

# Formulation and Evaluation of Herbal Mouthwash

Sudhir S. Pange<sup>1\*</sup>, Sharad V. Mali<sup>2</sup>, Neha N. Kale<sup>3</sup>, Deep D. Kawade<sup>4</sup>.

Assistance Professor<sup>1</sup>, Assistance Professor<sup>2</sup>, Student<sup>3</sup>, student<sup>4</sup>.

ASPM'S K.T.PATIL COLLEGE OF PHARMACY, OSMANABAD M.S – 413501 India.

**Abstract:-** The value of maintaining a clean mouth and teeth has been understood since the dawn of civilization and into the twenty-first century. A wide variety of mouthwashes with numerous distinct active and inert components are available to patients and dental professionals. Making well-informed choices on which products are best for which patients can be a challenging undertaking. Although numerous well-known herbal remedies have assisted in reducing tooth plaque and gingivitis, In addition to other dental hygiene practices like brushing and flossing, they have only recently been used. Different herbal items and their extracts, such as guava, pomegranate, neem, propolis, tulsi, green tea, cranberry, grapefruit, etc., have demonstrated a variety of health benefits. substantial advantages over chemical ones. Natural mouthwashes could have a lot of advantages over chemical ones. If mouthwashes that may be safely produced and used by people at home using natural materials can be developed, The population's overall dental health may improve as a result. The study uses a variety of organic components and materials. The quality of the components utilized was then examined using thin-layer chromatography. Next, studies on physical evaluation, pH measurement, stability, thin-layer chromatography, and antibacterial activity were conducted. According to this investigation, the created herbal mouthwash has substantial Therapeutically effective and a low-cost, but unquestionably high-potential, drug delivery mechanism. To prevent the negative consequences, there is a need for increasing the consumption of herbal preparations. This study aims to list these natural ingredients that could be used to make mouthwashes that work well.

**Keywords:-** *Neem Antibacterial Activity, Tulsi Anti-Infections Activity, Peppermint Flavoring Agents*

## I. INTRODUCTION

### ➤ Mouth:-

In human anatomy, the mouth is also known as the oral cavity or buccal cavity. opening through which the body receives food and air.

The back of the mouth empties into the throat after opening to the outside at the lips. The lips, cheeks, hard and soft palates, and glottis define their limits.

It is split into two parts: the vestibule, which includes the region between the cheeks and teeth, and the oral cavity. The tongue, a sizable muscle that is firmly attached to

the floor of the mouth by the frenulum linguae, fills the latter region to a great extent.

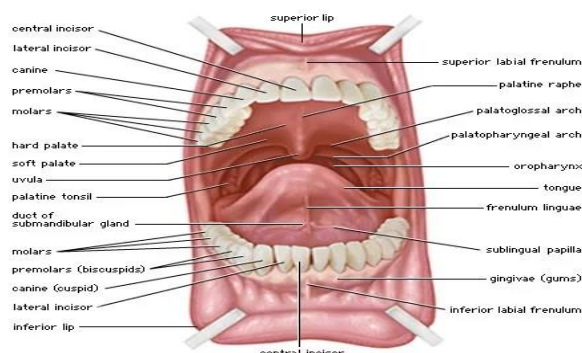


Fig 1:- Anatomy of oral cavity

### ➤ Functions of the mouth:

By causing salivation and propelling the alimentary bolus into the pharynx, it starts the digestive process. Additionally, it is a location for the chemosensory organ and the speech sound generator. Chewing and swallowing are facilitated. Taste buds on the tongue are used to detect flavor.

### ➤ Oral mucosa:

The term "oral mucosa" refers to the mucous membrane that lines the structures inside the boundaries of the oral cavity. Apart from teeth, the oral mucosa, which is the skin lining of the mouth, covers the majority of the oral cavity.

The oral mucosa is continuous with the skin at the lips, and it is continuous with the mucosa lining the remainder of the gut at the throat.

The two tissue components that make up the oral mucosa are the underlying connective tissue and the overlying epithelium.

