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Formulation and Evaluation of Herbal Toothpaste

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ABSTRACT:

This study presents the formulation and evaluation of herbal toothpaste, utilizing natural ingredients known for their oral health benefits. The formulation process involved selecting appropriate herbal extracts, essential oils, abrasives, and binders to create an effective toothpaste.This research proves that our herbal-based toothpaste formulation with natural ingredients is as excellent as it gets in terms of performance. This mixture has in no way been used earlier than in any studies. These extracts have antibacterial and anti-inflammatory properties. Various parameters such as pH, viscosity, microbial activity, and sensory attributes were evaluated to assess the quality and efficacy of the herbal toothpaste. Results indicate that the formulated toothpaste exhibits desirable characteristics, including suitable pH for oral hygiene, adequate viscosity for easy application, and effective antimicrobial properties. Sensory evaluation also revealed positive consumer acceptance, highlighting the potential of herbal toothpaste as a natural alternative for oral care.

***Keywords*:** - Herbal toothpaste , Formulation, Evaluation, Anti-inflammatory, Anti-bacterial.

INTRODUCTION: -

Herbal and herbal-based toothpaste has been used in ancientlife for many years and is one of the most significant aspects of oral health care. Following independence, multiple formulation developments of various detergents began, with sodium lauryl sulphate serving as an emulsifying agent. The formulation and evaluation of herbal toothpaste represent a significant endeavor in the pursuit of natural alternatives for oral hygiene. With a growing awareness of the potential hazards associated with synthetic ingredients in conventional toothpaste, there has been a notable shift towards herbal-based oral care products. Herbal toothpaste formulations harness the therapeutic properties of various plant extracts, essential oils, and natural abrasives to promote oral health while minimizing adverse effects. This expands the possibilities for developing and testing new herbal toothpaste formulations. The main goal is to make herbal toothpaste and evaluate it.

Toothpastes are the most common preventive means in oral health care. This study aims to explore the development of herbal toothpaste formulations using a combination of traditional knowledge and modern scientific techniques. By integrating herbal ingredients such as neem, clove, mint, and tulsi, known for their antibacterial, anti-inflammatory, and astringent properties, the formulation process seeks to create an effective oral care product.

The main purpose of toothpaste is to reduce oral bacterial flora and deliver fluoride to the teeth . This is because fluoride has been proven to protect teeth against attack from bacteria and can be found naturally in many everyday things including food and drinkinwater. Toothpaste that efficiently reduces oral bacterial flora should contribute to dental health.

- **Ideal Properties of Toothpaste**

1. Good abrasive effect.
2. Non Irritant and non-toxic.
3. Impart no stain in tooth.
4. Keep the mouth fresh and clean.
5. Prolonged effect.
6. Cheap and easily available.

Plant Profile

1. **Clove oil –**

Fig no 1 : clove oil

Botanical name : Syzygium Aromaticum.

Common Name : Clove, Lavang (Marathi), Laung (Hindi).

Chemical Composition :

- Clove oil is derived from the dried flower bud of the clove tree.
- The main active component of the clove oil is eugenol which accounts for 70% - 90% of the oils composition.
- Other constituents include eugenyl acetate, beta-caryophyllene, and small amounts of various other compounds.

Uses of clove oil :

- Dental Care: Clove oil is widely used in dental care products like toothpaste and mouthwash due to its antiseptic properties. It can help alleviate toothaches and gum pain.
- Antimicrobial Agent: Clove oil has antimicrobial properties, making it effective against bacteria and fungi. It can be used to disinfect surfaces and treat fungal infections like athlete's foot.
- Respiratory Health: Inhaling the vapors of clove oil may help relieve respiratory conditions like coughs, colds, and sinusitis.

2. **Peppermint oil**

Fig no 2: peppermint oil

Botanical Name: Mentha piperita

Chemical Components:

Peppermint oil contains various chemical compounds, including menthol, menthone, and menthyl acetate.

Uses:

- Aromatherapy: Peppermint oil is commonly used in aromatherapy to promote alertness, alleviate stress, and improve mental clarity.
- Digestive Aid: It's utilized to relieve symptoms of indigestion, bloating, and gas. Peppermint oil can be ingested in small amounts or diluted and massaged onto the abdomen.

- Topical Pain Relief: Due to its cooling effect, peppermint oil is often used topically to alleviate muscle pain, headaches, and tension. It's typically diluted with a carrier oil and applied to the affected area.
- Oral Health: Peppermint oil is found in many oral care products like toothpaste and mouthwash due to its antibacterial properties and ability to freshen breath

Drug profile

1. Sodium Benzoate :

Sodium benzoate is the sodium salt of benzoic acid, with the chemical formula C7H5NaO2. It is a white crystalline powder with a slightly sweet and astringent taste.

Uses:

1. Preservative: One of the primary functions of sodium benzoate in herbal toothpaste is to act as a preservative. It helps prevent the growth of bacteria, yeast, and mold, thereby extending the shelf life of the product and maintaining its microbial stability.
2. Microbial Growth Inhibition: Sodium benzoate inhibits the growth of various microorganisms commonly found in oral care products, including bacteria and fungi.
3. pH Adjustment: Sodium benzoate can also act as a pH regulator in toothpaste formulations. It helps maintain the desired acidity or alkalinity of the product.

2. Sodium Saccharine :

Sodium saccharin is an artificial sweetener with the chemical formula C7H4O3NSNa. It is derived from saccharin, which is about 300–400 times sweeter than sucrose (table sugar). Sodium saccharin is commonly used in various food and beverage products as a sugar substitute.

