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A Critical Interpretation on Bilwa Medicinal Plant (Aegle marmelos)

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ABSTRACT
Aegle marmelos, a member of the Rutaceae family with medicinal properties, is one of the most important plants in the field of medicine. Bilwa is used to treat a wide range of ailments. There has been this plant from the beginning of time. Since the plant produces a wide variety of alkaloids, all portions of it—fruit, leaves, bark, stem, and roots—are utilized to treat a variety of ailments. Antianaemic, antidiarrheal, antidysentric, antipyretic, and anti-inflammatory properties are some of its medicinal qualities. Chemicals obtained from fruit have been shown to have biological promise in the treatment of a number of diseases, including hyperlipidaemia, diabetes, anemia, and stomach ulcers. Numerous studies on its properties and medical applications have been carried out, indicating its applicability in the modern world. The structure, pharmacological properties, nutritional impact, ayurvedic applications, and distribution of this plant are all covered in this review study.
Keywords: Pharmacological properties, Antianaemic, Antidysentery etc.

1.INTRODUCTION

Many plants have been utilized for their therapeutic qualities for thousands of years. Approximately 85% of people worldwide either fully or partially receive their main healthcare from traditional medicine. These herbs are used in Ayurvedic, Siddha, and other medical systems. They are also mentioned in our ancient literature, including the Rigveda, Yajurveda, Charak Samhita, Sushruta Samhita, and Ashtanga Hrudaya, for their qualities and uses in curing different diseases. Among them is Bilwa, often called the wood apple vine.1

One of the holy plants in Hinduism is Bilwa. Leaves have been presented to Shiva and Parvati in prayers since ancient times. Its trifoliate leaves resemble Lord Shiva's shield Trisula, with spear-shaped leaflets. Numerous stories and tales surround this tree3. Bael's increased Sattva component in Bilwa Patra, which increases its capacity to both absorb and output Sattvika frequencies, is another intriguing feature of the entity.2

Among them is the elimination of Raja-Tama particles from the environment. When someone is experiencing bad emotions, the dark energy within them is diminished when a Sattvika leaf, like Bilwa Patra, is placed close by. Antianaemic, antimicrobial, antidiabetic, anti-inflammatory, analgesic, antipyretic, hypoglycaemic, wound healing, and five more properties are allegedly included in Bilwa.

2.Material and Method

The gathering of information on the Bilwa (Aegle marmelos) plant from reliable sources, including books, papers, manuscripts, and other publications.

Plant Morphology According to Modern Science

The medium-sized Aegle marmelos tree grows slowly and can reach a height of 12 to 15 meters. It has a tiny trunk, fuzzy, peeling bark, and occasionally spiky limbs.4 Young suckers often have straight, stiff spines. The deciduous Bael tree has alternate leaves that are produced individually or in clusters.5 The leaves are composed of three to five oval, pointed, shallowly toothed leaflets that are 10 cm long, 2 to 5 cm thick, and have a long petiole6.

Classification

- Kingdom- Plantae
- Family- Rutaceae

- Subfamily- Aurantioideae
- Genus- Aegle
- Species- Marmelos

Ayurvedic Properties of Bilwa

- Rasa - Madhura
- Guna -Laghu
- Virya -Sheeta
- Vipaka- Madhura
- Karma – Pandu, Tridoshaghna, Shothahara, Vedanasthapana, Raktastambhan, Deepan

Plant Habitat and Geographical Distribution

Indian-born bilwa is mostly found in the Himalayan and West Bengal areas of the country. It emerges in Jharkhand[7], Uttar Pradesh, Madhya Pradesh, Chhattisgarh, and Bihar. Bael may be found in a number of exotic locations, including Egypt, Malaysia, Bangladesh, and Sri Lanka.

