

# Formulation and development of herbal toothpaste & it's evaluation

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**Abstract-** In Present factors of dental care, the application of Herbal Toothpaste containing Natural constituents is widely recognized in public opinion compared to refined & non-natural constituent formulations for the adequacy, potency & effectiveness in mitigating dental caries & also to counteract another oral cavity issues. In this work of research, we had use Guava powder, Clove oil, Tulsi powder & Aloe vera gel with multiple functions as Anti-inflammatory, Dental Analgesic, Antimicrobial, and Antiviral respectively. Together with herbal base formulation a comparative analysis of marketed herbal toothpaste was carried out to acquire a review of body key specifications that is pH, stability, homogeneity, and correspondence to generate productive herbal formulation with stable functioning. The main aim of this study is to differentiate & estimate toothpaste with marketable toothpaste. This examines whether our formulation of herbal toothpaste with natural constituents is beneficial in terms of resulting outcomes.

**Keywords:** Herbal toothpaste, Anticaries, Antimicrobial activity, Oral cavity, standardization.

## I. INTRODUCTION

### • Herbal Toothpaste: - [1]

These are the semisolid dosage form of herbal medicament which are been applied externally over the teeth surfaces for treating dental caries, removing stains & brittleness.

Traditionally some of the Herbs were been used in treatment of dental cavity disorders since ancient period of times. Here by formulating similar herbs into a convenient dosage form i.e. Toothpaste.

### • Function of Ayurveda in control of Dental health: -

- For the treatment of oral cavity disorder Ayurveda highlights the procedure such as oral cleansing, extraction, excision, surgeries etc.

- In Ayurveda also suggest to follow some common & daily procedure for maintenance of oral hygiene involving as below.

#### I) Dant Dhavani. (Brushing)

- It includes the chewing of sticks of herbs which are astringent or bitter in taste to prevent the disease. eg. Azadirachta Indica , Glycyrrhiza glabra etc.

#### II) Jivha Lekhana. (Tongue Scrapping)

-By application of gold, silver & stainless-steel scrapping of tongue for preventing the bad breath from mouth.

#### III) Gandoosha. (Gargling)

-Use of oil for swishing in mouth for the prevention from decay, bleeding gums, dryness of throat & cracked lips etc

### • Aids for Application of Herbal Toothpaste: - [2]

It prevents the dental caries & other oral infections.

It cleans the teeth

It prevents the bad breath or bad odor.

It prevents the gum inflammation & infection

No any side-effects of formulation

Prepared from the natural ingredients

Easy availability  
 Safe for application.  
 Prolonged effect.  
 Good abrasive effect.  
 Impart no strain in teeth.  
 Provides the sense of wellbeing.  
 Helpful in treatment of oral cancer.  
 Useful in treating Gingivitis.  
 Eliminates the bacterial agents present in mouth.  
 Securable for oral application.  
 It replenishing damaged cells & taste buds.  
 It reviving natural immunity.  
 Having strong antibacterial, antifungal, anti-inflammatory action.

## II. MATERIAL & METHODOLOGY: [3]

**GUAVA POWDER:** - It is obtained from leaves of Species "Psidium Guajava." Phytoconstituent present "Quercetin" responsible for anti-inflammatory activity which belongs to the Flavonoid class.

**TULSI POWDER:** - It is obtained from the leaves of Species "Ocimum Sanctum." Phytoconstituent present "Ursolic Acid" responsible for anticaries & antimicrobial activity which belongs to the Triterpenoid class.

**CLOVE OIL:** - It is obtained from the Flowering Bud of Species "Syzygium aromaticum.L". Phytoconstituent present "Eugenol" acting as Dental Analgesic & Flavoring agent of volatile oil which belongs to the phenyl propanoids class.

**ALOEVERA GEL:** - It is obtained from the Fresh Leaves of Species "Aloe vera Barbadensis." Phytoconstituent present "Aloe Emodin" acting as Antiviral Agent which belongs to the Hydroxyanthraquinone class.

**NEEM POWDER:** - It is obtained from the dried leaves of Species "Azadirachta Indica." Possessing Antimicrobial activity & acting as Abrasive base in formulation.

**TRAGACANTH POWDER:** - It is obtained from dried gummy exudation of Species "Astragalus gummifer." Acting as Binder & Suspending Agent base in formulation.

**SORBITOL:** - It is obtained from the different species of herbs like apples, apricots, dates, figs, nectarines, peaches, pears, plums, prunes, and raisins etc.  
 Obtained from glucose, but preferably from fructose. Acting as Humectant & Sweetening agent in formulation.

**DECYL GLUCOSIDE:** - It is a non- ionic foaming agent commonly obtained from coconut / palm herb. Also biodegradable in nature & acting as a natural foaming agent in formulation.

