



## Formulation and Evaluation of Herbal Mouthwash

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### ABSTRACT:-

Herbal mouthwashes have gained popularity due to their perceived natural and safe properties. The objective of this study was to formulate and evaluate an herbal mouthwash using natural ingredients. The ingredients used in the mouthwash were chosen based on their antibacterial and anti-inflammatory properties. The formulated mouthwash contains extracts of clove, peppermint. The mouthwash was evaluated for its pH and antibacterial activity against *Streptococcus mutans* and *Porphyromonas gingivalis*. The pH of the mouthwash was found to be 5.15 to 5.20 which are within the acceptable range for oral care products. The antibacterial activity of the mouthwash was evaluated using the agar well diffusion method. The oral cavity is home to various bacterial species. Although some of the oral bacteria are harmless, there are certain species that are harmful and may cause oral plaque, bad breath, and mouth diseases. Medicinal plants or herbs are considered to be rich sources of ingredients that can be used in drug development. They can prevent and cure disease because of their antimicrobial and antibacterial properties against microorganisms. The importance of mouth and teeth cleanliness has been recognized since the earliest days of civilization. Patients and oral health practitioners are faced with a multitude of mouthwash products containing many different active and inactive ingredients. Natural mouthwashes may offer significant advantages over chemical ones. If such mouthwashes can be formulated to be easily prepared and safely used at home with natural products, it may lead to an improvement in the general dental health of the population.

**Keywords:** Herbal Mouthwash, *Streptococcus mutans*, *Porphyromonas gingivalis*

### 1. INTRODUCTION:-

Oral health is an integral component of general health, influencing not only the ability to eat, speak, and socialize comfortably but also having implications for systemic conditions such as cardiovascular disease, diabetes, and respiratory infections. Maintaining oral hygiene is therefore essential for preventing the accumulation of dental plaque, the primary etiological factor for caries and periodontal diseases. While conventional oral care products such as chlorhexidine and triclosan-based mouthwashes are effective antimicrobial agents, their long-term use is associated with side effects like mucosal irritation, dysgeusia, staining of teeth, and, in some cases, disruption of the oral microbiome. [25]

With growing awareness of the potential risks associated with synthetic chemical-based formulations, there is an increasing trend toward natural and herbal oral care products that offer safety, efficacy, and additional health benefits. The use of medicinal plants and their essential oils in traditional systems of medicine has long been established, with modern research now validating many of these uses through pharmacological and clinical studies. Among these, clove oil (*Syzygium aromaticum*) and peppermint oil (*Mentha piperita*) are two widely recognized herbal ingredients with a strong heritage in both culinary and medicinal applications. [10]

Clove oil, extracted from the flower buds of the clove tree, is rich in eugenol, a phenolic compound known for its antiseptic, analgesic, anti-inflammatory, and antioxidant properties. Eugenol has demonstrated significant antimicrobial activity against a broad spectrum of oral pathogens, including *Streptococcus mutans*, *Lactobacillus acidophilus*, and *Candida albicans*. It also exhibits anesthetic effects, which can help in reducing discomfort in conditions like toothache and oral ulcers. [24]

Peppermint oil, derived from the leaves of *Mentha piperita*, contains menthol, which provides a cooling sensation and contributes to its characteristic refreshing aroma. It also has antimicrobial, anti-inflammatory, and analgesic properties, making it beneficial for oral hygiene. Menthol not only inhibits microbial growth but also stimulates salivary flow, helping to maintain oral moisture and freshness, particularly in individuals with xerostomia (dry mouth).

The rationale behind combining these two potent essential oils lies in their complementary therapeutic effects, which can enhance the efficacy of the mouthwash while also improving user compliance due to their pleasant taste and aroma. Additionally, essential oils have been found to penetrate biofilms and disrupt bacterial cell membranes, making them especially valuable in controlling oral



biofilm-related diseases. [26]

This study is undertaken to formulate a stable, effective, and palatable herbal mouthwash incorporating clove and peppermint oils and to evaluate its physicochemical characteristics, microbiological activity, stability, and organoleptic properties. The development of such a formulation could offer a safe and natural alternative to chemical mouthwashes.

## **2. Aim:-**

Formulation and Evaluation of Herbal Mouthwash.

### **Objectives:-**

1. The objective of present work is to formulate and evaluate herbal mouthwash and to evaluate its effectiveness against microbial load of oral cavity. The plant materials were collected and extracted for water soluble ingredients.[5]
2. The aim of the study was to compare and to analyze the antimicrobial efficacy of 0.12% chlorhexidine and new formulated herbal mouthwash after using for 14 days.[7]
3. Ventilator-associated pneumonia (VAP) is one of the most common nosocomial infections in intensive care units (ICUs), and the use of mouthwash is the most widely used method to prevent its incidence. The aim of this study was to investigate effect of clove mouthwash on the incidence of VAP in the ICU.[16]
4. A mouthwash could also be recommended as an antimicrobial, a topical anti-inflammatory agent a topical analgesic, or for caries prevention.[9]
5. This study was performed to evaluate the efficacy and safety of clove-based herbal mouthwash in ameliorating radiation-induced oral mucositis in patients with head and neck cancer.[15]

## **3. Material and Method**

### **1. Clove Oil (*Syzygium aromaticum*)**

Properties: Clove oil has strong antibacterial, analgesic (pain-relieving), and antiseptic properties.