Bilwa Active Principles

The most common and varied class of secondary plant chemicals are called alkaloids. Aegle marmelos leaves have been used to isolate O-3,3-(dimethylallyl) halfordinol, N-2-methoxy-2-[4-(3',3'-dimethylallyloxy) phenyl] ethyl cinnamamide, and other compounds. Bilwa has three medicinally active ingredients: umbelliferone, skimmianine, and marmelosin.[8]

Bilwa's Nutritive Value:

Physiochemical research found that Bilwa has extraordinary nutritional value. Bilwa pulp may be mixed with milk to create an energy drink, and it's a rich source of sugar and glucose. Other nutrients included in Bilwa include proteins, lipids, fibre, calcium, minerals, iron, vitamin A, vitamin B1, vitamin C, and riboflavin. The leaves and shoots are eaten as a green vegetable in Indonesia. [9].

3.PHARMACOLOGICAL PROPERTIES

Antianaemic Activity:

Anaemia can be treated by combining boiling cow's milk with powdered Bilwa pulp. [10].

Antijundice Activity:

To extract the juice, one hundred soft Bael leaves were employed. Add ten teaspoons of black pepper powder to it. Take the mixture each morning and evening. Moreover, after a meal, sip at least five glasses of sugarcane juice.[11]

Antioxidant activity:

Antioxidant qualities of Bilwa are supposed to protect against various free radicals. A recent Bilwa study found that unripe fruit had a greater proportion of free radical inhibition than ripe fruit. An aqueous preparation of Bilwa berries was tested for antioxidant activity using DPPH radical scavenging.

Antimicrobial Action

The microorganisms with the strongest antibacterial activity were Bacillus subtilis, Staphylococcus aureus, E. coli, and Pseudomonas aeruginos. The essential oil extracted from A. marmelos tree leaves has been shown to have antifungal action against Trichophyton rubrum, Trichophyton mentagrophytes, Microsporum gypseum, Microsporum audounii, Microsporum cookie, Epidermophyton floccosum, Aspergillus niger, Aspergillus flavus, and Histoplasma capsulatum.[12] The agar well diffusion method was also used to gauge the antibacterial activity of different extracts. High antibacterial activity against E. Coli, Klebsiella pneumoniae, Proteus vulgaris, Micrococcus luteus, Enterococcus faecalis, and Streptococcus faecalis was demonstrated using hexane, cold methanol, hot methanol, and ciprofloxacin extracts.[13].

Antidiarrheal Action-

Unripe Bilwa fruit is a valuable remedy for diarrhoea and dysentery that has been utilized by people as a traditional medication. Numerous research has demonstrated the antidiarrheal properties of Bilwa. The ethanolic extract shown efficacy against Shigella flexneri, sonnei, and boydii, but only a limited degree of effectiveness against Shigella dysenteriae.[14].

Antidiabetic Action-

Multiple tests have demonstrated the anti-diabetic benefits of Bilwa. The anti-diabetic properties of Bilwa leaves were found in rats with alloxan diabetes. Blood sugar is lowered by the methanolic extract of Bilwa leaves. This shows that blood sugar levels were reported to be 54% lower when the concentrate was administered consistently for 12 days[15, 16]. Leaf extract has been utilized in Ayurvedic medicine to treat diabetes. Like insulin, it increases the body's capacity to use extra glucose loads by promoting glucose absorption. [17]

Anticancer Properties-

Cancer is the second most common cause of mortality for both men and women in industrialized and developing countries alike. The immune system is strengthened by Bilwa fruit extract, which strengthens the body's defence against cancer. A study[18] found that the Bilwa also has an anticancer effect in an animal model of carcinoma.

Preclinical research using leaf extracts from A. marmelos revealed that these extracts inhibited the growth of leukemic K562, T-lymphoid Jurkat, B-lymphoid Raji, erythroleukemic HEL, melanoma Colo38, and breast cancer cell lines MCF7 and MDA-MB-23122.

Antipyretic Properties

Using modern medication is not as beneficial as using traditional treatment. Bilwa is an antipyretic used to relieve pain and fever. According to the Bilwa study, the ethanolic extract significantly reduced high body temperature in a dose-dependent manner at dosages of 200 mg/kg and 400 mg/kg body weight. The antipyretic activity of the extracts was 100 mg/kg body weight, the same as paracetamol. [19, 20].

