

## Investigation of Anthelmintic Potential of *Madhuca indica* (Mahua)

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### ABSTRACT

Satpuda and Balaghat hills region of Maharashtra is inhabited by several tribes and they are using several plants or plant-based preparations for the treatment of various infectious diseases in their traditional system of medicine. During our course of literature studies on ethnomedicine of this region, the plant being used as antimicrobial agent is *Madhuca indica* (Mahua). This plant has a wide reputation among natives of being curative for various infections in the form of aqueous extract. Aqueous extracts of leaves and fruits are found to be antibacterial in previous studies.<sup>[1]</sup> Based on this, further attempt has been made to evaluate the anthelmintic potential of the same plant.

The aqueous extract of *Madhuca indica* (Mahua) bark was investigated for anthelmintic activity using adult Indian earthworms (*Pheretima posthuma*). Various concentrations (20-80 mg/ml) of plant extract were tested in the bioassay. Albendazole (20 mg/ml) concentration was used as reference standard drug whereas distilled water is considered as control. Determination of paralysis time and death time of test animals were recorded. Aqueous extract of Mahua bark exhibited very significant anthelmintic activity at concentration of about 80 mg/ml. The result shows that aqueous extract of bark possesses significant vermifugal activity and found to be effective anthelmintic.

### I. INTRODUCTION

One of the most common infections in humans, helminth infections are disturbing to a significant portion of the global population. Although the majority of helminth infections are often only found in tropical areas, they pose a serious health risk and increase the likelihood of pneumonia, anaemia, and malnutrition. The population in underdeveloped countries is primarily affected by parasitic illnesses, which produce merciless morbidity.<sup>[2]</sup>

Anthelmintic resistance is a prevalent issue in the treatment of helminth infections because the gastro-intestinal helminth develops resistance to the currently available conventional anthelmintic medications. Consequently, there is a rising need for prospective and natural anthelmintics.<sup>[3]</sup> Butternut tree, commonly known as madhuca, is a member of the Sapotaceae family. It stands roughly 17 metres tall. It is endowed with a variety of chemical and nutritional components that give it its many therapeutic benefits. Alkaloids, phenolic compounds, flavones, and saponins make up this substance. Phlegm, swelling, rashes, fractures, snake bites, diarrhoea, chronic tonsillitis, leprosy, fever, and rheumatism can all be treated with the bark. Mahua is said to have properties that help heal wounds and have antibacterial, antioxidant, anticancer, and antidiabetic properties.<sup>[4]</sup>

### Distribution and Habitat:

The Mahua species is distributed in northern, central and southern part of peninsular India, Sri Lanka and Burma. Southern India extending northwards to Maharashtra and Gujarat. *Madhuca indica* is found in some parts of central and north India and Burma. It is common in dry and mixed deciduous forests and dry teak forests. The tree grows on a wide variety of soils. It also grows on shallow, clayey and calcareous soils. It is found up to an altitude of 1200 m, mean annual maximum temperature 28-50°C, minimum 2-12°C; annual rainfall from 550-1500 mm. The species is drought-resistant, strong light demander and readily suppressed under shade.

### II. MATERIALS AND METHODS

#### Preparation of aqueous extract:

*Madhuca indica* bark was procured in November 2019 from a forest in Buldhana District, Maharashtra, and was verified by a botanist. The plant specimen was gathered and stored in our

facility for future use as a resource. The substance was exposed to the sun to dry, was ground using a grinder, went through sieve no. 40, was placed in an airtight container, and was later utilised for extraction. Madhucaindica bark powder (200 gm) was macerated with 1000 ml of distilled water for 12 hours, and then the mixture was decocted. The extract was concentrated by evaporation on a water bath after being twice filtered using muslin cloth and Whatman No. 1 filter paper. The extract was employed as a powder after being dried in a hot air oven. The percentage yield of extract was found to be 3.2 percent.

#### Animals:

An in vitro assessment of the anthelmintic activity was performed using adult Indian earthworms (*Pheretima posthuma*). Earthworms were gathered from the Gram Panchayat Banwadi, TQ Karad, an earthworm raising facility. Earthworms typically measured 6 to 8 cm long and 0.1 to 0.2 cm wide. The services of veterinary professionals were used to validate the identification of the worms.

#### Drugs and chemicals:

Albendazole suspension (Mankind) was used during the experimental protocol.

#### Evaluation of anthelmintic activity:

The anthelmintic assay was performed in accordance with industry standards.<sup>[5]</sup> Due to its morphological and physiological similarity to human intestinal parasites, the adult earthworm (*Pheretima posthuma*) was used in the assay in vitro for a preliminary assessment of anthelmintic activity. Six *Pheretima posthuma* worms were inserted in each 9 cm Petri dish containing 20 ml of the aforesaid test solution of extracts. Test samples of the extract were generated at the concentrations 20, 40, 60, and 80 mg/ml in distilled water. As a control, pure water was used and the reference standard was albendazole (20 mg/ml). Before beginning the experiment, all of the test solutions and the standard medication solution were freshly prepared.

The length of time it took for paralysis when the worms could only move when they were violently shaken was measured. After determining that worms did not move when shook vigorously or dunked in warm water (50°C), the time for worm death was recorded. Each result was shown in the following table as the mean SEM of six worms in each group. (N=6)

Treatment	Concentration (mg/ml)	Time taken for paralysis (minutes)	Time taken for death (minutes)
Control (Water)	20 ml	-	-
Albendazole (standard)	20	26.2±0.53	38.4±0.49
Aqueous extract	20	60.3±0.26	70.1±0.58
Aqueous extract	40	51.6±0.74	60.8±0.42
Aqueous extract	60	38.4±0.48	46.3±0.38
Aqueous extract	80	22.8±0.26	29.6±0.26

### III. RESULTS

Preliminary phytochemical analysis of aqueous extract of Madhucaindicabark has shown the presence of alkaloids, flavonoids and phenolic compounds and saponins. Some of these phytoconstituents present in extract may be responsible to show a potent anthelmintic activity. The result of anthelmintic activity of aqueous extract of Madhucaindicabark on earthworms *Pheretima posthuma* were studied. The aqueous extract of Madhucaindicabark showed moderately significant dose dependent anthelmintic activity.

### IV. CONCLUSION

From the above results, it is concluded that madhucaindica has anthelmintic activity in graded concentrations. Aqueous concentration at 80 mg/ml shown best anthelmintic activity among all concentrations.

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