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Formulation and Phytochemical Investigation of Herbal Tooth Powder

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ABSTRACT:
This research focuses on the formulation and evaluation of a herbal tooth powder in corporating the fruit of Syzygium cumini, commonly known as Jamun. Given the increasing interest in natural and herbal oral care products, Jamun was chosen for its known antimicrobial, anti-inflammatory, and antioxidant properties, which are beneficial for oral hygiene. The study aimed to develop a herbal toothpowder that is both effective and safe for daily use. Various formulations were created by combining Jamun powder with other natural ingredients like neem, clove, and mint. These formulations were evaluated for their organoleptic properties, antimicrobial activity, and user acceptability. The results indicate that the Jamun-based herbal tooth powder demonstrates significant antimicrobial activity against common oral pathogens and is well-received by users in terms of taste, texture, and overall oral cleanliness. Thus, Jamun herbal toothpowder presents a promising alternative to conventional synthetic toothpaste.

KEYWORDS: Jambhul, Ash, Tooth powder, Clove, FTIR.

I. INTRODUCTION:

Good oral health is essential for overall health, and taking care of it typically requires using a variety of dental products. Although modern dentistry provides various synthetic toothpastes and mouthwashes, an increasing number of people are interested in natural and herbal options for their minimal side effects and holistic advantages. One of the atural remedies with potential for oral health is Syzygium cumini, also known as Jamun or Indian blackberry. Historically utilized in Ayurvedic and Unani treatment, Jamun has qualities that can greatly aid in oral health, such as antibacterial, anti-inflammatory, and astringent properties. Herbal toothpowders consist of finely powdered plant materials with medicinal properties, usedintraditionaldentalcareformulations.Herbaltoothpowdersdonotcontain synthetic chemicals, unlike traditional toothpastes, which makes them a safer and more eco-friendly choice. The making of herbal tooth powders includes steps to protect active components, aidinginoral health, cavity prevention, and addressing gum issues. Jamun contains bioactive substances like tannins, flavonoids, and essential oils that enhance its medicinal qualities. The antibacterial, antioxidant, and anti-inflammatory properties of the Jamun tree have led to its extensive use in traditional medicine, with the seeds, bark, and leaves being the main components utilized. Jamun possesses characteristics that make it a perfect choice for adding to natural tooth powders. The antibacterial qualities assist in decreasing oral pathogens, while the astringent impact helps strengthen gums and prevent bleeding.

Antimicrobial Qualities: Jamun extracts have the ability to stop the proliferation of harmful bacteria in the mouth such as Streptococcus mutans and Porphyromonas gingivalis, which are associated with cavities and periodontal disease. Benefits of reducing inflammation: Soothing gumtissues and reducing inflammation areaided by the anti- inflammatory properties. Astringent qualities: Jamun's tannins aid in fortifying gums and averting bleeding [1].

TOOTH POWDER

Herbal tooth powder is a finely ground blend of medicinal herbs and natural elements designed for oral health. Herbal tooth powders use plants' therapeutic properties to clean teeth, freshen breath, and improve gum health, in contrast to traditional toothpastes with synthetic chemicals and additives. These powders have been commonly utilized in different societies and are recognized for their overall health advantages [2].

TYPES:

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1. Herbal tooth powder:

Herbal tooth powders consist of a combination of healing herbs and natural substances recognized for their medicinal benefits. These powders strive to support dental health using only natural ingredients and without any artificial chemicals.

2. Charcoal tooth powder:

The primary component of charcoal tooth powders is activated charcoal. Activated charcoalhas a reputation for its strong ability to adsorb stains and toxins from the teeth.

3. Clay based tooth powder:

Toothpowders made from clay contain natural clays such as bentonite or kaolin. These clays are a bundantin minerals and can assist in cleansing the mouth and restoring minerals to the teeth.

4. Baking soda baking tooth powder:

Sodium bicarbonate is the main cleaning ingredient in tooth powders made with baking soda. Baking soda has a slight abrasiveness which can assist in neutralizing acids in the mouth, making it an efficient method for cleaning and whitening teeth.