Hepatoprotective Properties-

In an animal experiment, Aegle marmelos leaves were employed as a control group, and four groups were given 30 percent ethyl alcohol for 40 days. The results of the study demonstrate the potent hepatoprotective properties of Aegle marmelos leaves.[21].

Cardio protective Properties –

The extract from bilwa leaves protects rats from myocardial infarction caused by isoprenaline. Bilwa has also been used to treat palpitations and as a heart depressant[22]. Various dilutions of fresh Bilwa fruit juice were employed for cardiotonic operation. The greater cardiotonic action of Bilwa over Digoxin is supported by recent studies. Other characteristics of Bilwa include antihistaminic, anti-inflammatory, insecticidal, antioxidant, immunomodulatory, wound healing action, anticonvulsant, and antifertility effects.

Application in *Ayurveda*

The root is quite good for treating "Tridosha" fevers, heart palpitations, stomach-aches, urinary diseases, hypochondriasis, and removing the elements of "vata, pitta, and kapha." Because of its laxative, astringent, digestive, and expulsion of "vata and kapha," the leaves are useful in the treatment of inflammations, ocular conditions, and deafness. The flowers are useful in treating dysentery since they reduce vomiting and thirst[23]. The mature fruit is good for the heart and mind; it is hot and dry, tonic, restorative, astringent, and laxative. Ripe fruit is converted into a silky, fragrant, pleasant morning sherbet that soothes upset stomachs. The unripe fruit is a remedy for dysentery and diarrhoea.

Mode of Action of *Bilwa Phala Majja* in *Pandu Vyadhi* –

Bilwa Phala Majja has the following effects: Varnya, Pitta-Kaphagna, Balya, Rasayana, and Pandugna. It is said to strengthen digestion and cleanse the strotorodha. In this illness state, the Bilwa Phala Majja responds most adaptively and contributes to the recovery of Dhatubala. The Ama dosha was eliminated by the Bilwa Phala Majja. The delicate ingredients of the medication, such as Rasa, Guna, Veerya, Vipaka, and Prabhava, are primarily responsible for its action.[24].

4.DISCUSSION

A mystical plant with numerous uses is Bilwa. A wide range of illnesses linked to toxins can be treated with Bilwa. In Ayurveda, it is used as an antidote against snake poison. Ushna Virya is there, along with Madhura, Tikta Rasa, and Kashaya. The Bilwa fruit is therefore thought to be quite helpful for diarrheal illnesses. Two components with Antianaemic, antimicrobial, anti-inflammatory, antipyretic, analgesic, anti-cancerous, antidiabetic, and hepatoprotective properties are coumarins and steroids. A native herb called Bilwa is used to cure a wide range of poisons. Tests have indicated that Bilwa can assist in the treatment of a number of problems associated to toxins, including those that can harm an organ or a system. On Bilwa, CCl 4 has hepatoprotective effects and Gentamycin has nephroprotective effects.[25]

The antitoxic properties of Bilwa are also shown by its antibacterial, antifungal, and antioxidant properties. Pain and inflammation are the most common symptoms of corrosive and irritant poisoning, and Bilwa can assist with both. It effectively protects against genotoxicity as well. In addition, a recent study discovered that chromium, a radioactive metal, may be effectively removed from the aqueous process using activated carbon derived from Bael fruit shells.

5.CONCLUSION

An auspicious plant with Antianaemic qualities is Bilwa. In the present world, even though individuals are aware of the medication's adverse effects, many have resorted to it for instant relief from ailments. Many therapeutic plants are abundant in our ecosystem, but not everyone is aware of their importance. Consequently, it serves as a way to inform others about what they have left behind. This article's several phytochemicals provide it Antianaemic, antimicrobial, antioxidant, antidiabetic, antipyretic, and anti-inflammatory properties. It is also reasonably priced. Therefore, a methodical research and development program must to be carried out in order to increase the economical and productive use of commodities.

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