

Formulation and Evaluation of Herbal Tooth Powder Containing Clove, Cinnamon Bark, Neem Leaves

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Abstract- Herbal tooth powder is a combination of natural ingredients that are known for their oral health benefits. These ingredients can include herbs, barks, and other natural extracts such as cloves, neem, or fennel seeds Herbal tooth powders are a great alternative to chemical paste, which often includes artificial flavours and synthetic preservatives that could harm your health in the long run. The Ayurvedic tooth powder benefits make it a safe and effective choice for dental care. Oral hygiene is essential for maintaining overall health. While brushing your teeth twice a day with a good-quality paste is important, adding an ayurvedic tooth powder could be an excellent way to supercharge your oral care routine.

Herbal tooth powders are becoming increasingly popular for their natural ingredients and beneficial properties. Moreover, they are not made from any kind of chemical that pollutes the environment after use.using herbal tooth powders is as easy as using regular paste, Dip your brush into the powder and brush your teeth and gums. Spit and rinse your mouth afterwards. While the taste and texture may be different from regular paste, it offers a refreshing change.

Herbal tooth powders offer a natural alternative to conventional paste and mouthwash. They can provide an array of benefits, from strengthening gums to preventing tooth decay. Plus, with no artificial flavours or preservatives, they are a safe and healthy choice for your dental hygiene. If you're looking for a natural way to care for your teeth and gums, consider herbal tooth powder benefits and add it to your rout hygiene.

Keywords- Herbal, clove. Cinnamon bark. neem leaves, oral hygiene

I. INTRODUCTION

Toothpastes containing many ingredients are widely sold on themarket. Therefore, today's method which focuses on these factors, is very useful for the standardization of herbal medicines and their formulations. Customers believe using toothpaste is safe, effective and non-toxic. Therefore,

this study focused on consumer with alternative methods and developed toothpaste powder using Clove, Neem bark. Acacia bark, Rock Salt, Ginger, and Amla. Tooth decay is an infectious disease that causes damage and infection to the teeth and gums. If le ft untreated, the disease may persist and cause tooth loss. The oral cavity has a normal flora consi sting of nonpathogenic opportunistic bacteria. This imbalance causes disease and tooth decay. Streptococcus mutants are thought to be major strains associated with dental caries development.

Dentifrices are the products which are 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. Synthetic formulation contains Toxic elements such as Sodium lauryl sulphate, fluoride, Propylene glycol and various artificial sweeteners. This formulation is natural and fluoride free. Fluoride is a toxic chemical when administered in body leads to generation of disease such as Neurological and endocrine dysfunctions. Mouth is the most absorbent place in the body. The toxic chemical will be absorbed by mouth and get into the body system easily, that is the reason some medicines are administered sublingually. Tooth powder is a mildly powder that is used in combination with tooth brush to maintain oral hygiene. The manufacturing of tooth powder is a comparatively simple operation. The primary objective is the homogenous distribution of all the ingredients without contamination of foreign substances. Herbal dentifrices help in maintaining good oral health by preventing tooth decay, bad odour from mouth, inflammations in tissues and gums, plaque formation. As oral cavity shows good absorption due to presence of mucosal membrane, blood tissues and enzymes, an individual should use safe and efficient dentifrices. Most of the synthetic tooth products use fluorides and sodium lauryl sulfate. The fluorides are toxic to human body as they cause neurological and endocrine dysfunction. 1-3 Sodium lauryl sulfate is hazardous and causes irritation in mouth and neurotoxicity in body.

The teeth are a group of hard organs found in the oral cavity. We use teeth to masticate (or chew) food into tiny pieces. They also provide shape to the mouth and face and are important components in producing speech. The teeth are a group of hard organs found in the oral cavity. We use teeth to masticate (or chew) food into tiny pieces. They also provide shape to the mouth and face and are important components in producing speech. Each tooth is an organ consisting of three layers: the pulp, dentin, and enamel. This can be avoided by using an efficient herbal dentifrice.

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Ideal properties:-

- Good abrasive effect
- Non irritant and non toxic
- Prolonged effect
- Keep the mouth fresh and clean
- Impart no stain in tooth
- Cheap and easily available.

