



(REVIEW ARTICLE)



Review on herbal drug used in various dental problems

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Abstract

Polyherbal tooth paste is gaining recognition as an organic substitute for conventional oral care utilizing the advantages of various herb constituents for elevated oral hygiene this review looks at the contents evaluation and antibacterial properties of polyherbal toothpaste with a focus on key components of medicinal value such as clove, tulsi, neem, and aloe vera. We discuss formulation techniques and their effects on stability and effectiveness, as well as assessment instruments to measure physical and microbiological characteristics. In vitro tests show that polyherbal toothpaste is effective against common oral infections compared to typical products. Clinical assessments offer further context for user experiences and safety profiles. All things considered, polyherbal toothpaste satisfies the growing need for natural goods while offering an economical solution to dental hygiene.

Keyword: Herbal; Oral Care; Herbal Tooth Paste; Natural Ingredients; Anti-Microbial

1. Introduction

The formulation and marketing of herbal toothpaste in comparison to conventional brands highlight the dynamic nature of the oral care industry. Toothpaste is not just a routine hygiene product; it is an evolving entity shaped by consumer demands, scientific advancements, and competitive strategies among manufacturers.

Toothpaste is widely recognized as one of the best sources of fluoride, essential for preventing caries in both deciduous (baby) and permanent teeth (1). This fundamental ingredient has become a cornerstone in dental health, and its efficacy has been reinforced by numerous studies. However, with advancements in dental science, there is a growing interest in alternative formulations, such as herbal toothpastes, which promise not only fluoride protection but also natural ingredients that appeal to health-conscious consumers. These alternatives often contain botanical extracts known for their antibacterial, anti-inflammatory, and whitening properties, catering to the rising demand for more natural products.

In the absence of extensive scientific evidence for certain clinical decisions, dentists must navigate a complex landscape, balancing patient preferences with their clinical experience to provide the best care possible. This practice becomes particularly relevant as patients increasingly seek personalized treatment options, including herbal formulations that align with their values and lifestyle choices.

The oral care market is witnessing an explosion of new product launches, many of which are extensions of established brands. Recognizing the increasing consumer preference for multifunctional products, marketers are keenly focused on toothpaste that offers additional benefits beyond cavity protection, such as whitening, fresh breath, and natural ingredients (2). This shift reflects a broader trend in consumer behavior, characterized by an informed and discerning clientele that actively seeks products that resonate with their needs and ethical considerations.

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Consumer behavior, defined as the array of actions taken by individuals when searching for, purchasing, using, evaluating, and disposing of products and services, plays a crucial role in shaping the toothpaste market. In recent years, there has been a marked shift toward products that emphasize sustainability, natural ingredients, and holistic health benefits. Consumers are increasingly turning to herbal toothpastes as they align with broader wellness trends, seeking formulations that avoid artificial additives and prioritize eco-friendly practices.

The fast-moving consumer goods (FMCG) sector has seen remarkable growth, with the toothpaste segment emerging as one of the most rapidly expanding categories. According to Euromonitor International, the Indian toothpaste industry alone was valued at over Rs. 6000 crore in 2013 (2,3), and it continues to grow, driven by both urbanization and rising health awareness. This growth signifies not only a booming market but also an opportunity for innovation in product development, as companies strive to meet evolving consumer expectations.

In conclusion, the comparison between formulated herbal toothpaste and marketed preparations underscores the ongoing transformation within the oral care landscape. As consumer preferences shift towards natural and multifunctional products, manufacturers must adapt by incorporating innovative ingredients and aligning their offerings with the values of today's health-conscious consumers. The future of toothpaste is not just about preventing cavities; it's about holistic oral health and aligning with the broader wellness ethos that defines modern consumer behavior.

