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Review on Herbal Toothpowder

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Abstract: *Dentifrices are products that are primarily used to maintain oral hygiene, including breath freshness and tooth decay prevention. Throughout the day, oral hygiene can be kept up by using a variety of dentifrices made from both herbal and artificial substances. This research was done to create a tooth powder that can be used to maintain good oral hygiene and to combat the negative effects of the synthetic components used to create traditional tooth powder. Several natural substances with antibacterial and antiseptic qualities were used to make the toothpowder. Myrobalan neem, amla, clove, cinnamon are the herbal ingredients which created the perfect tooth powder that can satisfy all the necessary requirements to keep the mouth fresh and to prevent tooth decay caused by germs. To make sure the created tooth powder has all the necessary qualities to be used against dental problems, it was tested for its organoleptic and physical characteristics, including colour, odour, taste, stability. foam ability, and abrasiveness. The outcome was determined to be within the legal bounds.*

Keywords: *Oral Hygiene, Herbal ingredients & Anti-bacterial effect*

I. INTRODUCTION

WHO estimates that 80% of the world's population, particularly those living in developing nations, rely on plant-derived medications for their healthcare, and there is growing interest in traditional medicine worldwide.[1] Natural products are secure, affordable, and work as strong substitutes for the chemotherapeutics now in use, which have negative side effects and increased bacterial resistance. India, a country renowned for its ancient medical practises, has long been intrigued by the search for alternative therapeutic modalities including natural items.[2]

Maintaining excellent appearance, one's opinion of themselves, and their sense of confidence all depend heavily on oral hygiene. The crown and the root are the two basic components of a tooth. Enamel, the hardest tissue in the tooth, covers the tooth's outer surface at the tooth's crown. Aside from hydroxylapatite, the main ingredients of enamel include keratin and water. Dentine is the layer of hydroxylapatite that lies beneath the enamel.[3] Additionally, 70% of the collagen water is present. The primary element in dentine is fluorine. Saliva is also present in the mouth, making it easier to swallow food. The primary substance used to lubricate meals and maintain an ideal oral environment is saliva. The lingual, labial, buccal, and palatal glands are the larger and smaller ones that continuously generate saliva to keep the environment around the teeth in a dynamic state. Saliva contains inorganic substances such calcium, chloride, sodium, phosphate, potassium ions, bacteria, enzymes, proteins, and mucin polysaccharide.[4]

The three most significant dental problems are calculus, plaque, and periodontal infections. Calculus is formed as a result of mineralized deposition, which is mostly brought on by bacterial action. These illnesses can be treated and prevented by brushing properly and using effective toothpastes and tooth powders because they are primarily brought on by neglect in adequate dental care.[5]Dental plaque are sticky films that coats teeth and may contain bacteria. Dental plaque hardens and becomes challenging to remove if it is not eliminated while it is still soft.[6] Tooth damage from dental plaque can result in tooth decay or tooth loss. A severe gum infection called periodontitis can kill the jawbone in addition to causing gum and bone damage. Although frequent, periodontitis is largely avoidable. Usually, inadequate dental hygiene is the culprit. Loss of teeth can result from periodontitis. [7]

To prevent and manage bad breath and tooth decay, dentifrice can be used as a preventative cosmetic treatment for teeth. Dentifrice can be made using both natural and artificial substances. When opposed to formulations using synthetic ingredients, herbal formulations are now highly demanded and necessary due to their effectiveness in preventing adverse effects. Based on their abrasive qualities, tooth powders and pastes are applied to the teeth and rub against them, helping to remove the minerals and food particles that have been deposited there.[10,11]

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The herbal dentifrices come in a variety of forms, including toothpaste, mouthwash, and tooth powder. Because tooth powder and toothpaste contain chemicals with antibacterial and antiseptic properties and that feel fresh and cool, they are helpful at removing plaque.[12]

The goal of this effort was to make a tooth powder that will be used as a tool permanently oral hygiene and to combat the negative effects of ancient tooth powder made of artificial substances. The tooth powder was ready by victimisation using ingredients that posses the bactericide, antiseptic and cooling properties. Myrobalan powder Amla powder, clove powder, cinnamon powder, neem powder, are some of the ingredients which were utilized in this work to formulate ideal tooth powder which may satisfy all the specified properties to stay the mouth clean and forestall carries[13].