Uses:

1. Pharmaceuticals: Saccharin is used as a sweetening agent in certain medications, particularly liquid medications where sugar isn't suitable.
2. Personal Care Products: Some oral care products, such as toothpaste and mouthwash, may contain saccharin to enhance flavor without adding sugar.
3. Tabletop Sweeteners: It's also found in tabletop sweeteners, providing a calorie-free option for sweetening coffee, tea, and other beverages.
4. Food and Beverages: Saccharin is used as a sugar substitute in various foods and beverages, including diet sodas, canned fruits, and low-calorie snacks

3. Glycerin :

Chemical Name: Glycerol

Chemical Formula: C3H8O3

- **Function in Herbal Toothpaste:**

1. Humectant: Glycerin serves as a humectant, attracting moisture and helping to keep the toothpaste moist and prevent it from drying out.
2. Texture Modifier: It contributes to the texture of the toothpaste, providing a smooth and creamy consistency.
3. Sweetener: Glycerin adds sweetness to the toothpaste, enhancing its palatability.
4. Solvent: It aids in dissolving other ingredients, ensuring they are evenly distributed throughout the toothpaste formulation.
5. Viscosity Modifier: Glycerin helps control the viscosity of the toothpaste, ensuring it has the right thickness for easy dispensing and spreading during brushing.

4. Calcium carbonate :

Chemical Formula: CaCO3

Uses:

1. Abrasive Agent: Calcium carbonate acts as a mild abrasive that helps remove dental plaque, stains, and debris from the teeth's surface. Its abrasive properties aid in the mechanical cleaning action of toothpaste.
2. Polishing Agent: In addition to its abrasive qualities, calcium carbonate contributes to the polishing effect of toothpaste, helping to smooth and polish the tooth enamel, which can enhance the teeth's appearance and shine.

3. pH Buffer: Calcium carbonate helps maintain the pH balance of the toothpaste formulation.

5. Sodium Lauryl Sulphate

Sodium lauryl sulfate (SLS) is a common surfactant used in toothpaste formulations for its foaming and cleaning properties.

Function:

- SLS acts as a surfactant, helping to create foam and disperse ingredients evenly throughout the toothpaste. It also aids in removing debris and stains from the teeth and gums.
- SLS is found in various personal care items such as shampoos, body washes, toothpaste, and facial cleansers due to its ability to create a lather and effectively remove dirt, oil, and impurities from the skin and hair.
- SLS is used in household cleaning products like dishwashing detergent, laundry detergent, and household cleaners

Material and Method:

- **Method of preparation :**

1. The solid ingredients calcium carbonate, sodium lauryl sulphate, glycerin, sodiumbenzoate, sodium saccharine are weighed accurately and sieved with sieve no.80 so as to maintain the particle size.
2. These ingredients were also mixed in a mortar and pestle, then triturated with precisely weighed glycerin until a semisolid substance was created.
3. Stirr the mixture continuously
4. Accurately weighed herbal extract in form of clove oil were added.
5. At the end, peppermint oil was added as a flavor

Formulation Table :

Sr no	**Ingredients**	**Quantity for F1**	**Quantity for F2**	**Quantity for F3**
1.	Clove oil	1.5ml	2ml	2.5ml
2.	Sodium Lauryl Sulphate	1gm	1.3gm	1.6gm
3.	Sodium Benzoate	0.3gm	0.4gm	0.5gm
4.	Sodium Saccharine	0.2gm	0.26gm	0.32gm
5.	Calcium carbonate	15gm	20gm	25gm
6.	Glycerin	10ml	13.3ml	16.6ml
7.	Peppermint oil	1ml	1.3 ml	1.62ml

Evaluation Parameter :

1. Physical Examination :

- **Colour** : The colour of the toothpaste assessed by visually.
- **Odour** : Smelling the product revealed the presence of odour.
- **Taste** : The taste of formulation was tasted by manually.
- **Smothness** : The smothness of the paste formulation was verified by rubbing it between the fingers.

Fig no 3 : physical examination of herbal toothpaste

2 . PH :

The ph of formulated herbal toohpaste was determned by using PH meter. Pour 10gm of toothpste from the container into 50ml beaker and add 10ml of freshly boiled and cooled water stir throughly.

Fig no 4: Determination of PH

3. Sharp and Edge Abrasive partical:

To verify for the presence of any sharp or abrasive particles, the contents were placed on the finger and scratched on the butter paper for 15-20cm. I went through the same process at least ten times. There were no sharp or edge abrasive particles discovered.

Fig no 5 : There is no sharp and edge abrasive particles

4. Foamability :

The foaming power (flammability) of herbal toothpaste was measured by mixing 2g of toothpaste with 5ml water in a measuring cylinder and shaking it for 10 times.

Fig no 6 : foam ability

5. **Spreadability** :

About1 gm of tooth paste is weighed at the center of glass plate (10x10 cm) and another glass plate is placed over it carefully. At the center of the plate a 2 kg weight is placed. After 30 minutes, th diameter of the paste is measured in cm. The experiment is repeated thrice and average diameter is determined.

Result and Discussion

Formulation and evaluation of herbal toothpaste was prepared.

Observation Table :

Sr no	Parameter	Observation
1.	Colour	White
2.	Odour	Characteristics
3.	Taste	Sweet
4.	Smoothness	Smooth
5.	PH	7.6
6.	Foamability	Good
7.	Spreadability (cm)	7cm

Summary and Conclusion

The formulation and evaluation of herbal toothpaste represent a concerted effort to develop natural alternatives for oral care. Through the integration of traditional herbal knowledge and modern scientific techniques, herbal toothpaste formulations leverage the therapeutic properties of plant extracts, essential oils, and natural abrasives to promote oral health. It offer a promising solution to the increasing demand for natural and eco-friendly oral care products. By harnessing the benefits of herbal ingredients, these toothpaste formulations provide effective alternatives to conventional products, with the added advantages of reduced environmental impact and fewer adverse effects.

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