5. Mineral tooth powder:

Mineral tooth powders contain a rich amount of minerals that help maintain tooth enamel and promote dental wellness. These powders commonly contain calcium, magnesium, and small amounts of minerals.

6. Essential powder tooth powder:

Tooth powder is a dental hygiene product in powder form that is essential for cleaning and shining teeth, usually made with natural components such as baking soda, clay, essential oils, and herbs to improve oral health and freshen breath [3].

Properties of toothpowder

Herbal tooth powder is recognized for its natural and beneficial properties that promote oral health. Some of the main properties include:

1. **Antimicrobial:** Various herbal ingredients, such as neem and clove, naturally possess antimicrobial properties that aid in reducing harmful bacteria in the mouth.
2. **Anti-inflammatory**: Ingredients such as turmeric and aloevera have anti-inflammatory properties that can calm gums and decrease swelling.
3. **Whitening:** Gentle abrasives like baking soda and charcoal assist in eliminating surface stains and naturally whitening teeth.
4. **Freshening**: Essential oils like peppermint and eucalyptus offer afresh, pleasant breath.
5. **Remineralizing:** Certain herbal toothpowders contain calcium and other minerals that can assist in strength ening tooth enamel.
7. **Non-toxic**: They are free from synthetic chemicals, artificial flavors, and preservatives, making them a safer option for oral care.
8. In gredients such as greentea and rosemary possess antioxidant properties that safe guard the mouth tissues from harm.
9. Herbs like myrrh have a stringent qualities that can aid in firming up gums and lessening bleeding[4].

PHARMACOGNOSTIC ACCOUNT OF JAMBHUL

Synonym: Jamun, Blackplum

Biological source: It is a fruit of Syzygium Cumini belonging to family MYRTACEAE.

Geographical source: India, Japan, Pakistan, Bangladesh, Shri-Lanka.

Chemical constituents:

The over whelming majority of jamun leaves' wellness advantages are credited to phytochemicals such as gallic acid, tannins, and mallic acidic substances, flavonoids, etheraloils, jambolin, ellagic acid, jambosine, antimellin, and betulinic acid which can be found in jamun leaves. 80% ash, 0.70% protein, 0.81% sugar, 12.70% (fructose and glucose; no sucrose); acidity (as sulphuric), 0.63% (as malic) 0.88%. The following composition per 100 mg of edible portion was reported for leaves freshly picked at the Satara Medicinal Garden of YSPM's Yashoda Technical CampusFacultyofPharmacy,Wadhe,Satara,Maharashtra.80%ofetherextract,12.9mgofash,0.32gmofcalcium,
8.3mg phosphorus,16.2mg iron. Analyses of the leaf of Syzygium cuminireflectscrude protein (9.1%), fat(4.3%), crude fiber (17.0%), ash (6.0%), calcium (1.3%), phosphorus (0.19%). It consists mainly of minor sesqui-terpene hydrocarbons which are "very common in etheral oils." Constituents of Syzgium cumini leaves are fatty oils (30 g/kg), including lauric (2.8%), myristic (31.7%), palmitic (4.7%), stearic (6.5%), oleic (32.2%), linoleic (16.1%), malvalic (1.2%), sterculic (1.8%)and vernolicacid (3%)and phytosterols such as β-sitosterol. Further

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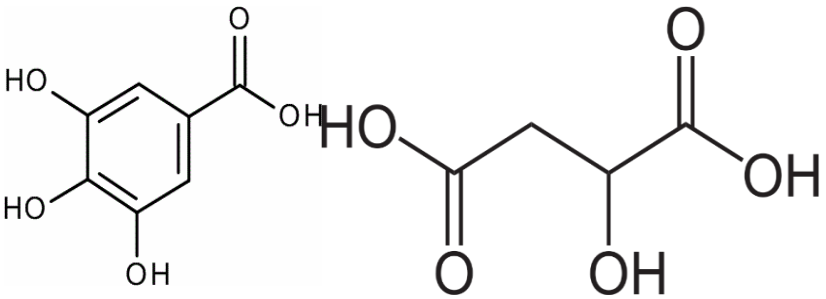
constituents are tannins (6%), predominantly corilagin, ellagitannins, ellagic acid, galloyl-galactoside and gallic acid. The leaf oil consists of 16.91% octadecane, 9.98% nonacosane, 9.38% triacontane, 7.38% octacosane, 4.86% Heptacosane, 4.25% hexadecanoic acid and 4.02% eicosane[5].