In the current study, a herbal dentifrice was studied using organoleptic, physiochemical, physical, and phytochemical properties. Tooth powder helps whiten teeth and freshens breath[14] Herbal toothpowder contains a lot of calcium, trace minerals, and antibacterial herbs. Baking soda changes the pH of the mouth, which lowers the amount of germs that causes cavities. The calcium and trace minerals help to restore dental enamel, while the herbs have antibacterial properties and encourage gum blood flow. For its superior quality and longer shelf life, herbal tooth powder is well regarded. A tooth-cleaning agent comprised almost entirely of natural materials is known as herbal tooth powder [15]

II CURRENT SITUATION OF TOOTHPOWDER

Currently, 66 percent of Indian families use toothpaste, 24 percent use toothpowder, and 18 percent don't use any toothpaste, according to IRS data (those who use neither toothpastes nor toothpowders)."These figures aren't all that stunning in and of themselves as a result of but typically cleaner and tooth powder unit of measurement utilized in Republic of Asian nation. Even but, some folks use each tooth powder and dentifrice as a result of they suppose that rubbing their gums with tooth powder is that the best thanks to maintain smart dental hygiene. Today, toothpowders square measure fashionable among customers everywhere the planet." Today, there are numerous instances of international corporations introducing toothpowder in their home markets. However, toothpowder demand is far smaller than toothpaste demand. However, certain consumers, particularly senior individuals, are devoted to toothpowders.[16,17]

2.1 Ingredients in Dentrifices

Most of the dentifrice contains the following ingredients-

1. **Abrasive**-These are added to clean teeth and remove stains. The best results are achieved by combining the cleaning action of one with the abrasive action of the other. Abrasive detergency depends on the type and amount of abrasive particles, the surface the abrasive comes into contact with, dilution with saliva, and brush pressure. Commonly used abrasives are silica/silicate hydrate, alumina hydrate, calcium carbonate, brushite and gibbsite. [18]
2. **Humectants**-These act as moisturizers and prevent the toothpaste from drying out during storage. It gives the toothpaste a smooth, creamy texture. Substances commonly used as humectants include glycerine, sorbitol, propylene glycol, and paraffin oil. [18, 19]
3. **Surfactant/Detergent**-They act as surfactants, reduce surface tension, and emulsify with a foaming action to remove dirt. Sodium lauryl sulphate, sodium lauryl sarcoside, sodium monoglyceride sulphate, ethionates of fatty acids, sodium dodecylbenzene sulfonate, and PEG oil (polyethylene glycol oil) are some of the commonly used detergents added to toothpaste.[18,19]
4. **Binding agents/Thickening agents**-These hydrophilic colloids, which disperse or swell in the presence of water, are used to stabilize dentifrice formulations by preventing separation of solid and liquid phases. Examples: Natural Gum (Arabic Gum, Arecalaya Gum, Tragacanth Gum), Seaweed Colloid (Alginate, Irish Moss Extract, Carrageenan Gum), Synthetic Cellulose (Carboxymethylcellulose, Hydroxyethylcellulose), Xanthan Gum, Carbomer-940 A or Carbomer-956.[19]
5. **Flavouring agents**-Toothpaste tastes pretty bad without other flavourings .Thus, various natural and artificial flavours such as spearmint, peppermint, spearmint, wintergreen, and sweeteners such as saccharin, acesulfame K, aspartame, and xylitol are added. It has been. Moisturizer sorbitol also provides a sweet taste. However, the

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American Dental Association (ADA) does not put a seal on toothpaste that contains sugar or other ingredients that promote tooth decay.[18]

6. **Therapeutic agents**-These are active ingredients added to toothpaste to reduce tooth decay, control tartar build-up, aid desensitization, and provide antibacterial and anti-inflammatory benefits. , fluoride, triclosan, sanguinarine, and chlorhexidine.[19]
7. **Colouring agents**-colorant give the toothpaste its attractive colour. FD&C Blue No. 1 is used to make red, green and blue toothpastes. Titanium dioxide, which is not present in gel toothpastes, is used to whiten some toothpaste.[18]
8. **Preservatives**-Preservatives prevent microbial growth in the toothpaste, eliminating the need to refrigerate the toothpaste. Common preservatives include sodium benzoate, methylparaben, and ethylparaben.[18]
9. **Water-** It acts as a solvent and dissolves the ingredients. They can be mixed.