Oral Benefits:

Helps in reducing oral bacteria responsible for plaque and bad breath.

Soothes inflammation in gums.

Provides temporary relief from toothaches.

Scientific Insight:

Clove contains eugenol, a powerful compound known for its effectiveness against oral pathogens.

### **2. Peppermint Oil (*Mentha piperita*)**

Properties: Contains menthol, which has antimicrobial and cooling effects.

Oral Benefits:

Freshens breath instantly.

Reduces microbial growth in the mouth.

Provides a soothing, refreshing feel during rinsing.

Scientific Insight:

Studies have shown that peppermint oil helps inhibit the growth of several bacteria and fungi in the oral cavity.

### **3. Sodium Lauryl Sulfate (SLS)**

Role: A mild surfactant (foaming agent) used in small quantities.

Function in Mouthwash:

Helps the mouthwash spread evenly.

Aids in loosening food particles and plaque during rinsing.

Safety Note:



Though SLS is widely used in personal care products, it is kept at a low concentration in mouthwash to avoid irritation in sensitive individuals.

#### 4. Colouring Agent

Purpose: Used for aesthetic appeal and product identification.

Safety: Approved food-grade or cosmetic-grade colorants are used, which are safe and non-toxic.

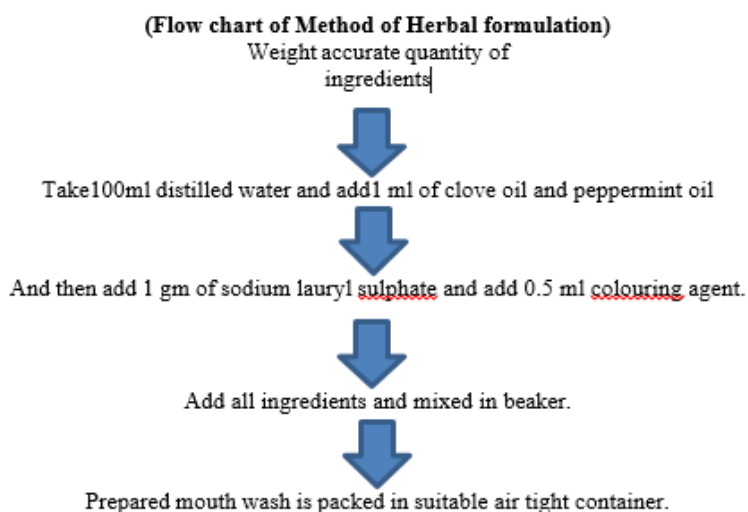
#### 5. Purified Water

Role: Acts as a carrier for the active herbal ingredients.

#### 4. Methodology:-

##### Formulation of Herbal Mouthwash:

Different mouthwashes containing various herbs were prepared using established standard procedures. The selection of the herbs were made, keeping in mind the anti-microbial efficacy along with their excipients properties namely, preservative flavoring effects, which are required to develop an ideal mouth wash. Weighed quantity of each ingredient will be taken Extract were taken mixed thoroughly in mortar and pestle property with small quantity of water. All other remaining ingredient will be gradually added with good mixing. Finally, water added to make volume and preservative will be added and the product will be packed in an amber colored, well closed container. The herbal Mouthwash was prepared by the formula given in table.[11]



##### Procedure for herbal mouthwash:-

Firstly, take all the equipment and wash it. then take prepared mouthwash as per the requirement take distilled water 100ml in 250ml of beaker and add 2-3 drops of clove oil and peppermint oil and then add 1gm of sodium lauryl sulphate with continuous stirring, then add colouring agent. All the ingredients were mixed in beaker.

##### Formula for Herbal mouthwash:-

Table no 1. Formula for Herbal mouthwash

Sr.No.	Name of ingredients	Quantity	Uses
1	Clove oil	1 ml	Analgesics, Anti-inflammatory
2	Peppermint oil	1 ml	Freshner, Antibacterial, Antifungal
3	Sodium lauryl sulphate	1 gm	Buffering agent
4	Patent V	0.5 ml	Coloring agent
5	Water	95 ml q.s	Quantity sufficient



## 5. Evaluation of Mouthwash

### 1. Physical evaluation:-

- Physical parameter such as colour, odour taste and consistency was examined by visual examination.
- The colour of Formulation is pale yellow. The older is sweet spicy clove phenolic woody nutmeg powder. The texture is very hard wood texture that may pose a physical hazard if biting it to it unnoticed.