Gallic acid Mallicacid

Macroscopy:
LEAVES
Shape: oval shaped Size:5-10cminlength
Arrangement: alternately
Margin: smooth or slight lyser rated Texture: smooth, slightly hair Color: dark green

Fig: Images of Jamun Leaves

Microscopy:
LEAFMICROSCOPY
Epidermis:
Upper epidermis: consist of single layer of cells covered with cuticle. Lower Epidermis: similar to upper epidermis but may containstomata.
Stomata:
Anomocyticstomata is present.
It is present more a bund anton lower epidermis.

Mesophyll:
Palisade parenchyma: consist of one or two layers of tightly packed cylindrical cells. Spongy parenchyma: loosly arranged

Vascular bundles:
Xylem & phloem: arranged in collateral[6].

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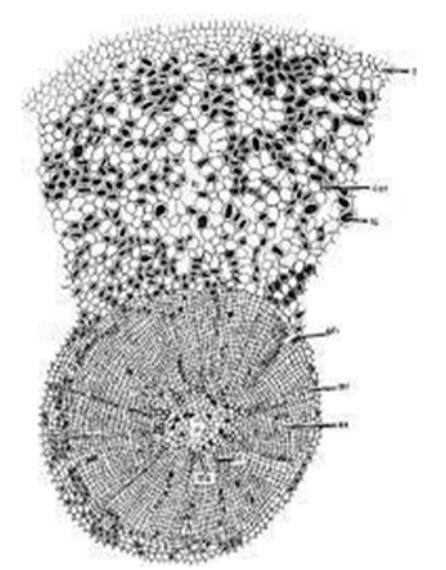

Fig.T.S.of Leaves of Syzygium Cumini

Uses:

- **Medicinal uses**
- Diabetes management
- Digestive health
- Antioxidants
- Anti-inflammatory
- Oral health

- **Nutritional uses**
- It contains vitamins A & Vitamin C.
- It provides minerals like calcium, iron, potassium.
- It contains high dietary fiber.

- **Traditional uses**
- Anti-bacterial
- Anti-fungal
- Wound healing
- Blood purification

- **Other uses**
- The wood of the jambhul is durable and used in making furniture, agriculture tools and construction.
- Dye
- Cosmetic application[7].

ADULTERANTS:

In feriorquality fruits Synthetic dyes
Starch and other fillers Sugar and sweetener Preservative[8].

DETERMINATION OF JAMUNASH:

➢ **Requirement:**

Jambhul powder, Drying oven, Crucible or Incinerator**,** Muffle furnace, Analytical balance, Desiccator.

➢ **Procedure:**

1. Preparation pf jambhul powder

Ensure that the jambhul powder is free from impurities and well dried. Weigh specific amount of jambhul powder using analytical balance. Record weight (W1).

2. Drying the powder

Place the powder in the oven.
Allow the powder to cool indesiccator to prevent moisture absorption.

3. Incineration

Prepare crucible: Weigh a clean, empty crucible and record its weight(W2). Transfer the dried powder into crucible.
Place crucible containing the jambhul powder in a maffle furnace. Set the temperature to 450^{0}c.
In cine rate the powder at 450^{0}c for 2.5 hrs.
This process will burn off the organic matter, leaving behind ash.

4. Collection and weighing of ash

After incineration, carefully remove the crucible from the furnace using tongs.
Place the crucible indesiccator to cool to room temperature without absorbing moisture. Weigh the crucible containing the ash and record (W3).

