

A Systemic Review on Aegle Marmelos (Linn) As Antiulcer

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ABSTRACT

Many people suffer from ulcers, a common gastrointestinal ailment. The erosion of the stomach and duodenal lining is known as an ulcer. Duodenal and stomach ulcers are classified into two categories. Together, they referred to as stomach ulcers. Ulcers can also be treated with synthetic medicines. These medications are more costly than herbal remedies, and they could also have more negative effects. The gastrointestinal tract lining's *Helicobacter pylori* infection has been linked in recent years to stomach ulcers. Peptic ulcer and gastric ulcer illnesses have been discovered to be protected against or treated by a variety of herbs and herbal preparations. In ancient India, the eagle marmelos, also known as Bael, was associated with mythology. In traditional medical systems such as Ayurveda, every component of the tree, including the root, bark, fruit, leaf, and flower, has therapeutic value for treating various disorders. *Aegle marmelos* is an Indian native. Traditional medical systems use the numerous nutraceutical and therapeutic qualities of the monotypic genus *Aegle*, which is a member of the Rutaceae family, to treat a wide range of illnesses.

KEYWORDS: *Aegle marmelos*, Peptic ulcer, Gastric ulcer, *Helicobacter pylori*, Bael

I. INTRODUCTION

In traditional medical systems, *Aegle marmelos*, a member of the Rutaceae family, is referred to as Bael and is thought to provide a number of therapeutic benefits. As the Bael is considered a sacred tree in Hinduism. Since ancient times, people have offered leaves to Shiva and Parvathi as a sign of prayer. A sacred deciduous tree known as Bael is linked to gods and is said to have beneficial medical qualities, particularly as a cooling agent. This tree can be cultivated in any home and is well-liked in temples dedicated to Shiva and Vishnu.^[1] The fact that plants contain a variety of active chemicals that serve as the basis for the development of numerous medications

makes them very important to humans. For millennia, flora have been employed in India as herbal or natural remedies. Many pharmacologically active principles and active substances are thought to be abundant in plants utilized in Indian medicine.^[2] In India, Bael is also referred to as Bengal-quince, golden apple, stone apple, and in some locations as a sacred tree in Hindu communities. *Aegle marmelos* (L.) Bael is one of the world's 250,000 extant terrestrial plant species that is valued for its therapeutic properties. Bael is beneficial for a range of phytochemical applications since it contains a number of them, including tannins, gums, resins, essential oils, polysaccharides, and alkaloids. a range of illnesses. Its nutritional content is far higher than that of other fruits. In terms of the environment, it is also quite significant.^[1,2] It has historically been utilized for its anti-tumor, anti-diabetic, and anti-lipidemic properties. Both adults and children's diarrhea can be stopped with the bark. Fruit is utilized to create hair tonic. One of the most common gastrointestinal disorders, gastric ulcers affect 5–10% of people at some point in their lives. Gram-negative *Helicobacter pylori* infection, increased hydrochloric acid output, and insufficient mucosal defense against gastric acid are the main causes of peptic ulcers. Acid and medications such as cholinergic medicines, NSAIDs and inappropriate eating habits.^[3]



Figure No.1: *Aegle marmelos* fruits



Figure No.2: Aegle marmelos fruits

Aegle marmelose

- Kingdom- Plantae.
- Order- Sapindales.
- Family- Rutaceae.
- Subfamily- Aurantioideae.
- Genus- Aegle.
- Species- Aegle Marmelos.
- Botanical name- Aegle marmelos,^[1]

Morphological characteristics

Plant part	Morphological characters
bark	The bark grey or brownish in colour, and it bears a number of long, straight spines. It includes gums, which form from wounded branches and harden over time. The easiest way to describe these gums is as a transparent, sticky sap. It tastes good at first, but it quickly gets irritating to the throat.
Leaf	Its leaves are trifoliate, with a pointy tip and a round base. Young leaves are pale green, whereas adult leaves are dark green.
Flower	The bisexual flowers have a greenish or yellowish hue. New leaves generally make it obvious
Fruit	The Bael fruit has an outer jacket that is robust and measures between 5 and 12 cm in diameter. When unripe, it is green; when ripe, it turns yellow-brown. There are up to 20 orange pulps inside of it.
Seed	They are hard, hairy, flattened-oblong, and tiny (almost 1 cm long), with an adhesive sac encircling each one. ^[2]

