



FORMULATION AND EVALUATION OF HERBAL TOOTHPASTE

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ABSTRACT

The global market is moving towards herbal medicines in healthcare. In the current scenario, the use of herbal toothpastes with natural ingredients in oral care is considered more acceptable than chemical, synthetic formulations because they reduce cavities and prevent other dental problems. Herbal toothpastes are used in the treatment of gum disease, bad breath, dry mouth, periodontal damage, tartar, dental caries. To develop a stable and functionally effective herbal toothpaste, eliminating all synthetic additives that are usually included in such formulations is the important task. Herbal toothpastes have received a lot of attention for reducing gingivitis. Studies show mixed results about the effectiveness of these toothpastes. Herbal toothpaste appears to be just as effective as non-herbal toothpaste. Organic toothpaste is a smart and healthier choice for those who want to minimize the amount of chemicals that can harm the overall health as well as oral health. This review provides basic information on the antimicrobial, anti-inflammatory potential of different herbs used in toothpastes and formula excipients.

KEYWORDS: Herbal toothpaste, phytochemical analysis, anti-bacterial, anti-inflammatory activity, gingivitis.

1.INTRODUCTION:

The anatomical component of a tooth consists of root, enamel, dentin and pulp. Common dental problems include gum disease, tooth decay, bad breath affect the oral health. Maintenance of oral health is often achieved by maintaining microorganism regulation and dynamic balance usually between the periodontal microflora and the host, resulting in a stable clinical condition and low periodontal inflammatory change in the peripheral gingival tissues(1). The manufacture and development of toothpaste began in China and India between 300 and 500 BC. At that time, pressed bone, ground egg and shells were used as abrasives to clean teeth(2). Modern toothpaste products were developed in the 19th century. Toothpaste is mainly used to clean, maintain and improve the health of the teeth. It is primarily used to promote oral hygiene, and also acts as an abrasive to help prevent plaque and food particles from building up on teeth. It helps to eliminate and/or mask halitosis, and releases active ingredients such as fluoride to help prevent tooth decay and gum diseases (eg gingivitis). Most of the cleaning is done by the mechanical use of the toothbrush with the help of auxiliaries used in toothpaste(3,4). Toothpastes generally help to keep teeth healthy, and also helps to prevent gingivitis and tooth decay, which lead to more serious dental problems. The toothpaste comes in , different flavors and helps keep your mouth and breath fresh after brushing. It can also mask the odors of strong aromatic foods such as garlic or onions. Gingivitis often cured with good oral hygiene, such as brushing and flossing longer and more often. In addition, to tooth pastes, antiseptic mouthwash may also be helpful(5). Chemicals used in mouthwashes or toothpastes can cause adverse effects such as changes in taste, tooth discoloration or hypersensitivity reactions. Therefore, the use of natural ingredients, which do not contain artificial sweeteners, flavors or preservatives in toothpaste is

the major need of today's scenario. Commercial toothpastes which are available in market contain not only antimicrobial agents, but also chemicals such as triclosan, sodium lauryl sulfate (SLS) and propylparaben. Allergens are also added to the toothpaste to improve the antibacterial effect(6). To avoid all the problems associated with chemical based tooth pastes, the herbal infused tooth pastes are gaining more importance. Herbs and herbal toothpastes have been used in ancient days and are one of the most important components of oral health care(7)(8). The use of numerous herbal medications is veritably effective because they contain active chemical constituents similar as polyphenols, gums, alkaloids, glycosides, etc. These preparations have also been studied for various biological effects. Which increases the possibilities of formulation and evaluation of new herbal toothpastes(9).

2. STEPS IN THE PREPARATION OF HERBAL TOOTH PASTE :

2.1. PREPARATION OF EXTRACTS:

Most commonly, for the preparation of herbal tooth pastes, the fresh plant samples were collected and cleansed with tap water. The collected material was shade dried, coarsely ground and stored in an airtight container for further use. The raw material was extracted by soaking in cold, distilled water, stirring occasionally for 3 days. Extract was obtained as a semi-solid mass which was stored in an airtight container for later use.(10) Table 1 showed the list of various herbs that are commonly used in dental care:

TABLE 1: HERBS USED IN DENTISTRY(11,12,13,14,15,16,17,18,19,20,21,22,23,24) :

S.NO	HERBS	CHEMICAL CONSTITUENTS	APPLICATION
1.	<i>Aloe barbadensis miller</i>	Aloin, Flavonoids, Sterols, Aminoacids, Aloeride	It is used in the treatment of denture glue, osteitis, mouth ulcers
2.	<i>Swertia chirata Buch</i>	Swertanone, Swertianin, Swerchirin	Reduces increased levels of Pro- pro-inflammatory cytokines
3.	<i>Syzygium aromaticum</i>	Gallic Acid, Oleanolic Acid, Ellagic Acid	Fight against gingivitis, halitosis, dental plaque
4.	<i>Tinospora cordifolia</i>	Alkaloids, Tannins, Phenols, Glycosides	It is used in the treatment of aggressive and chronic periodontitis
5.	<i>Curcuma</i>	Bisdemethoxycurcumin, Demethoxycurcumin, Curcuminoids	Relieves gingivitis and acts as an antibacterial agent.
6.	<i>Camellia sinensis</i>	Epicatechin, Epigallocatechin-3 Gallate, Epigallocatechin-3 Gallate	Reduces gingivitis and gingival oxidative stress
7.	<i>Morinda citrifolia</i>	Amino Acids, Vitamins, Proteins, Minerals, Anthraquinones	Prevents caries caused by Streptococcus Mitis and S. mutans

