



RESEARCH ARTICLE

Anthelmintic Evaluation of Formulated Polyherbal Syrup

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ABSTRACT

Helminthiasis is an infection of the human body with parasitic worm such as roundworms, earthworms, hookworms, flukes, tapeworms and pinworms. The worms usually only involve the intestinal tract but sometimes they may invade other organs. The present study was done with the aim to evaluate the anthelmintic activity of formulated polyherbal syrup containing traditionally used herbs like *Neolamarckia cadamba* and *Alstonia scholaris* using adult earthworms *Eisenia foetida* against albendazole as standard reference and normal saline as control. The time to achieve paralysis of the worms was determined.

KEYWORDS

Neolamarckia cadamba, *Alstonia scholaris*, polyherbal syrup, *Eisenia foetida*.

INTRODUCTION

Helminthiasis is a macroparasitic disease of humans and animals in which a part of the body is infected with parasitic worms such as pinworm, roundworm or tapeworm. Worms often live in the gastrointestinal tract, but may also burrow into the liver or lymphatic system or other organs.¹ Throughout the world; the parasitic helminthic infection increases the mortality and morbidity day by day. This includes the intestinal nematodes (roundworms), trematodes (flukes) and cestodes (tapeworms). It is unevenly distributed disease in low income countries which affected worstly and highest risk of morbidity because it is the major source of environmental contamination and transmission.²

The plant *Neolamarckia cadamba* (Roxb.) Bosser (Family: Rubiaceae) is commonly known as Kadam.³⁻⁴ The barks and leaves of the plant are reported to have various medicinal uses such as astringent, anti hepatotoxic⁵, anti diuretic, wound healing, antiseptic⁶ and anthelmintic⁷. The pharmacognostical study of leaves and bark of the plant are also reported⁸⁻⁹.

The plant *Alstonia scholaris* (Family: Apocynaceae) is commonly known as Saptaparna. The plant is native to India and grows in deciduous and evergreen forests and also in plains. The bark is useful in malarial fevers, abdominal disorders, dyspepsia and in skin diseases.¹⁰ The bark is bitter, astringent, digestive, laxative, anthelmintic, antipyretic, stomachic, cardiotoxic and tonic.¹¹ The bark extract has been reported to possess antiplasmodial, immune stimulant, anticancer effect and is also hepatoprotective.¹²⁻¹³

The oral route of drug administration is the most important method of administering drugs for systemic effects. Except in few cases, parenteral

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route is not routinely used for self administration of medications. It is probable that most of drugs used to produce systemic effects are administered by the oral route. Ayurvedic herbal formulations were also administered preferentially by oral route.¹⁴ Oral solutions, syrups, elixirs etc., are prepared and used for the specific effects of the medicinal agents present.

Designing of oral herbal formulations is till date a challenge in modern pharmaceuticals. There are number of medicinal herbs in traditional system of medicine which are time tested, useful for the number of ailment. In present study leaves of *Neolamarckia cadamba* and barks of *Alstonia scholaris* were selected for developing the polyherbal syrup.

MATERIALS AND METHODS

Plant Material

The leaves of the plant *Neolamarckia cadamba* (Roxb.) Bosser and barks of *Alstonia scholaris* were collected from Botanical Garden, Gandhinagar. The plant materials were identified and authenticated by Dr. Nainesh R. Modi, Botanist, M.G.Science Institute, Ahmedabad, Gujarat.

Experimental Animals

All the experiments were carried out in Indian earthworms (*Eisenia foetida*) collected from Entomology Department of Anand Agricultural University, Anand. The earthworms were selected because of its anatomical and physiological resemblance with the intestinal roundworm parasite *Ascaris lumbricoids*, of human beings.¹⁵ Because of easy availability, earthworms have been used widely for the initial evaluation of anthelmintic compounds *in vitro*.¹⁶⁻¹⁷

Chemical and Reagents

All the chemicals including Albendazole and reagents were procured from local suppliers and were of analytical grade.

DEVELOPMENT OF POLYHERBAL SYRUP

Preparation of Extracts

The collected plant materials (2kg) were dried under shade, size reduced into coarse powder and macerated separately with 4 L of ethanol. After 7 days of maceration, both the extract was filtered out and concentrated under vacuum using rotary vacuum evaporator. The residue obtained was kept in a dessicator for the present study.¹⁸

Preparation of Simple Syrup¹⁹

66.7 gm of sucrose was weighed and added to purified water and heated until it dissolved with occasional stirring. Sufficient boiling water was added to produce 100 ml.

Preparation of Polyherbal Syrup

One gram of each extracts of *Neolamarckia cadamba* and *Alstonia scholaris* were dissolved in simple syrup IP and the volume was made up to 100 ml. (Table 1)

Table 1: Formulation of anthelmintic polyherbal syrup

Extracts of plants	Each 10 ml of syrup (mg)
<i>Neolamarckia cadamba</i>	100 mg
<i>Alstonia scholaris</i>	100 mg
Syrup Base	q.s.

Evaluation of Formulated Polyherbal Syrup

The polyherbal syrup was evaluated for various parameters such as physical appearance (Colour, Odour, and Taste), pH, weight/ml and viscosity. Stability study and anthelmintic activity was also carried out. *In vitro* anthelmintic activity was carried out on earthworms (*Eisenia foetida*).