Types of tooth powder:-

1. Whitening tooth powder: The purpose is to freshen breath, help gums and reduce the amount of inflammation in the mouth. It is used to polish and whiten a person's teeth.
2. Natural tooth powder:- ingredient like sea salt which act as an abrasive, natural chalk and certain essential oils like peppermint, eucalyptus used in the natural tooth powder.
3. Herbal tooth powder: sore or bleeding gums also can benefit from herbal tooth powder. Can have a variety of ingredients. Baking soda, powdered chalk, and white clay are common. Herbal tooth powder has been around for centuries and many believe it to be as essential part of any Teeth Cleaning regimen.
4. Homemade tooth powder: These powders also can be made at home. Homemade herbal tooth powder can be beneficial because they may cost less and the person making it will know what ingredients he is putting in his mouth or in the mouth of the children,

Tooth powder is a mildly powder that is used in combination with tooth brush to maintain oral hygiene. The manufacturing of tooth powder is a comparatively simple operation. The primary objective is the homogenous distribution of all the ingredients without contamination of foreign substances.

There are many marketed preparations for the the mouth care such are-

1. Vicco Vajradanti
2. Vithoba Dantmanjan
3. Dabur LalDantmanjan
4. PatanjaliDantKantiManjan

1. Vicco Vajradanti Powder:

A perfect blend of 18 Ayurvedic herbs strengthen your gums by allowing the essences from 18 rich herbs to percolate down the gum layers. It also helps to treat pyorrhoea, swollen and bleeding gums and other periodontal disorders.



Figure: viccovajradanti powder

2. VithobaDantManjan is a herbal solution for your healthy gums and strong teeth. The best oral expert that prevents tooth weakening. The powder's special ingredients, such as Laung and Lahore Namak, are known for its ability to prevent and cure toothaches. The dental powder's other ingredients kill worms and help teeth that are sensitive to cold products.



Figure:-vithoba dant manjan

3. Patanjali Dantkantimanjan is herbal manjan containing herbs and ayurvedic ingredients and essential oil.

It can also help to prevent and reduce pain in the gums and to refreshing smell and can help people get rid of bad breath.



Figure:- patanjalidantkanti

4. LalDantManjan is in essence an inimitable formulation consisting of potent Ayurvedic ingredients, traditionally known (and scientifically proven) to aid in preventing various oral care problems, delivering the brand promise of Strong Teeth and healthy Gums.

These are the marketed preparation for the oral care and treatment on dental carries and different dental disease. With the referring of this preparation and their properties we further proceed to formulate the herbal tooth powder.



Figure:- lal dant manjan

Characteristics of Good quality herbal tooth powder:-

1. It cures tooth sensitivity.
2. It cures toothache.
3. It gives whitening and shining teeth.
4. It removes plaques.
5. It fights with bad breath and freshens it up.
6. It removes stains of beverages like coffee, tea, etc.
7. It cures gum sensitivity and prevents it from coming back.
8. It helps to lighten up the colour of the lips.

Benefits herbal tooth powder:-

Helps relieve painful, bleeding and spongy gums in gingivitis.

Maintain oral hygiene and fights bad breath.

- Prevents plaque formation and keeps the teeth strong.
- Reduces bacteria that cause gum disease
- Reduces gum swelling & irritation
- Helps remineralize teeth
- Antiseptic properties
- Reduces tooth pain
- Balances oral biome

II. AIM& OBJECTIVES

Aim:-

The aim of presented study is Formulation and Evaluation of Herbal Tooth Powder for oral health

