

HYPOLIPIDEMIC EFFECT OF *BACOPA MONNIERI* (L.) WETTST LEAVES IN RATS: SEASONAL VARIATION

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ABSTRACT

Hypolipidemic effect of *Bacopa monnieri* (L.) wettst leaves on normal rats was studied. Serum lipids like cholesterol, triglycerides, HDL and LDL were estimated. Results showed that leaves of *Bacopa monnieri* (L.) wettst could decrease serum cholesterol, triglycerides, LDL in rats. Seasonal variation in hypolipidemic effect of *Bacopa monnieri* (L.) wettst leaves was also studied in normal rats. It was found out that *Bacopa monnieri* (L.) wettst leaves of the months July and August had maximum hypolipidemic effect.

INTRODUCTION

Bacopa monnieri (L.) Wettst. (Family: Scrophulariaceae) is a perennial creeping herb, grows in wet places and under shade. It is distributed throughout India generally reared up to 5000 ft. The plant is known as 'Bramhisak' in Bengali. In Hindi it is called 'Brahmi' and in Sanskrit as 'Bharati'. 'Water hyssop' is the English name of the plant. October and December are the flowering and fruiting times of *Bacopa monnieri* (L.) Wettst respectively.

Bacopa monnieri (L.) Wettst. is a well-known plant in Ayurveda. The plant is bitter and pungent in taste. It has heating, emetic, laxative, aphrodisiac, diuretic and eperient properties used in curing diseases such as ulcers, tumours, ascities, enlargement of spleen, indigestion, inflammation, fever, diarrhoea etc. Hysteria cases are cured by the use of this plant and are also found to be maturant and expectorant. The plant is also used as nervine tonic useful in insanity, epilepsy and hoarseness. The plant has further been described as cardiac tonic also used for dermatosis, anaemia and diabetes [1,2].

In modern research, *Bacopa monnieri* (L.) Wettst. is said to have capacity of improving intellectual activity [3] and memory capacity [4]. It also enhances immune function [5] and is useful in the treatment of epilepsy and asthma [6]. *Bacopa monnieri*'s extract has also been shown to impact the oxidative stress cascade by scavenging reactive oxygen species, inhibiting lipoxxygenase activity and reducing divalent metals [7]. Many active compounds like alkaloid, saponins, flavonoids, sterols etc. are the ingredients of *Bacopa monnieri* (L.) Wettst.

With this in view, hypolipidemic effect of *Bacopa monnieri* (L.) wettst leaves on normal rats, if any, was studied. In present communication hypolipidemic effect of *Bacopa monnieri* (L.) Wettst leaves as well as seasonal variation in the effect are being reported.

MATERIALS AND METHODS

Collection of *Bacopa monnieri* (L.) Wettst leaves

Leaves of *Bacopa monnieri* (L.) Wettst were collected in morning hours (9 – 10 AM) from the medicinal plants garden of the University of North Bengal, Dist. Darjeeling, west Bengal, India randomly and during the periods of January – February, March – April, May – June, July – August, September – October and November – December in the year 2012. Leaves were

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authenticated by the experts of the department of Botany of the said University. A voucher specimen was kept in the department of Biochemistry, North Bengal Medical College, Dist. Darjeeling, West Bengal, India for future reference.

Test drug

Leaves of *Bacopa monnieri* (L.) Wettst were shade dried and powdered. This powder was used as test drug.

Acute toxicity study

In our earlier communication [8] we have reported that leaves of *Bacopa monnieri* (L.) Wettst is not toxic for rats.

Chemicals

All chemicals used in this study were of analytical grade and procured from Sigma Ltd. USA.

Animals

Wister strain rats of either sex, body weight between 150g and 180g, were used for this study. Animals were housed individually in polypropylene cages, maintained under standard conditions e.g. 12h light and 12h dark cycle, 20-30 degree centigrade, 35-60 % humidity. Rats were fed with standard rat pellet diet (Hindustan Lever Ltd., Mumbai, India) and provided water *ad libitum*. The animal experiment was approved by the ethics committee of the Institute.