**PURIFIED WATER:** - It is use for or acting as a Vehicle in formulation.

**CITRIC ACID:** - It is use as preservative in formulation.

### • METHOD OF PREPARATION:

#### I.Preparation of Herbal Extracts (API).

#### II.Preparation of Herbal Toothpaste Formulation.

##### ❖ Preparation of Herbal Extracts

##### A) Guava Powder Extract

The Fresh Leaves of Plant were being dried at normal room temperature.  
 The dried leaves are grinded to formed the fine powder with the help of grinder.  
 This powder drug is extracted by the ultra-sonication method for preparation of the Extract as below.  
 20 g of powder drug is accurately weigh & added with 100ml of distilled water  
 On the proper mixing of drug is subjected for ultrasonic extraction process at 70-80°C for about 20 mins  
 Sonication involves the sound waves generated causes agitation of solute particles into solution.  
 Prepared Extract is being concentrated & 0.1% of ethanol added for avoiding the degradation.

**B) Tulsi Oil Extraction**

The extraction process utilizing a Soxhlet apparatus was carried out to ascertain the oil percentage in the raw material employed.

Extractions were conducted in triplicate using approximately 5 g of basil and 200 mL of hexane.

The extraction duration was set at 4 hours, maintained until the boiling temperature reached approximately 69 °C.

**C) Clove oil Extraction**

Apparatus consists of one round bottom flask of 1000ml which is connected with another two ways round flask which holds raw material.

The top flask is connected with condenser through the connector.

The separating funnel is used for the separation of essential oil and water

- Buds (100 gm) of *Syzygium aromaticum* were collector from F.R.I Dehradun, then washed the buds with water  
Clove buds are cut into pieces less than 2 X 2 cm within half a day.

- After collection and 150-200 g boiled with 500 ml of distilled water in a Clevenger apparatus until oil distillation ceased after 5-6 hrs.

- The volume of essential oils was determined from a calibrated trap. The essential oils in the distillate were dried over anhydrous  $\text{Na}_2\text{SO}_4$  and kept in the freezer.

**D) Aloe vera gel preparation [4].**

- The Fresh Leaves of Plant were taken out & keep vertical until the yellow aloin is removed to avoid the toxicity.

- The inner most layer containing aloe vera juice is been isolated into a beaker.

- Addition of citric acid acting as preservative.

- Proper mixing is being done by using the Magnetic stirrer or a mechanical agitator.

- Transfer it into suitable container.

- Keep the container in refrigerator for at least half an hour until the foam formed is settled down to formed a gel.

**❖ Preparation of Herbal Toothpaste Formulation: -****• Procedure: -****- Preparation of Base: - [5]**

1) Accurately weigh all the Excipients & the powder form such as neem powder, sorbitol, tragacanth powder, citric acid.

2) Passing from Sieve No 60#.

3) All the excipients are transferred to mortar and pestle.

4) Addition of foaming agent.

5) Triturate these all-base components to formed a semisolid mass.

**-Addition of Herbal Ingredients: -**

1) Weigh accurately all the Herbal API.

2) Herbal API Added into the Base.

3) The Guava extract & Tulsi extract are added with constant triturating with mortal pestle & addition of Clove oil & Aloe vera gel with quantity sufficient of purified water to formed a semisolid paste.



❖ **Formulation of toothpaste: - [6]**

Sr.no	Ingredients	Quantity	Category
1	Guava powder extract	0.5	Anti-inflammatory
2	Clove oil	0.1	Dental Analgesic
3	Tulsi oil	0.6	Antimicrobial
4	Aloe vera gel	0.46	Antiviral

(Table 1.1 Herbal Ingredients)

Sr.no	Ingredient	Quantity	Category
1	Neem powder	1.44	Antimicrobial & Abrasive
2	Sorbitol	4.6	Sweetning
3	Tragacanth powder	0.05	Binder
4	Decyl glucoside	2.2	Foaming agent
5	Citric acid	0.05	Preservative
6	Purified water	q.s	Vehicle

(Table 1.2 Herbal Excipients)

**III.EVALUATION OF HERBAL TOOTHPASTE: -[7]**

The Standardization of formulation is most significant parameters for the all Herbal formulations.

Refers to determination of identity, purity & quality of the formulation.

Evaluation deals with quality assessment of the herbal formulation before its manufacturing also termed to be “Quality control measures”.

**I.Physical Examination (Colour, Odour, Taste, Smoothness)**

- In this the formulated toothpaste is been evaluated on basis of its colour of formulation, odour of formulation, taste of formulation & smoothness of formulation.

TEST	RESULT
Colour	Dark green
Odour	Aromatic & characteristics
Taste	Slightly sweet
Smoothness	Good consistency & smooth texture

**II.Inertness of Tube**

Evaluation generally performed for the determination of quality of container use in formulation.

Usually, the collapsible tube is used as container in toothpaste which may resulting to damage or corrosion during the storage condition.

PARAMETER	OBSERVATION
Inertness of tube	No sign of corrosion or damaged

**III.pH [8]**

About 10g of formulation is dispersed in 50ml of beaker with freshly boiled & cooled water to make about its 50% of aqueous suspension. Stir thoroughly to formed suspension. Using digital pH meter determination of pH of formulation has been performed.