2.2 Types of Oral and Dental Disease

It's not surprising that such a lot of things will fail over time, particularly if you do not take excellent care of your teeth since we have a tendency to use our teeth and jaws for thus many alternative activities. With smart oral hygiene one will avoid majority of dental and oral health issue.

1. **Cavities -** Caries, or tooth decay, is another name for cavities. These are regions of the tooth that have sustained long-term harm and may even be hole-filled. Cavities are relatively typical. They happen when food, acid, and bacteria combine to form a plaque on your teeth. Your teeth's enamel starts to dissolve due to the acid on them, and then the dentin or connective tissue beneath follows. This may eventually result in irreparable harm.[20,21]
2. **Gum Disease -** Gingivitis, another name for gum disease, is gum inflammation. It typically happens when plaque accumulates on your teeth as a result of bad brushing and flossing practises. When you brush or floss, gingivitis can cause increase in bleeding in gums. Gingivitis, if left untreated, can develop into periodontitis, a more serious infection.[22]
3. **Periodontitis -** Your jaw and bones may become infected when periodontitis worsens. Additionally, it might cause an inflammatory response across the entire body.[23]
4. **Cracked / Broken teeth -** An injury to the mouth, eating harsh foods, or overnight teeth grinding can all cause a tooth to fracture or break. A broken tooth might hurt a lot. It is important to visit the dentist right soon if you have a cracked or broken tooth.[24]
5. **Sensitive teeth -** If you have sensitive teeth, drinking or eating cold or hot things may cause you pain or discomfort. Tooth sensitivity is additionally called dentin hypersensitivity. Generally it happens in brief when a passageway or filling. It mightly possible come from–

- Receding gums
- Cracked tooth
- Gum disease
- Worn-down fillings or crowns

Some people naturally have sensitive teeth due to thinning enamel. A change in your everyday oral hygiene routine can help you cure naturally sensitive teeth. For persons with sensitive teeth, there are specific brands of toothpaste and mouthwash.[25]

5. Oral Cancer – It embrace cancer of the

- Gums
- Tongue
- Lips
- Cheek
- Floor of the mouth

The leading causes of mouth cancer are smoking and chewing tobacco.[26]

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2.3 Ideal Properties of Tooth Powder

- **Good abrasive effect**- Silica, calcium carbonate, baking soda, aluminium oxide are mostly used as abrasive. They are important because they help in removing stains and debris from teeth.
- **Non irritant and non toxic**-Tooth powder while using should not be irritant to teeth. It should also not contain any toxic substance which would harm teeth. As dentifrices contain many chemicals which carry functions like maintain dental health and cleaning teeth. Chemicals such as triclosan may cause cancer, sodium lauryl sulphate is used as foaming agent but act as skin irritant and dry off the delicate skin which seeps into blood. Propylene glycol, fluoride, Diethanolamine (DEA) should also be avoided in dentifrices as are harmful.
- **Prolonged effect-** Tooth powder should have long lasting effect to keep excellent dental health for long time.
- **Impart no stain in tooth-** Carbamide peroxide, hydrogen peroxide are whitening agents used in dentifrice. Baking soda, charcoal, vinegar are natural ingredients used in dentifrice. Natural ingredients whereas take more time to offer good result. Thus these stain removers helps to whiten and polish teeth. Thus they help removing discolouration of tooth.
- **Cheap and easily available-** Tooth powder must contain the ingredients which are cost efficient and are easily available in market. There shouldn't be shortage of any material.
- **Keep the mouth fresh and clean-** Tooth powder must have flavouring agent which helps to maintain good odour of mouth. Peppermint, spearmint oil, saccharin, xylitol are added for fresh breath and mask bitter taste over other ingredients.[27]

2.4 Types of Toothpowder

1. **Whitening tooth powder** - Its goal is to improve breath quality, mend gums, and reduce oral inflammation. A person's teeth can be polished and made whiter with tooth powder.[28]
2. **Natural tooth powder** - Natural tooth powder frequently contains components like sea salt, which has an abrasive effect, natural chalk, and some essential oils including peppermint, eucalyptus, and wintergreen.[29]
3. **Herbal tooth powder** - Herbal tooth powder is also beneficial for sore or bleeding gums. Ingredients in herbal tooth powder can vary. White clay, powdered chalk, and baking soda are all prevalent. Since ancient times, there has been herbal tooth powder.[30]
4. **Homemade tooth powder** - These powders can be produced at home as well. Because it is less expensive, the person producing it will know precisely what components he is putting in his mouth, and it is safe for kids, homemade herbal tooth powder can be advantageous.[31]

2.5 Advantages of Herbal Toothpowder

- Maintain oral hygiene.
- Fight against bad breath.
- Prevents plaque formation.
- Cures tooth sensitivity and toothache.
- Relieves painful, bleeddy and spongy gums in gingivitis. Chemical free – contains no parabens and no sulphates.
- Easy to use.

