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Review Paper

A Comprehensive Review on The Formulation and Evaluation of Herbal Toothpaste by Using Andrographis Paniculata

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ABSTRACT

Gingivitis is a common, non-destructive inflammatory disease of the gingival tissues primarily caused by the accumulation of dental plaque. It represents the initial and reversible stage of periodontal disease. However, if left untreated, it may progress to periodontitis, leading to irreversible attachment loss and tooth loss. Globally, plaque-induced gingivitis affects nearly 75% of the population across all age groups, highlighting the need for effective preventive and therapeutic strategies. Herbal toothpastes incorporate plant-based ingredients such as Andrographis Paniculata (Bhui Neem) , Aloe vera, Clove, and Lemongrass oil which possess well-documented antimicrobial, anti-inflammatory, antioxidant properties. Several clinical studies have demonstrated that herbal dentifrices significantly reduce plaque index, gingival bleeding, inflammation, and improve salivary pH when used regularly. The available evidence suggests that herbal toothpaste can serve as an effective adjunct to routine oral hygiene practices for the prevention and management of gingivitis. However, further well-designed clinical trials are required to standardize formulations and confirm long-term efficacy and safety..

INTRODUCTION

Gingivitis is a relatively harmless inflammation of the gum tissues, with linked blood loss and exudation. Gingivitis might transform to periodontitis, inflammation that prolongs deep into the tissues and triggers loss of supporting connective tissue as well as alveolar bone is known as periodontitis. [1] The most common form of gingivitis, and the most common form of periodontal disease overall, is in response to bacterial plaque that is attached to tooth surfaces, termed plaque-induced gingivitis.Gingivitis is reversible with good oral hygiene; however, without treatment, gingivitis can progress to Periodontitis, in which the inflammation of the gums results in tissue destruction and bone

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resorption around the teeth. Periodontitis can ultimately lead to tooth loss[1]

Prevention and management of gingivitis mainly focus on mechanical plaque control (brushing and flossing), along with chemical plaque control agents such as mouthwashes containing chlorhexidine, essential oils, or herbal extracts. In recent years, herbal formulations containing plant extracts like Andrographis paniculata, and have shown promising antibacterial and anti-inflammatory potential in reducing gingival inflammation and plaque accumulation. [2]

Objectives :

1. To evaluate the therapeutic effect in the management of Gingivitis.
2. To examine its role in reducing dental plaque accumulation.

Benefits of Herbal Toothpaste

- Use to reduce dental plaque
- Use to treat Gingivities
- To maintain oral hygiene

Plant profile

1. **Andrographis Paniculata**



Fig. Andrographis Paniculata

Synonym:

Andrographis Paniculata

Biological Source : It consists of the leaves or the entire a parts of Andrographis Paniculata belong to Family Acanthaceae.

Pharmacological Uses [3]

- **Anti-inflammatory and Antipyretic :** The plant's extracts and diterpenoid components(Andrographilid neo andrographolide, etc.) exhibit significant anti-inflammatory and fever-reducing effects. This makes it effective for treating fevers, sore throats, tonsillitis.
- **Antimicrobial and Antiviral :** It has strong activity against various bacteria (e.g., E. coli Staphylococcus aureus), viruses (e.g., herpes simplex virus, influenza, and SARSCoV-2), and protozoa.It is often used for respiratory infections, dysentery, diarrhea, and skin infection.
- **Antidiabetic and Antihypertensive :** Extracts have been shown to lower blood glucose levels in diabetic animal models and help manage hypertension by causing smooth muscle relaxation in blood vessels.

2.Clove Oil



Fig.Clove oil

Synonym : Clove oil, Eugenol

Biological source : Clove oil is obtained by steam distillation of dried flower buds leaves or stem of Syzyumaromaticum

Family : Myrtaceae

Pharmacological uses [4]

Dental Care : Clove oil is an effective topical analgesic for relieving toothaches, gum pain, and mouth ulcers. Eugenol-based compounds (such as a mixture with zinc oxide) are also used by dentists as a temporary filling material and for root canal sealing due to their numbing and germicidal effects

Anti-inflammatory Effects: The eugenol in clove oil can suppress the expression of inflammatory mediators and is beneficial for reducing swelling and irritation in various conditions, including some forms of arthritis and lung inflammation.

