



# FORMULATION AND EVALUATION OF HERBAL TOOTH POWDER

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## **Abstract:**

Herbal tooth powders consisting of various ingredients that are available in the market in a wide range. Hence modern methods focusing on these aspects are useful for the standardization of herbs and their formulations. Consumers believed by using herbal-based toothpowders are safe, effective, and less toxic. This study is thus aimed to provide an alternative to the consumer and formulate herbal tooth powder using Clove, Neem, Ritha, Babool, Tulasi, Black salt, Stevia Leaf, Cinnamon, Fennal, Allum, Mentha, Camphor. The oral cavity infections are the most common types of infections. Dental caries is an infectious disease, causes damage and infection of enamel and dentine. If it is not treated, the infection continues and will lead to tooth loss. The mouth contains normal flora of opportunistic bacteria that are normally non-pathogenic. The imbalance of this situation causes infection and tooth decay. Streptococcus mutants are considered as the main species involved in the development of dental caries. S. mutants, acid-producing bacteria, causes fermentation of carbohydrates which results in tooth decay. Therefore, in the present work, the following aspects of Herbal tooth powders were planned for the formulation, standardization of herbal tooth powder, and anti-bacterial screening of the extracts of herbal tooth powder.

The enamel, which is a composite of hydroxyapatite. It also consists of 70% of the collagen water. Fluorine is the major constituent of dentine. Or consists of not only tooth but also saliva for easy to consume the food. Saliva is the major element proposed for lubricate the food and to maintain an appropriate environment in the mouth. Dentifrices are the product which is used to maintain the Oral Hygiene such as Freshness of mouth and to avoid tooth decay. The oral hygiene can be maintained throughout the day by using various dentifrices prepared by herbal and synthetic ingredients

## **Introduction :**

Oral hygiene is an important key to uphold good appearance, thought of an individual and gives confidence. The tooth consists of two parts, the crown, and the root. The crown of the tooth is covered by an outer surface called enamel and it is the hardest tissue in the tooth. The major composition of enamel is hydroxyapatite other than that it consists of water and keratin. Dentine is the under part of the enamel, which is a composite of hydroxylapatite. It also consists of 70% of the collagen water. Fluorine is the major constituent of dentine. Oral consists of not only tooth but also saliva for easy to consume the food. Saliva is the major element proposed for lubricate the food and to maintain an appropriate environment in the mouth. Saliva is formed by various glands such as Labial, lingual, buccal, and palatal are the larger and smaller glands that produce saliva continuously to keep the tooth environment in the dynamic state. Proteins, enzymes, bacteria, and mucous - polysaccharide are there in the saliva and inorganic materials like calcium, sodium, potassium, chloride, phosphate ions, etc. The plaque, calculus, periodontal diseases are the major issues related to the tooth. It is mainly caused by bacterial action and mineralized deposition leads to calculus. These diseases are

mainly due to the negligence in good caring of the tooth, so it can be prevented and controlled by proper brushing by using effective toothpaste and tooth powders. Dentifrice can be used as a prophylactic cosmetic for the tooth to avoid tooth decay and bad breath. Dentifrice can be prepared by synthetic and herbal ingredients nowadays herbal formulation is high in demand due to its effectiveness, to avoid the side effects when compared with synthetic formulations. Toothpaste and tooth powders are based on its abrasive property, the paste and powder apply on the tooth to rub against the tooth which helps to eliminate the deposited food debris and minerals from tooth. "Oral health is essential to good health and quality of life." –

WHO fact sheet on oral health, 2012. All these facts drag our attention towards our traditional system of medicines Ayurvedh, which mentions many herbal as well as mineral drugs which are known to be effective in oral hygiene. Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. Despite the efficiency of many toothpaste formulations with antibacterial properties, there is a rising societal want to rely on naturally occurring compounds for health care, Ayurvedh has mentioned many such herbs which have an insightful effect on oral hygiene and have also brought into being their way into dentistry.

## **Keywords:**

Morgosa, Holy Basil, Caryophyllum [ Antimicrobial activity]

## **Dental care:**

Tooth decay and gum disease are caused by plaque, a sticky combination of bacteria and food. Plaque begins to build up on teeth within a few minutes after eating. If teeth are not cleaned well each day, plaque will lead to tooth decay or gum disease. If you do not remove plaque, it turns into a hard deposit called tartar that becomes trapped at the base of the tooth. Plaque and tartar irritate and inflame the gums.