BOTANICAL DESCRIPTION:

Aegle marmelos is a medium-sized, slowly growing tree that can reach heights of 12 to 15 meters. It has a short trunk, thick, soft bark that flakes, and spreading, occasionally prickly branches. The bottom ones sagging. Young suckers have a lot of straight, hard spines.^[1] The bark, leaf, flower, fruit, and seed are examples of plant components. The bael tree has spiky steam branches that can be seen. The alternating, usually trifoliate leaves have three to five leaflets per leaflet, each measuring four to ten centimeters in length and two to five centimeters in width. An analogous young leaves have a somewhat lighter green color, but as they mature, they turn a dark green color. The tree has thick, separating bark with frequently spiky limbs. There is a gum discharge visible from the injured bark. The bael flower has a greenish-

white appearance. with a good smell. Mainly yellowish green in color, the bael fruit has a diameter of 5.3–7.2 cm, an approximate weight of 77.2 g, a volume of 73.7 mL, and a sphericity of 93.72 ~ 2.78% [11]. The fruit's pulp is colored yellow in both mucous and colored. There are several spots on the outside, and there are a lot of firm seeds with white thread-like hairs covering their outside surface.^[1,4]

TYPE OF SOIL

Although Bael is supposed to thrive in rich, well-drained soil, it has also developed and produced fruit on southern Florida's oolitic limestone. Additionally, it thrives in marshy, alkaline, or rocky soils with a pH between 5 and 8.^[1]

APPLICATIONS OF PARTS

Seed:Bael seed contains a pyranocoumarin called liganetin, which exhibits protective properties against pylorus- and aspirin-induced. It is also used in febrifuge

Leaf: It has been proven to be quite helpful in the treatment of asthma and jaundice. Bael leaves work well to help clear the bronchial tubes of their secreted mucilage. Applications include the treatment of conjunctivitis and potentially its cure. Diarrhea, constipation, and deafness. Bael leaf powder may be used to treat bowel syndrome.^[4]

Sore, spinal pain, eye grievances, stomach problems, retching, trims and wounds, ulcer, dropsy, beriberi, heart shortcoming, cholera, the runs, cardiogenic, glucose, creature wounds, neurological issues, hair tonic, intense bronchitis etc.^[6]

Fruit: Fruit extracts have been shown to speed up the treatment of thyroid in many body areas. When consumed with boiling rice water during pregnancy, it is believed to be highly useful in treating vomiting. In a pustule unripe fruit pulp powder is particularly beneficial for curing.^[4] Astringent, diarrhea, loose stools, stomach problems, obstruction, purgative, tonic, stomach-related, stomachic, and effects on the mind and heart gonorrhoea, epilepsy, intestinal parasites, tonic, ulcer, and antiviral medication.^[6]

Flowers:The flower, which is used to treat epilepsy, possesses both astringent and antibacterial qualities. After the flower is distilled, marmala water is separated and proven to be beneficial for treating conjunctivitis. Bael flower extract possesses been examined for their ability to heal wounds.^[4]

Bark: Stomach problems, heart issue, discontinuous fever.^[2]

CHEMICAL CONSTITUENT:

- Alkaloids
- Terpenoids
- Coumarins
- Gum
- Resins
- Essential Oil
- Phenylpropanoids,
- Polysaccharides
- Flavonoids^[1,5]

SYNONYMS

Hindi	Bilva, triphala, shivadruma, Shiva pal
Sanskrit	Maredu
Bengali Cambodia	Pheou or poi
Vietnamese	Baunau
Malayan	Modjo bel
Gujarati	Bil
Kannada	Bilpatra, kumbala, malura
Tamil	Kuva Lum
Thai	Matum and main. ^[6]

PLANT PART CHEMICAL CONSTITUTE:

Leaf	Skimmianine, Aeglin, Rutin, -sitosterol, -sitosterol, Flavone, Lupeol, Cineol, Citral, Glycoside, O-isopentenyl, Hallordiol, Madeline Citronellal, Cuuminaldehyde phenylmethyl cinnamates Eugenol,
Fruit	Psoralen, Marm elide, Tannin, Phenol, Marmelosin, Luvangetin, Auraptene, Tannin, Phenol, Tannin, Tannin,
Bark	Alkaloids, Fagarine, Marmin, Furoquinoline
Seed	D-limonene, A-D-phellandrene, Cineol, Citronellal, Citral, PP-Cyrene, and Cumin aldehyde are essential oils.
Roots	Terpenes, Halopine, Coumarins, and Alkaloid. ^[6]