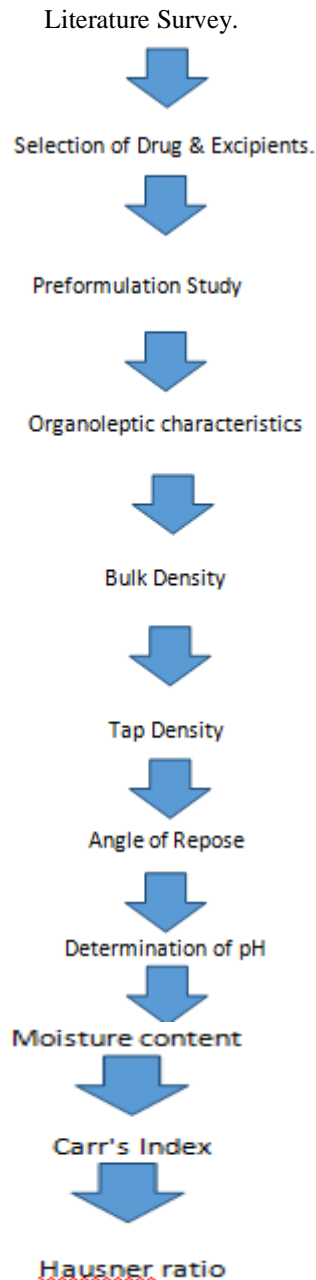
Objective:-

The objectives of the presented study are-

1. To select the ingredients for the herbal tooth powder.
2. To perform the preformulation study of selected ingredients.
3. To study the organoleptic characteristics.
4. To evaluate and submit formulated herbal powder.

PLANT OF WORK:-

For any investigation, an organized and integrated effort with expertise is essential. Therefore, the current work was followed with a plan which is described below:



HERBAL PROFILE:-

A Clove:

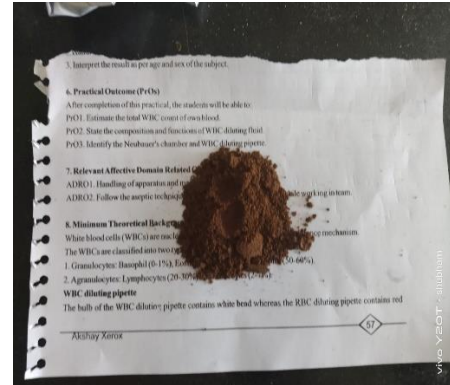


Figure:- clove Powder

Synonyms: Clove buds, clove Powder, lavang(hindi)

Biological sources: Clove consists of the dried flower buds of *Eugenia caryophyllus* Thumb

Family:Myrtaceae

Macroscopic Characteristics:-

Colour: Reddish-brown in colour, with an upper crown and a hypanthium...

Odour: Aromatic Odour.

Taste: Strong Spicy

Size Length: Generally, 10 to 13 mm long, 4 mm wide, and 2 mm thick

Shape: Unpeeled drug straight and nearly cylindrical

Microscopic Characteristics:

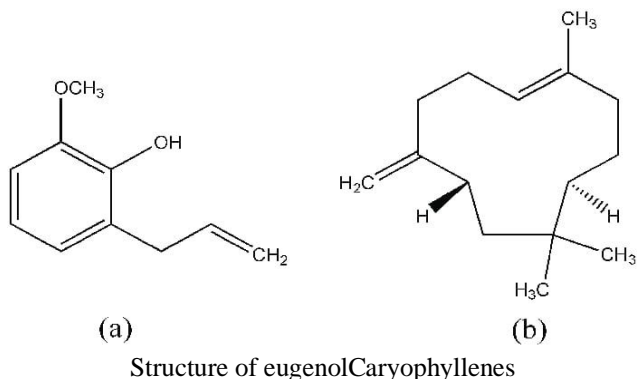
The transverse section should be taken through the short upper portion which has the bilocular ovary and also through the hypanthium region. The transverse section through the hypanthium shows the following characters. It has a single layer of epidermis covered with thick cuticle. The epidermis has ranunculaceous stomata. The T.S. through ovary region shows the presence of an ovary with numerous ovules in it.

Chemical constituents:-

Clove consist of about:

1. Volatile oil (15-20%)

2. Eugenol (70-90%)
3. Acetyl Eugenol
- 4.a,B- Caryophyllene
5. Tannins
6. Other substances mainly methyl furfural and dimethyl furfural.



How to prepare clove Powder:-

- Bring a cast iron or other non-coated pan to medium high heat.
- Place whole cloves into pan and toss for 2 minutes or until fragrant Immediately remove from heat and let cool
- Move cloves to a spice mill, coffee grinder, or mortar and pestle Grind until cloves are a fine power.

