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IP Indian Journal of Clinical and Experimental Dermatology

Journal homepage: www.ijced.org/

Original Research Article

# Development and analysis of a herbal bath bomb for its antifungal properties

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ARTICLE INFO

*Article history:*
Received 04-01-2024
Accepted 12-02-2024
Available online 12-03-2024

*Keywords:*
Aeglemarmelos Correa leaves
Sodium bicarbonate
Epsom salt
Citric acid

ABSTRACT

**Introduction :** Fungal skin infections are a prevalent health issue that requires investigation into safe and efficient alternative remedies. Herbal components are a good option for cosmetics formulations because they have historically shown antifungal capabilities. Building on this idea, the research seeks to create a novel antifungal herbal bath bomb by utilizing the medicinal properties of plants.

**Aim & Objective:** The aim of this project is to develop evaluate a herbal bath bomb, with an emphasis on its antifungal qualities. The main goal is to create a bath bomb with carefully chosen herbal elements that have been suggested to have antifungal properties.

**Materials and Methods:** The study employed a systematic approach to construct the herbal bath bomb, including a variety of herbal ingredients recognized for their antifungal properties. Precise measurement and blending were necessary during the material preparation process to ensure optimal efficacy. The effectiveness of the herbal bath bomb against common fungus strains was evaluated in the lab along with antifungal testing.

**Results & Conclusion:** The results reveal promising antifungal properties of the developed herbal bath bomb, as evidenced by its efficacy against common fungal strains. This study contributes valuable insights into the potential of herbal-based hygiene products for combating fungal skin conditions. The findings support the conclusion that the formulated bath bomb holds promise as a natural and effective solution, paving the way for further exploration and development in the realm of herbal skincare products.



## 1. Introduction

AegleMarmelos belongs to the citrus family Rutaceae.[1] Its known as a holy tree in Hindu scriptures which is grown near temples and is also an indicator of underground water sources. AegleMarmelos is known as Bael and originates in India (Figure 1). Its mentioned in Indian scriptures since 800 BC. The taxonomical classification of A. marmelosis given in Table 1. In Hindu culture all parts of this plant were considered medicinal and were used to treat various conditions like asthma, fractures, anemia, swollen joints, wound healing, diabetes, high BP, jaundice, diarrhea, stomachache, cancer, malaria and gastroduodenal disorders (Figure 2).[2] The bael plant contains furocoumarins such as xanthotoxol and the methyl ester of alloimperatorin, and also flavonoids such as rutin and marmesin, essential oils, and alkaloids such as á-fargarine (=allocryptopine), O-isopentenylhalfordinol, and O-methylhafordinol.] N-[2-hydroxy-2(4-methoxyphenyl) ethyl]-3-phenyl-2-propenamide (N-[2-hydroxy-2(4-ethoxyphenyl) ethyl]-3-phenyl-2-propenamide) is a component that may be isolated from bael leaves. Aeglemarmelosine has been extracted as an orange viscous oil.[1–3] Bath bombs commonly contain bath salts, which help in muscle relaxation. It also acts as a

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https://doi.org/10.18231/j.ijced.2024.005

soft moisturizer and provides nourishment to the skin. The herbal ingredient used in bath bomb has various therapeutic properties such as antifungal, antimicrobial, antiviral, antidiabetic, analgesic, etc.[3] The antioxidant activity of methanolic and ethanolic extracts of the fruit pulp of the A. marmelos plant was studied in a rat model using the DPPH radical scavenging method and the nitric oxide scavenging method.[4] The antibacterial activity of petroleum ether, ethanol, and aqueous extract of A. marmelos plant leaves was investigated using the agar well diffusion technique. The extracts were reported to be efficient against E. coli, Streptococcus pneumoniae, Salmonella typhi, Proteus vulgaris, and Klebsiella pneumoniae bacteria.[5]Antifungal activity was shown in an ethanolic preparation of the root towards A. fumigates and T. mentagrophytes.[6] The antifungal activity of essential oils extracted from the ethanolic leaf extract of the Bael plant (Aegle marmelos), (Rutaceae Family), was studied against Candida albicans strains.[7] All A. marmelos leaf extracts were tested for hypoglycemic action in a variety of animal models. At 500 mg/kg body weight, the aqueous and alcoholic extracts of the fruit portion demonstrated glycemic action against rabbits.[8] In vitro proliferation of human tumour cell lines such as the leukemic K562, T-lymphoid jurkat, Blymphoid Raji, erythroleukemic HEL, melanoma Colo 38, and breast cancer MCF and MDA-MB-231 cell lines was inhibited by the extract.[9] The analgesic effect of a methanolic extract of Bael plant leaves was investigated in a mouse model utilising a squirming and tail immersing test at a dose of 200 mg/kg. The plant's analgesic activity was found to be significant.[10–12]