Bacteria and the toxins they produce cause the gums to become:

- Infected
- Swollen
- Tender

By taking good care of your teeth and gums, you can help prevent problems such as tooth decay (caries) and gum disease (gingivitis or periodontitis). You should also teach your children how to brush and floss from an early age to help them protect their teeth.

Plaque and tartar lead to a number of problems:

- Cavities are holes that damage the structure of teeth.
- Gingivitis is swollen, inflamed, and bleeding gums,
- Periodontitis is the destruction of the ligaments and bone that support the teeth, often leading to toothloss.
- Bad breath (halitosis).
- Abscesses, pain, inability to use your teeth.

### Information:

Healthy teeth are clean and have no cavities. Healthy gums are pink and firm, and do not bleed. To maintain healthy teeth and gums, follow these steps:

At least once per day. It is best to floss after brushing. Flossing removes plaque that is left behind after brushing from between the teeth and on the gums.

Brush your teeth twice a day with a soft-bristled toothbrush. Brush for at least 2 minutes each time.

- Use fluoride toothpaste. The fluoride helps strengthen tooth enamel and helps prevent tooth decay.
- Replace your toothbrush every 3 to 4 months or sooner if needed. A worn-out toothbrush will not clean your teeth as well. If you use an electric toothbrush, change heads every 3 to 4 months as well.
- Eat a healthy diet. You are less likely to get gum disease if you eat healthy foods.
- Avoid sweets and sweetened drinks. Eating and drinking a lot of sweets increases your risk of cavities. If you do eat or drink sweets, brush your teeth soon after.
- Do not smoke. Smokers have more teeth and gum problems than non-smokers.
- Keep dentures, retainers, and other appliances clean. This includes brushing them regularly. You may also need to soak them in a cleansing solution.

- Schedule regular check-ups with your dentist. Many dentists recommend having the teeth professionally cleaned every 6 months for optimal oral health. Seeing the dentist every 3 to 4 months may be needed if your gums become unhealthy.

Regular teeth cleaning by a dentist removes plaque that may develop, even with careful brushing and flossing. This is very important for getting at areas that are hard to reach on your own. Professional cleaning includes scaling and polishing. This procedure uses instruments to loosen and remove deposits from the teeth.

### **Collection of plant material**

The plants Neem [*Azadirachta indica*] & menthol [*Mentha piperita*] leaves were collected from Gurukurpa Institute of Pharmacy College Campus, Majalgaon. The sample was washed thoroughly with fresh water to remove sand particles. The plant material dried under sunlight for 4 to five days.

Then the dried plant material where crushed, sieved to get nearly fine amorphous powder. Powdered material was extracted with a suitable solvent.

Ritha powder, Clove and Tulsi powder were collected from the local market of Majalgaon.

### **Materials:**

#### **1) Neem:**



# **Synonyms:** Holy tree, Margosa

- **Biological Source:** It is obtained from fully matured seeds of *Azadirachta indica* Linn.
- **Family:** Meliaceae.
- **Chemical Constituents:** It contains glycerides of saturated and unsaturated fatty acids. The main fatty acids are oleic (50 per cent) and stearic (20 per cent) acids. It contains nimbidin, nimbin, nimbinin and nimbidol. The unsaponifiable part contains nimboesterol (0.03 per cent).
- **Uses:** Nimbin, nimbidin and related compounds possess anti-viral activity. As non-edible oil, it is
  - used for soap making and for manufacture of oleic and stearic acids. It is indicated in rheumatism and also as a pesticide and in medicated soaps for skin diseases.

## **2 Tulsi:**



**Synonyms:** sacred Basil, Holy Basil.

**Biological Source:** Tulsi consist of fresh and dried leaves of *Ocimum sanctum* Linn

**Family:** lamiaceae.

**Chemical Constituents :** Tulsi leaves contain bright, yellow coloured and pleasant volatile oil ( 0.1-0.9 percent). It contains approximately 70percent Eugenol, Carvacol, (3percent) and eugenol-methyl- ether(20) percent. It also contains Caryophyllin.