Uses:-

Dentists use clove oil as an oral anesthetic and to disinfect the root canals.

Clove is used as an antiseptic, stimulant, carminative, aromatic, and as a flavouring agent.

2.cinnamon:-



Fig:- cinnamon powder

Synonyms:- Cinnamon bark, Kalmi-dalchini, Ceylon cinnamon.

Biological source:- It consists of the dried inner bark of the shoots of coppiced trees of *Cinnamomum zeylanicum* Nees (*Cinnamomum verum* J. S. Presl.)

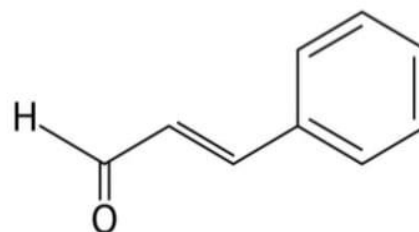
Family: Lauraceae

Chemical constituents:-

1. Cinnamon contains about 10% of volatile oil, tannin, mucilage, calcium oxalate and sugar.

2. Volatile oil contains 60-70% cinnamaldehyde, 5 to 10% eugenol, benzaldehyde, cuminaldehyde, terpene hydrocarbons such as phellandrene, cymene, caryophyllene, pinene and small quantities of ketones and alcohols.

CINNAMALDEHYDE



Structure of Cinnamaldehyde

Microscopy characteristics: The transverse section shows the presence of three to four layers of sclereids which are horse shoe shaped consisting of starch grains. The pericyclic fibres (6 to 15) are present on the outer margin. It consists of sieve tubes which are completely collapsed and are arranged tangentially; lignified phloem fibres, arranged as tangential rows of four to five cells, biseriate medullary rays with needle-shaped calcium oxalate crystals,

Uses:-

Cinnamon Bark are pure compounds show significant antimicrobial activities against oral pathogens and could be beneficial in caries and periodontal disease prevention, endodontics, and candidiasis treatment.

How to prepare cinnamon powder:-

- Break the Cinnamon sticks in to small sticks (This helps the sticks to get powdered without much difficulty)

- Now blend it into a fine powder using a Food processor or blender Sieve the powdered Cinnamon.
- Finally Transfer the sieved powder and sugar in to the blender and blend it.

Neem:-

Fig:- Neem leaves

Synonyms: Meliaazadirachta

Biological source:-It consists of leaves and other aerial parts of Azadirachta indica

Family: Meliaceae

Chemical constituents:-

The active ingredients are Azadirachtin, Salannin and Meliantriol

Neem leaves contain Nimboesterol and Quercetin

Seeds contain Azadirachtin, Salanin, Meliantrol and Meliacin.

The trunk bark contains Nimbin. Nimbinin, Nimbidin, Nimboesterol and a bitter principle called Margosine.

Neem oil contains chiefly glycerides of Oleic (50%) and Stearic (20%) acids.

Macroscopic characteristics :-

Leaves they are alternate, exstipulate, leaflets 7-17; alternate or opposite, very shortly stalked, 1-1.5cm long.

Color: dark green

Odour: typical

Taste: bitter

shape: lanceonate

How to prepare neem leaves:-

- Neem leaf were collected from nearby sources and dried for 2 or 3 days. Then the dried leaf was grained with the help of grinding tool to get fine particles
- The powder is activated at a temperature of about 400°C. Then the powder was sieved by the IS standard sieve size of 90 micron. Sieved powders are washed with double distilled water and filtered using the filter paper.
- Then washed powder is dried and it is ready to be utilized as a Bio- coagulant. The fine powder was collected and stored in airtight container to keep away from moisture

uses:-

Neem is known for its pesticidal and insecticidal properties, but people also use it in hair and dental products.