2.6 Disadvantages of Toothpowder

- Lacks the cavity-fighting component fluoride.
- Leaves a bad aftertaste in your mouth
- Too much abrasiveness can be bad for your tongue.
- The ADA has not given any powders its seal of approval.[32]

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2.7 Need to Prepare Herbal Toothpowder

- The primary goal of this invention is to create a formulation that may be used to replace the disadvantages of earlier tooth powders with a natural herbal tooth powder.
- Another goal is to create a high-quality tooth powder that, when applied frequently, can effectively shield teeth against toxicity, poisonous residue, and inflammation. It should not leave stains on teeth or fingers after use, have a nice odour, and meet cosmetic standards. A requirement of the formulation would be to whiten teeth by removing stains.
- A formulation with natural aromatic and medicinal herbs that are safe, biodegradable, and have very low mammalian toxicity is yet another goal of the current innovation. These herbs are helpful for gums and teeth.[33]

III. COMMERCIAL TOOTHPOWDERS AVAILABLE IN MARKET

Table 3.1: Marketed Preparation of herbal toothpowder

BRAND NAME	INGREDIENTS	USES	FIGURE
Dabur Lal Dant Manjan	• Clove Oil • Pudina • Satva & Karpura • Pippai • Tomar Beej	• Effective • Against • Bacteria And Beneficial For Gingivitis. • Helps Prevent Foul Breath and • Toothaches.	
Vithoba Dant Manjan	• Laung • Lahore • Namak	• Prevents Tooth Decay. • Effective • Against • Strong Teeth And Healthy Gums. • Relieve • Toothaches • Eliminates • Worms and Shield Teeth From Being Harmed By • Cold Foods.	
Divya Dant Manjan	• Babool • Neem • Tumbaru • Pudina • Majufal • Haldi • Samudra Fen	• Results In Strong Gums. • Dental • Problems • Like Pieria I.E • Flow of Excess Blood And Pus From Gums Would • Be Solved. • Bad Odour Would Be • Ceased.	

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Vicco Vajradanti Powder	• Ajwain • Dalchini • Khair • Patang • Harada • Amala • Behada • Maifal • Babhul • Jambhul • Acrod	• Treats • Pyrorrhoea, • Swollen • Gums, Bleeding Gums And Gum • Irritation • While Preventing Tooth Decay. • Used To Treat Toothaches. • Cure Wounds. • Harden Gums And Teeth.	

IV. HERBS USED

1. Myrobalan
2. Neem powder
3. Amla powder
4. Clove powder
5. Cinnamon powder
6. Peppermint oil

Myrobalan -The Myrobalan could be a moderate sized deciduous tree attaining a height of 25-30 metres. For haemorrhage and painful gums, discard seeds and use a fine powder of the edible fruit as tooth powder. For mouth ulcers, build a swish paste of the pulverised fruit cowl, combine with thin milk and use as a gargle many times on a daily basis.[34]

- **Synonym**-Prunus Cerasifera
- **Family**-Combretaceae
- **Common name**-Haritaki
- **Part used**-Dried immature fruits
- Vernacular name- HINDI- Harad

GEOGRAPHICAL REGIONS Myrobalan is found throughout South and geographical region together with in Republic of India, Sri Lanka, Bhutan, Nepal, Bangladesh, Myanmar, Cambodia, Laos, and Asian country. In India, They are found within the Sub range region from Ravi eastward to West Bengal and Assam.[35]

How to prepare myrobalan powder-

1. Myrobalan Powder is created from the nuts of Terminalia chebula.
2. Nuts were collected from nearby supply and dried.
3. Then the dried nuts were small-grained by using mortar and pestle.
4. The fine powder was hold on in well closed container.[36]

Fig 3.1 Myrobalan & its powder

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Neem - The neem tree grows quickly. Although it is evergreen, in extreme droughts the majority of its leaves may fall off. Because it is a rich source of antioxidants and is used as an antibacterial agent and to freshen the breath, it's fruit and seeds are the source of neem oil, which is credited with having a healthpromoting impact.[37]