1.1. Advantages of Herbal Toothpaste:

- **Natural Ingredients:** Herbal toothpaste is formulated with natural extracts and essential oils, reducing exposure to synthetic chemicals and artificial additives often found in conventional toothpastes.
- **Antimicrobial Properties:** Many herbal ingredients, such as neem, clove, and peppermint, possess natural antibacterial and antifungal properties that help combat oral bacteria and promote overall oral health.
- **Gentle on Gums:** Herbal formulations are often less abrasive than their chemical counterparts, making them gentler on sensitive gums and reducing the risk of irritation.
- **Whitening Benefits:** Certain herbal ingredients, like baking soda and activated charcoal, can aid in natural teeth whitening without the harshness of chemical whitening agents.
- **Holistic Oral Health:** Many herbal toothpastes are designed to address multiple oral health issues, including plaque reduction, breath freshening, and gum care, all while supporting overall wellness.
- **Environmentally Friendly:** Herbal toothpastes often emphasize sustainable sourcing and eco-friendly packaging, appealing to environmentally conscious consumers.
- **Cavity Protection:** Many herbal formulations still contain fluoride or other mineral-based alternatives that effectively protect against cavities, combining the benefits of traditional and natural approaches.
- **Customization:** With the rise of herbal products, consumers have access to a variety of formulations tailored to specific needs, such as sensitivity, whitening, or breath freshening.
- **Consumer Preference:** Increasingly, consumers are seeking out products that align with their lifestyle choices, and herbal toothpaste meets the demand for natural and holistic personal care options.
- **Reduced Risk of Allergies:** Herbal toothpastes are often formulated without common allergens found in conventional products, making them a suitable choice for individuals with sensitivities.

1.2. Anatomy of Teeth

The intricate structures called teeth are necessary for speaking, eating, and maintaining overall oral health, among other bodily functions. Each component that makes up a tooth has a different function and set of properties. Here is a longer summary of the anatomy of teeth:

1.2.1. Crown

- **Definition:** The crown is the part of the tooth that is visible above the gum line. It is the section that interacts with food and is primarily responsible for biting and chewing.
- **Types:** The shape of the crown varies depending on the type of tooth:
- **Incisors:** Flat and sharp for cutting food.
- **Canines:** Pointed and conical for tearing food.
- **Premolars and Molars:** Broad and flat surfaces for grinding and chewing.

1.2.2. Enamel

- **Composition:** Enamel is composed mainly of hydroxyapatite, a crystalline structure made of calcium phosphate. It is the hardest substance in the human body.
- **Function:** Enamel serves as a protective barrier, shielding the underlying dentin and pulp from physical damage and bacterial invasion. Its hardness helps resist wear from chewing and protects against acid attacks from food and drinks.
- **Regeneration:** Unlike other tissues, enamel does not regenerate. Once damaged, it cannot heal itself, which is why dental care is vital for its preservation.

1.2.3. Dentin

- **Location:** Dentin lies beneath the enamel and makes up the majority of the tooth structure.
- **Characteristics:** Softer than enamel, dentin is yellowish and has a tubular structure filled with microscopic canals that connect to the pulp. These tubules can transmit sensations, making dentin sensitive to temperature and pressure changes.
- **Function:** Dentin provides support to the enamel and absorbs some of the forces from chewing, protecting the pulp from trauma.

1.2.4. Pulp

- **Composition:** The pulp is a soft tissue located at the center of the tooth, containing nerves, blood vessels, and connective tissue.
- **Function:** The pulp is crucial for the tooth's vitality, providing nutrients and moisture to keep the tooth healthy. It also plays a role in sensation, allowing us to feel temperature changes and pain.
- **Pulp Chamber:** The pulp resides in a space known as the pulp chamber, which extends down into the roots through canals.

1.2.5. Root

- **Definition:** The root is the part of the tooth that anchors it securely into the jawbone, providing stability.
- **Structure:** The root can vary in length, width, and shape depending on the type of tooth. Most teeth have one or more roots.
- **Root Canal System:** Inside the root lies the root canal system, which houses the pulp and extends into the surrounding alveolar bone.

1.2.6. Cementum

- **Location:** Cementum is a calcified tissue that covers the root of the tooth.
- **Function:** It helps anchor the tooth to the periodontal ligament and provides a surface for the attachment of fibers that connect the tooth to the surrounding bone. Cementum is softer than enamel and dentin and can repair itself to some extent in response to wear.

1.2.7. Periodontal Ligament

- **Composition:** This fibrous connective tissue surrounds the root and connects it to the alveolar bone.
- **Function:** The periodontal ligament plays a vital role in tooth stability, absorbing the forces exerted during chewing and allowing for slight movement of the tooth. It also contains nerves and blood vessels, contributing to the tooth's sensitivity and health.

1.2.8. Alveolar Bone

Definition: The alveolar bone is the part of the jawbone that contains the sockets for the teeth.