- > Increases immunity
- > Moisturises skin
- > Improves digestion
- > Oral health

4.Amla:-

Fig:- amla powder

Synonyms: Emblica, Indian goose berry, Embelic, Myrobalan

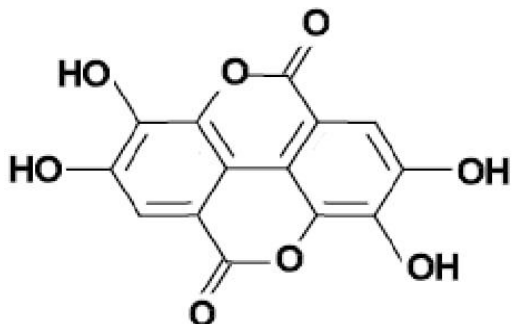
Biological source:-Dried as well as fresh fruit of the plant Emblica officinalis.

Family:Euphorbiaceae

Chemical constituents:-

Vitamin C, 0.5% fat,
Phyllembin 5% Tannins.
Phosphorus, Calcium, Iron,
Pectin.

Macroscopic character:-

Ellagic acid

Colour: Green changing to light yellow or brick red when matured.

Odour: None

Taste: Sore and astringent

Size: 1.5 to 2.5 cm in diameter.

Shape: The fruits are globose

Uses:-

Liver tonic, as a purgative, treatment of jaundice, dyspepsia and cough; cooling, diuretic, anti-bacterial and anti-fungal; anti-spasmodic; used in gastritis syndrome.

How to prepare amla powder:-

- Chop the gooseberry into small pieces and put them in the sunlight for a couple of days for drying. A few days in the sunlight and you will notice that the amla pieces will be dried up.
- Transfer the dried amla pieces into a blender and blend them completely
- The Amla powder is ready. The amla powder can be stored in an airtight container

5. Ginger:-

Fig:- ginger powder

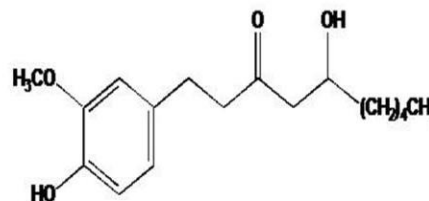
Synonyms: Rhizomazingiberis, Zingibere

Biological source:-Ginger consists of the dried rhizomes of the Zingiberofficinale..

Family: Zingiberaceae

Chemical constituents:-

Volatile oil: sesquiterpene, zingiberene; sesquiterpene alcohol; zingiberol; borneol; linalool, geraniol etc aldehyde: citral; pungent prine



Structure of Gingerol

Macroscopic character:-

Colour: buff

Odour: agreeable & aromatic

Taste: agreeable & pungent

Size 5 to 15 x 1.5 to 6.5

Shape: laterally compressed bearing short flat, ovate & oblique branch on the upper side, with bud at apex

Uses:-

Ginger can help to prevent cavities and remove plaque. Ginger can strengthen the gum around the teeth.

It is also used as remedies, for painful affections of the stomach, cold, cough, and asthma. Sore throat, hoarseness, and loss of voice are benefited by chewing a piece of ginger.

6. Alum:-

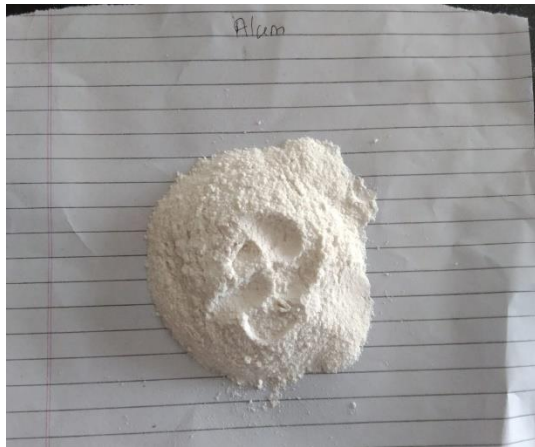


Fig:-alum

Synonyms: Potassium Aluminum Sulphate

Biological source:- Alums occur naturally in various minerals. Potassium alum, for example, is found in the minerals kalinite, alunite, and leucite, which can be treated with sulfuric acid to obtain crystals of the alum.

Chemical constituents:-

Aluminum sulfate is an aluminum salt composed of aluminum, sulfur, and oxygen, three plentiful elements. Its molecular formula is $Al_2(SO_4)_3$ or $Al_2S_3O_{12}$ or $Al_2O_3S_3$

Chemical test:-

Chemical test of alum containing qualitative and Quantitative test of chemistry Such as Sulphate Ion test, Melting Point and Boiling Point Etc.

