

Formulation and Evaluation of Aegle Marmelos Herbal Churn

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Abstract: *Aegle marmelos*, a member of the Rutaceae family, is well-known as Bael and possesses a number of medicinal uses. Originally from India, it can be found all over South Asia. This fruit is grown in dry, semi-arid regions of North-East India, the Indo-Genetic plains, and the Sub-Himalayan zone. Deciduous forest found in southern and central India. Grown in India, Ceylon, China, Nepal, Sri Lanka, Myanmar, Pakistan, Bangladesh, Nepal, Vietnam, Laos, Cambodia, Thailand, Indonesia, Malaysia, Tibet, Sri Lanka, Java, Philippines and Fiji, *aegle marmelos* is a widely dispersed plant. According to the kinds of bael, the fruits vary in terms of tree height and size, fruit form, average weight, fruit skin, fiber content, color, TSS, ascorbic acid, average fruit output, etc.

Keywords: Aegle marmelos

I. INTRODUCTION

Aegle marmelos, a member of the Rutaceae family, is well-known as Bael and possesses a number of medicinal uses. Originally from India, it can be found all over South Asia. This fruit is grown in dry, semi-arid regions of North-East India, the Indo-Genetic plains, and the Sub-Himalayan zone. Deciduous forest found in southern and central India. Grown in India, Ceylon, China, Nepal, Sri Lanka, Myanmar, Pakistan, Bangladesh, Nepal, Vietnam, Laos, Cambodia, Thailand, Indonesia, Malaysia, Tibet, Sri Lanka, Java, Philippines and Fiji, *aegle marmelos* is a widely dispersed plant. According to the kinds of bael, the fruits vary in terms of tree height and size, fruit form, average weight, fruit skin, fiber content, color, TSS, ascorbic acid, average fruit output, etc. The valuable fruits of the *aegle marmelos* tree, which have an oval or round form and a diameter ranging from 5 to 25 cm, are the main reason for its worth. The bael fruit is comprised of a rich, aromatic, sweet flesh inside a hard, woody outer shell. The seeds are found in the pulp of the bael fruit. And they are surrounded by a thick, greasy, transparent mucilage. The pulp of the bael fruit is a naturally occurring source of bioactive chemicals and important antioxidants. The pulp has laxative qualities and is regarded as one of the best laxatives available at this time. The portions of bael plant are used to treat digestive issues like diabetes, dysentery, and diarrhea. It possesses antifungal and antibacterial qualities. Bael is well known for its analgesic, anticancer, and antipyretic properties. It also relieves constipation. Alkaloids, Phenols, Glycoside, Coumarins, steroids, tannins and carotenoids are among the phytochemicals that have identified and isolated from different portions of *A. Marmelos*.¹ It is a mixture of powdered herbs and or minerals. It is a fine powder of drug of drugs which are closed are cleared properly, dried, crushed and then sieved. The churn free flowing and should be preserved in airtight containers. Triphala churna is most example. It is similar to powder formulations in Allopathic system of medicine. These medicaments have many applications because of their particle size. Similar the particle size greater is the absorption rate and hence the greater is bioavailability. It is generally used in the treatment of diabetes, indigestion, constipation etc.²

Objectives

- Drying of Aegle Marmelos fruit and preparation of powder by sun drying.
- Blending of Aegle Marmelos fruit pulp with other ingredients.
- Packaging of moringa herbal tea.³

Types of Churn

- Simple Churn- There is only one medication in it.
- Compound Churn- It has two or more medications in it.⁴

Uses-



- Jaundice can be cured with bael.
- The blood pressure is regulated by the bael.
- Bael is also used to eradicate disorders of the skin and hair.
- Bael is also effective in treating liver disease.
- Bael fruits are used to treat diabetes- like condition.⁵
- The bael fruit is a fantastic tonic for heart and brain health because it has laxative properties.
- Fruit is recommended for the treatment of TB and hepatitis.
- Pregnant and nursing mothers with diabetes were treated with herbal medication derived from bael.
- Growing babies and kids under three years old may not experience teething problem if bael fruits are included to their diet.
- The bael fruit pulp are used to treat dysentery and diarrhea.
- The bael fruit is used to treat ulcer condition.
- Bael juice helps the body rid itself of pollutants.
- The body has more energy when bael juice is consumed.
- Fruit bael is beneficial to expectant mothers.⁶



Side Effects of Bael -

There have been no documented common negative effects when using bael.

