



IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH
An official Publication of Human Journals

ISSN 2349-7203





Human Journals

Research Article

February 2018 Vol.:11, Issue:3

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In Vitro Anthelmintic Activity of Bark Extracts of *Artocarpus heterophyllus*

			
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Submission:	24 January 2018		
Accepted:	29 January 2018		
Published:	28 February 2018		

Keywords: Anthelmintic, *Artocarpus heterophyllus*.

ABSTRACT

The use of herbs to treat disease is almost universal among non-industrialized societies and is often more affordable than purchasing modern pharmaceuticals. The World Health Organization (WHO) estimates that 80 percent of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care. Studies in the United States and Europe have shown that their use is less common in clinical settings, but has become increasingly more common in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available. The annual global export value of pharmaceutical plants in 2011 accounted for over US\$2.2 billion. About 100 disorders, like aging, inflammatory condition, rheumatoid arthritis, gastrointestinal ulcer genesis, renal and hepatic injury, metabolic disorder, atherosclerosis, cancer, neurodegenerative disease *etc.* plant are also used as Anthelmintic drug. Helminthiasis has been found to result in poor birth outcome, poor cognitive development, poor school and work performance, poor socioeconomic development, and poverty. Chronic illness, malnutrition, and anemia are further examples of secondary effects.



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INTRODUCTION:

Ayurvedic medicine (also called Ayurveda) is one of the world's oldest medical systems. It originated in India more than 3,000 years ago and remains one of the country's traditional healthcare systems. Its concept about health and disease promote the use of herbal compounds, special diets, and other unique health practices. India's government and other institutes throughout the world support clinical and laboratory research on Ayurvedic medicine, within the context of the Eastern belief system. But Ayurvedic medicine isn't widely studied as part of conventional (Western) medicine. This fact sheet provides a general overview of Ayurvedic medicine and suggests sources for additional information.

Key concepts of Ayurvedic medicine include universal interconnectedness (among people, their health, and the universe), the body's constitution (*Prakriti*), and life forces (*dosha*), which are often compared to the biologic humor of the ancient Greek system. Using these concepts, Ayurvedic physicians prescribe individualized treatments, including compounds of herbs or proprietary ingredients, and diet, exercise, and lifestyle recommendations. The majority of India's population uses Ayurvedic medicine exclusively or combined with conventional *Western medicine*, and it's practiced in varying forms in Southeast Asia (<https://nccih.nih.gov/health/ayurveda/introduction.htm>).

Anthelmintic

The term helminths have been derived from a Greek word meaning worm. It was originally referred to the only intestinal worm. Anthelmintic worm infection is one of the major global public health problems mostly in tropical countries. Besides the environmental condition particular to tropics poverty, illiteracy, lack of adequate sanitary facilities and of pure water supply makes the total evaluation of this problem very difficult. They harm the host by depriving him of food causing blood loss injury to organs, intestinal or lymphatic obstruction and by secreting toxins. Helminthiasis rarely fatal but is the major cause of ill health. Development of resistance has not been a problem in the clinical use of anthelmintic.

Helminthiasis, also known as **worm infection**, is any macroparasitic disease of humans and other animals in which a part of the body is infected with parasitic worms, known as helminths. There are numerous species of these parasites, which are broadly classified into tapeworms, flukes, and roundworms. They often live in the gastrointestinal tract of

their hosts, but they may also burrow into other organs, where they induce physiological damage. (Peter J. Hotez,2008)

Causes of helminthiasis

Helminth eggs contaminate food, water, air, pets, feces and wild animals, and objects such as toilet seats and door handle. The eggs enter the body of a human through the mouth, the nose, and the anus. Once inside the body, helminth eggs usually lodge in the intestine, hatch, grow and multiply. They can sometimes infest other body sites (Hwang I.S. 2011).