Natural history

Originating from India, Bael is present in Bangladesh, Egypt, Malaysia, Myanmar, Pakistan, Sri Lanka, and Thailand. The tree grows wild in dry forests on the hillsides and plains of central and southern India, as well as in mixed deciduous and dry timberlands in Burma, Pakistan, and Bangladesh.^[2,7]

ULCER

A gastric ulcer, also called a peptic ulcer, is a localized area of stomach lining erosion that causes pain in the abdomen, possibly even bleeding, and other symptoms related to the gastrointestinal area. The stomach infection caused by the Helicobacter pylori (H. pylori) bacterium is one of the most frequent causes of gastric ulcers. H pylori's proliferation Its mode of transmission among humans is unknown; it could be through

tainted food and water. Although many people contract *H. pylori* at an early age, symptoms usually manifest in adults.^[8] Gastric acid, pepsin secretion, *Helicobacter pylori* (*H. pylori*), bile salts, ethanol, some medications (such as non-steroidal anti-inflammatory drugs), lipid peroxidation, and other factors are involved in the pathophysiology of ulcer disease. Based on the location and severity of the condition, there are many classifications for gastric ulcers. Numerous additional variables, including reactive oxygen species and tumor necrosis factor alpha (TNF alpha), also play a role in the pathogenesis of gastric ulcers. species (ROS), histamine release, apoptotic frequency, and secretion of bile acid. There is proof that non-steroidal anti-inflammatory drug-induced ulcers are highly prevalent. NSAIDs accelerate the development of ulcers by suppressing the production of cyclooxygenase (COX), which is thought to prevent arachidonic acid (AA) from being converted to PG. as a result, the mucosal barrier is altered and pepsin's corrosive function is triggered, which advances the development of stomach ulcers.^[5] A benign lesion known as peptic ulcer disease (PUD) develops in the stomach or duodenum when the mucosal epithelium is exposed to acid and pepsin. It appears when certain aggressive and gastro-protective factors lose their careful balance.^[9]

TYPES OF ULCERS

- Duodenum (called duodenal ulcer)
- Esophagus (called esophageal ulcer)
- Stomach (called gastric ulcer)
- Meckel's diverticulum (called Meckel's diverticulum ulcer; is very tender with palpation).^[2,9]

SIGN AND SYMPTOMS

The symptoms include nausea and frequent vomiting, bloating and fullness in the

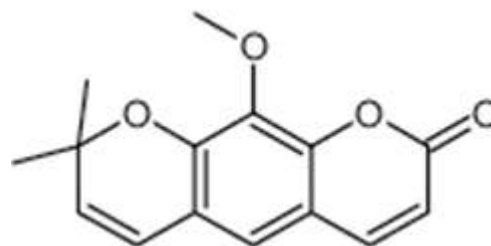
abdomen, loss of appetite, weight loss, and severe abdominal discomfort that worsens around mealtimes and about three hours after eating. Nausea, and copious vomiting, Loss of appetite and weight loss.^[3,10]