However, a doctor should be called for an expert advice if any form of negative effect is discovered

NUTRITIONAL VALUE OF DIFFERENT PART OF AEGLE MARMELOS-

Plant part	Plant part pictures	Nutritional value
Leaves		Leaves of A. Marmelos four new alkaloids viz, o-halfordinol, N-2- ethoxy-2ethylcinnamid, besides aegelenine and aegeline. Condensed tannins, phlobatannins, flavonoid, glycosides are also present.
Fruits		The fruit contain protein, fat, carbohydrates, fiber. Besides are present in small amounts calcium, phosphorous, iron, riboflavin, niacin, oxalic acid and vitamin C.

Seeds		Seeds of A. Marmelos contains the fatty acid composition of the oil is as follows: palmitic, stearic Oleic, Linoleic acid linoleic.
Root bark		The root bark contain alkaloid haplopine, skimmianine, y- jagarine, marmesin, marin, xanthitoxi, umbelliferone and lupeol.

Nutrient's Composition of Bael-

Amount of Bael: 100 gm.⁷

Nutrients	Amount
Proteins	1.8 g
Carbohydrates	
Total carbohydrates	31.8 g
Fats	
Total fats	0.3 g
Vitamins	
Riboflavin	1.19 mg
Niacin	1.1 mg
Thiamin	0.13 mg
Vitamin A	55 mg
Vitamin C	8 to 60 mg
Minerals	
Calcium	85 mg
Phosphorus	50mg
Potassium	600 mg



Fig. Nutrient composition of Bael

Benefits of **Organic Jaggery Powder**

- Purifies Blood
- Filled with minerals & irons
- Improves Digestive Process
- Improves Nervous System
- Improves Metabolism



Medicinal uses of different parts of Aegle marmelos -

Plant part	Medicinal uses
Leaves	Anti- inflammatory, Ulcer, causes sterility, or absorption, laxative, asthma, opthalmia and eye affection, expectorant, cold and respiratory infection, backache, abdominal disorder, vomiting, cut and wounds, dropsy, beriberi, weakness of heart, cholera, diarrhea, cardiac tonic, control blood sugar, nervous disorder, hair tonic, acute bronchitis, veterinary medicine for wound healing anti worms, stimulation of respiration.
Fruits	Dysentery, diarrhea, gastric troubles, constipation, laxative, tonic, digestive, stomatic, brain and heart tonic, ulcer, antiviral.
Seed	Antibacterial, Antifungal
Root Bark	Intermittent fever and fish poison, palpitation, antidogbite, gastric troubles, heart disorders, fever, antiamoebic, hypoglycemic, rheumatism. ⁸

Pharmacological activities-

Antidiabetic activity- Approximately 100 million individuals globally (6% of the global population) suffer from diabetes mellitus (DM), the most prevalent endocrine condition populace. It is brought on by the pancreas' inability or lack of ability to produce enough insulin, which causes variations in blood glucose levels. An assessment of the antidiabetic potential of Aegle marmelos fruit extract was conducted in a histopathological investigation including streptozotocin- induced diabetes. The purpose of this study was to clarify how an aqueous extract of Aegle marmelos fruits protected the pancreas' histopathology in rats with streptozotocin- induced diabetes.⁹

Constipation- Ripe fruit has laxative properties. It facilitates peristaltic motions, which helps eliminate feces.¹⁰

Stomach ulcer- Peptic ulcers have been treated with betel leaf and fruit infusion. The fruit has several benefits, one of which is that it creates a mucilaginous layer on the stomach mucosa, which inhibits the interaction of acid with the mucosal layer.¹⁰

Antiviral action- The fruit extract from Bael has demonstrated antiviral efficacy against the Ranikhet virus when ethanolic illness. The most potent viricidal compound, marmilide, found in bael fruit, disrupts the early stages of the replicating cycles.¹¹