### 2. pH:-

- The pH of prepared herbal mouthwash was measured by using digital pH meter.
- The pH meter was calibrated with the help of standard buffer solutions weight 1 ml of mouthwash and 50 ml of distilled water and its pH was measured with the help of digital pH meter.

### 3. Microbial Assay:-

- The antibacterial activities were evaluated by measuring the zones of inhibition (in mm).
- Agar media was prepared then the formulated mouthwash was inoculated on the plates agar media by steak plate method and controlled is prepared by mouthwash. The plates were placed in the incubator and are incubated 37°C for 24 hours. After the incubation period the plates were taken out and the Microbial growth were checked and compared with the control.

### 4. Stability studies:-

- Room temperature and 40°C.
- The results of stability were shown in table no change in colour, order, texture Physical parameters like colour, odour, consistency and pH was determined at was observed. The Stability studies showed a slight change in pH formulation at 40°C.

### 5. Taste:-

- The taste is strong and remains almost same over the week except for the ambient temperature sample.
- Clove oil contains a chemical called eugenol, which acts as an anesthetic and antibacterial agent. Clove oil is anti-inflammatory and antifungal. It is available from many supermarkets, drug stores, and health food shops, or can be bought online. It has a strong, warm, and spicy taste.



## 6. Flavour:–

a. The flavour is almost unchanged and has an excellent fragrance of clove and peppermint. Only a week after, the fragrance is somewhat lost when kept at ambient temperature.

b. It has a tingly, spicy flavour similar to cinnamon.[14]

## 6. Result and Discussion:-

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

The pH of prepared herbal mouthwash was measured by using digital pH meter.

The pH of the formulation was found to be 5.15, as the skin is having an acidic pH around 5.20, this pH range of the formulation is suitable for oral disorder.

### 1. Morphological Evaluation (Visual inspection)

Table no 2. Morphological Evaluation

Sr. No.	Observation	Result
1	Colour	Pale yellow
2	Odour	Deep spicy and wood clove
3	Appearance	Visual appearance
4	Texture	Liquid

### 2. pH: (pH of Herbal Mouthwash)

Table no 3. pH Range

Sr. No.	Day of measurement	(pH) prepared herbal mouthwash
1	0 th Day	5.15 to 5.20



Fig no 1. pH meter

### 3. Microbial Evaluation:

Agar media was prepared then the formulated mouthwash was inoculated on the plates agar media by steak plate method and controlled is prepared by mouthwash. The plates were placed in the incubator and are incubated 37°C for 24 hours. After the incubation period the plates were taken out and the Microbial growth were checked and compared with the control.



Table no 4. Microbial evaluation

Storage of temperature sample	Storage life (log cfu/ml) – 0 th
Ambient (normal room temp.)	No growth
Refrigerated No growth	No growth



(A) (B)  
Fig no 2. Microbial Activity A- Before keeping in incubator B- After incubator

#### 4. Stability Study:

The result of stability was shown in table no change in colour, odour, texture was observed. The Stability studies showed a slight change in pH formulation at 40°C.

Table no 5. Stability study

Sr. No.	Parameter	At room temp.	At 40°C
1	Colour	No Change	No Change
2	Odour	No Change	No Change
3	Texture	Liquid	No Change
4	pH	5.15	5.20

#### 7. Conclusion:-

In this study, a herbal mouthwash was successfully formulated using Clove oil and Peppermint oil as the main active ingredients. Both these natural oils are well known for their beneficial properties in oral care. Clove oil has strong antibacterial, analgesic (pain-relieving), and anti-inflammatory effects, which help in reducing oral bacteria and soothing gum problems. Peppermint oil provides a refreshing flavour and also has antimicrobial and cooling properties, which contribute to maintaining fresh breath and oral cleanliness.[6]

The formulated herbal mouthwash was evaluated for various physical parameters such as colour, odour, consistency, and pH. The results were satisfactory. The product showed good stability when stored at room temperature and 40°C for a period of 1 month, which was done as part of short-term stability testing. There were no significant changes observed in the colour, odour, or consistency of the formulation. A slight variation in pH was noticed at 40°C, but it was within acceptable limits and did not affect the quality or usability of the mouthwash.[9]

From the observations, it can be concluded that the herbal mouthwash is physically stable, safe for use, and has potential oral health benefits. It can be considered a natural and cost-effective alternative to commercially available chemical-based mouthwashes, with fewer chances of side effects. Further studies can be done for long-term stability and microbial testing to strengthen the finding. [11]

To the information presented in this study, the created herbal mouthwash has significant therapeutic potential and is an appropriate vehicle for medication delivery at a reasonable cost. When compared to commercial mouthwash, herbal mouthwash formulations work effectively and have few side effects; as a result, their use should be increased to prevent negative consequences. The current liquid herbal mouthwash may be really effective in assisting people to get rid of foul breath and other oral health issues.[8]





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