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Biopotency of *Allium sativum.*Linn (Garlic) in Lead Acetate Intoxicated Male Albino Rats

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ABSTRACT

The present study was undertaken to examine the inhibitory effect of the Bulbs part of Garlic (Allium sativum.L) on Lead acetate induced hepatotoxicity in Liver. Enhanced synthesis of Total cholesterol and decreased synthesis of HDL cholesterol were observed in the liver of Lead acetate poisoned rats. Administration of the Paste of Allium sativum 500 mg/kg body weight effectively suppressed the synthesis of cholesterol in the liver, thus controlling the effect of Lead acetate. The results suggest that Allium sativum may exert a protection effect by inhibiting the synthesis of cholesterol and the vitamins induced by Lead acetate.

Key words: Lead acetate intoxication, Garlic (*Allium sativum*.L), Cholesterol, Lipoprotein.

INTRODUCTION

Garlic is one of the edible plants, which has generated a lot of interest throughout human history as a medicinal panacea. Garlic is well known for its medicinal benefits, especially in helping to prevent cancer and cardiovascular diseases [1]. Garlic (*Allium sativum*.Linn), commonly used in our daily diet has been extensively studied for its therapeutic uses. *Allium* extract has been reported to effectively decrease the lipid levels in experimental animals [2].

There is an explosion of global awareness concerning increasing imbalances in natural ecosystem. Therefore various measures are being taken up to correct the root cause of the imbalances. Metals play an important role in biological process. They are essential components of life, but are harmful when present in excess [3]. Lead toxicity has emerged as an important global problem with public health consequences particularly in children [4]. Lead represents an exclusive case (among cumulative metal contaminants) because of its ubiquitous presence in the environment and easy recognition of its major sources, which give rise to environmental pollution [5]. Lead especially Lead acetate and Lead phosphate has been anticipated to be a carcinogen (possible human carcinogen) by DHAS, IARC, EPA, and WHO [6]. Profiles of lipids and lipoproteins are of paramount importance for their role in maintaining membrane integrity and in regulating cellular process. Profound alterations in the composition and morphology of RBC'S have been observed in a variety of pathological conditions [7-9]. Plasma lipid levels and lipoprotein patterns are labile and affected by diet etc, which may be reflected in the lipid composition of the membrane.

MATERIALS AND METHOD

Animals

Male albino rats aged 8-10 weeks were obtained from Indian Institute of sciences (IIT), Bangalore, India, were housed six in a polypropylene cage and provided with food and water *adlibitum*.The animals were maintained in a controlled environment under standards conditions of temperature and humidity with an altering 12hr light/dark cycles. All animals were fed with standard pellet diet (Hindustan Level Limited, India).

Treatment Schedule

The animals were randominised into experimental and control groups and divided into 4 groups of six animals each. Animals in

Group-I were control which had free access of double deionised water alone.

Group-II Animals were Lead acetate given animals which had free access of lead acetate in deionized water in a concentration of 200 ppm for 90 days.

Group-3 Animals received Lead acetate in water for 90 days and then they were treated with the extract of *Allium sativum*.L orally at a dose of 500mg/kg body weight orally daily for 21 days.

Group-4 Animals received the extract of *Allium sativum*.L orally at a dose of 500mg/kg body weight orally daily for 21 days.

Estimations

Blood samples were collected in heparinized tubes and were centrifuged at 1000 g for 15 mins, to separate the plasma. Lipids in plasma were estimated by the method of Parekh and Jung [10], Total cholesterol [11], Phospholipids [12], Triglycerides [13] and HDL cholesterol [14].

Statistical analysis

The data are presented as means ±S.D statistical significance was calculated using students "t"-Test.

RESULTS

Table-1 shows the plasma lipid profiles of normal, control and Lead acetate treated animals. Total cholesterol, HDL Cholesterol and Phospholipids were significantly lower whereas LDL Cholesterol and TG's were significantly higher. Lead acetate treated groups showed a pattern of significant difference which proves the therapeutic effect of the drug.

Table.1: Plasma lipid profiles (mg/dL^{-1}) of Control and Experimental animals

Sl.no	Parameters	Control	Lead acetate	Lead acetate +*Allium sativum*	*Allium sativum*
1	Total cholesterol	57.3±2.97	69.7±1.61*	32.5±1.67*a	56.7±4.81*
2	Phospholipids	192.02±10.41	172.8±9.17*	100.3±4.45*a	191.9±8.19*
3	HDL cholesterol	16.6±0.79	9.9±0.47*	9.5±1.15*a	15.9±0.51*
4	LDL cholesterol	4.4±0.21	17.2±6.84*	3.4±1.84*a	9.2±1.89*
5	VLDL cholesterol	15.66±0.88	29.36±1.6*	16.14±1.20*a	15.1±1.42*
6	Triglycerides	78.3±3.92	146.8±7.35*	84.9±4.28*a	79.5±5.49*

Means±S.D ; *→As compared with Normal<0.005; P<0.001(Student t-test).; a→As compared with Normal<0.001(Student t-test).; NS→Not significant.

Vit-E and Vit-C contents in plasma of control animals showed significant decreases when compared to normal and a marked increases in the drug treated animals which is indirectly related to the lipid profiles in Table-2.

Table.2: Plasma, Vit- E and VIt-C (mg/dL^{-1}) contents of Control and Experimental animals

Sl.no	Parameters	Control	Lead acetate	Lead acetate + *Allium sativum*	*Allium Sativum*
1	Vit-E	3.25±0.49	2.57±0.18**	3.27±0.47*** [a]	3.76±0.68**
2	Vit-C	1.38±0.29	0.68±0.03***	1.19±0.41*** [a]	1.27±0.35***

Means±S.D; *→As compared with Normal<0.005; P<0.001(Student t-test).; a→As compared with Normal<0.001(Student t-test).; NS→Not significant.

DISCUSSION

The enhanced plasma cholesterol level can cause a rise in plasma LDL, in which cholesterol is the predominant lipid. An elevated cholesterol level causes a suppression of LDL receptor activity, being increases the plasma LDL level which in turn raises the plasma cholesterol level[14]. A reduction in plasma HDL cholesterol has been reported in Lead acetate control animals. The decreased in HDL cholesterol in the present study may be due to either increased LDL cholesterol, VLDL, TGS or diminished Lecithin cholesterol acyl transferase (LCAT) activity. Recent studies have shown that Vit-E plays an important role in cholesterol metabolism by increasing HDL cholesterol and decreasing total cholesterol in hyper-cholesterolaemice patients [15]. Ascorbic acid deficiency has been reported to induce increases in serum cholesterol and β-lipoproteins [16]. The decrease in plasma, Vit-E and Vit-C levels in lead acetate intoxicated control animals was observed. Hence the increased total cholesterol and decreased HDL cholesterol seen in the present study may be related to deficiency of Vit-E and Vit-C.

CONCLUSION

Allium sativum.L showed a marked increased in antioxidant activity towards the hepatocellular damage caused by the Lead acetate by the presence of Phenols and flavonids in it. It also decreased the plasma lipid level which was supported with the results of Vitamin markers. As *Allium sativum*.L is a readily available vegetable throughout the year, it can be used whenever needed.

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