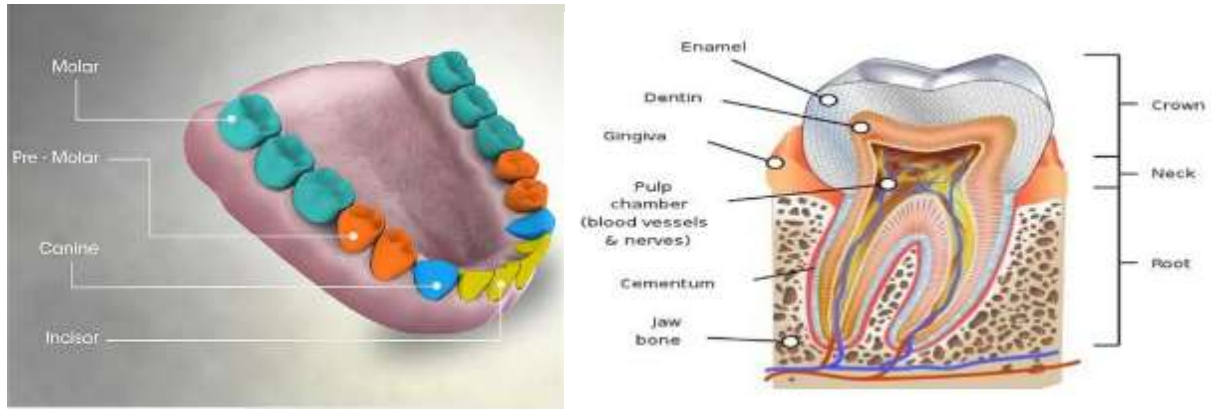


Figure 1 Anatomy of Teeth

- **Function:** This bone provides support and stability for the teeth. Healthy alveolar bone is crucial for maintaining tooth position and preventing tooth loss.
- **Resorption and Regeneration:** The alveolar bone can undergo changes due to factors such as tooth loss, periodontal disease, and hormonal changes.

1.2.9. Gums (*Gingiva*)

- **Composition:** Gums are the soft tissues that surround and protect the teeth.
- **Function:** They provide a seal around the teeth, helping to protect the underlying bone and tooth roots from bacteria and food particles. Healthy gums are essential for preventing gum disease and maintaining overall oral health.
- **Gingival Margin:** The edge of the gums is known as the gingival margin, which should ideally fit snugly against the tooth surface.

1.3. Definition's :

• **Herbs:** Herbs are defined as plants or plant parts, such as leaves, stems, flowers, seeds, or roots, that are valued for their medicinal, culinary, aromatic, or decorative properties. They are typically distinguished from spices, which are often derived from other parts of the plant, such as seeds, bark, or fruits. Herbs can be used fresh or dried and have been utilized across cultures for centuries to enhance flavor in cooking, promote health and wellness, and support traditional medicine practices. Their diverse range of chemical compounds contributes to their therapeutic effects, making them a vital component in herbal remedies and holistic health approaches.

• **Herbal medicine:** Herbs are plants or plant parts valued for their medicinal, culinary, or aromatic properties. Typically consisting of leaves, stems, flowers, or roots, herbs are used in various forms—fresh, dried, or powdered—to enhance flavor in cooking, provide health benefits, or serve decorative purposes. They are distinct from spices, which usually come from other parts of the plant, such as seeds or bark. Herbs have been utilized for centuries in traditional medicine and holistic practices due to their diverse chemical compounds that contribute to their therapeutic effects.

• **Herbal products:** Herbal products are items made from plant materials, including leaves, flowers, stems, roots, and seeds, that are used for medicinal, therapeutic, or dietary purposes. These products can take various forms, such as teas, extracts, capsules, oils, powders, or topical applications, and are often marketed for their health benefits, including promoting well-being, preventing illness, or alleviating specific conditions. Herbal products may be formulated from single herbs or blends and are commonly used in alternative and complementary medicine. Their efficacy and safety can vary, depending on the formulation and the individual's health needs.

• **Herbal nutraceuticals:** Herbal nutraceuticals are products derived from herbs or plant extracts that provide health benefits beyond basic nutrition, blending the therapeutic properties of herbs with the nutritional aspects of nutraceuticals. They are often used to promote overall health, prevent chronic diseases, or manage specific conditions.

1.4. Common Herbal Nutraceuticals

1.4.1. Green Tea Extract:

Benefits: Rich in antioxidants like EGCG (epigallocatechin gallate), green tea extract supports weight management, cardiovascular health, and has anti-inflammatory properties. It is also known to boost metabolism and improve brain function.