**Table 1:** Taxonomical classification of aeglemarmelos

| | |
|---|---|
| **Kingdom** | Plantae |
| **Order** | Sapindales |
| **Family** | Rutaceae |
| **Subfamily** | Aurantioideae |
| **Genus** | Aegle Correa |
| **Species** | A.Marmelos |
| **Clade** | Angiosperms |
| **Division** | Magnoliophyta |
| **Common name** | Baelpatra, Bael |

**Figure 1:** Image of aegle marmelos leaves

## 2. Materials and Methods

### 2.1. Experimental

Aegle Marmelos leaves were taken from the local area of Pimpri, Pune. All the chemical were of AR grade.

All of the leaves of Bael were cleaned and dried with distilled water. Using a mortar and pestle or mixer grinder, fine powder was extracted from the dried leaves. The cold extraction/maceration method was used to extract fine leaf powder using solvents such as ethanol. 50g of powdered sample was soaked in 100ml of each solvent for 4-5 days to allow diverse chemical contents from the leaf to permeate into the solvents, and the filtrate was collected after the filtration procedure. By evaporating extra solvent with the help of rota evaporator equipment, final pure form of extract is obtained.[13–16]The rotovap works by increasing the rate of evaporation of the solvent by reducing the pressure to lower the solvent boiling point, rotating the sample to increase the effective surface area and heating the solution.

### 2.2. Preparation of bath bomb

All the dry ingredient in dist were combined and mixed until uniform. Food Colourant was added in the last step. After the dry ingredient mixed Bael leaves extract (Figure 2) was added and combined well. At the same time, wet ingredients were mixed in separate bowl without adding food colourant. Dry ingredients were then added to wet ingredients and stirred it properly. During mixing the mixture appeared like dry sand. Bath bomb mould was used to give it beautiful shape. Mould was allowed to stand for 20 minutes in refrigerator before removing the opposite side of the mould. After letting the second side to dry, leave the bath bomb to harden up overnight.Prepared formulations were evaluated forvarious parameters like Effervescent time, pH test, Antifungal test.

**Figure 2:** Extract obtained from leaves of Aeglesmarmelos

**Table 2:** Formulation table for bath bomb

| S.No. | Ingredients | Quantity | | | | Role |
|---|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 | |
| 1 | Sodium bicarbonate | 2.55 g | 2.50 g | 3.20 g | 2.85 g | Weak base |
| 2 | Citric acid | 1.04 g | 2.14 g | 2.74 g | 1.14 g | Weak acid |
| 3 | Corn starch | 1.14 g | 1.14 g | 1.98 g | 2.14 g | Binder |
| 4 | Magnesium sulphate | 1.02 g | 1.32 g | 1.22 g | 1.42 g | Muscle relaxant[5] |
| 5 | Bael leaves extract | 1.00 g | 0.99 g | 1.00 g | 1.00 g | Antifungal & Antimicrobial[17–20] |
| 6 | Turmeric | Q.S | Q.S | Q.S | Q.S | Coloring agent & Antiseptic[13] |
| 7 | Honey | Q.S | Q.S | Q.S | Q.S | Moisturizer & Antibacterial[21] |
| 8 | Rose water | Q.S | Q.S | Q.S | Q.S | Fragrance & Anti-inflammatory[22] |

### *2.3. Determination of zone of inhibition*

The cup-plate diffusion method is used to compare the zone of inhibition of ethanolic extract of Bael leaves (Aeglemarmelos) to Fluconazole solution in potato dextrose agar media.[15,23]