Uses:-

Alum mouthwashes used for its properties like astringent, anti-plaque, anti-gingivitis, antimicrobial, antiseptic, anti-calculus, decreasing dentinal hypersensitivity, prevention of halitosis, reduction of enamel dissolution, and symbiotic activity with fluoride

7.guava tree leaves:-

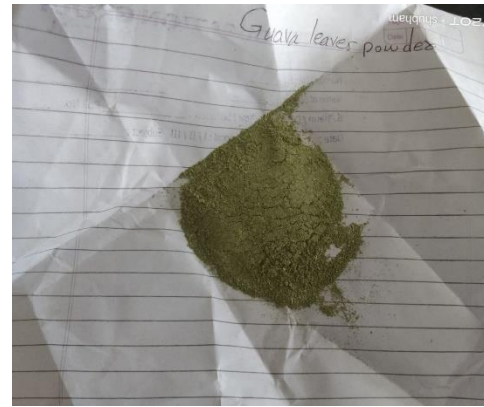


Fig:- guava tree leaves

Synonyms: Common guava, Lemon Guava

Biological source: Guava trees are native to tropical America and are grown in tropical and subtropical areas worldwide. Guava fruits are processed into jams, jellies, and preserves and are common pastry fillings.

Family: Myrtaceae

Microscopic character:-

The leaf is simple on short petiole. They are 8-12 x 3-5 cm in size and ovate in shape. Upper surface is green and glabrous while lower surface is pale green and softly pubescent with the prominent principal nerves. The apex is acuminate, the odour and taste are specific

Chemical constituents:-

Guava leaves contain an essential oil rich in caryophyllene, nerolidiol, beta bisabolene, aromandrene, p-selinene. Also contain flavonoids, beta sitosterol, terpenoides, leucocyanidins and about 10% of tannins.

Uses:-

Guava leaves have long been used effectively for oral hygiene due to their antibacterial and antimicrobial properties. These properties have a positive effect on controlling plaque.

Acacia bark:-

III. MATERIAL AND METHOD

A. Material used



Fig. Acacia bark

Synonyms: Babool, Black Catechu, kattha.

Biological source:-dried aqueous extract prepared from the heartwood of Acacia catechu Willdenow,

Family: Leguminosae

Chemical constituents:-

Cutch or black catechu resembles pale catechu or gambier in its composition. It contains about 2-12% of catechin and about 25 to 33% of phlobutanincatechutannic acid. The principle fraction of cutch has been identified as a mixture of catechin isomers which includes (-) epicatechin, acatechin, DL-acacatechin, L-acacatechin and D-isoacacatechin. It also contains 20-30% gummy matter, catechin red, quercetin and quercetin. It yields 2-3% of ash.

Chemical test:-

- Because of the presence of catechin, Accacia bark gives pink or red colour with vanillin and HCL
- Lime water when added to aqueous extract of Accacia gives brown colour, which turns to red precipitate on standing for some time

Uses:-


It is used in medicine as astringent. It cures troubles of mouth, diseases of the throat and diarrhoea, It also increases appetite. In India and eastern countries, it is used in betel leaves for chewing.

Sr.no	Name of herb	use	Supplier
1.	Clove	Pain relieving	Ayurvedic store
2.	Ginger	Whitening and strengthening	Pure organic
3.	Amla	Astringent	Nutri.org
4.	Neem leaves	Antibacterial and antioxidant	Ayurvedic store
5.	Acacia bark	antimicrobial	Ayurvedic store
6.	Menthe leaf	antiseptic	Vegetable market
7.	Salt	Cleansing agent	Ayurvedic store
8.	Cinnamon powder	preservative	Nutri.org
9.	alum	Rapid relief	Ayurvedic store

Procedure for preparation of herbal tooth powder :-

- Take 1 tablespoon of Amla powder, Neem Powder, Cinnamon powder, Baking soda Pink himalaya salt mix it well.
- Add few drops of papermint or tea tree oil or clove essential oil(Optional)
- Add 1 tablespoon mint leaf powder or pudina. Mix well all powder & Store in well closed container
- Herbal tooth powder application for teeth and gum