- **Synonym**- Melia azadirachta
- **Family**- Meliacea
- Common name- Neem
- **Parts used**-dried leaves
- **Vernacular name- Sanskrit**- Nimba, Arishta, Ravipriya , **Hindi**- Nimb,

GEOGRAPHICAL REGIONS - The exact place of origin is unknown, while some people assert that neem is a native of the entire Indian subcontinent, while others attribute it to dry woods in Sri Lanka, Malaysia, and Indonesia .India is the country that uses the tree the most.[38]

How to prepare neem powder-

1. Neem leaves were taken from local sources and dried for two to three days. The dried leaf was then crushed into fine particles using a tool for grinding.
2. At a temperature of roughly 400°C, the powder is activated. Following that, the powder was sieved using a 90 micron IS standard sieve size. Using filter paper, sieved particles are filtered before being rinsed with double-distilled water.
3. The dried, cleaned powder is then prepared for use as a bio coagulant. To protect it from moisture, the fine powder was gathered and placed in an airtight container.[39]

Fig 3.2 Neem & its powder

Amla- Amla is frequently referred to as an Indian gooseberry. The berries of the trees are often used in pharmaceutical formulations due to their therapeutic properties. In classical Ayurveda, the Amla is described to by a number of titles, including sour, nurse, immortality, and mother.[40]

- **Synonym-** phyllanthusemblica L.
- **Family-** Euphorbiacea
- Common name- Amla
- **Parts used-** pericarp of dried matured fruits
- **Vernacular names- Sanskrit**-Amalaka, Dhhatriphala , **English**- Emblic myrobalan , **Hindi**- Amhala

GEOGRAPHICAL REGIONS - Throughout India [41]

How to prepare amla powder-

1. Amla's should be chopped into small pieces and dried in the sun for a few days. The dried-up amla fragments will be visible after a few days in the sun
2. Transfer the dried amla pieces into a blender and blend them completely.
3. The Amla powder is ready. The amla powder can be stored in an airtight container.[42]

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Fig 3.3 Amla & its powder

Clove- Clove tress are evergreens that grow to some 40feet tall Their bark is smooth and gray and their long.5-inch leaves look like bay leaves.[43]

- **Synonym-** caryophyllum,clove buds,lavang
- **Family-**Myrtaceae
- **Common name-**clove , cengkih chengkeh
- **Parts used-** dried flower buds
- **Vernacular name- Sanskrit-** lavanga, varala, lavangam ,**English-** lavang,laumg

GEOGRAPHICAL REGIONS – Clove is also grown in Malaysia, SriLanka, India, Indonesia, France, USA.[44]

How to prepare clove powder-

1. Bring a cast iron or other non-coated pan to medium high heat.
2. Place whole cloves into pan and toss for 2 minutes or until fragrant immediately remove from heat and let cool.
3. Move cloves to a spice mill, coffee grinder, or mortar and pestle.Grind until cloves are a fine power.[45]

Fig 3.4 Clove & its powder

Cinnamon- Cinnamon verum trees grow to a height of 10–15 metres (30–50 feet). The leaves are 7–18 cm long and ovate–oblong in form. The blooms, which grow in panicles, are greenish in colour and smell strongly. The fruit is a singleseeded purple lem druple. [46]

- **Synonym-** Cinnamon bark
- **Family-** Lauraceae
- **Common name-**Cinnamon verum
- **Partsused**-dried inner bark of the shoots of trees of cinnamanmomum zeylanicum
- **Vernacularnames- Sanskrit**- Cassia, Chinese cinnamon , **English-** sthula tvak, Taja.

GEOGRAPHICAL REGIONS - Cinnamon verum trees are 10-15metres (30-50feet) tall. The leaves are ovate -oblong in shape and 7-18cm long. The flowers which are arranged in panicles have a greenish colour and a distinct odour. [47]

How to prepare cinnamon powder-

1. Cinnamon sticks should be broken into smaller sticks (This helps the sticks to get powdered without much difficulty)

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2. Using a food processor or blender, now finely powder it. Sieve the powdered cinnamon.
3. Finally, add the sugar and sieved powder to the blender and blend. However, doing so is optional.[48]

Fig 3.5 Cinnamon & its powder

Peppermint- The hybrid species of mint known as peppermint is a cross between spearmint and water mint.[49]