### *2.4. Determination of zone of inhibition*

Firstly Candidaalbicans grown on agar media. Plates were allowed to dry before 5 mm wells were made using a sterile cork borer. Plant leaves extract was added using a micropipette into the wells of incubated plates, which were then allowed to stand for 10-15 minutes for extract diffusion before incubation freeze it for 3 to 4 hrs then being incubated at 37° C for 48 hours. Following the incubation period, the plates were evaluated for the presence of a clear zone surrounding the extract-containing wells. Then compare the zone of inhibition of ethanolic extract of Bael leaves to Fluconazole solution in potato dextrose agar media.[22–24]

## 3. Result and Discussion

### *3.1. Effervescent time and pH*

The effervescent time and pH of a bath bomb formulation F1 to F4 were tested both in cold and hot water mentioned as below:

**Table 3:** Effervescent time and pH

| Formulations | Hot water | Cold Water | pH |
|---|---|---|---|
| F1 | 1.21 | 1.30 | 6.6 |
| F2 | 1.25 | 1.37 | 6.8 |
| F3 | 1.18 | 1.40 | 6.5 |
| F4 | 1.29 | 1.49 | 6.7 |

### *3.2. Antifungal activity*

The cup-plate diffusion method is used to compare the zone of inhibition of ethanolic extract of Bael leaves (Aeglemarmelos) to Fluconazole solution in potato dextrose agar media.Based on the results, it was determined that betel leaves had antifungal action. The zone of inhibition of ethanolicBael (Aeglemarmelos) against Candida albicans was nearly identical to the normal (standard) Fluconazole formulation. A bath bomb comprising an ethanolic extract of Bael leaves was effectively made and tested (Figure 3).

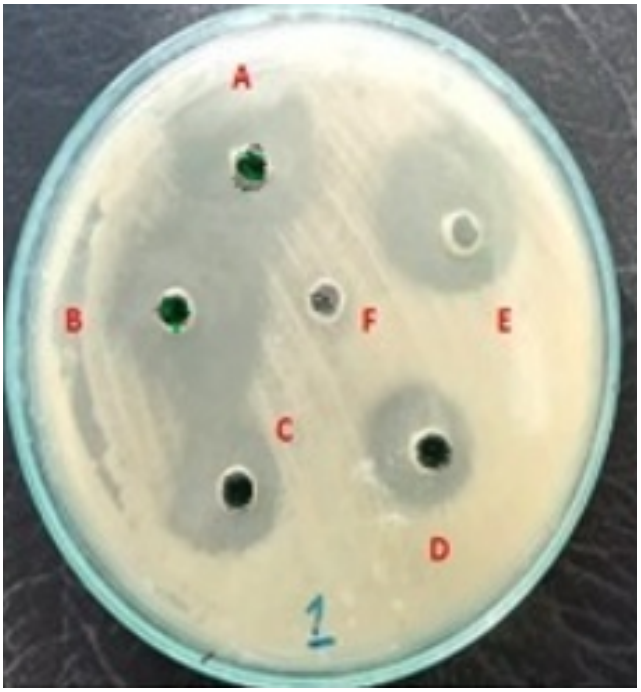


**Figure 3:** Antifungal activity of aeglesmarmelos

## 4. Discussion

Fungal species are becoming resistant to many antifungal medications as a result of their widespread usage, necessitating the creation of new drugs. If a drug is generated from natural resources, it must be extremely successful in treating a fungal condition. A novel

formulation makes it possible to target specific fungi. Effective fungus killing is made possible by topical medication administration. It's interesting to think about how to prepare a soothing bath with therapeutic activity.Further research on this subject could aid in the development of a new anti-dermatophytosis medicine.

## 5. Source of Funding

None.

## 6. Conflict of Interest

None.

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**Cite this article:** Labhade SD, Kapare HS, Jagtap JS, Chitlange SS, Rathi KM. Development and analysis of a herbal bath bomb for its antifungal properties. *IP Indian J Clin Exp Dermatol* 2024;10(1):28-31.