PARAMETER	OBSERVATION
pH	7.15



#### IV.Homogeneity

At room temperature normal force applied on the collapsible tube containing formulation & observed if paste extrude homogeneously from tube.

PARAMETER	OBSERVATION
Homogeneity	Homogeneous

#### V.Determination of Sharp & Edge abrasive particles [9]

The contents on to the finger and scratched on the butter paper for 15- 20cm long to check for the presence of any sharp or abrasive particles.

Repeated the same process for at ten times.

No sharp or edge abrasive particles were found.

PARAMETER	OBSERVATION
Particle Evaluation	No sharp and edge particles are found

#### VI.Foamability

- It is determined by taking 2g of paste with 5ml of water in measuring cylinder initial volume was noted for about 10 times. Final foam formed is noted.

PARAMETER	OBSERVATION
Foam Test	Foam increased by 1cm



#### VII.Determination of Moisture and Volatile Matter

It is determined by taking 2g of paste in porcelain containing 6-8cm in diameter 2-4cm in depth.

Dried at oven at 105°C.for about 15 min.

**FORMULA –**

Initial sample weight -:  $\frac{\text{Weight of dried material}}{\text{Total weight of drug taken}}$   
 %LOD = Initial sample weight – Weight of dried material

Initial sample weight= 71.25 gm  
 Weight of dried material= 71.10 gm  
 Total weight of drug taken= 2 gm

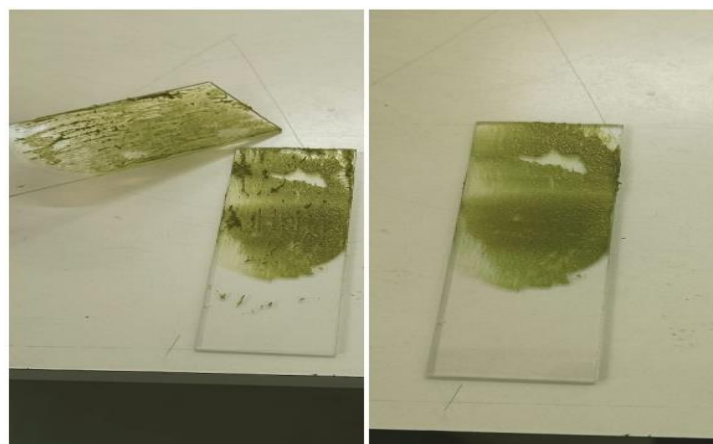
PARAMETER	OBSERVATION
Loss of drying	7.5 %



**VIII.Determination of Spreadability**

- It is determined by taking 1-2 g of toothpaste weigh and place on between the two-glass slide (10×10cm) over each other and the slides are pulled at opposite direction.
- Measure the spreading of toothpaste (in cm) after 3 mins.
- Repeat it & calculate the average spreading of toothpaste

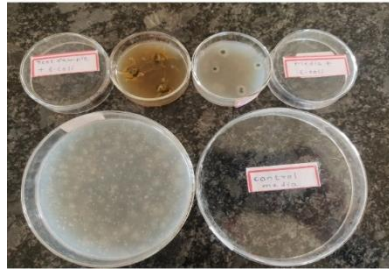
PARAMETER	OBSERVATION
Spread-ability	1gm of toothpaste spread in 3cm



**IX.Anti-microbial Activity [10] [11]**

- In-vitro anti-bacterial study of formulated toothpaste was performed by disc diffusion method against suitable bacterial strain.
- Initially cultured cells tend into the agar plate, then the plate was streaked with inoculum.
- Bores made of 5mm diameter into medium using streak cork borer.
- Surface of agar plate was rotated for equally distribution of inoculum around the bore.
- Then the formulated paste placed in the bores on cultured plate & wrapped with paraffin & labelled & incubated at 37°C for 24hrs.
- Each plate was examined after 24hrs.

- The zone of Inhibition was found.



### RESULT & DISCUSSION: -

- In current case, the people acquire prevention for tremendous dental disorders without any adverse effect.
- Herbal constituents initiated to prepared cosmetics without any hazardous impacts
- Herbal toothpaste thought to be significant way of oral cleansing
- We find out ideal properties of toothpaste as a cosmetic product for use.
- Next ideal characteristics about it is that toothpaste is non-toxic in nature & does not cause any allergic reaction.
- This formulated Herbal Toothpaste is of desirable quality as it complies with all evaluation parameters.

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### CONCLUSION: -

As a result of Research following conclusion is illustrated that formulation prepared having a preferable pH, Homogeneity, Foamability, Spreadability as well physical, chemical & antimicrobial characteristics. This formulation has also an expediency of not involving any toxic substances & presence of natural powdered drug in extensive range of herbal compounds vital for the oral & dental cavity comparative to other marketed chemical-based toothpaste.

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