Label :

HERBAL TOOTH POWDER IP - 30Mg		
Content :- 1.clove - 4.0gm 2.Ginger- 2.0 gm 3.Amla. - 2.0gm 4.Neem leaves - 3.0gm 5.acacia bark - 3.0gm 6.meantha leaf- 2.0gm 7.rock salt- 3.0gm 8.cinnamom powder - 4.0gm 9.guava tree leaf- 2.0gm 10.Alum- 5.0gm		Mfg lic no:- 514 Mfg bach:- C14 Mfg date:- 10/24 Exp date:- 15/26
Direction:- External use only		
Storage:- Store in a room temperature		
MFG BY:- ADITYA INSTITUTE OF PHARMACEUTICAL BEED.		

Formula:

Sr.no	Name of herb	Quantity
1.	Clove	4 gm
2.	Ginger	2 gm
3.	Amla	2 gm
4.	Neem leaves	3 gm
5.	Acacia bark	3 gm
6.	Menthe leaf	2 gm
7.	Salt	3 gm
8.	Cinnamon powder	4 gm
9.	Alum	2 gm
10.	Guava leaves	5 gm

Evaluation Of Powder:**1. Organoleptic Character:**

Texture	Soft
Test	Bitter
Odour	Characteristic
Colour	Yellow Green

2. Determinatio of PH:-

Firstly, we weigh 1gm of sample and the mixed it in 10ml beaker with diluent water. Then calibrated the PH meter with standard alkali solution, 7Ph alkali solution. After we have taken the sample measured the PH. is 6

3.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.

$$\% \text{Moisture Content} = \frac{(\text{Initial Weigth of sample} - \text{Final weigth of sample}) * 100}{\text{Initial weigth of sample}}$$

4.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.

$$D = \text{Mass/Volume}$$

5.Tapped density:-

The tapped density of powder is the ratio of mass of powder sample and its volume after tapping it 100 times by digital tap density meter. It is expressed in gram/ml

$$D = \text{Mass/Tapped Volume}$$

6. Angle of repose:-

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.

$$\text{Angle of Repose } \theta = \tan^{-1} h/r$$

7. Abrasiveness:- It was evaluated manually.

8. Carr's Index

Carr Index of any solid is calculated for compressibility of a powder which is based on true density (pT) and bulk density (PB),

$$CI = 100 [(True Density - Bulk Density) / Bulk Density]$$

9. Hausner Ratio:

The Hausner ratio is a number that is correlated to the flowability of a powder or granular material.

Hausner ratio can be Calculated as formula:

$$Hr = \frac{\text{Tapped Density}}{\text{Bulk Density}}$$

IV. RESULT AND DISCUSSION

In the present study formulated and evaluated Herbal tooth powder. The organoleptic property showed a yellowish green colour characteristics odour with a Bitter taste. The moisture content of the powder shows 6% and many more evaluation which are given below.

Dental caries is the most common oral infections 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. Formulated preparation shows and effective result on dental diseases. Also, our formulation is compared with the most popular marketed product which is Vicco Vajradanti.

Evaluation of parameters

Parameter	Optimized
Bulk density	0.51gm/ml
Tapped density	0.72gm/ml
Angle of repose	41.98degree
Determination of ph	3.58(acidic)
Moisture content	6%
Carrs index	41.27
Hausners ratio	1.4

V. CONCLUSION

The ingredient used in the present work was selected to pass antibacterial effect and to maintain oral hygiene. Any herbal toothpowder is considered safe to used twice a day and it does not cause any harmful effects, instead imparts good freshness and away from bad odour. Oral hygiene can be maintained in a reliable, safe and inexpensive way by using herbal tooth powder. In the study, it was found that Natural plant products are an important source to control bacterial pathogens. Our herbal tooth powder is considered safe to use twice a day and it does not cause any harmful effects, instead, it imparts good freshness and away from bad odour. It was concluded that our formulation passes all evaluation test with marketed tooth powder.

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