**Uses:** It has Anti inflammatory properties. And used as stimulant



### **3 Ritha: (ref.13)**

**Synonyms:** Soapnut, Soapberry, Washnut, Ritha, Aritha.

**Biological Source:** It is obtained from Sapindus mukorossi

**Family:** Sapindaceae

**Chemical Constituents:** (Ref.13)

Saponins are the major active constituent of the fruit pulp. Mukorosside is one of the saponins isolated from the fruit rind1.

**Uses:** (Ref.13)

Soapnuts are used to get rich foam and pleasant aroma. Soapnuts are used as detergent for washing cloth before dyeing.

**Other Uses:** (Ref.14)

The plant glycosides have been used for washing by native peoples. In Nepal, soapnut berries soaked in water is used for washing the finest silks and woolens. Soapnuts are being considered for commercial use in cosmetics and many other cleaning agents which will not cause any toxic effects on human skin and eyes.

#### 4      **pudina:** (Ref.12)



**Synonyms:** Oleum mentha piperita, Colpermin, Mentha Oil.

**Biological Source:** It is obtained from fresh flowering tops of the plants known as Mentha piperita Linn.

**Family:** Labiatae.

**Chemical Constituents:** Peppermint oil contains chiefly menthol to the extent of 70 per cent. Other important constituents of the peppermint oil are menthone, menthofuran, jasmone, menthyl acetate.

**Uses:** Peppermint or Mentha oil is used as carminative (prevent flatulence) stimulant, and flavouring agent. It has mild antiseptic properties too. Both mentha oil and menthol have calcium channel blocking activity causing spasmolytic and smooth muscle relaxant effects, and hence useful in irritable bowel syndrome.

#### 5      **clove:**



**Synonyms:** Caryophyllum, Clove flower, Clove buds.

**Biological Source:** Clove consists of dried flower buds of *Eugenia caryophyllus*. It should contain not less than

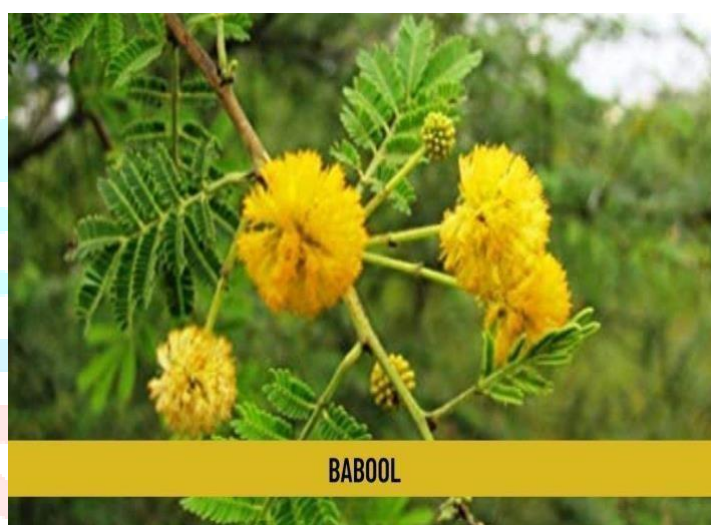
7.0 per cent (w/w) of eugenol calculated on dried basis.

**Family:** Myrtaceae

**Chemical Constituents:** Clove contains about 15 to 20 percent of volatile oil, 10 percent to 13 percent of tannin (gallotannic acid), resin, chromone and eugenin. The volatile oil of the drug contains eugenol (about 70 to 90 percent).

**Uses:** Clove is used as a dental analgesic, carminative, stimulant, flavouring agent, an aromatic and antiseptic.

## 6 **Babool:**



**Synonyms:** *Vachellia nilotica*

**Biological source:** It is native to Africa, the Middle East and the [Indian subcontinent](#). It is also considered a '[weed of national significance](#)' and

an [invasive species](#) of concern in Australia, as well as a [noxious weed](#) by the federal government of the United States.<sup>[8]</sup>

**Family:** Leguminosae

**Chemical constituents:** Gum of the tree contains calcium, magnesium and potassium, malic acid, sugar. Bark and pods contain a large quantity of tannins.