- **Synonym**- Mentha piperita
- **Family**- Lamiaceae
- **Common name**- Eucalyptus amygdalina
- Parts used- leaf
- Vernacular names - English- peppermint , Hindi- Pudina

GEOGRAPHICAL REGIONS - The plant, which is originally from Europe and the Middle East, is now widely farmed throughout the world. It occasionally coexists with its parent species in the wild.[50]

How to prepare peppermint oil-

1. Put fresh peppermint leaves in a glass jar with a tight lid and crush or muddle them.
2. Apply grapeseed or olive oil to the leaves. Lock the jar lid and shake.
3. Keep for three days. Put the leaves in a basin after straining.
4. Pack the jar with fresh leaves, pour the oil back in the jar and cover with fresh oil.[51]

Fig 3.6 Peppermint oil

4.1 Excipient Profile

- Sodium bicarbonate
- Himalaya Pink Salt
- Charcoal

A) Sodium Bicarbonate

Baking soda, commonly known as sodium bicarbonate, works by neutralising excess stomach acid to treat heartburn, sour stomach, and acid indigestion. The cleaning, whitening, and preservation of teeth are known benefits of numerous different dentifrice formulations. The mouth feels clean and fresh after consuming sodium bicarbonate. Additionally, sodium bicarbonate aids in deodorising the mouth by neutralising acidic odours.[52].

Sources- Baking soda or sodium Bicarbonate comes from soda ash obtained either through the Solvay process or form from anore, ahard, crystalline material.

Uses-

Use of Sodium Bicarbonate in Oral Hygiene

Baking soda is used for tooth whitening as when it comes in touch with water, it forms an alkaline solution which thus release free radicals that help in teeth whitening. Apart from these it is also used to prevent tooth decay, cavity formation and gum disease.[53].

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Fig 3.7 Sodium Bicarbonate

Himalaya Pink Salt

Comparable to table salt chemically is pink Himalayan salt. It has a sodium chloride content of up to 98%. The remaining salt is made up of trace minerals like potassium, magnesium, and calcium. Halite, or rock salt, is mined in Pakistan's Punjab province to produce Himalayan salt.

Use of Himalaya Pink Salt in Oral Hygiene

Helps in preventing the build-up of plaque and tartar. Also fight halitosis, Also used as flavouring and sweetening agent.[54]

Fig 3.8 Himalaya Pink Salt

Charcoal

A fine black powder or black porous solid made of carbon and any leftover ash, charcoal is odourless, tasteless, and obtained by eliminating water and other volatile components. Since the beginning of time. it is used as a gastrointestinal decontaminant to treat patients who have consumed harmful drugs. Charcoal is neither absorbed nor digested in the gastrointestinal tract.

Use of Activated Charcoal in Oral Hygiene

When activated charcoal is added in toothpowder, it's intended to whiten your teeth because the charcoal is used to lift stains from your teeth and to make your teeth look brighter and whiter.[55]

How to prepare charcoal powder from coconut-

1. Raw shells of coconut were collected.
2. Coconut shells were carbonized under anhydrous, oxygen-free, high temperature and high pressure conditions.
3. After carbonizing, they were crushed into powders.
4. Binder like corn starch and water are added and mixed well.[56]

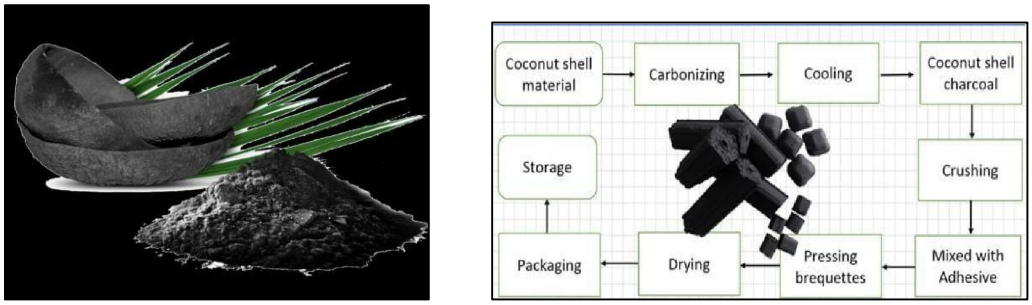

Fig 3.9 Charcoal powder

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Table 4.1: Ingredients & There Roles