Uses: Popular in supplements for fat burning, enhancing mental alertness, and improving heart health.

1.4.2. Turmeric (Curcumin):

Benefits: The active compound in turmeric, curcumin, has powerful anti-inflammatory and antioxidant properties. It is widely used for managing inflammation, joint pain, and promoting brain and heart health.

Uses: Found in capsules or powders to support joint health, reduce inflammation, and improve digestion.

1.4.3. Ginseng:

Benefits: Known for its adaptogenic properties, ginseng helps the body resist stress and boosts energy levels. It is also believed to improve cognitive function, support immune health, and enhance physical performance.

Uses: Common in energy-boosting supplements and those aimed at improving mental clarity and stamina.

1.4.4. Ashwagandha:

Benefits: An adaptogen, ashwagandha helps the body cope with stress, reduce anxiety, and balance hormones. It also supports overall energy levels and may help reduce symptoms of depression.

Uses

Found in capsules, powders, and teas, used to reduce stress, enhance sleep, and improve focus and endurance.

• **Microbes** :Microbes are tiny living things that are found all around us. Also known as microorganisms, they are too small to be seen by the naked eye. They live in water, soil, and in the air. The human body is home to millions of these microbes too. Some microbes make us ill, others are important for our health. The most common types are bacteria, viruses and fungi.



Figure 2 Microbes

• **Anti – Microbial:** Diseases in human beings and animals may be caused by a variety of microorganisms such as bacteria, virus, fungi and other pathogens. An antimicrobial tends to destroy/prevent development or inhibit the pathogenic action of microbes such as bacteria (antibacterial drugs). Fungi (antifungal agents), virus (antiviral agents), or other parasites (antiparasitic drugs) selectively. Antibiotics, antiseptics and disinfectants are antimicrobial drugs.

• **Bacteria:** Bacteria are unicellular, free-living, microscopic microorganisms which are visible under the light microscope and are capable of performing all the essential functions of life. They possess both deoxyribonucleic acid (DNA) and ribonucleic acid (RNA). Bacteria are prokaryotic microorganisms that do not contain chlorophyll. They occur in water, soil, air, food and all natural environments. They can survive extremes of temperature, pH, oxygen tension and atmospheric pressures. They grow on artificial laboratory media and multiply by binary fission. Cocci are about 1 μm in diameter and bacilli are 1 to 8 μm in length and 0.1 to 0.5 μm in width. Many bacterial species can cause diseases in plants, animals and human beings. Bacteria are very small microorganisms which are visible under the light microscope.

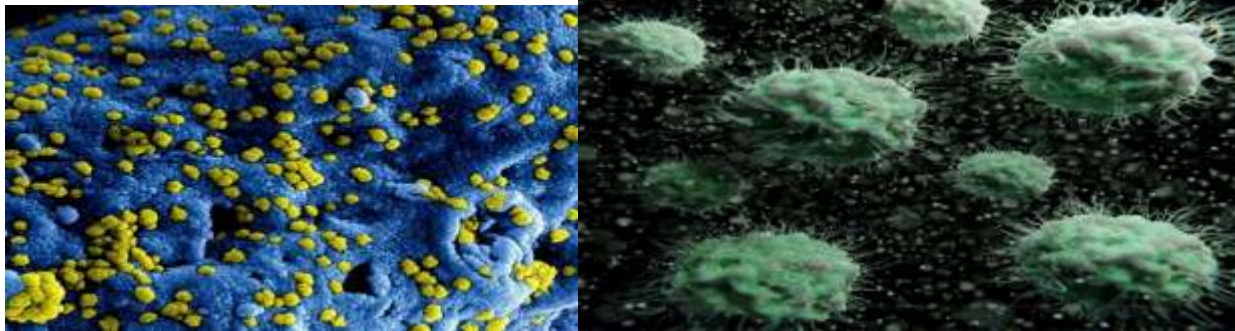


Figure 3 Bacteria

• **Anti – Bacterial:** Antibacterials can be classified on the basis of type of action: bacteriostatic and bactericidal. Antibacterials, which destroy bacteria by targeting the cell wall or cell membrane of the bacteria, are termed bactericidal and those that slow or inhibit the growth of bacteria are referred to as bacteriostatic.