8.	<i>Piper siriboa. L</i>	Leaves Consist Of Starch, Sugar, Diastases, Volatile Oil Includes Safrole, Piper Betol, Eugenol	It has antimicrobial property against many microorganisms such as <i>Proteus vulgaris</i> , <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus pyrogen</i>
9.	<i>Phyllanthus emblica</i>	Triphala Consists Of Thiamin, Riboflavin, Ascorbic Acid, B-Sitosterol, Galloyl Glucose, Chebulagic Acid, Chebulinic Acid.	Contains antioxidants, antimicrobial properties. It is used for ulcerated and bleeding gums and dentures
10.	<i>Citrus medica</i>	Citric Acid, D-Limonene, Hesperidin, Diosmin, Eriocitrin	Used to treat scurvy, bleeding gums due to its high antioxidant potential

2.2 PHYTOCHEMICAL ANALYSIS:

Before formulating the herbal tooth paste, the plant extracts were analysed for various phyto chemical constituents like Phytochemicals may have antioxidant activity, modulation of enzyme activity, stimulation of the immune system, antibacterial and antiviral activity. Some can physically bind to cell walls and thus prevent pathogens from adhering to human cell walls (27). Alkaloids, flavonoids, amino acid, Carbohydrate, proteins, mucilage, steroids, tannins, and saponin. (25,26)

2.3 FORMULATION OF HERBAL TOOTHPASTE:

For herbal toothpaste formulations, the weight of the plant extracts and the natural ingredients were determined. Herbal toothpaste was prepared using 4ml of selected plant extract, 5g of calcium carbonate 5g and each 2g of honey, coconut oil, orange peel powder, cinnamon, cloves. (28)(9)

2.4 EVALUATION OF FORMULATED TOOTHPASTE: (4,9,28,29,30)

2.4.1. PHYSICAL PROPERTIES ANALYZATION (COLOR, SMELL, TASTE, SMOOTHNESS):

The color of the finished toothpaste was evaluated, visually. The odor was found by sniffing the product. The taste was checked by tasting the composition. Smoothness was tested by rubbing the paste composition between the fingers.

2.4.2. CLEANING CAPACITY:

200 ml of water was heated in a beaker and 15 ml of vinegar and 20 drops of red food coloring were added to it respectively. A hard-boiled egg was immersed in food coloring solution for 5 minutes until it was stained with red. A line was made with a permanent marker running the length of the eggshell, dividing it in half. Moisten the toothbrush with distilled water and it was used to brush one side of the egg with 10 strokes (each stroke was a full back and forth motion). The egg was checked for color removal. The toothbrush was washed with water and a pea-sized amount of formulated toothpaste was applied to the toothbrush, and the other side of the egg was brushed with the brush in 10 strokes. The egg was washed and checked for discoloration.

2.4.3.pH:

Pour 10 g of toothpaste from the container into a 50 ml jar and add 10 ml of freshly boiled and cooled water (27 °C) to make a aqueous suspension. Mix thoroughly and check the pH with pH meter

2.4.4.FOAMABILITY

In a measuring cylinder the foam (foaming) of herbal toothpaste was determined by taking 2 g of toothpaste with 5 ml of water . The initial volume was noted and then shaken 10 times. The final foam volume was recorded.

2.4.5.ANTI-MICROBIAL ACTIVITY

An *invitro* antibacterial study of the prepared tooth paste was performed by the well diffusion method using Muller Hinton Agar medium against a pathogenic bacterial strain. Initially, the plates were brushed with inoculant, and 5 mm diameter holes were made on the agar plate with a sterile cork borer. The prepared paste and marketed preparations were then placed in the wells of cultured plates. Each plates were examined after 24 hours of incubation. The diameter of the zone of inhibition (ZOI) was measured in millimeters (mm) with a ruler.

2.4.6.DETERMINATION OF SPREADABILITY:

Spreadability is determined by the slip and durability characteristic of paste. Approximately 1-2 g of herbal toothpaste was weighed and placed between two slides (10 x 10 cm) stacked on top of each other (no slip should occur) and the slides were pulled in opposite directions. Measure the spread (cm) of toothpastes after 3 minutes. Repeating the experiment, tracked the average of the three readings.

2.4.7.GRITTY MATTER:

A small amount of toothpaste was rubbed onto pieces of butter paper. The number and intensity of scratches on butter paper were recorded as absent or present.

2.4.8.HOMOGENEITY

At 27 ± 2 °C, the toothpaste should squeeze out a uniform mass from a collapsible tube or any suitable container with normal force. In addition, most of the contents must be squeezed out of the fold of the container and then gradually rolled.

2.4.9.STABILITY

The stability of the toothpaste is checked by keeping product at 35 ± 2 °C for 28 days. No separation, fermentation and gasification of phase was observed after storage. Also under refrigerator conditions 2-8 °C for 2 hours. Product should be stable even under refrigerated conditions

2.4.10.INERTNESS OF TUBE:

The container used for the herbal toothpaste did not cause corrosion or deterioration under normal storage conditions, such as ten days of heating at 35 ± 2 °C. The inertness of the tube was determined by cutting the inner surface, opening it, and observing for signs of deterioration or chemical reaction in the vessel.

CONCLUSION:

India has a long history of producing and cultivating herbal medicines because of its diverse climatic circumstances. This review lists some plant medicines with a track record of working well as tooth-care products. To create and evaluate herbal toothpaste, various test were conducted to establish a criteria for the quality and purity of herbal tooth paste based on conventional wisdom. There is a significant market for toothpaste made from natural ingredients because the world now embraces the idea of "green pharmacy" or "green cosmetics. For a herbal formulation to be suitable as a commercial product, long-term trials may be

advised to demonstrate its safety, stability, and efficacy. It is concluded that herbal toothpaste is safer and has fewer side effects than synthetic toothpaste with a chemical foundation, and it is crucial for maintaining oral hygiene and preventing dental cavities.

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