibrinolytic activity by feeding onion along with fat.

Garlic feeding for 3 weeks in rats (11) increased fibrinolytic activity with reduction in plasma fibrinogen level and prolongation of blood clotting time while prothrombin time was unaltered. Jain *et al.* (9) observed reduction in bleeding and clotting times and decrease in leucocyte count in rabbits as well as human volunteers on garlic diet. Garlic oil has been shown to increase fibrinolytic activity in volunteers as well as in patients with coronary artery diseases (6) and acute myocardial infarction (5). Interestingly, prolonged garlic therapy (2) for 12 weeks dose not cause any appreciable change in plasma fibrinogen level or coagulation time in patients with ischaemic heart disease as well as in healthy controls. Fibrinolytic activity is increased by the 4th week but returns to about pre-garlic level at the 12th week.

The essential oils in garlic and onion act by interfering with thromboxane synthesis (13). Recently it has been shown that a minor component (4-10%) of natural garlic oil is responsible for inhibition of platelet aggregation (1), which provides for anticoagulant activity. Our experimental finding supports that a prominent anticoagulant activity exists in onion which is not of antithrombin type.

The present *in vitro* work shows that only onion has a fibrinolytic activity of the type of a plasminogen activator, which does not require a proactivator. The activity is absent in garlic as well as commercial garlic oil pearls. Further study of this plasminogen activator from onion may have considerable potentials.

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