Both diarrhea and dysentery- The most effective treatment for diarrhea and dysentery is bael fruit, which is both unripe partially ripe. Although ripe fruit is typically used for this, dried fruit powder has also been shown to have the same effect. The term "gastrointestinal infections" refers to a broad range of symptoms caused by an identified pathogen. Diarrhea is a common sign of gastrointestinal illnesses and continues to pose a global health danger to people. It is the cause of illness and mortality in children under five years old, with over 1000 million episodes and over 4 million deaths annually.¹²

Anticancer activity- Most powerful antitumor treatment are pricy. Mutagenic, and teratogenic medications made from natural sources. Therefore, efforts are focused on creating low-cost, non toxic medications from alternative sources. Using tumor, cell lines, the MIT assay, the brine shrimp lethality assay, and the sea urchin egg assay, the cytotoxicity of the Aegle marmelos extracts was evaluated. All of the assays that were performed showed that the aegle marmelos extract was hazardous.⁹

Antihyperlipidemic activity- Elevations in blood triglyceride, fatty acid, and cholesterol levels cause arterial damage that result in atherosclerosis. This can also cause myocardial infraction, ischemic heart disease, and cerebral vascular accidents. When streptozotocin-induced diabetic rats were given an extract of bael fruits and seeds separately at concentration of 250 mg/kg, the results showed a significant reduction in both the serum and tissue lipid profile.⁹

Radiation- protective and antiturn- To treat burns externally, a mixture of bael fruit powder and mustard oil is applied. Bael fruits have been discovered to have a radioprotective impact because of their free scavenging activity in multiple investigations.¹⁰

Activity against thyroid- The amount thyroid hormone was lowered by an extract from A. marmelos leaves. The medicine propylthiouracil was not present, as scopoletin had a greater therapeutic effect.¹¹

Affections of the respiration- Relief from repeated colds and respiratory ailments can be obtained from a medicinal oil, made from basal leaves. Sesame oil is combined with the juice collected from bael leaves and cooked to a perfect temperature. The hot oil is infused with a small amount of black pepper and teaspoonful of black cumin. When needed, it is then kept after being taken out of the fire. In order to prepare the scalp for a head wash, apply a teaspoonful of this oil to the scalp for a head wash, apply a teaspoonful of this oil there. It strengthens resistance to coughs and colds with continued usage.¹²

IMPORTANCE

The India Pharmacopoeia mentions the fruit. They have great importance in Ayurvedic medicine as well. The dense, nearly areas immediately inside the rind has a nice, resinous smell. The walls that divide the chambers are a pale yellow colour that turns yellowish brown when exposed to light and has a faintly bitter, acidic taste. The chambers are filled with a translucent, sticky, slightly sweet, faintly scented pulp that has an amber of honey colour and is viscous. The sticky water-based pulps to enhance their brilliancy and strength. In younger fruits, it is more prevalent. Drilling fluid has been stabilized with the addition of gum. There is also a gum in the stem that resembles gum Arabic. The therapeutic qualities of bael fruit are what make the tree one of India's most valuable medicinal plants. The "Charaka Samhita," a historic Sanskrit medical text, discusses its therapeutic qualities. An extensive range of Ayurvedic remedies are prepared from all parts of the tree, including the stem, bark, root, leaf, fruits, seed oil, and fruits at any stages of ripening. Compared to other popular fruits like mango, banana, guava, apple, etc., Bael is not extremely in demand and consumed raw. In order to create a delightfully refreshing drink, the pulps are occasionally diluted with water and combined with the necessary amount of sugar and tamarind. The bael pulp serves as a foundation for a variety of fruit products including RTS, jam, slabs, toffee, powder, and nectar. Murabba is made from green bael fruits and is typically eaten for stomach problems. Unripe or partially ripe fruit is considered to be heart and brain-healthy, stomachic and astringent. The fruit is used as a heart and brain tonic and to treat dysentery and chronic diarrhea. It is a helpful adjuvant because it relieves constipation, which impedes the repair of ulcerated intestinal surface. In addition to this fruit, the bark and roots are used as a decoction to treat palpitation, intermittent fever, and depression. Root possesses hypoglycemic and anti-amoebic qualities. Cattle, sheep, and goats are fed the young leaves and shoots. Snuff boxes are made from the shells of smaller fruits.¹³

Purpose-

Bael fruits are of dietary use and the fruit pulp is used to prepare delicacies like murabba, puddings, and peptic ulcers, as a laxative and to recuperate from respiratory affections in various folk medicines.¹⁴

BENEFITS-

Enhance Digestion- Bael churn has a major function in the breakdown of food particles in the stomach and intestine because of its potent digestive qualities. This action increases assimilation and the absorption of vital nutrients through the intestines by causing the stomach to secrete digestive fluids. Along with relieving gaseous cramps, distension, and bloating. It also aids in the evacuation of stomach gas.