Potential Anticancer Properties: Preliminary research suggests that compounds in clove oil may have an inhibitory effect on the proliferation of various cancer cells and could enhance the effects of conventional chemotherapy, though more research is needed in this area.

3. Aloe vera



Fig . Aloevera

Synonym : Aloe barbadensis Mill

Biological source : Aloevera consist of the dried latex or fresh gel obtained from the leaves of aloe vera.

Family: Asphodelaceae\Liliaceae

Pharmacological use [5]

Anti-inflammatory and Antiseptic: Compounds like bradykinase, lupeol, and salicylic acid provide anti-inflammatory and analgesic effects, reducing pain, itching, and swelling.

4.Stevia



Fig.Stevia Powder

Synonym : Stevia, Sugar leaf

Biological Source : Stevia consist of the dried leaves of the plant Steviarebaudiana bertoni

Family: Asteraceae

Pharmacological Uses [6]

- **Anti-diabetic:** Stevia is widely used as a natural, non-caloric sweetener for individuals with diabetes as it does not affect blood glucose levels.
- **Anti-inflammatory:** Steviol and stevioside exhibit anti-inflammatory properties, which can be beneficial in managing chronic inflammatory conditions.

5.Lemon Grass



Fig. No. 7: Lemon Grass

Synonym : Lemon Grass
Biological Source : Lemongrass oil is obtained from the fresh or dried leaves of the plant cymbopogoncitratus
Family : Poaceae

Pharmacological uses

Antimicrobial Activity: Lemongrass essential oil exhibits potent antibacterial, antifungal, and antiviral properties. It is used topically to help treat fungal infections like athlete's foot, ringworm, and dandruff, and has shown activity against drug-resistant bacteria in lab studies.
Anti-inflammatory and Analgesic Effects: The plant contains anti-inflammatory compounds, such as citral and geranial, that help reduce pain and swelling associated with conditions like arthritis, muscle cramps, and headaches.

6. Xanthan Gum



Synonym : Corn sugar gum
Biological Source : Xanthan gum is naturally extracellular polysacride
obtained From the fermentation of the carbohydrate
Family : Xanthomonadales
Pharmacological uses
Laxative: When taken orally in high doses, xanthan gum acts as a bulk-forming laxative. It swells in the digestive tract, binds water, and stimulates intestinal function to relieve constipation.
Treating Dysphagia (Swallowing Disorders): Xanthan gum is used to thicken liquids and foods for individuals with difficulty swallowing, reducing the risk of choking or aspiration without changing the taste or appearance of the product .
Saliva Substitute: In some specific mouthwashes and toothpastes, it helps lock in moisture, acting as a saliva substitute for patients suffering from chronic dry mouth conditions.
Potential Health Benefits (Adjunct): Preliminary research suggests that when consumed with meals, it may help lower blood sugar spikes and cholesterol levels, though it is not a primary treatment for these conditions.

Evaluation of Herbal toothpaste

Formulation of Material toothpaste

Extract of Andrographi's leaves	4ml
Xanthan gum	20gm
Stevioside	11gm
Citral	2gm
Aloe vera	10gm
Peppermint oil	3gm

Evaluation Parameters
- **PH measurement**
- **Stability testing**
- **Washability**
- **Organoleptic**
- **Abrasiveness**

- **Viscosity**
- **Spredability**
- **Moisture content**
- **Cleaning**

CONCLUSION

The review conclude that the Herbal toothpaste of Andrographis paniculata is safe and effective and natural alternative to chemical toothpaste. The phytochemicals present in herbs provide antimicrobial , anti Inflammatory.Making the formulation benefical for maintaining oral hygiene and managing condition such as Plaque , Gingivities .has complaired tooth herbal toothpaste , it show few side effect and better for long term use. Though further clinical studies are recommended to confirm its long term efficacy and safety.

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