**Uses:** Wound. Babool gum is an excellent healer due to its Ropan (healing) and Kashaya (astringent) properties. ...

Skin disease. Babool bark powder cures skin problems like eczema and fungal infection due to its Kashaya (astringent) quality.



## 7 Black salt :



**Synonyms** : Himalayan salt and sulemani salt

**Chemicals compositions**: Black salt mainly consists of sodium chloride and a trace amount of sodium sulphate, sodium bisulfate, sodium bisulfite, sodium sulfide, iron sulfide and hydrogen sulfide. Due to the presence of iron and other minerals, the salt is pinkish grey in color

**Uses :**

Black salt has antioxidant properties and has surprisingly low sodium levels. It also contains important minerals like iron, calcium, and magnesium, which are essential to healthy bodies. Black salt stimulates bile production in the liver, and helps control heartburn and bloating.

## 8 Stevia leaf :



**Synonyms** : candy leaf , sugar leaf

**Chemical composition :** Stevia extracts generally contain a high percentage of the glycoside diterpenes stevioside (CAS no. 57817-89- 7) and rebaudioside A (CAS no. 58543-16-1), the principal sweetening compounds, and smaller amounts of other steviol glycosides.

**Family:** Lamiaceae

**Uses:** People take stevia for obesity, high blood pressure, diabetes, and many other conditions, but there is no good scientific evidence to support these uses. In the US, stevia leaves and extracts are available as supplements, but are not approved for use as sweeteners.

## **9 Cinnamon :**



**Synonyms:** amber, bay, beige, bister, brick, bronze, buff, chestnut

**Chemical Composition :** cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils

**Biological source:** Cinnamon is the dried inner bark of the coppiced shoots of *Cinnamomum zeylanicum* Nees., belonging to

**family :** Lauraceae

**USES:** It can lower blood sugar levels, reduce heart disease risk factors and has a plethora of other impressive health benefits. Just make sure to get Ceylon cinnamon or stick to small doses if you're using the Cassia variety.

**10 Fennel:**

**Synonyms:** sauf

**Biological source:** fennel, (*Foeniculum vulgare*), perennial herb of the carrot.

**Family :** Apiaceae

**Chemical constituents:** Fennel contains volatile oil (1-4%), fixed oil (9-12%) and proteins (20%).

**Uses:** Fennel is used for various digestive problems including heartburn, intestinal gas, bloating, loss of appetite, and colic in infants.

**11 Allum:**

**Synonyms :** Turuti

**Uses :** purification of drinking water as a chemical flocculant.

in styptic pencil to stop bleeding from minor cuts.

the adjuvant in vaccines ( a chemical that enhances the immune response) deodorant "rock"

pickling agent to help keep pickles crisp. flame retardant.

## 12 Camphor :



**Synonyms** : Kapur

**Biological source** :- camphor laurel (Cinnamomum camphora)

**Chemical constituents**: - camphor (51.3%), 1,8-cineole (4.3%), and  $\alpha$ - terpineol (3.8%)

**Uses**:- Reduce pain related to cold sores, insect stings and bites, minor burns, and hemorrhoids.

### **Ingredients table: [table no. 1]**

SR.NO.	Name of Ingredients	Qty. Taken	Activity
1.	Neem	3.5g	Antiseptic
2.	Ritha	5.0g	Ritha
3.	Babool	16 g	Anti bacterial
4.	Tulsi	8.85g	Bacteridal
5.	Black Salt	10.98g	Cleaning
6.	Stevia Leaf	14.54g	Sweetner
7.	Cinnamon	4.78g	Analgesic
8.	Fennel	13.0g	Mouth Freshner
9.	Alum	10.0g	Antiinflammatory
10.	Mentha	2.85g	Antifungal
11.	Camphor	3.5g	Analgesic
12.	Clove	7.0g	Dental analgesic

## **Method of preparation:**

All drugs were collected from the local market. The Standardized herbal materials were dried under shade and tested for their moisture content until it came below six percent and tested for their standards according to Ayurvedic Pharmacopoeia of India. The materials were powdered and used for the formulation of Herbal tooth powder. The powdered herbal materials were sieved through a mesh size 85. The composition of the developed formulation is summarized in above the table.