Relieves IBS- The main cause of IBS, also known as Grahani in Ayurvedic terminology, are unhealthy food choice, an excessive amount of hard-to-digest food particle, allergy-producing or nutrient-deficient foods, overeating, irregular eating schedules, and emotional variables. Constipation and diarrhea are two symptoms of IBS that can occur together. Yet Bael churna is the best option for treating this excruciating inflammatory illness because it contains amazing digestive herbs.

Resolves Diarrhea- For the purpose of getting rid of germs that cause diarrhea and other intestinal diseases, Bael churn is widely utilized due to its potent antibacterial and antidiarrheal properties. A form of acute diarrhea called AMA ATISARA, which is characterized by a slimy, sticky, mucus-filled bowel and an offensive stench, can also be treated. It reduces the amount and frequency of loose stools in cases of dysentery and diarrhea.

Prevents Flatulence and Bloating- This digestive powder, which is sanctified with a variety of bioactive ingredients like saunf, sonth, hing, and dhania, is effective in getting rid of stomach gas and reducing bloating, flatulence, and a

heavy feeling in the abdomen. In addition, it works wonders for colitis when combined with Praval Pishti, Mukta Pishti, Vanshlochan and Swarna Parpati.

Treatments for Nausea- The primary anti-inflammatory, antibacterial, and analgesic properties of the herbs in this formulation are vital for clearing the digestive tract and eliminating any stomach problems that may be causing nausea. Additionally, it aids in the promotion of digestion and the prevention of bloating, Both of which treat underlying issues that may result in nausea or vomiting.

Doshas- Bael Churn has the effect of pacifying all doshas. It reduces Kapha (earth and water) Dosha, normalizes vata (air), and detoxifies Pitta (fire and air) Dosha in general.¹⁵

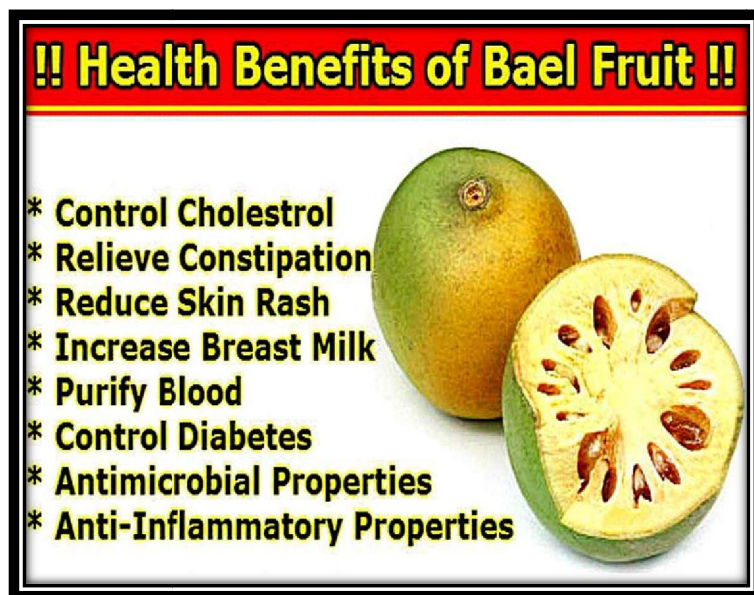


Fig. Benefits of Aegle Marmelos

CHURN MAKING PROCESS

Harvesting Aegle marmelos churn: To make aegle marmelos churn, you will fresh bael fruits. If you have access to a bael tree, you can harvest the fruits yourself. Choose mature fruits that light yellow in colour and free from any signs of damage or disease. Gently pluck the fruits from branches. Alternatively, you can purchase fresh bael fruits from local farmers' markets or speciality stores.

Washing the Fruits: Once you have gathered the bael fruits, it is essential to wash them thoroughly to remove any dirt or impurities. Rinse the fruits under running water to ensure they are clean and ready for brewing.

