

Hypolipidemic Activity of *Azadirachta indica* Leaf Extract in Rats

R R CHATTOPADHYAY

Biometry Research Unit, Indian Statistical Institute, 203, Barrackpore Trunk Road, Calcutta 700 035

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The effect of *Azadirachta indica* leaf extract on serum and liver lipid parameters viz. cholesterol, total lipids, phospholipids and triglycerides was studied in rats fed on atherogenic diet for 4 wk. *A. indica* leaf extract exhibited significant hypolipidemic activity in rats. Significance of these findings is discussed.

Key Words: *Azadirachta indica*, Hypolipidemic activity, Rats

Introduction

Azadirachta indica (Meliaceae; Neem) is an indigenous plant widely available in India and Burma. Different parts of this plant have been reported to exhibit several pharmacological properties like antidiabetic, antiseptic, wound healing, antiulcer activity (Kirtikar & Basu 1933, Chopra et al. 1986). Water soluble portion of alcoholic extract of *A. indica* leaves was found to possess antihyperglycemic, hypotensive, antiserotonin, antiinflammatory, antifertility, hypocholesterolemic and hepatoprotective activities (Chattopadhyay et al. 1986, 1987, 1992, 1993). But reports on hypolipidemic activity of *A. indica* leaf extract seems to be dubious. The present study reveals the possible hypolipidemic effect of *A. indica* leaf extract in rats.

Materials and Methods

Fresh matured leaves of *A. indica* (1kg) were soaked in ethanol for 3 days and filtered. The filtrate was distilled off. The remaining solid residue was dissolved in distilled water and filtered. The filtrate was evaporated to dryness (yield =

100g). The dried mass was suitably diluted with normal saline (500mg/ml) and used in experiments.

Inbred Swiss albino rats of either sex weighing 80-100g (6-8 wk old) were maintained under controlled conditions of light (12hr/24hr) and temperature ($23 \pm 1^\circ\text{C}$). Animals were divided into following three groups of 6 each and were maintained for 4 wk on the following diets.

Group I : Normal rats (Control group).

Group II : Normal rats treated with 0.15 per cent bile salt + 1 per cent cholesterol (atherogenic diet).

Group III : Normal rats treated with atherogenic diet + *A. indica* leaf extract (100mg/kg, po/day).

Rats from all groups received isocaloric diet and water *ad libitum*. Animals from each group were deprived of food overnight and sacrificed by decapitation at the end of 4 wk. Serum and liver from different group of animals were collected. Cholesterol (free and esterified) (Schoenheimer et al. 1954), total lipids (Folch et al.

1957), phospholipids (Fiske & Subba 1925) and triglycerides (Kaplan & Lee 1965) were estimated. Fractions of cholesterol were estimated by the method of Warnick and Albers (1981). Results were statistically analysed by analysis of variance and multiple comparison procedure using Scheffe's method (Woolson 1987).

Results

Tables 1 & 2 show the results of cholesterol, total lipids, phospholipids and triglycerides of serum and liver of control and experimental rats. The total cholesterol levels of *A. indica* leaf extract treated rats (group III) were significantly lower both in serum and liver than in controls (group

II). Both free and esterified cholesterol levels of serum and liver of *A. indica* leaf extract treated rats were also significantly lower when compared to respective controls. But lipid phosphorus levels in serum and liver of group III rats were not altered significantly as compared to its control animals (group II). The values of total lipids and triglycerides in serum and liver of *A. indica* leaf extract treated rats (group III) were also significantly lower than in controls (group II).

Figure 1 shows the significant reduction in serum LDL and VLDL fractions of *A. indica* leaf extract treated rats when compared to its control

Table 1 Effect of *A. indica* leaf extract on serum lipids in rats

Group	Serum lipids (mg/dl) (Mean±S.E.)					
	Cholesterol			Total lipids	Phospholipids	Triglycerides
	Total	Free	Ester			
I	90.40±3.20	24.61±4.43	65.70±3.61	152.46±6.70	115.52±5.24	116.25±4.52
II	126.52±5.65	52.46±4.61	62.75±3.80	204.27±7.62	162.71±6.72	144.67±6.82
III	88.54 ^c ±5.26	29.72 ^c ±3.65	52.64 ^a ±3.24	176.66 ^c ±6.75	159.45±5.44	122.62 ^b ±5.64

^a < 0.05; ^b < 0.01; ^c < 0.001 in comparison with group II.