5. Repeattheprocedurefor5times
6. Calculate ash weight by using above formula
   Weight of ash = W3-W2

W1 = 50gm W2=62.34gm
W3=63.54gm[weight of crucible + weight of ash(1)] Weight of ash(1) = 1.200gm.
Weight of ash(2) = 1 gm. Weight of ash(3)=0.95gm. Weight of ash(4)=0.85gm. Weight of ash(5)=1gm[9].

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Fig. Image Ash of Jamun Leaves

FORMULATION OF HERBAL DENTIFRICE:

Ingredients:

Sr.No.	**Ingredients**	**BatchA**	**BatchB**	**BatchC**
1.	JambhulAsh	0.3gm	0.6gm	1gm
2.	Clove	1gm	1.5gm	1.5gm
3.	Ritha	0.5gm	1.5gm	1.5gm
4.	Liquorice	0.7gm	1gm	1.5gm
5.	Rock salt	0.2gm	0.4gm	0.1gm
6.	Guargum powder	-	0.05gm	0.06gm

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Fig. Image of Crude Drug Powder

Uses of Ingredients:

1) **Jambhul**: The ash of the leaves is used for strengthening the teeth and gums.
2) **Clove:** Antimicrobial.
3) **Ritha:** Foaming agent.
4) **Liquorice:** Sweetener.
5) **Rock salt:** Abrasive Agent
6) **Guargum:** Whitening agent.

PROCEDURE OF TOOTH POWDER

1. Weigh the aboveing redients
2. Pass it through mesh size85
3. Mixitin mortar pestle.
4. Evaluate the powder[10].

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Fig.Image of Tooth powder

EVALUATION TEST:

Color: The prepared toothpowder was evaluated foritscolor. The color was checked visually.

Odour: Odour was found manually by tasting the product.

Stability: The product was maintained in different temperature conditions to check its stability.

Spread ability: Spread ability was evaluated by spreading the powder.

Abrasiveness: It was evaluated manually.

Foamability: The foamability of the product was evaluated by taking small amount of preparation with water in measuring cylinder initial volume was noted and then shaken for 10min. Final volume of foam was noted[11].

USAGE:

Adequate amount should be used on a toothbrush and applied two times a day in the morning. In the morning and before sleep, or following the dentist's recommendations for optimal outcomes. It is beneficial for practical purposes to fight off bacteria and keep the mouth feeling fresh[12].

II. RESULTANDDISCUSSION:

Assessment of Antimicrobial Activity

The antimicrobial activity of the herbal drug was recorded shown in figure. The study results clearly show that herbal drug give its effect upto 45-50%.

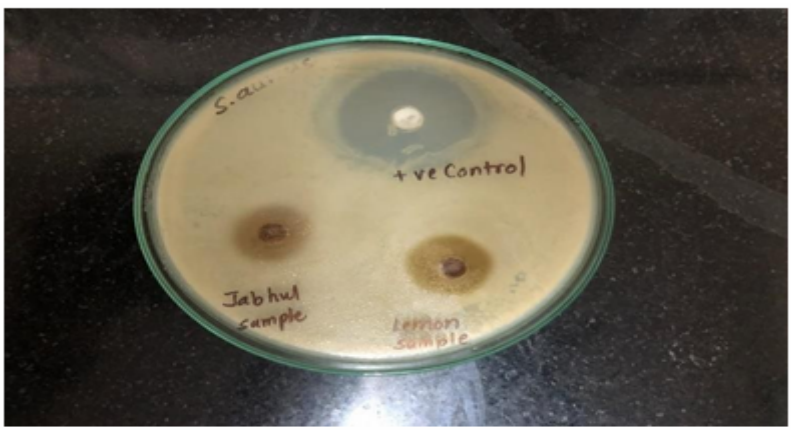

Fig. Assessment of Antimicrobial Property

FTIR of Tooth Powder:

