

LETTER TO THE EDITOR

EFFECTS OF INTRAVENOUS GARLIC JUICE ALLIUM SATIVUM ON RAT  
ELECTROCARDIOGRAM

Sri,

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Earlier, garlic (*Allium sativum*) has been reported to produce a tonic effect on isolated frog heart (7), and oral ingestion of its essential oil, lowers blood lipids in animals on high cholesterol and high fat diet (3) and has a protective effect against atherogenesis (4). It was deemed of interest to study the electrocardiographic effects of garlic in rats.

Juice of garlic was prepared by separating individual bulbs of garlic and peeling off the garlic pearls and subjecting them to expression and comminution (Crushing) to make a thick liquid of the pulp juice with the solid contents 14 to 16 percent. The juicy extract was filtered by straining through a fine muslin cloth. The extract was not centrifuged after such filtration. The PH of the extract thus obtained was adjusted to 7.2 by adding 2-3 drops of N/10 sodium hydroxide per 6-8 ml of the extract. Every time fresh extract was prepared just before use. About 0.01 to 0.02 ml juice could be expressed from 1 pearl of garlic.

Effect of this garlic juice on the ECG was studied in albino rats of both sexes (125-200 g), anaesthetised by pentobarbitone sodium 35 mg/kg, ip. The three limb lead electrocardiography was done by connecting the right fore limb and the left fore and hindlimbs of the anaesthetised animal with the respective limb lead channels of Universal Bioamplifier of Polyrite Polygraph (Medicare Bangalore make). The instrument was set at 0.2 millivolt sensitivity. In a preliminary study its doses and gross effects were ascertained by giving 0.01 ml to 1.0 ml juice through tail vein. The rats were kept under observation for 7 days. No rat developed apparent morbidity or mortality. About 0.01 to 0.02 ml volume is expressed from 1 pearl of garlic. For the present study therefore, lower 0.1 to 0.5 ml volume doses (representing 10 to 50 garlic pearls) were injected. Higher doses were avoided to prevent acute cardiovascular alteration. In another group of 10 rats juice was injected slowly into the tail vein of the rat in 0.1, 0.2, 0.4 or 0.5 ml doses. As a control Krebs's or Ringer's solution 0.1 to 0.5 ml was similarly administered 20 min before garlic juice. There appeared no ECG alteration following Krebs's or Ringer's solution administration. This ruled out the effects of the volume.

From the figure, it is evident that the garlic juice increased the amplitude of atrial complex—'P' wave and the ventricular complex 'QRS' of the rat electrocardiogram. This is suggestive of the increase in the voltage output of the atria and the ventricles probably in accordance with positive inotropism (6, 7). The changes lasted for 5 min to 15 min with different doses. The effect was dose-dependent-increasing with the increase of the dose from 0.1 to 0.5 ml. The 'Q' wave remained isoelectric and the 'T' wave also showed slight increase in the amplitude, which is suggestive of normal ventricular repolarisation. This tall 'T' could not be due to hyperpotassemia as it was preceded by tall 'P' the wave which is depressed or becomes bifid or unidentifiable during hyperpotassemia (5). The unidentifiable 'P' in the terminal strip may be due to tachycardia (in 0.5 ml dose) (10). Increase in 'P' and 'R' waves during exercise in human is interpreted as evidence of atrioventricular overload and ischemia. Direct measurements of parameters *in vitro* can only set aside the cause of increased amplitude of 'P', 'R' and 'T' waves and absence of 'P' wave in terminal strip, (1, 8) as observed. P-R interval of atrioventricular conduction (2) and Q-T interval of intraventricular conduction ranged 0.04–0.06 sec and 0.08–0.1 sec respectively and remained unchanged in different doses. The heart rate ranged between 360 to 440 per min with paper speed of 5 cm/sec; slight reduction of R-R interval in high dose of 0.5 ml is suggestive of positive chronotropism (9).

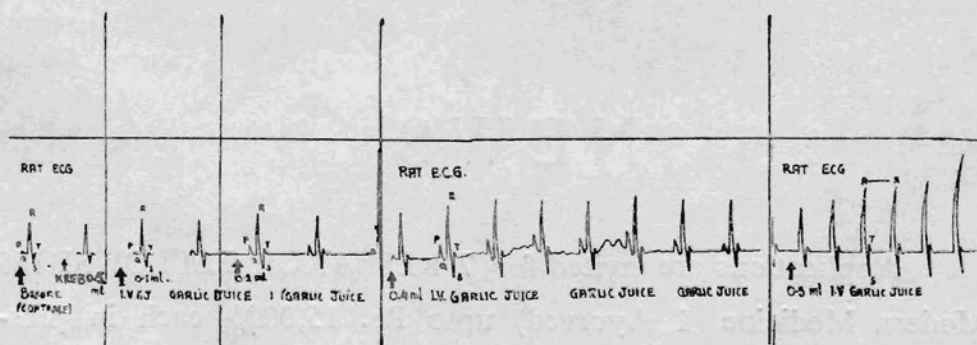


Fig. 1. : Effect of intravenous garlic juice (*Allium sativum*) on rat Electrocardiogram.

All the electrocardiographic changes caused by garlic juice appeared within 10 sec of intravenous administration and remained sustained for 5 to 15 min. As reported (7), the active principles contained in the oil fraction of the garlic extract are allylpropyl disulfide, allyl disulfide and sulfur containing compounds. However, it remains to be investigated whether cardiotoxic effect and the reported antihyperlipemia (3, 4) and antiatherogenic effects (4) are all due to the same active principles of garlic.

S. K. TONGIA

Department of Pharmacology,  
Gandhi Medical College, Bhopal - 462 001

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