Differences in mean values of cholesterol (total, free and esterified), total lipids and triglycerides levels of serum of group III rats are significant in comparison with group II but phospholipids are not.

Table 2 Effect of *A. indica* leaf extract on liver lipids in rats

Group	Liver lipids, mg/g (Mean ±S.E.)					
	Cholesterol			Total lipids	Phospholipids	Triglycerides
	Total	Free	Ester			
I	6.22±0.511	2.65±0.21	3.60±0.35	75.62±3.46	52.66±4.24	52.64±4.53
II	24.74±2.15	9.65±0.82	14.47±3.24	105.76±4.21	44.62±3.65	96.88±4.67
III	12.45 ^c ±2.14	4.22 ^c ±0.64	9.87 ^a ±1.20	92.50 ^b ±5.27	43.62±4.82	74.47 ^b ±5.65

^a < 0.05; ^b < 0.01; ^c < 0.001 in comparison with group II.

Differences in mean values of cholesterol (total, free and esterified), total lipids and triglycerides of liver of group III rats are significant in comparison with group II but phospholipids are not.

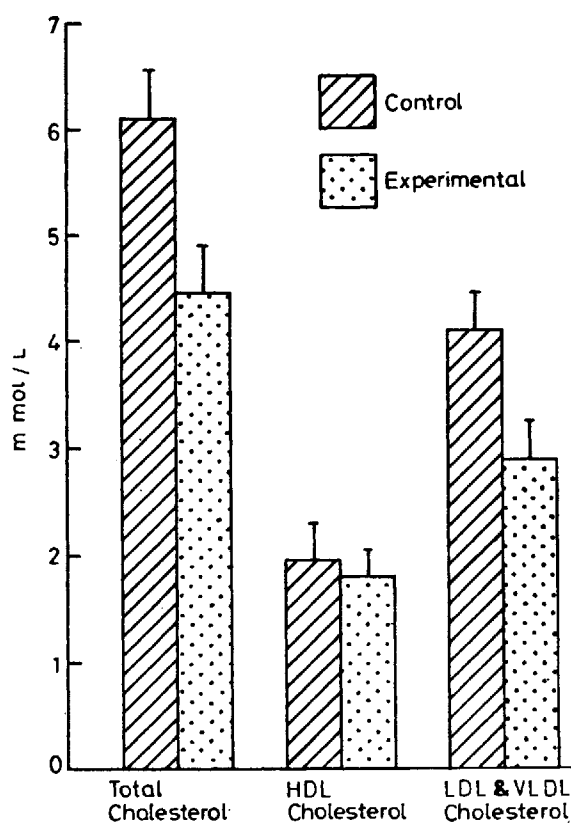


Figure 1 Effect of *A. indica* leaf extract on serum lipid profiles in rats

group. But HDL cholesterol levels remained unchanged.

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Discussion

It has been established that serum and hepatic ester cholesterol contribute largely to atherosclerosis (Getz et al. 1969). Other lipids like phospholipids and neutral lipids have also been shown to be of equal importance (Zilversmit et al. 1954, Bottcher et al. 1960). Since alteration in serum lipid profiles are known in diabetics (Betteridge 1989) which are likely to increase the risk of coronary heart disease (Stamler et al. 1986), a reduction in serum lipids, particularly in LDL and VLDL fractions and triglycerides levels should be considered as beneficial in the long-term prognosis of these patients.

Thus *A. indica* leaf extract may be helpful in controlling the development of hypercholesterolemia and atherosclerosis in view of its hypolipidemic action. This preliminary report may serve as a footstep on this aspect.

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