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A Review on Eugenol as a Key Component in Clove Oil Toothpaste: Benefits and Applications

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ABSTRACT

Clove oil has long been known for its analgesic, antibacterial, and anti-inflammatory qualities. It is extracted from the cloves of the Syzygium aromaticum plant. Clove oil has been used in toothpaste formulations and other oral health products because of these advantageous qualities. The formulation, efficacy, and advantages of clove oil toothpaste—which attempts to enhance gum health and dental hygiene—are examined in this study. Clove oil's active ingredients, such eugenol, have strong antibacterial properties against common oral infections, which helps to prevent plaque, gingivitis, and foul breath. Furthermore, the calming properties of clove oil help lessen gum inflammation and tooth discomfort. Clove oil provides a natural substitute for artificial chemicals in toothpaste, satisfying consumer desire for herbal and environmentally friendly dental care products. According to user reviews and clinical research, clove oil toothpaste offers a delightful, safe, and efficient alternative for regular dental care. To ensure its best usage in dental care products, more study is necessary to completely comprehend its long-term advantages and without any drawbacks.

Keywords: Analgesic, Eugenol, Gingivitis, Toothpaste

1. INTRODUCTION

Ayurveda makes use of cloves. It is frequently referred to as "lavang" A significant spice that is a member of the Myrtaceae family is clove (Syzygiumaromaticum). Cloves are frequently used in cooking. Antibacterial, antifungal, antiviral, anti-inflammatory, and antioxidant qualities are all present in clove oil. With between 1200 and 1800 flower species, Syzygium is the biggest genus in the Myrtaceae family. It is found in tropical and subtropical parts of Asia, Africa, Madagascar, the Pacific, and fluvial marine environments. the Chinese mainland, the United States, the European Union, and other nations and regions recognize eugenol, the primary ingredient in clove oil, as a food product. There is little scientific evidence to support these and other claims, although clove is most commonly applied directly to the gums to treat toothaches, discomfort during dental procedures, and other issues. Cloves are used to flavour food and drink. Clove is utilized in the production of toothpaste, soaps, cosmetics, scents, and cigarettes. Kreteks, another name for clove cigarettes, usually include 20–40% grated and 60–80% tobacco. India, known as the

"Botanical Garden" of the globe, is the world's greatest producer of medicinal plants. Approximately 7,000 medical professionals are currently listed in the Ayurvedic system, compared to about 7,000 in the modern medication system. According to the 70% of people living in rural India, Ayurveda is a form of traditional medicine. The state of our teeth, gums, and overall oral-facial system—which enables us to chew, talk, and smile—is referred to as oral health. Oral cancer, periodontal (periodontal) disease, and cavities (tooth decay) are some of the most prevalent conditions that affect our oral health. Caries of the teeth (tooth decay), alveolar (gum) disease, missing teeth, or malignancies of the cheeks and the cavity are the most common oral illnesses. Because they interact with certain chemical receptors in the body and are, in terms of pharmacodynamics, medications themselves, herbal extracts are effective. Although individuals have avoided the numerous negative effects that are often associated with regular medications by taking herbal remedies, side effects are still possible.

(Fig 1 Toothpaste)

2. USES OF CLOVE

Considering cloves have antimicrobial qualities, they can be utilized in mouthwashes and toothpastes. It functions as a carminative by raising stomach hydrochloric acid to enhance peristalsis and as a decongestant, reducing discomfort in emergency conditions. Additionally, it promotes quick wound and bite recovery. Inhaling clove oil improves blood flow, lowers blood glucose levels in diabetics, eases muscle soreness, clears phlegm, and cures colds, coughs, and asthma. Breathe in its scent to alleviate headaches, light-headedness, and agitation. Dental plaque, tooth decay, and gum disease are mostly caused by oral illnesses. The organism Porphyromonas gingival is (P. gigivalis) is regarded as one of the most significant pathogens of chronic periodontal disease, despite the fact that the condition is a polymicrobial one. Commensal microbiota gives way to dysbiosis microbiota as a result of these microorganisms. The development of several virulence factors, including but not confined to cysteine proteases, sometimes referred to as gingipains, which affect the host defence system and regulate side effects and degradation, contributes to the pathogenesis of periodontitis. protein in tissue One of the most prevalent bacteria that causes gingivitis is Porphyromonas gingivitis is said that clove toothpaste offers several advantages for dental health. The antibacterial qualities of cloves aid in the destruction of harmful oral germs. Tooth paste is made of simple ingredients to balance out the mouth's acidity. Because some types of acids in our mouths can also lead to tooth decay, toothpaste has a basic character. When we brush our teeth, the basic yogurt responds with the acids in our mouths to become neutral. For this reason, toothpaste is basic in nature.