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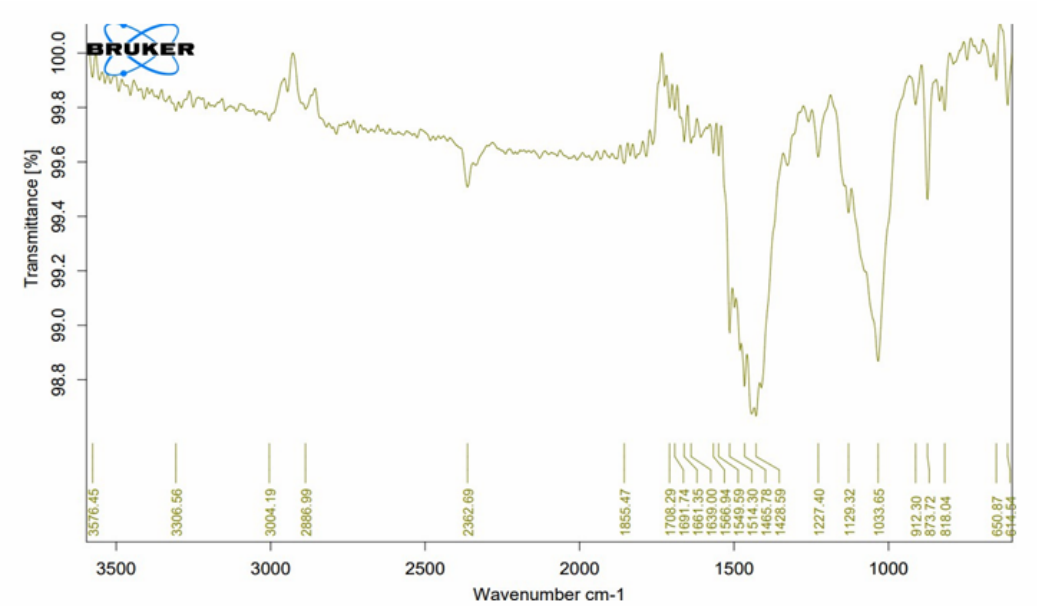

Fig. IR Of Tooth Powder

Interpretation of IR:

Carbonyl Group = The range of functional group is 2362.69cm^{-1}. Methyl Group=The range of the functional group is1428.59cm^{-1}.

Polysaccharide Group=The range of the functional group is 1033.65cm^{-1}. Aromatic Compound = The range of the compound is 873.72cm^{-1}.

Halogen Compound=The range of the compound is 614.54cm^{-1}.

FTIR of Jambhul Ash:

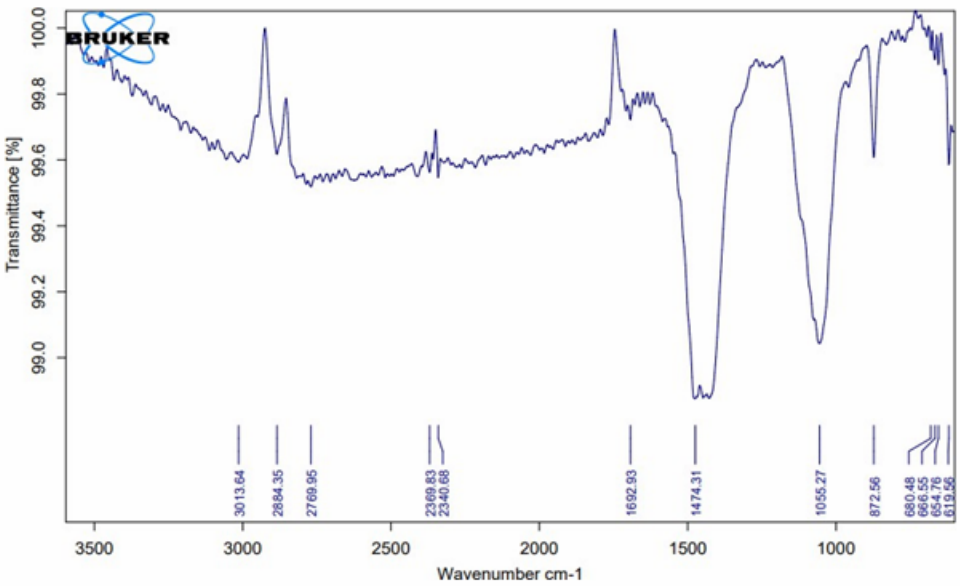

Fig. IR of Jambhul Ash

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Interpretation of IR:

Nitrosamine= The range of the group is 1474.31^{-1}. Polysaccharide Group= The range of the functional group is 1055.27cm^{-1}. Aromatic Compound = The range of the compound is 872.56cm^{-1}. Halogen Compound=The range of the compound is 619.56cm^{-1}[14].