Evaluation of the organoleptic parameters of the polyherbal syrup revealed that the syrup was dark brown colour and had a pleasant odour and sweet taste. (Table 2)

Table 2: Organoleptic parameters of the formulated polyherbal syrup

Parameter	Result
Colour	Dark Brown
Odour	Pleasant
Taste	Sweet

Evaluation of the physicochemical parameters of the polyherbal syrup revealed that the syrup had a weight/ml of 1.989 g/ml. Viscosity and pH of polyherbal syrup was 2.012 poise and 6.8 respectively. Refractive Index of polyherbal syrup was also determined. (Table 3) Stability study of formulated polyherbal syrup was carried out at different temperature and at relative humidity. (Table 4)

Table 3: Physicochemical Parameters of the formulated polyherbal syrup

Parameter	Result
Weight/ml	1.989 g/ml
Viscosity	2.012 poise
pH	6.8
Refractive Index	1.578

PHARMACOLOGICAL SCREENING

Anthelmintic Activity²⁰

The worms were divided in different groups and each group contained six worms. Albendazole (25mg/ml, 50 mg/ml, and 100 mg/ml) was used as reference standards. Normal saline were used as control. All the test solutions and standard drug solutions were prepared freshly before starting the experiment. Three concentrations of extracts and formulated syrup were prepared in normal saline and used for this study like Extract of leaves of *Neolamarckia cadamba* (50mg/ml, 100mg/ml, and 200mg/ml), Extract of barks of *Alstonia scholaris* (50mg/ml,

100mg/ml, 200mg/ml) and formulated polyherbal syrup (50mg/ml, 100mg/ml, 200mg/ml).

Observations were made for the time of paralysis and death. Time of paralysis was noted when no movement of any sort could be observed except when the worms were shaken vigorously. Death time was noted when worms lost their motility followed with fading away their body colours. All experiments were carried out in accordance with the guideline of the Institutional Bio safety and Ethical Committee.

Statistical Analysis

All graph drawings and statistical calculations were performed using Microsoft excel. All values are expressed as Mean \pm SEM.

RESULTS AND DISCUSSION

The primary objective of this work was to develop polyherbal syrup from leaves of *Neolamarckia cadamba* and barks of *Alstonia scholaris*. The development of such herbal formulation will mark an important advancement in the area of phytopharmaceuticals. The present investigation examines development and evaluation of herbal syrup.

The prepared oral liquid herbal formulation showed good elegance and palatability. The formulated polyherbal syrup was evaluated for measurement of pH, specific gravity and stability. The final formulation found to have pH 6.8 and specific gravity 1.198 g/ml. The results of stability study of formulated polyherbal syrup indicate the homogeneity of syrup without turbidity at storage temperature. The result of the anthelmintic activity showed the single extract of the plant have significant anthelmintic activity, but polyherbal syrup has synergistic effect on earthworms have comparable activity to that of Albendazole. Thus it can be concluded that these formulated polyherbal syrup could be suitable dosage form from leaves of *Neolamarckia cadamba* and barks of *Alstonia scholaris* for helminthiasis.

Table 4: Results of Stability testing of formulated polyherbal syrup dosage form.

Sr. No	Sample No	Time Duration	Temperature (°C)	Turbidity/ Homogeneity	Colour/ Odour
1	A1	24	4°C	No Turbidity	No Change
2	B1	24	R.T.	X	No Change
3	C1	24	47°C	Homogeneity	No Change
4	A2	48	4°C	No Turbidity	No Change
5	B2	48	R.T.	X	No Change
6	C2	48	47°C	Homogeneity	No Change
7	A3	72	4°C	No Turbidity	No Change
8	B3	72	R.T.	X	No Change
9	C3	72	47°C	Homogeneity	No Change

Table 5: *In vitro* anthelmintic activity of formulated polyherbal syrup on earthworms.

Drug	Time Taken for Paralysis (in Min) ± SEM	Time Taken for Death (in Min) ± SEM
<i>Albendazole</i>		
25mg/ml	21.91 ± 0.45	35.93 ± 0.35
50mg/ml	15.37 ± 0.56	30.12 ± 1.18
100mg/ml	12.03 ± 0.62	22.94 ± 2.42
<i>Neolamarckia cadamba (Alcoholic leaf extract)</i>		
50mg/ml	23.89 ± 0.44	41.54 ± 0.22
100mg/ml	19.74 ± 0.52	35.06 ± 0.51
200mg/ml	18.80 ± 0.41	29.99 ± 0.56
<i>Alstonia scholaris (Alcoholic bark extract)</i>		
50mg/ml	25.89 ± 0.59	39.61 ± 1.19
100mg/ml	18.93 ± 0.29	31.84 ± 1.69
200mg/ml	14.99 ± 0.57	25.23 ± 0.75
<i>Polyherbal syrup</i>		
50 mg/ml	20.59 ± 4.63	38.07 ± 0.47
100mg/ml	18.97 ± 1.09	28.28 ± 0.49
200mg/ml	12.22 ± 2.12	22.77 ± 0.33

(All values represent Mean ± SEM; n=6 in each group, Comparisons made between standard versus treated groups)

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