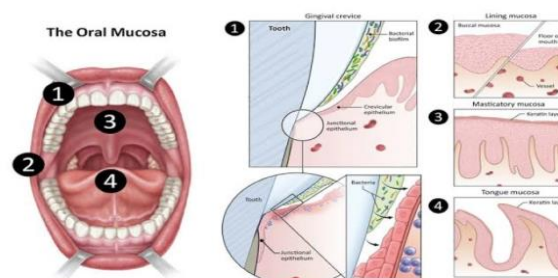


Fig 2:- Anatomy of Oral mucosa

➤ *Layers of oral mucosa:-*

Oral mucosa is composed of four layers –

- Stratum basale
- Stratum spinosum
- Stratum granulosum
- Stratum corneum

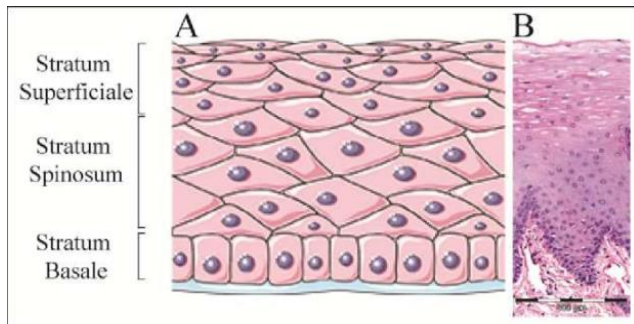


Fig 3 :- Layers of Oral mucosa

➤ *Functions of the oral mucosa include*

- Protection against abrasion and mechanical forces from food chewing as well as from microorganisms that live in the mouth cavity.
- Sensation: Touch, pain, taste, temperature
- Secretion - Saliva is a major secretion.
- The defense integrity of the oral epithelium serves as a reliable barrier against the invasion of microorganisms.

➤ *Throat:-*

The pharynx, often known as the throat, is a muscular passageway inside the body that resembles a funnel.

The esophagus, which leads to the stomach, and the larynx, which leads to the trachea and subsequently the lungs, are joined by it to the mouth and nose.

In the center of the neck is the pharynx. It measures around 4.5 inches long and begins at the base of the skull.

➤ *Anatomy of throat:-*

The Nasopharynx, which connects the top of the throat to the nasal cavities and allows air to travel through, is part of the throat's pharynx.

Oropharynx: The connection between the oral cavity and the middle of the throat. It permits the passage of food, air, and liquid.

Laryngopharynx: The area at the base of the throat close to the larynx. It controls the flow of food and liquid into the esophagus as well as the passage of air to the lungs.

➤ *Functions of Throat :-*

It serves as a pathway for medicine delivery and for gargling

The respiratory system is supplied with air by it.

It provides the digestive system with food and drink.

It balances ear pressure and removes moisture from the ears.

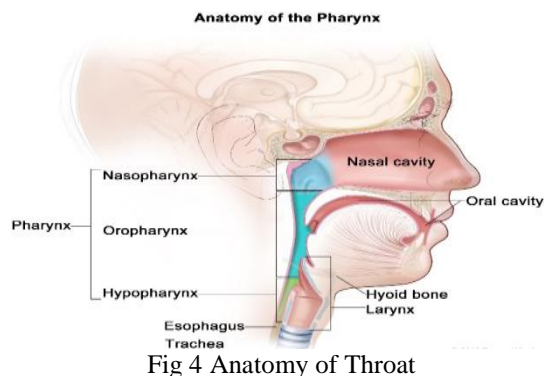


Fig 4 Anatomy of Throat

➤ *Mouthwash:*

Used to clean and deodorize the mouth or buccal cavity, mouthwashes are concentrated, clear, aqueous solutions with a pleasant taste.

They help to maintain oral hygiene and treat oral infections. Hydroalcoholic solutions, such as mouthwashes or mouth rinses, are used for oral hygiene to clean and deodorize cavities.

Mouthwash, also known as a mouth rinse, oral rinse, or mouth bath, is a liquid that is passively retained in the mouth or swirled around the mouth by perioral muscular contraction and head movement. It may also be gargled, in which case the head is tilted back and the liquid is bubbled at the back of the mouth

Neem, which has antibacterial properties and reduces oral microbial flora, is an ingredient in mouthwash.

Additionally, peppermint oil, a flavoring ingredient, and germ-killer, is present.

Tulsi oil is used in mouthwash because it possesses antiviral, antibacterial, and cooling qualities.

➤ *Characteristics of mouthwash:-*

The following are the qualities that should be present in mouthwash: It should act quickly and be powerful enough to exert the desired effect at a particular dilution. Strong enough flavor to cover up bad mouth odor It ought to be of passable taste. The mouth cavity or mucous membranes shouldn't become irritated by it. It must not be harmful or irritable.