Experimental design

In first set of experiment, rats were divided into two Groups of eight each. First Group of animals took normal diet while animals of the second Group, in addition to normal diet, took test drug prepared from randomly collected leaves of *Bacopa monnieri* (L.) Wettst in the dose of 1g/kg body weight daily for 4 weeks through oral route. Test drug in the form of suspension in water was administered to the rats orally through a feeding tube. Dose selection of the test drug was as per of our earlier studies [9-10]. In second set of experiment rats were divided into following Groups of eight each.

(1) Control: In this Group rats were given normal diet and water.

(2) *Bacopa monnieri* (L.) Wettst (January – February):

Powder from leaves of *Bacopa monnieri* (L.) Wettst of the periods January – February was given to the

rats daily through oral route along with normal diet and water for 4 weeks. Dose was 1g/kg body weight of the animals.

(3) *Bacopa monnieri* (L.) Wettst (March – April):

Powder from leaves of *Bacopa monnieri* (L.) Wettst of the periods of March – April was given to the rats. Rest part was same to that of Group – 2.

(4) *Bacopa monnieri* (L.) Wettst (May – June):

Powder from leaves of *Bacopa monnieri* (L.) Wettst of the periods May – June was given to the rats. Rest part was same to that of Group – 2.

(5) *Bacopa monnieri* (L.) Wettst (July – August):

Powder from leaves of *Bacopa monnieri* (L.) Wettst of the periods July – August was given to the rats. Rest part was same to that of Group – 2.

(6) *Bacopa monnieri* (L.) Wettst (September – October):

Powder from leaves of *Bacopa monnieri* (L.) Wettst of the periods September – October was given to the rats. Rest part was same to that of Group – 2.

(7) *Bacopa monnieri* (L.) Wettst (November – December):

Powder from leaves *Bacopa monnieri* (L.) Wettst of the periods November – December was given to the rats. Rest part was same to that of Group 2. Experiment was continued for forty days.

Estimation of serum lipids

After overnight fast, samples of blood from rats were withdrawn through cardiac puncture under pentobarbitone sodium (40mg/kg, i.m.) anaesthesia. Blood samples, taken after 4 weeks of *Bacopa monnieri* (L.) Wettst treatment, were estimated for total serum cholesterol, triglycerides, high density lipoprotein as well as for low density lipoprotein by the methods of Jasmin & Daisy [11] and Banz *et al* [12].

Statistical analysis

The values were expressed as mean \pm SEM and was analyzed using one-way analysis of variance (ANOVA) using Statistical Package for Social Sciences (SPSS). Differences between means were tested employing Duncan's multiple comparison tests and significance was set at $p < 0.05$.

Table 1. Effect of *Bacopa monnieri* (L.) Wettst leaves (randomly collected) on serum lipid levels in normal rats

Group	Total cholesterol	Triglycerides	LDL cholesterol	HDL cholesterol
Control	102.1 \pm 3.22	78.8 \pm 2.33	44.7 \pm 1.76	40.5 \pm 1.06
<i>Bacopa monnieri</i> (L.) Wettst treated (1g/kg)	62.8 \pm 2.58**	51.7 \pm 2.13**	32.6 \pm 1.65**	46.1 \pm 1.13*

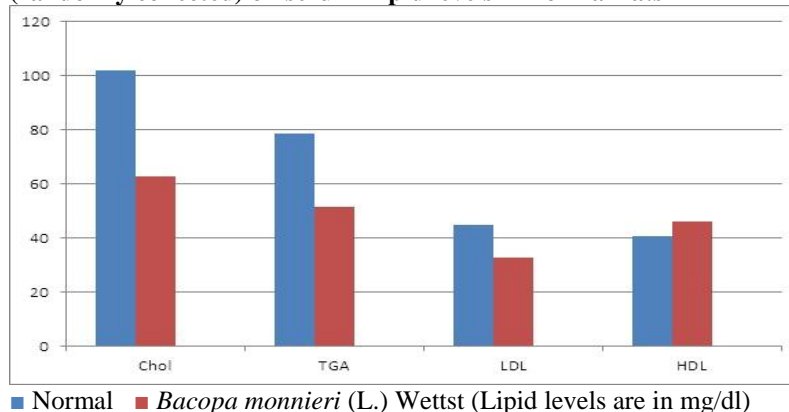
Values (mg/dl) are mean \pm SEM, * $P < 0.05$, ** $P < 0.001$.



