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Investigation of Phytochemical Screning and Antipyretic Potential of Methanolic Extract of *Bacopa Monnieri* (L.) Wettst Roots

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ABSTRACT

Bacopamonnieri (L.) Wettst plant commonlycalled as Brahmi whichbelongs to the family of Plantaginaceae. This plant has been used as folklore medicinesinceancient times. Currentstudy deals with investigation of phytochemical screening and anti-pyreticpotential of the methanolicextract of *Bacopamonnieri*(L.) Wettstroots. Preliminary phytochemical screening has done on this Brahmi plant roots to evaluate the existence of various plant constituents, includingflavonoids, alkaloids, steroids, cardiac glycosides, phenols and tannins in the methanolicextract. Antipyreticpotentialwasassessed by using the method of Brewer'syeastinducedpyrexia in rats to the methanolicextract of *Bacopamonnieri*(L.) Wettstroots. The methanolicextract of roots of *B. Monnieri*(L.) Wettstwereused for thisstudy in the concentration ranges about 100 mg/kg, 200 mg/kg and 400 mg/kg body weight. Based on thedoses of various concentrations of methanolicextractreducedelevatedtemperature.

KEYWORDS:*Bacopamonnieri*(L.) Wettst,investigation of phytochemical screening, antipyreticpotential, brewer'syeastpyrexia.

1. INTRODUCTION

Bacopamonnieri(L.) Wettst plant frequentlycalled as Brahmi and water hyssop. This plant belongs to the family of Plantaginaceae. Basically, this plant is a creeper and generallyobserved in wetlands. *Bacopamonnieri*(L.) Wettstis a main component of Ayurvedicmedicineswhichisused to enhancelearningcapability and improve memory likelymedhya and rasayana formulations. *Bacopamonnieri*(L.) Wettstisused as a medicine to treat malaria, headache, diarrhoeal infections and for the improvement of memory (Singh *et al*2012;Bhowmik*et al*2010; Shah *et al*2014). So many important plant constituents are there, but mainly due to the presence of bacosides the

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pharmacologicalactivities of this plant wereverysignificant in nature. Two important flavonoids-luteolin and apigeninweredetected in *Bacopamonnieri*lant (Deepak*et al,* 2005). Another important phytoconstituentisalkaloid, italsoplays a verysignificantrole in this*Bacopamonnieri*(L.) Wettstplant those are herspestine, brahmine, etc(Chopra *et al,* 1958). Pharmacologicalproperties of *Bacopamonnieri*(L.) Wettstplant includes memory enhancer, anti-convulsant, anti-inflammatory, antihypertensive, antidepressant and anticancer (Ramadas*et al*, 2016;Wasnik*et al*, 2015;Kasthuri*et al*, 2013; Patil*et al*, 2014). For Alzheimer'sdiseasealsothis*Bacopamonnieri*(L.) Wettstplant can bea suggestive herbaldrug(Limpeanchob*et al,* 2008). The control over feverwasdone by using various synthetic types of drugsincludingaspirin, paracetamol. So many adverse effects are there by takingthesesynthetic types of drugs. Therefore, herbalmedicines are used in the form of alternative therapy as theypossesslessersideeffects and more availability.

2. MATERIALS AND METHODS

2.1. Collection of Plant Material and It'sAuthentication

Roots of Bacopamonnieri(L.) Wettstplant wascollectedfrom the area of Andhra University, Visakhapatnam. The authenticationwasdone by Dr. Padal, Taxonomist, Department of Botany, Andhra University, Andhra Pradesh. The rootsweresorted out, cleaned. Therootswerechopped and dried at room temperature. This can begroundedinto a coarsepowder.

2.2. ExtractPreparation

The coarsepowder of root materialwasextractedwithmethanol by usingsoxhlation process and getfiltered. By using a rotary evaporator, the extractwasconcentrated. The concentrated mass wasplaced in air tight container and kept in a desiccator for furtherstudies.

2.2.1. Phytochemical screening

The methanolicextract of *Bacopa monneiri* (L.) Wettstroots were analyzed to know the occurrence of various phytoconstituents such as flavonoids, glycosides, steroids, tannins, alkaloids, carbohydrates and phenols (Khandelwal, 2005;Harborne*et al*, 1998).

2.2.2. Animals

For the antipyretic activity study, albino rats of both sexes weighing about 150-200 g were procured. These animals were placed in cages under controlled atmospheric conditions and then

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allowed to take dry pellets and drinking water *ad libitum.* Before performing of this experiment these experimental rats were adjusted for ten days under laboratory conditions.

2.2.3.Evaluation of antipyretic activity

For this anti-pyretic study animals were categorized into 5 groups (n=6). 20 % w/v Brewer's yeast suspension was used for the induction of fever into a subcutaneous region of the animals. Animals of all groups were fasted overnight and then allowed to access to take drinking water. Recording of rectal temperature was done for each and every animal after 24 hours.

2.2.4. Experimentalprotocol

The animalswerecategorizedinto 5 groups, of 6 rats each. The experimentalprotocolwas as follows:

Group A: Normal saline water (control)

Group B: Paracetamol (reference standard is about 150 mg/kg).

Group C: Methanolic extract of the roots of *Bacopa monnieri*(100 mg/kg).

Group D: Methanolic extract of the roots of *Bacopa monnieri*(200 mg/kg).

Group E: Methanolicextract of the roots of *Bacopamonnieri*(400 mg/kg).