III. CONCLUSION:

The components used in the current study were examined and chosen for their antimicrobial properties. To keep oral hygiene and achieve the desired effects, using this toothpowder is recommended. Herbal toothpowder can be used twice daily without any adverse effects on health. Instead of causing adverse effects, it provides a pleasant feeling of freshness and does not give unpleasant odors. Maintaining good oral health is important.

Regular use of this Jamun-based herbal tooth powder promotes oral hygiene, combats harmful bacteria, and ensures a refreshing and pleasant oral environment. This natural product thus offers an effective and safe alternative to conventional oral care products.

REFERENCE:

[1]. Hameed, F., Gupta, N., Rahman, R., Anjum, N., & Nayik, G. A. (2020). Jamun. Antioxidantsin Fruits: Properties and Health Benefits, 615-637.

[2]. MARIYAPAUL, A.N.N.(2023). FORMULATION OF ANHERBAL TOOTHPASTE (Doctoraldissertation, St Terasa's (autonomous) Ernakulam).

[3]. Bharathi, M., Rajalingam, D., Vinothkumar, S., Artheeswari, R., Kanimozhi, R., & Kousalya, V. (2020). Formulation and evaluation of herbal toothpowder for oral care. International Journal of Pharmaceutical Research and Life Sciences, 8(1), 1-5.

[4]. Kanouté, A., Dieng, S. N., Diop, M., Dieng, A., Sene, A. K., Diouf, M., ... & Carrouel, F. (2022). Chemical vs. natural tooth paste: which formulas for which properties? As coping review. Journal of Public Health in Africa, 13(3).

[5]. ShrikantBaslingappa,S.,NayanSinghJ,T., MeghataiM,P.,&ParagM,H.(2012).Jamun(Syzygiumcumini(L.)): A review of its food and medicinal uses. Food and Nutrition Sciences, 2012

[6]. Mahmoud II, Marzouk MS, Moharram FA, El-GindiMR, Hassan AM. Acylated flavonol glycosides fromEugenia jambolana leaves. Phytochemistry 2001; 58: 1239-1244.

[7]. Reynertson KA,Basile MJ, Kennelly EJ.Antioxidant potential of sevenmyrtaceous fruits. Ethnobot Res Appl2005; 3: 25-35.

[8]. Morton J.Fruits of warm climates.Miami: Julia Morton Winterville North Carolina;1987.

[9]. Gamble JS. Theflora of the presidency of Madras. London: Adlard & Son LTD;1935.

[10]. Hooker JD. The flora of British India. London:Nabu Press;1879,p,499.

[11]. Craveiro AA, Andrade CHS, Matos FJA, Alencer JW, Machado MIL. Essential oil of Eugenia jambolana. J NatProd 1983; 46: 591-592.

[12]. Ravi K, Ramachandran B, Subramanian S.Protective effect of Eugenia jambolana seed kernel on tissue antioxidants in streptozotoc in induced diabetic rats. Biol Pharm Bull 2004; 27: 1212-1217.

[13]. Ravi K, Ramachandran B, Subramanian S.Effect of Eugenia jambolana seed kernelon antioxidant defense system in streptozotocin induced diabetes in rats. Life Sci 2004a; 75: 2717-2731.

[14]. Bajpai M, Pande A, Tewari SK, Prakash D. Phenolic contents andantioxidant activityofsome food andmedicinal plants. Int J Food Sci Nutr 2005; 56: 287-291.