FORMULATION AND EVALUATION OF POLYHERBAL TOOTHPASTE USING MEDICINAL PLANTS

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ABSTRACT

The aim of the present research was to formulate herbal toothpaste utilizing herbal powder of Neem leaves, Tulsi leaves, Ginger, Clove. Herbal toothpaste was prepared by using a different concentration of various ingredients. Herbal toothpaste which can be used as a tool for proper oral hygiene and to overcome the side effect of the conventional toothpaste by synthetic ingredients. The herbal ingredients that are used to formulate herbal toothpaste which can satisfy all the required properties. The prepared toothpaste was evaluated for different parameters like homogeneity, Spreadability, foaming power, stability, PH, moisture and volatile matter and etc. The prepared toothpaste was evaluated for its Organoleptic and physical characteristics to ensure that it possesses all the desired features to use against dental diseases. The result was found to be within permitted limits. It has been a good scope in future dental research and dental health of public.

**Keywords*: -* Herbal toothpaste, organoleptic, Spreadability, Stability.

INTRODUCTION

In India, medicines are used about 60% World's population. These are not used for only primary health care and not just in rural areas in developing countries, but they have also developed countries as well where modern medicines are predominantly used. While traditional medicines are obtained medicinal plants, minerals, and so on herbal medicines of organic matter are prepared medicinal plants only. In the west, use of herbal medicines is increasing with the use of reporting about 40% of the population within the last one year of medical diseases to treat herbs. Due to the general public, education and government's interest in increasing are traditional medicines increasingly due to side effects of adverse drug reactions and cost factor modern medical systems[1].

Oral hygiene is the practice of keeping one's mouth clean and free of disease and other problems (e.g. bad breath) by regular brushing of the teeth (dental hygiene) and cleaning between the teeth.   It is important that oral hygiene be carried out on a regular basis to enable prevention of dental disease and bad breath. The most common types of dental disease are tooth decay (cavities, dental caries) and gum diseases, including gingivitis, and periodontitis.   General guidelines suggest brushing twice a day: after breakfast and before going to bed, but ideally the mouth would be cleaned after every meal. Cleaning between the teeth is called interdental cleaning and is as important as tooth brushing[2].

Oral hygiene and systemic Diseases[2]**:**

Several recent clinical studies suggest oral disease and inflammation (oral bacteria & oral infections) may be a risk factor for serious systemic diseases, such as:

- Cardiovascular disease (heart attack and Stroke)
- Bacterial pneumonia: Oral hygiene care for critically ill patients has been reported to reduce the risk of ventilator associated pneumonia.
- Low birth weight or extreme high birth weight of one's baby
- Diabetes complications
- Osteoporosis

Herbal Tooth Paste:

Herbal tooth paste contains medicinal plants extract which provide strong antibacterial and antifungal properties. This helps in control of plaque and tarter build up, thereby making the gum & teeth healthy and strong, thus reducing the incidence of cavity and tooth decay. Here no chemical preservatives are added; instead, glycerin and common salt are added as natural preservatives. This toothpaste can cure various diseases of teeth like Gingivitis, tooth decay,

cavity, gum bleeding, bad breath and dental-caries as well as it has anti-smoking and anti-cancer properties. It helps to prevent tooth decay, bad odour Fight germs and bacteria to reduce tartar & plaque. It also Provides Gingival protection to prevent gum swelling. It is ayurvedic toothpaste that is totally natural and herbal. This toothpaste is best for the ones with sensitive teeth as it doesn't contain artificial flavors, gelatin or chalk powder. The herbal ingredients are easily soluble in saliva and the natural freshness gives a soothing effect in the mouth.

Ideal Properties of Herbal Tooth Paste:

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

Benefits of Herbal Toothpaste:

When brushing your teeth, it's inevitable that you'll swallow or absorb some of the toothpaste. By using a natural option, you don't have to worry about any potentially harmful ingredients getting into your body.

Natural toothpaste is free of dyes that can potentially cause behavioral issues. This is particularly important for children with delicate nervous symptoms.

- It's less abrasive than mainstream toothpaste, which can actually cause your gums to prematurely recede.

- It's kinder to the environment. The excess toothpaste that goes down your drain eventually makes its way to the ocean. You can help protect the environment by using earth-friendly ingredients.

- It's more sustainable to produce. By opting for natural and renewable ingredients, you're opting for a more people and earth-friendly product.

MATERIALS AND METHODS:

Neem, Tulsi, Ginger, Clove, Calcium carbonate, SLS, Sodium saccharine, Menthol, Methyl paraben, Glycerine, Purified water were purchased.

Procedure:

All herbal ingredients powders were purchased. The required quantity of ingredients was weighed and taken in mortar, calcium carbonate, SLS, methyl paraben, lactose, menthol and

glycerine were added in water. This solution was added drop wise into mortar containing herbal ingredients and triturated well until a paste consistency is achieved.