ULCER HEALING ACTIVITY OF AEGLE MERMELLOS

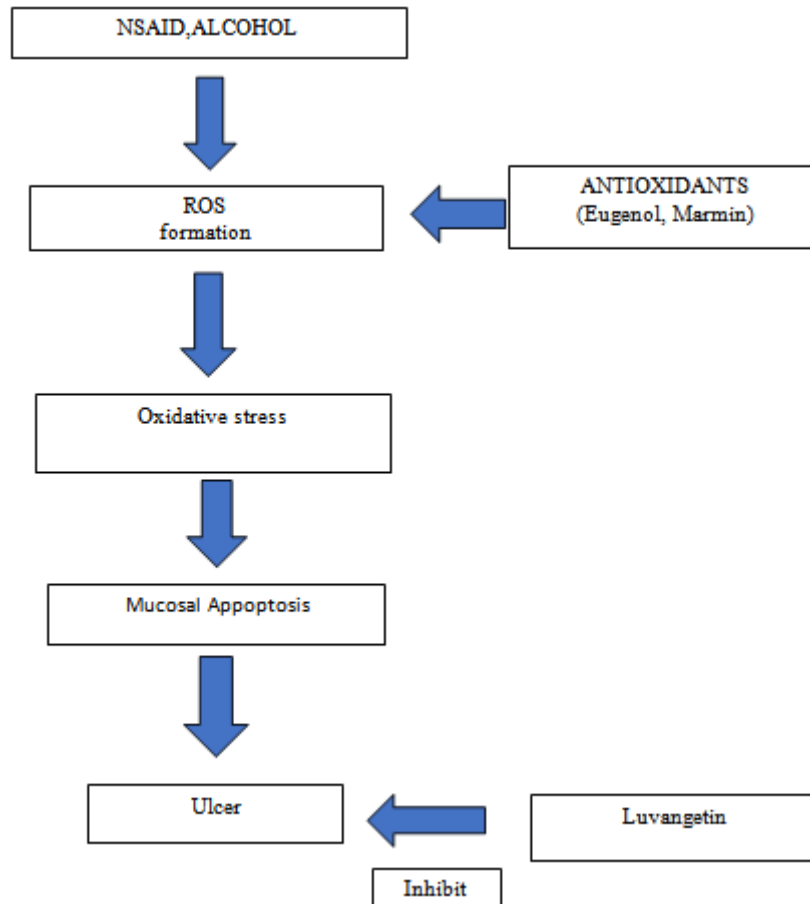
The plant that is mostly found in India is *Aegle marmelos*, also referred to as a "Bael tree" and a member of the Rutaceae family. It is regional. referred to as "vilvam." This plant contains flavonoids, tannins, and saponins as chemical components.^[10] Numerous investigations have demonstrated Bael's anti-ulcer properties. Oral administration of Bael methanolic extract has been used to treat gastric ulcers in rats caused by lipopolysaccharide. S According to the study, a dose of 500 mg/kg of Bael's methanolic extract effectively reduces stomach ulcers by 93.98%.^[4] Aqueous leaf extract is given orally for 21 days at a dose of 1 gramme per kg of body weight to generate stomach ulcers in rats that have been pylorus-ligated and sensitive to aspirin. Comparing the outcome to the control, there was a discernible decrease in the number of ulcer lesions.^[5] *Aegle marmelos* contains "Luvangetin" as a active constituent which shows action against ulcer.^[11]

CHEMICAL STRUCTURE OF LUVANGETIN:

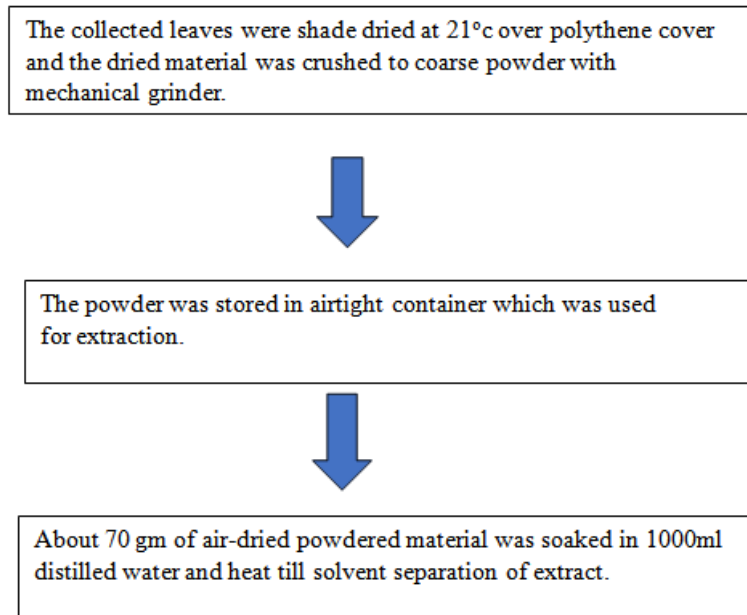
$C_{15}H_{14}O_4$



MECHANISM OF ACTION



Preparation of Aqueous extract





Separated filtrate extract is filtered by using muslin cloth .and the liquid is centrifuge at 10000 rpm by separating sediment.