Treatment

Treatment in most cases involves the use of highly effective anti-worm drugs known as vermifuge that kills the worms. (Kar, 2007)

S.N.	Natural Anthelmintic Drug	Synthetic Anthelmintic Drug
1	Tobacco	Benzimidazole, Albendazole, Mebendazole, Thiabendazole, Fenbendazole, Triclabendazole.
2	Walnut	Abamectin
3	Clove	Niclosamide
4	Garlic	Suramin
5	Pineapple	Diethylcarbamazine
6	Kalonji seeds	Pyrantel pamoate

PLANT PROFILE

Botanical Source: Kathal or Jackfruit is mainly obtained from the leaves or bark of the plant *Artocarpus heterophyllus* Lam belong to family Moraceae (Kokate C.K. 2014).

Parts used: Apart from the whole plant, seeds, fruits, bark, root, leaves, and latex are also used.

Chemical Constituents- Root bark consists of prenyl flavones, heterophylline, cycloheterophylline, hetero Flavonone-A&B. The pulp contains several volatile flavor

constituents like Carboxylic acid & Carbonyl compounds. Seed is rich in iron & protein (Gupta A. 2011).

Properties & Uses- The roots are credited with antidiarrhoeal properties. The leaves are useful in fever, boils, wounds, skin disease, & vitiated condition of pitta & vata. The unripe fruits are astringent, carminative & tonic. They are useful in vitiated conditions of kapha, dyspepsia, aphrodisiac & tonic & are useful in the vitiated condition of vata & pitta & ulcers. The seed is sweet diuretic, aphrodisiac & constipating. The wood is a nervine sedative, & is useful in convulsions the latex is useful dystopia ophthalmitis & pharyngitis (Indian medicinal plants, 2014).

Common Uses – Hypoglycemic, Demulcent, Nutritive, laxative.

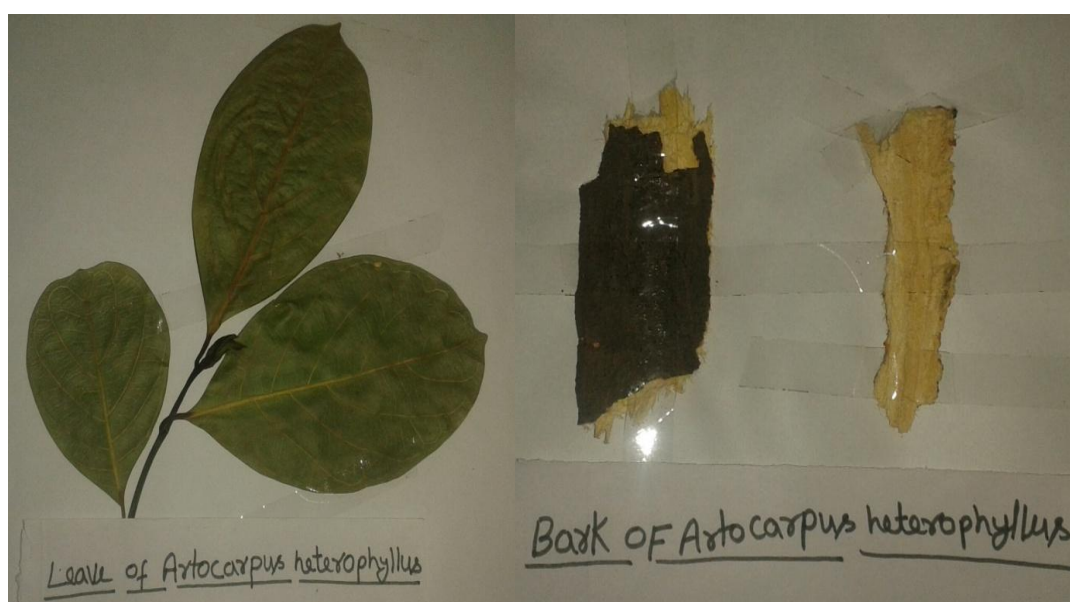


Fig.1. Leaves & Bark of Artocarpus heterophyllus

Growth & Distribution

Artocarpus heterophyllus grows rapidly in early years, up to 1.5 m/yr (5 ft/yr) in height, slowing to about 0.5 m/yr (20 in/yr) as the tree reaches maturity. Jackfruit has been cultivated since prehistoric times and has naturalized itself in many parts of the tropics, particularly in Southeast Asia, where it is today an important crop of India, Myanmar, China, Sri Lanka, Malaysia, Indonesia, Thailand, and Philippines. It is also grown in parts of Africa, Brazil, Surinam, Caribbean, Florida, and Australia. It has been introduced to many Pacific islands

since post-European contact and is of particular importance in Fiji, where there is a large population of Indian descent (The wealth of India, 2009).