SR.NO	INGREDIENTS	ROLE OF INGREDINTS
1.	Myrobalan Powder	Anti – caries
2.	Neem Powder	Antiseptic
3.	Amla Powder	Antibacterial
4.	Clove Powder	Antioxidant
5.	Cinnamon Powder	Germicide
6.	Peppermint oil	Prevents bad breath
7.	Baking soda	Abrasive
8.	Himalaya Pink salt	Flavouring agent Preservative
9.	Charcoal	Whitening agent

V. PARAMETERS TO BE EVALUATED

4.1 Physical Examination

- **COLOUR-** The colour of toothpowder was checked visually.
- **ODOUR -** Odour would be found by smelling the product.
- **TASTE-** Taste will be checked manually by tasting the product.
- **ABRASIVENESS-** They make up the tooth polishing particles. Each of these powders is designed to remove material, with some powders being more aggressive than others. The "grit" of the powder is typically referred to as the abrasiveness of the particles. It would be evaluated manually.
- **SPREADABILITY-** Spreadability would be evaluated by spreading the powder manually. It is thus calculated by placing the powder between two slides and measuring the length which is spread between them.
- **ABRASIVENESS-** They make up the tooth polishing particles. Each of these powders is designed to remove material, with some powders being more aggressive than others. The "grit" of the powder is typically referred to as the abrasiveness of the particles. It would be evaluated manually.[56]
- **FOAMABILTY-**Some amount of drug should be taken in a flask containing boiling water. It should be cooled and filtered in volumetric flask and volume was make-up. The decoction should be poured in test tubes and the volume of test-tube should be made up with water.[57]
- **DETERMINATION OF FLOW PROPERTY** -The angle of repose is calculated using the formula below.
- Tan θ = h/r [58]
- **DETERMINATION OF BULK DENSITY-** The volume of powder and the bulk density in gm/ml is calculated as
- BULK DENSITY=WT. OF DRUG / TAPPED VOL.[59]
- **DETERMINATION OF TAPPED DENSITY-** The formula to calculate tapped density is -
- TAPPED DENSITY = WT.OF DRUG/TAPPED VOLUME [60,62]
- **DETERMINATION OF SWELLING INDEX-** The formula to calculate swelling index is-**S.I=FINAL VOLUME-INITIAL VOLUME**
- **S.F=SWELLING INDEX X 100/ INITIAL VOLUME** [61,62]

4.2 Extraction Methods

Soxhlet Apparatus - When a compound needs to be extracted but is only partially soluble in the chosen solvent and impurities are insoluble, a Soxhlet extractor is utilised. Repeating the extraction process results in the desired component dissolving more and more each time, leaving the insoluble contaminants in the sample.[63]

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Fig 4.1 Soxhlet apparatus

Percolation Method

Traditional medicines are processed using the extraction technique known as percolation. It is possible to efficiently remove components that are unstable under heat conditions. There are drawbacks, nevertheless, such as excessive solvent use and prolonged extraction times. Also significant energy usage during subsequent concentration procedures .A percolation vessel with a filter and a discharge valve is used in the apparatus. During the cold percolation process, a heater is given to warm the contents of the vessel to up to roughly 60° C. A control is offered to keep track of the vessel's contents and adjust the heater's output in order to reach and maintain the right temperature.The process involves constantly percolating a solvent through a bed of herbaceous material in a vessel at a temperature between room temperature and 60° C. The extract created is extremely concentrated and contains a significant amount of the active ingredients in the raw material. Lower unit doses of the resulting extract can be employed to deliver improved medical care. [64]

VI. CONCLUSION

The ingredients employed in this study were examined and chosen because they had antibacterial properties and helped maintain oral hygiene, which led to the conclusion that will make an effective toothpowder. Any herbal toothpowder is thought to be safe to use twice daily and has no negative side effects. Instead, it imparts good freshness and keeps bad odours at bay. Using herbal tooth powder is a dependable, safe, and affordable option to maintain oral hygiene. The study found that natural tooth powder is safer with fewer adverse effects than synthetic preparation, and it is more accepted in dentistry research. The specially prepared tooth powder can maintain oral and dental health while also exhibiting antimicrobial activity against infections. The herbal tooth powder which will be created offers potential for the general population in the future. The toothpowder is used to fight against multipurpose like cavities, bacteria, discolouration of teeth, plaque, tartar, gingivitis, bad odour.

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