At the end of the extraction process the marc was taken out and it was dried. After drying, the powdered marc was weighed & again packed. The yield obtained is 14 gms.^[12]

Preparation of methanolic extract

Aegle marmelos leaves were dried at 50°C, powdered coarsely



Extracted it with 75% methanol twice by soaking in container overnight.



The extract was evaporated to dryness.



Again, the extract was re suspended in distilled water and used for the animal experiments.^[13]

PHAMACOLOGICAL USES

Several scientists have documented various Aeglemarmelos biological activity. These are listed under the subsequent headings.

- Antibacterial
- Ulcer healing
- Antihistaminic
- Antifungal
- Anti-inflammatory
- Antipyretic and analgesic
- Hepatoprotective
- Insecticidal
- Hypoglycemic and Antioxidant
- Antidiarrheal
- Antimicrobial and Antiviral
- Diuretic
- Antithyroid
- Immunomodulatory
- Myocardial infraction
- Anxiolytic and antidepressant
- Wound healing
- Antimalarial
- Antistress adaptogenic
- Antifertility ^[1,2,14, 17]

Antimalarial activity

The leaf methanol extract of *A. marmelos* had the greatest activity against *Plasmodium falciparum* in vitro and provoked minimal cytotoxicity. Additionally, the ant plasmodial activity of *A. marmelos* was shown to have an IC₅₀ of 7 g/ml, which is encouraging. Mice who were infected and had a suppressive effect on the parasite did not react to *C. longa* therapy; yet, parasite infection was suppressed by *A. marmelos* at doses of 20 and 40 mg/kg body weight. ^[15]

Anticancer activity

It has been discovered that *A. marmelos* extract effectively inhibits the in vitro proliferation of human tumor cell lines, such as leukemic K562, T-lymphoid Jurat, beta-lymphoid Raji, and Erythroleukemia HEL. ^[1,16]

Ant inflammatory and analgesic activity

The anti-inflammatory properties of *Aegle marmelos* leaf extracts were studied in series. Additionally assessed were the antipyretic and analgesic qualities. The majority of the carrageenan-induced paw oedema and cotton-pellet granuloma in rats were significantly inhibited by

the plant extracts *Aegle marmelos*. The mice's early and late phases of paw licking were reduced by the extracts, which also demonstrated notable analgesic efficacy. A noteworthy decrease in rats' hyperpyrexia was also brought about by the majority of the extracts.

Antipyretic activity

The antipyretic action of *A. marmelos* on Brewer's yeast caused pyrexia in rodents with fair skin. They demonstrate that at dosages of 400 mg/kg and 200 mg/kg body weight body weight, the ethanolic extract caused a dose-dependent crucial (P0.001) drop in the high internal heat level. The antipyretic viability of the concentrates was comparable to that of paracetamol (100 mg/kg body weight). ^[1,2,16]

Antifungal

An analysis suggests that the essential oil from *Aegle marmelos* leaves may interfere with the Ca²⁺-dipicolonic corrosive metabolic pathway and perhaps restrict spore improvement. Leaf extracts from *A. meleophylos* in ethanol, methanol, and water shown adequate antifungal activity against dermatophyte organisms. ^[2,7,16,17]

II. CONCLUSION

Numerous pharmacological and nutritional qualities make *A. marmelos* one of the significant plants. The conclusions and observations of this study indicate that the ethanolic extract of *Aegle marmelo* leaves has an impact that prevents ulcers, which calls for more research. Bael's non-toxic behavior has been shown by clinical research, ensuring that the pharmaceutical application is incredibly safe and free of adverse effects. Bael has discovered extremely promising therapeutic properties, making them deserving of further research. Mucosal defense factor was determined to be the cause of the antiulcer action that was seen. Thus, peptic ulcer therapy can be contributed by it. It's normal to observe peptic ulcers and various ulcer forms everywhere we look. Ulcers are mostly caused by patients who use high doses of NSAIDs, junk food, *H. pylori*, and excessive amounts of caffeine. We attempted to describe the scientific evidence for herbal antiulcer agents in this review. *A. marmelos* has a number of phytoconstituents that have a major role in the plant's therapeutic efficacy. This plant's almost whole, including its leaves, fruits, seeds, bark, and roots, are used to treat a wide range of ailments. Considering the Bael tree's enormous potential, it

should be maintained or grown to the fullest extent possible. Possibility of profit and the development of novel, strong herbal remedies.

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