3. PHARMACOLOGICAL ACTIVITIES

- **Antioxidant-activity:**

In order to alleviate oxidative stress, which results in memory loss, antioxidants are necessary substances. By lowering glutathione levels, clove oil lessens oxidative stress and aids in memory restoration. Clove's potent antioxidant properties are on par with those of artificial antioxidants like pyrogallol and BHA (butylated hydroxyanisole). Because of the linoleic acid emulsion system's greatest hydrogen release capability, clove oil exerts

inhibitory effect and lowers lipid peroxidation. Additionally, it has demonstrated the ability to suppress hydroxyl free radicals, including DPPH (2,2-diphenyl1 picryl hydroxy)

- **Antimicrobial activity:**

It has been demonstrated that clove oil works well against the bacterial species Staphylococcus and the fungal species Aspergillus Niger. By distributing clove oil in a 0.4% v/v concentrated sugar solution, germicidal activity against S. aureus, a species of pseudo aeruginosa, and Klebsiella pneumonia have been demonstrated. Clove oil's antibacterial properties was tested using E. coli.

- **Antiviral activity:**

Around a dosage of 10 µg/ml, the syringe made from clove was shown to be effective towards herpes. Bacterial polymerase for DNA is inhibited by syringes. aromaticum extract in water.

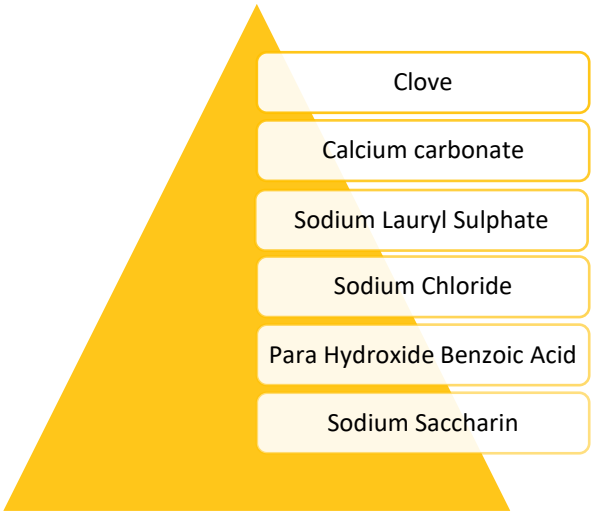
- **Anti-inflammatry activity:**

Eugenol is the anti-inflammatory compound found in clove oil. Studies on animals have shown that adding clove oil extract to other anti-inflammatory drugs can have synergistic benefits. like the liver oil of cod However, flavonoids including kaempferol, rhamnetin, and β-caryophyllene enhance its anti-inflammatory properties.

➢ **Ideal Characteristics of Toothpaste**

- Good abrasive action
- Non-toxic and non-irritating
- No tooth discoloration
- Maintain a clean and fresh mouth
- Long-lasting impact
- Low-cost and readily accessible

4. INGREDIENTS



(Fig 2 Ingredients)

a) Clove

Clove's anti-inflammatory qualities help to lessen gum swelling. Clove protects your teeth from acid damage by supplying essential nutrients to the tooth enamel and improves gum the condition of tissues by increasing circulation. Clove toothpastes are produced with premium components that have been confirmed by science.

(Fig 3 Clove)

b) Calcium carbonate

Its mildest and best-performing abrasive is calcium carbonate, which is used to manufacture PCC with particles as small as 0.7 microns. The toothpaste is crystallized by the microscopic particles, which prevents the need for expensive thickeners. It functions as a moderate thickening mechanism with particle sizes ranging from 2 to 4 microns.

(Fig 4 Calcium Carbonate)

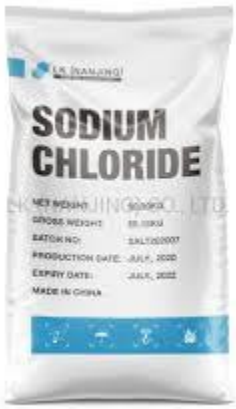
c) Sodium Lauryl Sulphate

Toothpaste frequently contains lauryl sulphate of sodium (SLS) because it produces foam, which has a number of advantages. Along with brushing, the foam produced by SLS aids in the removal of food particles and facilitates the interaction of active substances like fluoride with your teeth.