Drying the Fruits: After washing the fruits, grind it and scoop out pulp of the bael fruits. Then add citric acid 2.5 gm and Sodium bicarbonate 1 gm. And allow to sun dry.

Grinding the fruits: Once the Bael fruit pulp is dry, you can grinding them into fine powder using a blender or mortar and pestle. Grinding the fruits helps release their natural flavours and nutrients, making the churn more flavourful and beneficial. The herbal ingredients are added into the bael fruit powder and well. Ensure that the powder is finely ground to avoid any coarse particles in the churn.

Brewing Aegle marmelos churn: Now that you have to bael fruit churn, it's time to brew your drink.¹⁶

MATERIALS AND METHODS:

Bael fruit powder- It has carminative action, also it has anti-diarrheal activity. Bael powder supports the healthy and regular functioning of various parts of the GI TRACT.

Sugar- The most important among these are that added sugar in foods acts as sweetener, preservative, flavouring and coloring agent, bulking agent.

Black Paper It helps in digestion process.

Cumin- It used to flavour a variety of commercial food products, also helps in digestion process.

Fennel- Fennel is prepared from the mature, dried fruits of the *Foeniculum vulgare* plant. It has flavoring and carminative, aromatic, stimulant, expectorant properties. The two primary varieties of fennel are sweet fennel and bitter fennel.¹⁷

Development of Aegle marmelos churn- Processing-

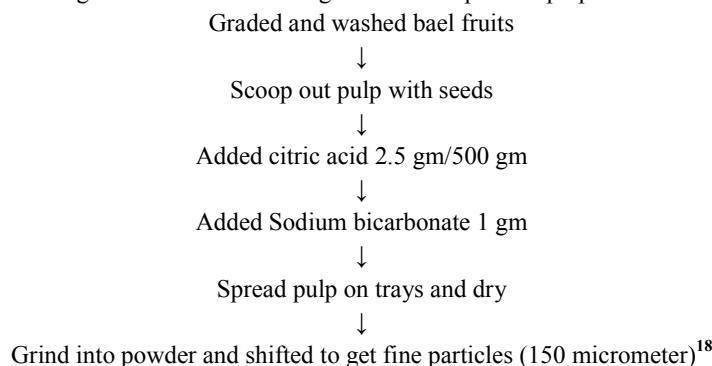
Collection of crude drugs-

The crude drugs used in preparation of Aegle marmelos churn were collected from Bael tree of Medha.

Preparation of Aegle marmelos churn-

Bael fruit powder was made by sun drying of bael ripe fruit pulp, then grinding it in a mixer grinder and shifting result to obtain fine particle (150 micrometer). Other ingredients such as Cumin, Fennel, Black pepper, sugar was powder by grinding it separately in a mixer then these ingredients are mixed in proportion and packed in a well closed container to protect them moisture.

Figure 1: Process flow diagram for Bael powder preparation.



FORMULATION OF AEGLE MARMELOS CHURN-

Sr. No	INGREDIENTS	M1	M2	M3
1	Bael powder	48	55	60
2	SJAugGaGr ERY	25	30	30
3	BTRlaIcPkHpAepLpAer	1.5	2.5	2
4	Cumin	2	3	3.5
5	Fennel	3.5	4	4

PACKING

In case of Bael churn, it is store in a cool, dark place for several months. Pack in clean, well- sealed glass or plastic bottles. It is ideal for the fruit to remain unbroken during packaging, storage, shipping, and marketing in order to avoid fungal infestation. Bael fruit may be stored for up to 12 weeks at 9°C, as opposed to just 2 weeks at 30°C. When the storage temperature dropped below 9°C, a noticeable physiological deterioration was seen. The Aegle marmelos churn is fil into it plastic bottles and each small bottles contains 50 gm of bael churn.²¹



Fig. Packing

II. CONCLUSION

The research on Formulation And Evaluation Of Aegle Marmelos Herbal Churn. From the above study it was found that Aegle marmelos herbal churn can be successively used in the treatment mucus discharge, Diarrhoea any Dysentery and other Stomach Related Problems. In the above research study we prepared Bael churn using different concentration of different ingredients. Batch M1 showed higher acceptability in overall evaluation test and these batch formulation passed the evaluation test parameters successfully

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