



# FORMULATION AND EVALUATION OF HERBAL MOUTHWASH

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**Abstract:** This study outlines the formulation process of a herbal mouthwash aimed at providing an alternative to conventional oral hygiene products. Through a systematic approach, a selection of herbs renowned for their antimicrobial and oral health-promoting properties was made. These herbs were carefully blended and tested in varying concentrations to optimize the formulation for efficacy and safety. Parameters such as pH, viscosity, and antimicrobial activity were evaluated to ensure the quality of the herbal mouthwash. The results indicate that the formulated product demonstrates promising antimicrobial effects against oral pathogens while maintaining desirable physical characteristics. This research contributes to the development of natural and effective oral care solutions, paving the way for further exploration and utilization of herbal ingredients in the field of dentistry and oral hygiene.

**Index Terms –** Herbal mouthwash, *Ocimum sanctum*, *Camellia sinensis*, Oral disorder

## I. INTRODUCTION

Herbal mouthwash is a liquid used to clean your mouth and freshen your breath. It's swished around in your mouth and can help kill germs and reduce plaque. Unlike some chemical mouthwashes, herbal ones are made from natural ingredients and may have fewer side effects. They're popular because they can quickly ease pain and are less likely to cause problems. Using natural ingredients like herbs can help keep your mouth healthy. Herbal mouthwashes, made from plants like neem and tulsi, can fight problems like bad breath and gum diseases. They're safe for many people, including pregnant women and children. Making mouthwashes from extracts of herbs like tulsi and green tea seems like a good idea for improving oral health without causing harm.

## History of herbal mouthwash

Throughout history, people have cared about staying clean and having fresh breath. Long ago, Egyptians used mixtures like honey and water with spices to freshen their breath. They even made chewable tablets with plants and honey. A Greek doctor suggested using olive leaves and other natural things for mouthwash. Romans were also into keeping their teeth clean, using toothpaste and mouthwash that included a strange ingredient: urine. This continued until the 18th century. Mouthwash has been mentioned for helping with diseases since a long time ago.

## Types of mouthwashes

### 1. Fluoride Mouthwash:

Helps prevent cavities but be careful because the chemicals can be harmful if swallowed.

### 2. Antiseptic Mouthwash:

Kills germs and helps with bad breath. It's used with brushing and flossing to prevent infections.

### 3. Cosmetic Mouthwashes:

Just freshen breath, but don't do much else for dental care.

### 4. Natural Mouthwash:

Like other mouthwashes but made with natural stuff. It's safer to use and doesn't have alcohol.

## The role of herbal mouthwash

It lies primarily in promoting oral hygiene and overall mouth health. Here are some key roles:

- 1. Freshening breath:** Herbal mouthwashes typically contain natural ingredients like peppermint or spearmint, which provide a refreshing scent and help combat bad breath.
- 2. Reducing plaque and gingivitis:** Certain herbal ingredients, such as tea tree oil, neem, and thyme, possess antimicrobial properties that can help reduce plaque buildup and prevent gingivitis when used as part of a regular oral hygiene routine.
- 3. Soothing irritations:** Ingredients like aloe vera, chamomile, and calendula found in herbal mouthwashes may have soothing properties that can help alleviate minor mouth irritations, such as inflammation or soreness.
- 4. Supporting overall oral health:** Herbal mouthwashes can contribute to maintaining a healthy mouth by providing a natural alternative to conventional mouthwashes, which may contain alcohol or artificial chemicals that some individuals prefer to avoid.
- 5. Environmentally friendly option:** Many herbal mouthwashes use plant-based ingredients that are biodegradable and environmentally sustainable, making them a greener choice for those concerned about their ecological footprint.

## Benefits of herbal mouthwash

Herbal mouthwashes offer several benefits, including freshening breath, reducing plaque and gingivitis, and soothing minor mouth irritations due to their natural ingredients like tulsi, peppermint, green tea, and clove oil. They often lack alcohol and harsh chemicals found in conventional mouthwashes, making them gentler on the mouth and potentially appealing to those with sensitivities. Additionally, some herbal ingredients possess antimicrobial properties, which can help combat bacteria that cause bad breath and oral infections.