(Fig 5 Sodium Lauryl Sulphate)

d) Sodium Chloride

One of the main ingredients across numerous salt toothpastes is sodium chloride, commonly referred to as table salt. Sodium chloride helps get rid of tooth stains by acting as a mild abrasive. Additionally, it possesses inherent antiseptic and antibacterial qualities that can aid in the battle against dangerous oral microorganisms.



(Fig 6 Sodium Chloride)

e) Para Hydroxide Benzoic Acid

4-The main application of hydroxybenzoic acid is as the starting point for the synthesis of its esters, or parabens, which are preservatives found in several ophthalmic solutions and cosmetics. It is isomeric to 3-hydroxybenzoic acid and 2-hydroxybenzoic acid, sometimes referred to as salicylic acid, which is an aspirin precursor.

(Fig 7 Para Hydroxy Benzoic Acid)

f) Sodium Saccharin

The paste is flavoured with sodium saccharin, a sweetener. It gives your toothpaste a pleasant flavour to make brushing more comfortable. Mint and other essential oils are used as flavourings in the majority of toothpaste varieties. Plaque microorganisms are also eliminated by sodium saccharin.

(Fig 8 Sodium Saccharine)

5. EVALUATION

- **Colour:**

The produced toothpaste's colour was assessed based on its hue. The colour was visually examined.

- **Odour:**

By sniffing the product, the odour was discovered.

- **Taste:**

The product's taste was manually assessed by tasting it.

- **Determination of Ph:**

In a 150 ml beaker, combine 1 g of toothpaste with 10 ml of recently cooked and cooled water (27°C). To get a full suspension, thoroughly mix. Using a computerized pH meter, find the suspension's pH in five minutes. The findings are stated.

- **Foamability**

A little sample is taken, water is added to the graduated vessel, the initial amount is filled, and the product is shaken ten times to determine its foaming ability. Note the foam's final volume.

- **Spread ability:**

The ease with which the moisturizer travels to the application area is referred to as spreading time. Having a nice spread is one of the requirements for a good paste.

- **Viscosity:**

A Lamont digital viscometer (LV DII Ultras Adjustable Remoter, USA) was used to test the viscosity of the paste utilizing dimension 3 with increasing shear rate in order to illustrate the paste's flow behaviour. Every viscosity measurement was conducted at 300°C.

6. MARKET FORMULATION

S.no	Marketed Product	Therapeutic Uses	Company Name
01	Herbal Toothpaste	Whitening, Gum care, Sensitive	Orchid Lifesciences
02	Marcel 2in1 Herbal Toothpaste	Prevents tooth decay, gum disease & bad breath.	Marcel
03	Aloe Neem - Herbal Toothpaste	Teeth Whitening	Perfora
04	Herbal Dental Gel	Gum care, prevent cavity	Aloe Gold
05	Vicco Vajradanti Paste	Preventing bad breath	Vicco
06	Enshine Herbal Toothpaste	Protects teeth from cavities, tartar & plaque.	Enshine
07	Red Herbal Toothpaste	Prevent Plaque, Erosion, Bad Breath	Elements

7. CONCLUSION

It has been demonstrated that cloves can help avoid illness. It has been demonstrated that antibiotic resistance to different drugs is significant for every illness examined. This result implies that the extract's many botanicals are what cause the action. The findings demonstrate that the extract's active ingredients govern the dentist's antibacterial action, and as a result, the activity is tightly regulated when reincorporated into the toothpaste. According to studies, herbal toothpastes are better than artificial varieties, contain less dangerous chemicals, and are more effective and acknowledged in dental research. Toothpaste and other oral care products include antibacterial qualities that are intended to stop germs. Comparing the model to the business strategy reveals that it has exactly the same pride and fervour as the model's introduction (Colgate, Dabur Red, and Dant Kanti). The created toothpaste boasts a promising future in public health and naturopathic research. The manufactured herbal toothpaste meets the fundamental specifications for a typical herbal toothpaste based on its physical assessment. As a result, the toothpaste may be improved to a higher degree to suit the tastes of various age groups. Future development of this toothpaste as something that benefits society will require more precise experimental measurement and assessments.

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