➤ *Herbal mouthwash has the following uses:*

It soothes irritated mucous surfaces It is utilised to lessen unpleasant mouth breath. It is applied to enhance oral hygiene. It can be used to treat gum inflammation or illness. It reduces inflammation and pain. It aids in reducing tooth plaque.

➤ *Advantages of herbal mouthwash:-*

- It helps to prevent cavities
- It helps to freshen breath
- It can help to reduce plaque
- It can kill bacteria and help to clear excess particles
- It keeps mouth healthy

- They have minimal or no side effect and they are less harmful

➤ *Disadvantages of herbal mouthwash:-*

- Mouthwashes can be dangerous for children hence children below 6 years are advised not to use them.
- It does not remain in the mouth for a long time

➤ *Neem:-*

*Azadirachta indica*, a member of the Meliaceae family, is the plant whose leaves are used. Nimbin, Nimbinin, and Nimbinin are chemical components. It prevents bacteria from multiplying and plaque from forming. Neem is a plant whose seeds, twigs, and leaves have long been used to clean teeth and treat bacterial infections. Neem extract is suitable for treating oral infections and gingivitis because it prevents plaque formation and bacterial growth. Neem leaves, twigs, and seeds have been used to clean teeth and treat bacterial and fungal illnesses in India and South Asia for thousands of years. Because it prevents the development of plaque and the growth of germs, neem extract is effective in the treatment of gingivitis and oral infections. Neem has demonstrated to significantly affect microorganisms that cause a variety of human and animal diseases, including as *E. coli* and streptococcus, as well as other bacteria.

➤ *Peppermint:-*

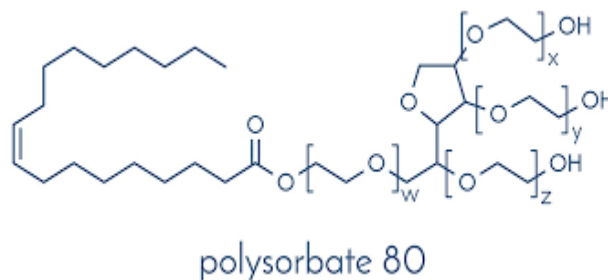
The Lamiaceae family includes the leaves of the aromatic herb *Mentha piperata*. Menthol, menthone, and cineole are chemical components. Due to its potent, pure properties, peppermint is the mint that is most frequently utilized commercially in mouthwash. Gingivitis can be treated with mint. Peppermint imparts scent. For preventing cavities, peppermint oil is more effective. It functions as an analgesic and has healing, antiviral, and antibacterial qualities. Peppermint oil mainly contains menthol (about 70%). It also contains menthone, menthyl acetate, and other terpene derivatives like cineole, pinene, iso pulegone, camphene, limonene, zasmone, menthofurone, and menthyl isovalerate.

➤ *Tulsi oil:-*

Tulsi scientifically known as *Ocimum Scantum* is considered as Queen of Herbs and described as a sacred and medicinal plant in ancient literature. It is derived from 'Sanskrit', which means "the incomparable one". Tulsi in ayurvedic medicine is being used in various clinical conditions like anxiety, chronic cough, bronchitis, fever, snake, and scorpion bites. It has various properties like Anti-stress, Antioxidant, Hepatoprotective, Immunomodulating, Anti-inflammatory, Anti-bacterial. Antiviral, anti-fungal, Antipyretic, Antidiuretic, Antidiabetic, Hypoglycemic, Ilypolipidemic, Antimalarial, etc.

➤ *Polysorbate 80*

Polysorbate 80 is a nonanoic surfactant and emulsifier used in pharmaceuticals. This synthetic compound is a viscous, water-soluble yellow liquid.



Molecular formula: -  $C_{64}H_{124}O_{26}$

Molecular weight: - 1,310 g/mol

Boiling point: -  $100^{\circ}C$

Solubility: - Soluble in water, ethanol, methanol, toluene

Appearance: - Amber coloured liquid

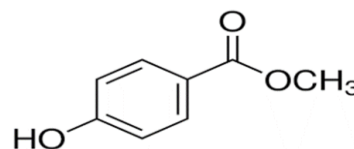
Category: - Surfactant

➤ *Mechanism of action:-*

It acts as a surfactant and forms a layer between two liquids and reduces interfacial tension between liquid that helps in solubilisation

➤ *Methyl paraben:-*

Methyl paraben is a preservative. It is the methyl ester of p-hydroxybenzoic acid.