• **Polyherbal toothpaste:** Polyherbal toothpaste is a type of toothpaste made using a blend of different herbal ingredients, often derived from traditional medicine practices like Ayurveda. These ingredients are selected for their natural properties that promote oral health. Common ingredients in polyherbal toothpaste may include:

- **Neem:** Known for its antibacterial properties, helping to reduce plaque and prevent gum disease.
- **Clove:** Often used for its antiseptic and pain-relieving qualities, especially beneficial for soothing toothaches.
- **Licorice (Mulethi):** Helps prevent cavities and reduce inflammation.
- **Tulsi (Holy Basil):** Provides antibacterial and antifungal properties, helping to prevent oral infections.
- **Mint:** Adds a fresh flavor while having a cooling, antimicrobial effect.
- **Aloe Vera:** Soothes gums and helps in healing mouth ulcers.

Polyherbal toothpaste is marketed as a natural alternative to conventional toothpastes, promoting holistic oral care with fewer synthetic chemicals or artificial flavors. It is often preferred by those who seek natural or eco-friendly products for their dental hygiene.

• **A brief list of herbal antimicrobial, antibacterial agents and its medicinal applications, main biological compounds and its synonyms and family.**

1.4.5. Garlic (*Allium sativum*)

Family: Amaryllidaceae

Main Compounds: Allicin, ajoene

Synonyms: Ajo, poor man's treacle

Medicinal Use in Toothpaste: Antibacterial properties help reduce oral bacteria, prevent gum infections, and maintain overall oral hygiene.



Figure 4 Garlic

2. Turmeric (*Curcuma longa*)

Family: Zingiberaceae

Main Compounds: Curcumin

Synonyms: Haldi, Indian saffron

Medicinal Use in Toothpaste: Anti-inflammatory and antibacterial properties help in soothing gum inflammation, reducing plaque, and preventing tooth decay.



Figure 5 Turmeric

3. Thyme (*Thymus vulgaris*)

Family: Lamiaceae

Main Compounds: Thymol, carvacrol

Synonyms: Garden thyme, common thyme

Medicinal Use in Toothpaste: Acts as a natural preservative and antiseptic, helps fight oral bacteria, reduces bad breath, and prevents gum disease.



Figure 6 Thyme

4. Echinacea (*Echinacea purpurea*)

Family: Asteraceae

Main Compounds: Cichoric acid, alkamides

Synonyms: Purple coneflower

Medicinal Use in Toothpaste: Boosts oral immunity and helps prevent bacterial growth in the mouth, reducing the likelihood of infections.



Figure 7 Echinacea

5. Tea Tree (*Melaleuca alternifolia*)

Family: Myrtaceae

Main Compounds: Terpinen-4-ol, cineole

Synonyms: Melaleuca oil

Medicinal Use in Toothpaste: Strong antibacterial and antifungal agent; helps reduce plaque, prevent gum disease, and freshen breath.



Figure 7 *Melaleuca alternifolia*

6. Ginger (*Zingiber officinale*)

Family: Zingiberaceae

Main Compounds: Gingerol, shogaol

Synonyms: Ginger root, zingiber

Medicinal Use in Toothpaste: Anti-inflammatory properties can help reduce gum swelling, prevent bacterial infections, and freshen breath.



Figure 8 *Zingiber officinale*

7. Goldenseal (*Hydrastis canadensis*)

Family: Ranunculaceae

Main Compounds: Berberine, hydrastine

Synonyms: Yellow root

Medicinal Use in Toothpaste: Antimicrobial properties help prevent oral infections and inflammation, making it effective against gum disease and tooth decay.



Figure 9 *Hydrastis canadensis*

8. Oregano (*Origanum vulgare*)

Family: Lamiaceae

Main Compounds: Carvacrol, thymol

Synonyms: Wild marjoram

Medicinal Use in Toothpaste: Antibacterial and antifungal properties make it effective in reducing oral bacteria, treating infections, and preventing cavities.



Figure 10 *Origanum vulgare*

9. Conclusion

Polyherbal toothpaste can be an effective natural alternative for maintaining oral health. The combination of herbal ingredients provides antiseptic, anti-inflammatory, and soothing benefits while helping to reduce plaque, fight bacteria, and freshen breath. The formulation can be adjusted to suit individual needs, and with proper preservation techniques,

it can last for an extended period. The natural ingredients are gentle on the gums and teeth, making it suitable for daily use without harsh chemicals found in commercial toothpastes

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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