- 1. Gentle on sensitive mouths:** Herbal mouthwashes typically contain natural ingredients that are less likely to cause irritation or sensitivity compared to alcohol-based mouthwashes.
- 2. Reduced risk of staining:** Some herbal mouthwashes contain ingredients like sage or baking soda, which may help prevent staining on teeth caused by coffee, tea, or other beverages.
- 3. Promotion of oral health:** Many herbal ingredients, such as echinacea, myrrh, and neem, have been traditionally used for their antibacterial and anti-inflammatory properties, which can contribute to overall oral health.
- 4. Environmentally friendly:** Herbal mouthwashes often use plant-based ingredients that are biodegradable and environmentally sustainable, making them a greener choice compared to conventional mouthwashes that may contain synthetic chemicals.
- 5. Refreshing and pleasant taste:** Herbal mouthwashes often have a refreshing taste derived from natural flavors like mint, citrus, or herbal extracts, providing a pleasant mouthfeel after use.

### Ideal properties of mouthwash

1. It should be not irritated.
2. It should be capable of cleaning and freshening the mouth cavity.
3. It should have a pleasing flavour and aroma.

### Advantages of herbal mouthwash

1. Herbal mouthwash works as bactericidal.
2. It is easy to apply.
3. It prevents bad breath, Halitosis, Gingivitis, Periodontitis, and dryness of mouth.
4. This type of mouthwash shows the very less harmful effects.
5. Fresh breath.

### Disadvantages of herbal mouthwash

1. **Varied efficacy:** The effectiveness of herbal mouthwashes in killing bacteria and preventing bad breath can vary compared to commercial options.
2. **Limited research:** There may be less scientific evidence supporting the effectiveness and safety of herbal mouthwashes compared to conventional ones.
3. **Shorter shelf life:** Herbal ingredients may degrade more quickly than synthetic ones, leading to a shorter shelf life for herbal mouthwashes.
4. **Possible allergic reactions:** Some individuals may be allergic to certain herbal ingredients used in mouthwashes, leading to irritation or other adverse reactions.
5. **Less availability:** Herbal mouthwashes might be less readily available in stores compared to conventional mouthwashes, making them harder to find.

## II. LITERATURE SURVEY

### 1. Priyanka Namdeo (2021)

Worked on formulation and evaluation of herbal antibacterial mouthwash and to evaluate its effectiveness against microbial load of oral activity. Prepared mouthwash further evaluates for its physicochemical properties and antimicrobial activity. They act on mouth pathogens, microbes and reduces the pain instantly and also has no more side effects.

### 2. Shadab Dehshahri (2017)

Combination of Persian oak husk of *Quercus brantii* (Jaft) with a stringent and antibacterial properties of its tannins and *Zataria multiflora* leaves with anti-bacterial activity related to its essential oil seems to be more effective.

### 3. Shivani B. Shambharkar (2021)

Worked on formulation and evaluation of herbal mouthwash and performed antibacterial activity against oral pathogens. The streak-plate method was used. The zones of inhibition produced by the mouthwash against the bacterial isolates were measured to determined degree of susceptibility.

### 4. Nazmeen Shaikh (2020)

Worked on formulation of herbal mouthwash. In this study, Chlorhexidine showed higher levels of antimicrobial action against the selected bacterial species. However, the herbal mouthwash too was effective in these bacterial species in vitro method.

### 5. Yenny Lisbet Siahaan (2021)

Worked on the formulation of herbal mouthwash using bangun-bangun leaves (*Coleus amboinicus* Lour.) to prevent the dental plaque occurrence on the students of III A and III B classes in private Madrasah Ibtidaiyah Annur Medan, North Sumatera, obtaining that 80% bangun-bangun leaves solution is the best treatment with OHI-S value of 0.76 (good criteria).