Molecular formula: -  $C_8H_8O_3$

Melting point: -  $125-128^{\circ}C$

Solubility: - Soluble in water, slightly soluble in benzene, carbon tetrachloride

Appearance: - Colourless crystals or white crystalline powder

Category: - Preservative

Mechanism of action: -

It acts by interfering with cellular membrane transfer processes as well as by inhibition of the synthesis of DNA, RNA, and enzymes in bacterial cells

## II. MATERIAL AND METHODS

### How to Make Herbal Mouthwash

1. Place a 250 ml beaker on the magnetic stirrer.
2. Next, put 15 ml of Polysorbate 80 in the beaker you just took out.
3. Use a magnetic stirrer to dissolve it.
4. After that, stir in 6 cc of peppermint oil.
5. After the peppermint oil has completely dissolved, stir in 6 cc of tulsi oil.
6. Next, put 20 ml of neem extract in it.
7. Next, include 9 gramme of methyl paraben as a preservative.
8. To finish, add just enough distilled water to fill the volume.
9. Use Whatman filter paper to eliminate impurities from the



prepared herbal mouthwash.  
 10 minutes of sonication with this mouthwash.  
 11. Next, put it in the right container.

**Table 1 Formula:-**

Sr. no.	Ingredients	Quantity taken
1	Neem extract	20 ml
2	Peppermint oil	6 ml
3	Tulsi oil	6 ml
4	Polysorbate 80	15 ml
5	Methyl paraben	9 gm
6	Distilled water	qs

**Evaluation test:-**

- Physical evaluation: Visual inspection was used to assess physical characteristics such as colour, aroma, taste, and consistency.
- Determination of pH: A digital pH meter was used to measure the pH of prepared herbal mouthwash. A standard buffer solution was used to calibrate the pH meter. One milliliter of mouthwash was weighed, dissolved in fifty milliliters of purified water, and its pH was measured.
- To test for microbial growth in mouthwash formulations, a control was created and mouthwash formulations were inoculated on an agar media plate using the streak plate method. The plates were put in the incubator, where they would stay for 24 hours at 37°C. Plates were removed from the incubation period and examined for microbial growth by contrasting them with the control.

**i. Preparation of Nutrient Broth:**

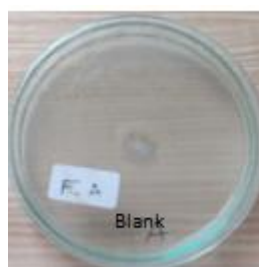
1. Weigh 1.3 grams of nutrient broth accurately, then dissolve it in 100 milliliters of purified water.
2. For 10 to 15 minutes, boil the mixture.
3. Next, use a cotton plug to cover the conical flask's opening.
4. To sterilize it, I kept the conical flask in the autoclave for 20 to 25 minutes.

**ii. Nutrient Agar Preparation:**

1. Weigh 3 grams of nutrient agar precisely, and then dissolve it in 100 ml of purified water.
2. For 10 to 15 minutes, boil the mixture.
3. Next, use a cotton plug to cover the conical flask's opening.
4. Sterilised for 25–30 minutes in an autoclave.
5. Agar medium is then prepared for usage.

**Microbial Assay:** Check for microbial development in mouthwash formulations.

By using the streak plate approach, the created mouthwash was infected in the agar media plates while control was made. The plates were put in the incubator, where they would stay for 24 hours at 37°C. Plates were removed from the incubation period and examined for microbial growth by comparing them to the control.



Antimicrobial activity of prepared mouthwash against E.coli



Antimicrobial activity of prepared mouthwash against Streptococcus

**III. RESULT**

Physical parameters such as color, odor, taste, and consistency were examined by visual examination. 2. The ph of prepared herbal mouthwash was measured by using a digital ph meter. 3. The ph of the formulation was found to be 6.1, as the skin is having an acidic ph of around 5.5, this ph range of the formulation is suitable for oral disorder 4. Stability studies were done with open and closed containers. 5. Here, by subjecting the product to room temperature for one month. 6. This mouthwash is purely herbal and prepared without the addition of alcohol. 7. The formulation undertook stability studies for physical and chemical change 8. The formulation was free from microbes as they have not produced any microbial growth when they get inoculated on the agar surface. 9. Using the streak plate method, the antibacterial activity of mouthwash at various concentrations was assessed. 10. Herbal mouthwash produces a pleasant flavor while masking unpleasant odors. However, herbal mouthwash with medicinal components like anti-microbials may be useful for some long-term odor control. 11. Alcohol usage and consumption are known to increase the risk of head and neck cancer. Neem, clove, and other vital plant extracts, which are antibacterial, have been reported to lessen plaque and gingivitis when used in mouthwashes