Table 2. Seasonal variation in effect of *Bacopa monnieri* (L.) Wettst leaves on serum lipid levels in normal rats

Group	Total cholesterol	Triglycerides	LDL cholesterol	HDL cholesterol
Normal	100.3±3.01	76.2±2.12	43.5±1.54	40.2±1.02
<i>Bacopa monnieri</i> (L.) Wettst (Jan-Feb)	98.1±3.77	72.7±2.87	41.6±1.66	41.4±1.39
<i>Bacopa monnieri</i> (L.) Wettst (March – April)	95.7±2.88	70.9±2.31	40.3±1.56	42.9±1.89
<i>Bacopa monnieri</i> (L.) Wettst (May – June)	84.2±2.12*	64.5±2.13*	37.4±1.67*	45.6±1.22*
<i>Bacopa monnieri</i> (L.) Wettst (July – August)	60.1±2.34**	50.5±2.04**	30.4±1.38**	47.8±1.13**
<i>Bacopa monnieri</i> (L.) Wettst (Sept. – Oct.)	84.9±2.43*	64.9±2.73*	38.2±1.07*	45.9±1.18*
<i>Bacopa monnieri</i> (L.) Wettst (Nov. – Dec.)	92.3±2.81	70.2±2.54	39.9±1.84	43.2±1.32

Values (mg/dl) are mean ± SEM, *P<0.05, **P<0.001. *Bacopa monnieri* (L.) Wettst : 1 g/kg

Figure 1. *Bacopa monnieri* (L.) Wettst**Figure 2. Showing effect of *Bacopa monnieri* (L.) Wettst leaves (randomly collected) on serum Lipid levels in normal rats**

RESULTS AND DISCUSSION

Results on effect of *Bacopa monnieri* (L.) Wettst leaves (randomly collected) on serum lipid levels in normal rats are given in Table 1. Significant fall ($p < 0.05$) in serum total cholesterol, triglycerides, LDL and significant increase in serum HDL level were observed in rats after four weeks treatment with *Bacopa monnieri* (L.) Wettst leaves.

Seasonal variation in the effect of *Bacopa monnieri* (L.) Wettst leaves on serum lipid levels in normal rats was presented in Table 2. Results showed that maximum hypolipidemic effect of *Bacopa monnieri* (L.) Wettst. leaves in normal rats was found during the period of July to August. Levels of serum cholesterol, triglycerides and LDL were decreased and serum HDL increased and the changes were found statistically significant up to the level of $p < 0.001$.

Leaves of *Bacopa monnieri* (L.) Wettst for the months of May – June and September – October could also decrease serum lipid fractions in rats but the magnitude of decrease was less than that of the leaves of *Bacopa monnieri* (L.) Wettst for the period July and August. Leaves of *Bacopa monnieri* (L.) Wettst for the months of January – February, March – April and November –

December, however, did not exert hypolipidemic effect in rats.

Influence of climate on the active principles in medicinal plants was advocated by Fluck and Pharm [13]. Thereafter, series of experiments were conducted in this direction. Now a days reports are available which suggest that accumulation of chemical compounds in roots, stem and leaves of plants varies with season [14-18].

In present experiment maximum hypolipidemic effect of *Bacopa monnieri* (L.) Wettst leaves was noted in the months of July and August. This may be due to maximum accumulation of active ingredient(s) responsible for hypolipidemic action during the period. Experiments are now going on to check this. Further, hyperlipidemia is very often associated with diabetes [19]. Studies are thus planned to see hypolipidemic effect of *Bacopa monnieri* (L.) Wettst leaves in diabetes.

CONCLUSION

The present study showed hypolipidemic effect of the leaves of *Bacopa monnieri* (L.) Wettst in normal rats and the effect was maximum by the leaves of the period July to August. *Bacopa monnieri* (L.) Wettst leaves may thus be used in hyperlipidemia.

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