Table 1. Formulation of Tooth paste

Ingredients (Qty in gm)	T1	T2	T3
Neem	5	5	5
Tulsi	10	10	10
Ginger	5	5	5
Clove	5	5	5
SLS	2.5	5	7.5
Methyl paraben	0.15	0.15	0.15
Menthol	1.5	3	4.5
Calcium carbonate	30	35	40
Glycerine	20	20	20
Purified water	Q.S	Q.S	Q.S

Evaluation of Toothpaste[3,4]

1. Physical Examination

a. Colour: The prepared toothpaste was evaluated for its colour. The colour was checked visually.

b. Odour: Odour was found by smelling the product.

c. Taste: Taste was checked manually by tasting the product.

d. Relative density- Relative density was determine by weight in gram taken in 10 ml formulation and 10 ml distilled water using RD bottle

Evaluation Parameter:

Determination of sharp and edge abrasive particles

The contents were taken on finger tip and scratched on the butter paper for 15-20 cm length to check for the presence of any sharp or abrasive particles. This was repeated 10 times. No sharp or abrasive particles were found.

Determination of spreadability

A gram of toothpaste was placed on a glass slide (10 x 10 cm) and covered with another glass slide. Then 2 kg weight was placed (sliding, shall not take place). The spreading (in cm) of the toothpaste was measure after 3 minutes. The procedure was repeated 2 more times and average of three observations was noted.

Determination of fineness

10g of toothpaste was weighed accurately and placed in a 100 ml beaker. 50 ml of water was added, and allowed to stand for 30 min with stirring until the paste was completely dispersed.

The solution was transferred to 150µ & 75µ IS sieves and washed with a slow stream of tap water. The water was allowed to drain completely and sieve was dried at 105±2℃ by placing it in an oven. The residue particle present on the sieve was transferred on to a watch glass and was weighed.

Calculation: Material on the sieve % by (Retained mass / Material taken) x 100.

pH determination

10 g of toothpaste was weighed and placed in 150 ml beaker. 10 ml of boiled water was added and then cooled. It was stirred vigorously to make a suspension. The pH of the suspension was measured using pH meter.

Determination of lead

The color produced with sample solution containing hydrogen sulfide was compared with standard lead solution.

Foaming power

A suspension of the material was taken in measuring cylinder and shaken for 12 times and the volume of the foam produced after shaking for 5 minutes was measured.

Procedure: 5g of toothpaste was weighed in to a 100 ml glass beaker. 10 ml of water was added, covered with a watch glass and kept aside for 30 minutes. The suspension was heated gently to dissolve the detergent if present in it. The suspension was stirred with glass rods and transferred to 250 ml measuring cylinder. It was examined to check if no foam is produced (more than 2 ml). The residue retained in the beaker was transfer to measuring cylinder by adding of 5-6 ml of water. Then the volume was made up to 50ml of water. The contents were stirred with up-down movements to get uniform suspension at 30℃. After shaking, the cylinder was kept aside for 5 minutes. And note the final volume obtained with foam and water.

Determination of moisture and volatile matter-

5g of sample was weighed and placed in a porcelain dish of 6-8 cm in diameter and depth of 2- 4 cm. The sample was dried in an oven at 105°C.

Calculation: % by mass =100 M1 / M

M1 - loss of mass (in grams) on drying

 M - Mass (in grams) of the material taken for the test.

Stability study:

The stability study was performed as per ICH guideline. The formulated paste was filled in collapsible tube and stored at different temperature and humidity conditions, 25℃± 2℃ /

60% ± 5% RH, 30º C ± 2ºC / 65% ± 5% RH, 40ºC ± 2ºC / 75% ±5% RH for the period of three months and studied for appearance, pH and Spreadability.

Evaluation of Toothpaste-

1. Physical Examination

Table 2. Physical Examination of formulated toothpaste

Test	T1	T2	T3
Colour	Brown	Brown	Brown
Odour	Characteristic	characteristic	Characteristic
Taste	Better	Better	Better
Smoothness	Smooth	Smooth	Smooth
Relative Density	10.4	10.2	10.5

2. Evaluation Result:

Table 3. Evaluation of formulated toothpaste

Test	T1	T2	T3
Sharp and edge	Absent	Absent	Absent
Spreadability	5.2	5	5.3
Fineness	0.32	0.38	0.41
pH	8.2	7.9	8.4
Lead content	absent	absent	Absent
Foaming power	54	57	52
Moisture	1.7	1.9	1.8
stability	good	good	good

3. Stability Studies

Table 4. Stability studies of formulated toothpaste At 25ºC ±2ºC/ 60% ± RH (3rd month)

Colour	Appearance	Spreadability	pH
Brown	Homogeneous	5.3	8.4

Table 5. Stability studies of formulated toothpaste At 35ºC ±2ºC/ 65% ± RH (3rd month)

Colour	Appearance	Spreadability	pH
Brown	Homogeneous	5.2	8.2

Table 6. Stability studies of formulated toothpaste At 40ºC ±2ºC/ 75% ± RH (3rd month)

Colour	Appearance	Spreadability	pH
Brown	Homogeneous	5.0	8.0

CONCLUSION:

The herbal toothpaste is an emphasizing and more acceptable in dental research and they are safer with minimum side effects than synthetic preparation. The formulated tooth paste complied the requirements of all evaluation tests and was found suitable for the teeth and oral hygiene. The formulated herbal toothpaste has good scope in future in nature remedies research and dental health of public.

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