The methanolic extract of roots of *B. Monneiri* (L.) Wettst (100 mg/kg, 200 mg/kg 400 mg/kg) was administered orally. Paracetamol was given as a reference drug and normal saline also given orally as a control. By using a digital thermometer, the rectal temperature is recorded at 1, 2, 3, 4, 5 & 6 hr. After administration of methanolic extract of *B. monneiri* (L.) Wettstof various extracts andreference drug. Percentage reduction in pyrexia was calculated by using a formula represented in an equation 1 (Farre*et al*, 2008).

$$\text{Percentage reduction} = \frac{B - C_n}{B} * 100 \quad 1.$$

B= Temperatureafter induction of pyrexia

C_n = Temperatureafter 1, 2, 3 & 4hr

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2.2.5. StatisticalAnalysis

Data of thisstudywereexpressed in mean $\pm$ Standard error of mean. One-way analysis of variance (ANOVA) was used to calculate statistical significance and it was followed by Dunnett's t test for multiple comparisons. $p < 0.05$ was considered as significant.

1. RESULTS

Investigation of preliminaryphytochemical screening expressed the presence of flavonoidsalkaloids, carbohydrates, proteins and steroids in the methanolicextract of roots of Bacopa monneiri (L.) Wettst. The results of thisstudydepicted in the Table 1. The antipyreticactivitystudyrevealedthat the rats showed an increase in rectal temperature due to various concentrations and paracetamolshowed significant ($p<0.10$) in the reduction of pyrexia in 3rd and 4th hr. Alterations in the change of temperature after giving the plant extracts and the paracetamol were represented in Table 2. Inhibition of pyrexiareadingswasdepicted in Table 3.

The percentage of inhibition wasobserved maximum at the concentration of 400 mg/kg at the 4th hour of methanolicextract of B. monneiri (L.) Wettst as compared to standard paracetamol of 150 mg/kg. Methanolicextract of B. monneiri (L.) Wettstrootsexhibited a significant dose dependent variation to control the temperature during the period of the 4th hour when the animals were treated with 100, 200 & 400 mg/kg body weight.

2. DISCUSSION

Fever is a condition where it is caused as a secondary impact of infection and in various types of diseases. It is a defense mechanism exhibited by the body naturally(Chopra*et al.* 2007). Anti-pyrectics are the compounds helps in the reduction of elevated body temperature. NSAIDS are used to lower the pyrexia condition, since they possess an inhibitoryeffect on prostaglandinsynthesis(Howard *et al,* 1993). The pyrexia was caused by different chemicals, but yeast induced pyrexia is very much significant as it interferes with the production of prostaglandins. Antipyretic activity of B. monneiri rootsextractexhibitedsignificant ($p<0.05$) in a reduction in body temperature of animals & these results are compared to reference sample i.e., Paracetamol. It appears to be anti-pyretic activity due to inhibition of PG's synthesis. The

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preliminary phytochemical screening of this plant extract alsorevealed the presence of various phytocompoundssuch as flavonoids, alkaloids, proteins, steroids and carbohydrates. Hence, may be due to the presence of these phytochemicals the activity was possessed by this plant.

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Table 1:Results ofPreliminary Phytochemical screening of methanolic extract of roots of *Bacopa monneiri* (L.) Wettstplant

Type of plant constituents	Chemical test	Methanolic extract of *Bacopa monneiri*
Alkaloids	Mayer's test	+
	Wagner's test	+
	Dragendroff's test	+
	Hager's test	+
Glycosides	Legal's test	+
	Borntrager's test	-
Carbohydrates	Molisch's test	+
	Benedict's test	-
	Barfoed's test	-
	Fehling's test	-
Proteins	Biuret test	+
	Xanthoproteic test	+
	Millon's test	+

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Flavonoids	Shinoda test NaOH test	+ +
Saponins	Froth formation test	-
Tannins	Ferric chloride test	+
Steroids	Liberman-Buchard reaction	-

+ indicatespresent

- indicates absent.

Table 2. Antipyreticactivity of methanolextract of *Bacopamonnieri*(L.) Wettstplantby brewer'syeastinducedpyrexia model.

Groups	**Normal temperature (°C)**	**Rectal Temperature (°C) 18 hrs after yeast induced pyrexia**	**Rectal temperature (°C) after treatment with extract**			
			1hr	**2hr**	**3hr**	**4hr**
Group A	36.98±0.39	37.70±0.19	37.98±0.27	38.10±0.19	38.07±0.21	37.70±0.09
Group B	36.75±0.17	37.80±0.29	37.65±0.19ns	37.46±0.16ns	37.12±0.09**	36.85±0.07**
Group C	37.10±0.41	37.95±0.29	37.90±0.16*	37.82±0.1	37.77±0.1	37.65±0.0

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				6ns	5ns	9ns
Group D	37.07±0.38	37.92±0.23	37.90±0.24ns	37.74±0.09**	37.67±0.12ns	37.55±0.13ns
Group E	36.65±0.32	37.68±0.25	37.53±0.20ns	37.40±0.27ns	37.20±0.29*	36.98±0.27*
ONE WAY ANOVA		P	0.3311	0.023	0.0015	0.0001
		F	1.169	2.310	3.430	5.124

N=6 in each group; Values mean ± S.E.M; *P<0.10, **P<0.05, *** P<0.01

Table 3. Results of the reduction percentage in pyrexiaof methanolic plant extract of *Bacopa monneiri* (L.) Wettstby brewer'syeastinducedpyrexia model in rats.

Groups	**Reduction percentage in pyrexia**			
	1hr	**2hr**	**3hr**	**4hr**
Group B	14.28	31.75	65.08	90.48
Group C	5.88	15.69	21.56	35.29
Group D	1.96	21.56	29.42	43.14
Group E	14.52	27.41	46.78	67.75