### 6. Smriti Ojha (2018)

Worked on formulation and evaluation of antibacterial herbal mouthwash against oral disorders. In vitro antibacterial activity was performed on isolated colonies of *Streptococcus mutans*. The Agar well diffusion technique was used for determining the zone of inhibition and minimum inhibitory concentrations (MIC). The results of zone of inhibition also confirmed that this herbal mouth rinses was found to be a potent plaque inhibitor.

### 7. Raj M Pitambare (2020)

Worked on the herbal mouthwash made up of herbal ingredient which gives the best result as compared to another chemical mouthwash. Use of all-natural ingredients so they can cause less harmful effects. It was cause less side effects. The use of herbs in dentistry should be based on evidence of effectiveness and safety. The anti-bacterial activities could be enhanced if active components are purified, and adequate dosage determined for proper administration.

## III. DRUG PROFILE

### 1. TULSI

#### a. Biological source

Tulsi consists of the fresh & dried leaves of *ocimum sanctum* L. and *Ocimum basilicum* L. belonging to



family Labiatae.

Fig.1 Tulsi

**b. Parts used:** Leaves, Seeds, and Roots.

#### c. Chemical constituents

Volatile Oil-0.8%

- i. Eugenol, nerol, eugenol methyl ether.
- ii. Caryophyllene, terpinene-4-ol-decylaldehyde
- iii. Camphor and carvacrol
- iv. Essential oils, ascorbic acid, carotene, calcium, phosphorus, and insoluble oxalates.
- v. It also contains terpenes, mucilage, fixed oil, and fatty acids.

## 2. GREEN TEA

### a. Biological source

The green tea consists of leaves and leaf buds of *Camellia Sinensis* belonging to the Theaceae family.

**Fig.2 Green Tea**

**b. Parts used:** Leaves, leaf buds.

### c. Chemical constituents

The leaves of tea consist of these which is an enzymatic mixture containing an oxidase, which partly converts the phlobatannin into phlobaphene, as chemical constituent.

i. Tannins, caffeine. (1-5% of tannin and 10-24% of caffeine.)

ii. Theobromine is also present in small amount.

iii. Theophylline and volatile oil.



iv. Alkaloid content present in green tea leaves

## 3. CLOVE

### a. Biological Source

Clove consists of dried flower bud of the plant *Eugenia caryophyllus* belongs to the family Myrtaceae.

### b. Chemical constituents

Eugenol, caryophyllene, methyl amyl ketone.

**Fig.3 Clove Oil**

## IV. RESEARCH METHODOLOGY

### 1) Collection, Procurement and Extraction of Tulsi leaves





The leaves of ocimum sanctum are collected dry under shadow and then coarsely cut into small pieces.