**IV. CONCLUSION**

Based on the findings of this study's data, it was determined that the herbal mouthwash that had been produced had great therapeutic efficacy and was a viable vehicle for drug delivery at a low cost but undoubtedly with tremendous potential. Since this product will be utilized as a medical product, additional research and studies should be conducted to better understand all of the effects and side effects of the new product through long-term follow-up and laboratory testing. When compared to other mouthwashes on the market, herbal mouthwash preparations have a powerful action and few side effects; as a result, their use

should be increased to prevent negative consequences. Consequently, there is a need to raise knowledge of the usage of herbal mouthwashes among prescribers and the general population and many more similar studies ought to be supported.

### REFERENCES

- [1]. Kulkesh Kumar Rathore, G. Hanmanth Reddy, Rajwinder Singh Johar, Piyush Kadelwal, Raghavendra M Shetty, Vashundhara Rathore, Antimicrobial Effect of Mouthwashes in Patients Undergoing Orthodontic Treatment, *Ind. J Dent Oral Health*, 2018
- [2]. Renuka S, Muralidharan NP. Comparison in benefits of herbal mouthwashes with chlorhexidine mouthwash: A review. *Asian J Pharm Clin Res*, 2017; 10(2): 3-7.
- [3]. R.V.Geetha et.al, Evaluation of antimicrobial activity of herbal mouthwash on streptococcus mutans –an in vitro study., *International J. Pharm. Sci. Res*, 2017; 45(1): 161-163.
- [4]. Benjamin SN, Gathece LW, Wagaiyu EG. Knowledge, attitude and use of mouthwash among dental and medical students of the University of Nairobi. *Int. J. Dent. Oral Health*, 2016; 2(4): 01-6.
- [5]. Amit Parashar, Mouthwashes and their use in different oral condition., *Sch. J. Dent. Sci*, 2015; 2(2): 186-191
- [6]. Waghmare PF, Chaudhari AU, Karhadkar VM, Jamkhande AS. Comparative evaluation of turmeric and chlorhexidine gluconate mouthwash in prevention of plaque formation and gingivitis: a clinical and microbiological study. *J Contemp. Dent. Pract*, 2011; 1, 12(4): 221-224.
- [7]. BB Oluremi et.al., Evaluation of Anticaries Activity of Selected Mouthwash Marketed., *Trop. J. Pharm. Res*, 2010; 9(6): 581-586.
- [8]. Saket A. Deshmukh, Yogesh N. Ghosle, Rahul H. Kasliwal and Dinesh R. Chaple, Formulation, development, evaluation and optimization of Herbal antibacterial mouthwash. *Deshmukh et al*, 2019; 8(6): 828-841.
- [9]. Dr. Bhavna jha kukreja and Dr. Vidya dodwad, Herbal mouthwashes- A gift of nature. *International Journal of Pharma and Bio Sciences*, 2012; 3(2): ISSN 0975-6299.
- [10]. Rupali S. Jadhav, Lokhande S. S. And Nikam R. J., Herbal Mouthwash: An Update Review, *World journal of pharmacy and pharmaceutical sciences*, 2018; 7(9): 436-445.
- [11]. Ezequiel Rye, The Study of Crude Drugs belonging to various families of Medicinal importance Zingiberaceae Ginger Curcuma.
- [12]. Moonkyoo Kong, Deok-Sang Hwang, Seong Woo Yoon, Jinsung Kim, The effect of clove based herbal mouthwash on radiation-induced oral mucositis in patients with head and neck cancer: A single-blind randomized preliminary study, *Onco Targets and Therapy*, 2016; 9: 4533-4538.
- [13]. Tatiana V. Macfarlane, Michal m. kaweck, Claudia Cunningham, Iain Bovaird, Rochelle Morgan, kirstin Rhodes, Ray Watkins. Mouthwash use in general population: results from adult dental health survey in Grampian, Scotland. *J Oral Maxillofac Res*, 2010; 4(2): 1-9.
- [14]. Shahid Mitha, Mohamed Hassan Elnaem, Michelle koh, Ching En, Muneer Gohar Babar, Jamshed Siddiqui, Shazia Jamshed. Use and perceived benefits of mouthwash among Malaysian adults: An Exploratory Insight. *Journal of Advanced Oral*, 2016; 7(3): 7-14