Processing of plant materials

After the collection of plant materials, it was completely washed with water the plant material was cleaned and dried in shade for 15 days.

Preparation of extracts by cold maceration (Singhal K.C. 2011)

Aqueous extract

Accurately weighed 50 gm of the coarsely powdered drug was washed with distilled water and it was allowed to macerate for 7 days with occasional shaking. After a week the liquid was filtered with the help of a muslin cloth and the drug material was pressed to liberate more menstruum from the marc. Both the extracts were mixed and the liquid has evaporated without heating to get an aqueous extract.

Ethanolic extract

Accurately weighed 25 gm of the coarsely powdered drug was washed with ethanol and it was allowed to macerate in ethanol for 7 days with occasional shaking. After a week the liquid was filtered with the help of a muslin cloth and the drug material was pressed to liberate more menstruum from the marc. Both the extracts were mixed and the liquid has evaporated without heating to get the ethanolic extract.

Hydroalcoholic extract

Accurately weighed 10 gm drug of the coarsely powdered drug was washed with the hydroalcoholic solution (50:50) and it was allowed to macerate for 7 days with occasional shaking. After a week the liquid was filtered with the help of a muslin cloth and the material was pressed to liberate more menstruum from the marc. Both the extracts were mixed and the liquid has evaporated to get hydroalcoholic extract.

***In vitro* Anthelmintic Activity**

1. Adult earthworm (*Eudrilus Eugenia*) was collected (due to their anatomical and physiological resemblance with the intestinal roundworm parasite of the human being). Earthworms were washed to remove adhering material.
2. Petri dishes of equal size were taken, cleaned and dried. 12 dishes were arranged accordingly.
3. 20 ml of normal saline was poured in 1st Petri dish; 20 ml of Piperazine citrate solution containing 2mg /ml and 4mg/ml concentration were poured into 2nd and 3rd Petri dish respectively.
4. 20ml of the solution of aqueous extract of *Artocarpus heterophyllus* 4mg/ml, 8mg/ml, and 10mg/ml were taken in remaining Petri dishes in an arranged manner.
5. Earthworms of equal sizes were introduced in all Petri dishes and time was started on the stopwatch.
6. The time is taken for paralysis (motionless) and complete death of earthworms was confirmed by dipping it in water heated to 50°C (Singhal K.C. 2011).

Table No. 2: Phytochemical analysis of bark of *Artocarpus heterophyllus* (Khandelwal, 2008)

S. No.	Phytochemicals	Aqueous Extract
1.	Carbohydrates	+
2.	Proteins	+
3.	Steroids	-
4.	Amino acid	+
5.	Alkaloids	+
6.	Glycosides	+
7.	Vitamins	+
8.	Flavonoids	+
9.	Tannins & Phenols	+



Fig. 2. *In vitro* anthelmintic activity

Sr. No.	Treatment	Concentration (mg/ml)	Time taken for paralysis (min)	Time taken for death (min)
1.	Control (normal saline)	-	No paralysis	No death
2.	Piperazine citrate	2	48	83
		4	39	64
3.	Aqueous extract of <i>Toona ciliata</i>	4	101	170
		8	98	150
		10	75	127

RESULTS AND DISCUSSION:

In the present study, the plant *Artocarpus heterophyllus* was selected for its considerable flavonoid content, tannin, sugar, vitamins, volatile oil, polyphenol and an attempt was made to evaluate anthelmintic potential against *Eudrilus Eugenia*. As evident from the above Table No. 3, the aqueous extract of the bark of *Artocarpus heterophyllus* showed does not dependent and potent anthelmintic activity.

CONCLUSION:

Modern synthetic medicines are very effective in curing a number of diseases but also cause the serious side effects. Crude drug is less efficient with respect to cure of disease but is relatively free from side effects. Parasites have been of concern to the medical field for centuries and the helminths considered causing the considerable problem for humans and

animals. A large number of medicinal plants are claimed to possess anthelmintic property in the traditional system of medicine.

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