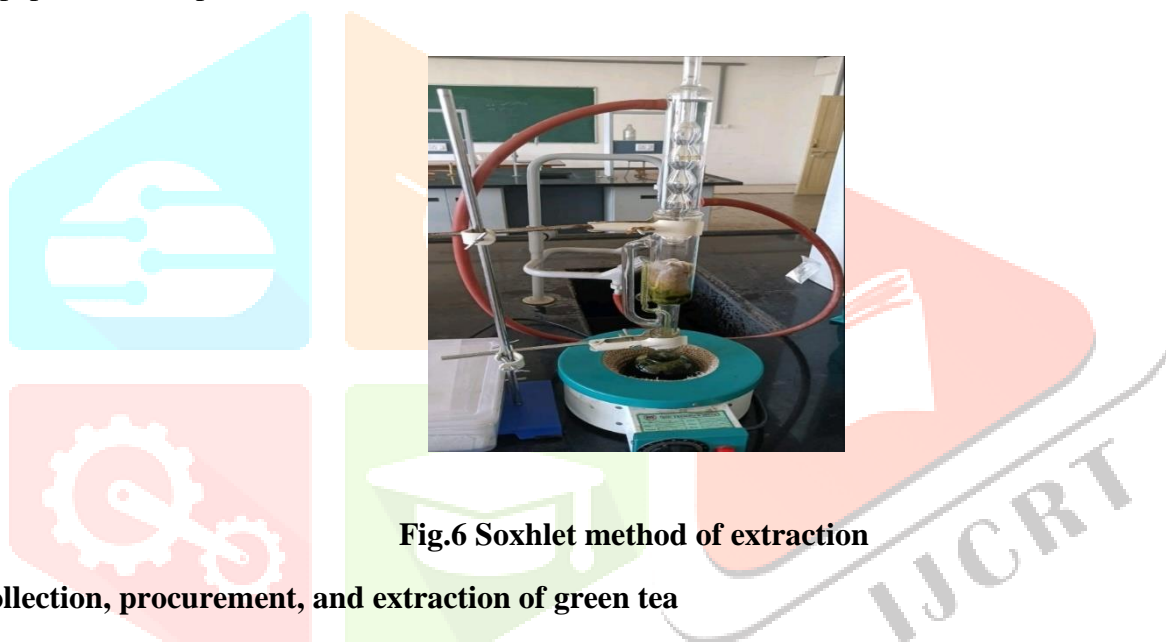
**Fig.4 Dry tulsi leaves**



**Fig.5 Dry tulsi leaves powder**



The dried coarse piece was extracted to obtain a tulsi extract. The successive extraction was carried out by Soxhlet method. The extract was filtered through muslin cloth and subsequently the filtrate was pass through filter paper and then packed in close container.



**Fig.6 Soxhlet method of extraction**

## 2) Collection, procurement, and extraction of green tea

Green tea was collected from local shop. Accurate quantity of green tea was weighted and mix with desired quantity of water and stirred well and kept it for 24 hours, the extract was filter and collected in a container.



**Fig.7.1 Green tea extract**



**Fig. 7.2 Green tea extract**

### 3) Equipments

Sterile Petri plates, measuring cylinder, Conical flask, Beakers, Whattmann filter paper, Incubator, Autoclave, funnel, mortar pestle, Hot air-oven, etc.

### 4) Method of preparation of herbal mouthwash

#### a. Material used.

Tulsi Extract, Green Tea Extract, Clove Oil, Cinnamon Oil, Menthol, Vitamin E, Glycerin, Distilled Water.

#### b. Formulation of herbal mouthwash

1. Mix the Tulsi extract 2.0 ml and Green Tea extract 2.0 ml in container (no.1) and shake it.



Fig.8 Tulsi and green tea extract

2. In a separate container (no.2), add 2 drops of clove oil, 2 drops of cinnamon oil, capsule of vitamin E and mix it properly. Then slowly add 0.04 gm of menthol, and 0.5 gm sodium benzoate stir well to obtain solution.

3. Take 4 ml of glycerin in container (no. 3) and in that glycerine slowly add 2nd solution. The 1st solution is slowly added in the 3rd mixture, stir well.

4. And then slowly add a distilled water to make a volume up to 100ml and then shake it continuously and clear liquid has a fresh mint taste



Fig.9 Addition of solution



Fig.10 Herbal mouthwash

**Table 1: The herbal mouthwash was prepared by the formula**

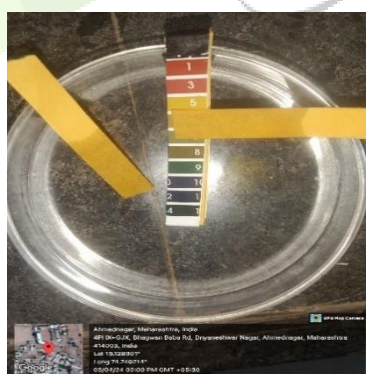
Sr.no.	Ingredients	Function	Quantity
1.	Tulsi extract (ocimum santum)	Antimicrobial, anti-inflammatory	2 ml
2.	Green tea extract (camellia sinensis)	Preventing gingivitis	2 ml
3.	Clove oil	Analgesic, anti-inflammatory	0.2 ml
4.	Cinnamon oil	Bactericidal	0.2 ml
5.	Sodium benzoate	Preservative	0.5 gm
6.	Menthol	Freshener, flavouring agent	0.04 gm
7.	Vitamin E	Antioxidant	0.015 ml
8.	Glycerin	Emulsifying agent	4 ml
9.	Distilled water	Vehicle	q. s.