## **Determination of Foaming Power :**

The product was evaluated for foam ability by taking a small amount of preparation with water in a measuring cylinder initial volume was noted and then shake and for 10 times. The final volume of foam was noted.

$$\text{Foaming power} = V1 - V2$$

$$V1 - \text{Volume in ml of foam with water} \quad \% \text{ Moisture content} = \frac{\text{Original sample weight} - \text{Dry sample weight}}{\text{Original sample weight}} \times 100$$

$$\text{Original sample weight} \times 100$$

**Moisture Content :** Tooth powder (10gm) weighed and dried it in the oven at 105°C then it was cooled. The loss of weight is recorded as percentage moisture content and calculated by the given formula

### **Formula for moisture content:**

$$\% \text{ Moisture content} = \frac{\text{Original sample weight} - \text{Dry sample weight}}{\text{Original sample weight}} \times 100$$

## 2] **Determination of Spreadability:**

About 1gm of the sample was weighed and placed at the center of the glass plate (10X10 cm) and another glass plate was placed over it suspiciously. Above the glass plates, 2 -kilogram weight was placed at the center of the plate to avoid sliding of the plate. The diameter of the paste in centimeters was measured, after 30 minutes for all samples. The experiment was repeated three times and the averages were reported for all samples.

**Bulk Density** : The bulk density of the powder is the ratio of the mass of an untapped powder sample and its volume including the contribution of the inter-particulate void volume.

It is expressed in gram/ml.

Bulk density = Untapped density – tapped density

**ORGANOLEPTIC CHARACTERS** : The sample was evaluated for organoleptic characters using parameters like appearance, color, odor and taste.

**Flow Property**: The angle of repose is a term used to measure the maximum angle, upwards from the horizontal, at which a pile of a particular granular material will remain stable without any of the material sliding downward. It is useful in designing storage and transportation machinery for granular material as it can give an engineering insight into an appropriate size and shape of search devices.

**Flow property =  $\tan^{-1}h/r$**  **Microbial test:**

### **Anti- Bacterial Activity:**

**In-vitro anti-bacterial activity** In-vitro antibacterial activity of all the four extracts Was evaluated by using the agar well diffusion Method.

**Agar well diffusion method:** Preparation of Agar media Suspended 9.5gm MHA agar in a 500ml conical flask And 250ml distilled water was added. Then, it was heated on a hot plate with frequent agitation until It completely dissolved. Then, the media was sterilized in an autoclave at

121°C for 1 hour. Approximately 25ml of Mueller-Hinton Agar (MHA) Was poured into a sterile petri- dish and allowed toSolidify. 50µl of bacterial inoculums was spread on The solidify MHA media by using the sterile spreader. In each of theseplates, two wells (5mm diameter) Were punched into the agar by using a sterile cork Borer. Then, the working concentration of 100mg,150mg, 200mg, and 250mg dilution were prepared From 500mg/ml of stock solution of each extract, And 150µl of each extract was separately added into Wells and allowed to diffuse at room temperature.

An equal volume of alcohol was used as a negative Control and standard antibiotic (Erythromycin) was Used as a positive control. The plates were incubated for 24hours at 37°C and the diameter (in mm) Of a clear zone of growth inhibition was recorded And measured with the help of radius scale.

### **Result and Discussion:**

Dental caries are the most common oral infectious disease among children and old age. The prevention strategy against dental caries includes the elimination of carcinogenic microorganisms from the oral cavity, inhibition of their plaque formation, and the enhancement of tooth resistance to demineralization. In the former strategies, phytochemicals have been widely studied for their antimicrobial activity. A variety of plants with potent activityare known to be traditionally used for dental hygiene world- wide. Antibiotics and other antimicrobial agents areeffective in the prevention and treatment of dental caries.

## **CONCLUSION:**

Natural plant products are an important source To control bacterial pathogens. Therefore, in the Present study, a herbal tooth powder was developed And evaluated for antimicrobial activity which has Shown excellent results.

The ingredients are used In the present work, was screened and selected to Possess anti-microbial effect and to maintain oral Hygiene as it claimed by its results as effective tooth Powder. Our herbal tooth powder is considered safe To use twice a day and it does not cause any harmful effects.

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