## V. EVALUATION TEST

### 1. Physical evaluation:

Physical parameter such as colour, odour, taste and consistency were examined by visual Examination.

**2.pH determination:** The pH of formulated mouthwash was 5, falling within the ideal pH range for mouthwash which is 5.5 or below. The formulated mouthwash is acid balanced which is near to the skin pH.



**Fig.11 pH determination**

### 3. Temperature:

During this test, mouthwash is stored either at room temperature, 25°C or in the refrigerator, 8 degrees Celsius.



#### 4. Viscosity:

Viscosity of herbal mouthwash can be determined by using an Ostwald viscometer. Ostwald viscometer is thoroughly cleaned with chromic acid or acetone. Viscometer should be placed in a vertical position in a suitable stand. Fill the water upto the mark in dried viscometer. Now note the time required for water to flow from mark A to mark B. Repeat the process for 3 times, to obtain accurate reading. Now wash the viscometer and fill it with herbal mouthwash, and then note the time required for mouthwash to flow from mark A to mark B.



Fig.12 Viscosity test

#### 5. Microscopic test:

A compound microscope with magnification powers of 10 and 40 was used to assess the mouthwash formulation's transparency.

#### 6. Stability Studies:

The formulation and preparation of any pharmaceutical product is incomplete without proper stability studies of the prepared product. This is done in order to determine the physical and chemical stability of the prepared product and thus determine the safety of the product. A general method for predicting the stability of any product is accelerated stability studies, where the product is subjected to elevated temperatures as per the ICH guidelines. A short term accelerated stability study was carried out for the period of 3 months for the prepared formulation. The samples were stored at under the following conditions of temperature as 3-50 C, 250 C RH=60%, 400 C  $\pm$ 2% RH= 75%. Finally, the samples kept under accelerated study were withdrawn on monthly intervals and were analyzed.

## FINAL PRODUCT

## VI. RESULTS AND DISCUSSION

**1. Physical Examination:** Visually examining the physical characterization of the medicament was performed, and the results are given in the table for various physical characterizations.

**Table 2: Physical examination of prepared mouthwash**

Formulation	Colour	Odor	Taste	Appearance
F1	Light green	Fragrant	Astringent sensation	Clear

**2. pH observation:** To measure pH, we used pH paper. A piece of pH paper was dipped into 5 ml of mouthwash. It supported a shadeation that identified the pH range between 5 to 5.5 by comparing it to a recognised pH shadeation range. Thus, the pH that was found between 5 to 5.5.

**3. Temperature:** Following exposure to various storage temperatures, the physical features of various mouthwash formulations.

**Table 3: mouthwash formulation exposure to different temperature**

Formulation	Room temperature	Refrigerator temperature	Time period	Changes
F1	25°C	2-8 °C	1 week	No change

**4. Viscosity:** With an Ostwald viscometer, the mouthwash's viscosity was determined. The viscosity range found to be 6.53.

**5. Microscopic test:** By using compound microscope with magnification powers of 10 and 40, it was observed that the mouthwash formulations are transparent was used to assess the mouthwash formulation's transparency.



**Table 4: result of microscopic test of mouthwash**

Formulation	Microscope	Magnification	Observation
F1	Compound microscope	10 and 40	Transparent

## VII. CONCLUSION

In conclusion, the formulation of tulsi and green tea herbal mouthwash presents a promising avenue for oral hygiene and therapeutic benefits. Our study suggests that this herbal combination could serve as an effective vehicle for drug delivery, with potential for significant therapeutic efficacy and minimal side effects. Further research and long-term studies are essential to fully explore its benefits, optimize its effects, and ensure its safety for prolonged use. Increasing awareness among prescribers and the public about the advantages of this herbal mouthwash could lead to its wider acceptance and usage as a preferable alternative in oral care.

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