



“DEVELOPMENT AND ASSESSMENT OF HERBAL MOUTHWASH”

¹Pooja .S. Kashid , ²Shivanjali Wagh

¹Department of Pharmaceutics ,

Navsahyadri Institute Of Pharmacy, Pune , India

Abstract : This review article discusses studies on mouthwash characteristics, benefits, drawbacks, negative impacts, adverse consequences, and applications, especially in COVID-19. It also addresses an unbiased comparison of chemical mouthwash formulations, herbal products, and their effects on allergens from foods as well as the significance of cosmeceuticals. It is considered that a variety of bacterial species called the mouth home. However, while some of these organisms are benign, others can be dangerous and lead to oral plaque, bad breath, and mouth diseases. Thus, keeping the mouth and body healthy requires practicing good dental hygiene. Mouthwash preparations made from extracts of herbs are known as herbal mouthwash preparations. Mouthwash made with herbs offers several advantages over mouthwash made with chemicals. (1)

Key words : Mouthwash , Herbal preparation , Oral hygiene , Alcohol free , Psidium guajava , Clove Oil.

Introduction : Dental plaque is a particular but highly fluctuating fundamental entity made up of salivary elements like mucin, desquamated epithelial cells, debris, and microorganisms embedded in an extracellular gelatinous matrix. It develops as a result of microorganisms colonizing tooth surfaces, restorations, and other areas of the oral cavity sequentially. Multiple investigations have demonstrated that dental plaque plays a significant role in the development of periodontal and gingival disorders. Maintaining plaque control is vital for avoiding dental cavities, gingivitis, and microbes that cause halitosis. The most often utilized instruments or techniques for treating supragingival plaque are dental floss, interdental brushing, and mechanical or electrical tooth brushing. (2)

From the dawn of civilization to the twenty-first century, people have understood the significance of keeping their mouth and teeth clean. There is an abundance of mouthwash products available to patients and oral health professionals, each with a unique combination of active and inactive components. It can be difficult to decide which product is best for a given patient without doing extensive research. Even while a lot of well-known herbal products have been shown to reduce tooth plaque and gingivitis, their use has only been temporary, and they are only meant to be taken in addition to other oral hygiene practices like brushing and flossing.

Many herbal products, including extracts from guava, pomegranate, neem, liquorice, tulsi, green tea, cranberries, and grapefruit, have demonstrated notable benefits over synthetic alternative. There could be a lot of benefits to using natural mouthwash instead of conventional ones. Such mouthwashes could improve the public's overall dental health if they could be created utilizing natural ingredients that people could readily manufacture and use at home. Mouthwash is an aqueous solution that is mostly used to regulate plaque or for its deodorization, refreshing, and antibacterial qualities. It could include flavoring, coloring, glycerin, artificial sweetness, alcohol, and surface active ingredients. Breath fresheners and the management of potentially life-threatening secondary infections, including oral mucositis in patients receiving bone marrow

transplant therapy, are examples of this. Correct diagnosis of the oral hygiene and product comprehension are necessary for using mouthwashes to achieve effective treatment. (3)

Mouthwash :



Mouthwash is a water-based product with anti-inflammatory, antimicrobial, and analgesic properties that is used to manage plaque. There are two types of Mouthwash ;

1. Herbal Mouthwash
2. Chemical Mouthwash

Herbal Mouthwash ;The natural extract found in herbal mouthwash comes from a variety of plants, including leaves, fruits, seeds, and tree oils. Herbal mouthwash is made from natural plant extract. Phytochemicals are naturally occurring ingredients found in herbal mouthwashes, which have the intended anti-inflammatory action. Herbs having antimicrobial properties, such as neem, yavanisatva, nagavali, pilu, gandhapurataila, bibhitaka, ocimum, Echinacea, chameli leaves, etc., are found in many herbal mouthwashes. Some of the plants found in mouthwashes include peppermint, which has a cooling impact on the mouth, and clove, which has long been used for oral health due to its antiseptic, antibacterial, and antiviral properties. Natural remedies for oral health issues, including clove oil, neem, triphala, tulsi, and pudina, have been shown in studies to be safe and effective when used alone or in combination. (4)

Alum and the leaves of palm trees, mehendi, and amla can be boiled together to form a puree in accordance with Ayurveda. Gargling with soup on a regular basis could help reduce pain. the introduction Psidium guajava, the scientific name for guava, has long been used for medicinal purposes, particularly in the treatment of oral health problems that are colorful. You might wish to include information on Since they have been used for a long time, patients and the general public are more accepting of herbal medicines. Because there is a steady supply of medicinal plants, we can continue to provide the growing global population with more affordable pharmaceuticals. Because of India's tremendous agro-climatic, cultural, and ethnic richness, access to medicinal plants is not restricted, and the processing and growing of therapeutic herbs is environmentally friendly. Even when taken for an extended period of time and seems to go unnoticed, using herbal medications is safe and beneficial. the active ingredients in the drugstore design, such as tannins, flavonoids, and essential oils, which contribute to the product's anti-inflammatory and antibacterial properties, while addressing its use for mouth ulcers. It would also be crucial to explore its mode of action, possibly emphasizing how guava's components aid in lowering inflammation, encouraging healing, and thwarting microbial growth, all of which aid in managing the symptoms of mouth ulcers. You might also learn about the creative wording and delivery methods used in mouthwashes, gels, and tablets that contain guava as a therapy for oral ulcers. It would also be essential to explicitly state any implicit adverse effects, potential contraindications, and lozenge suggestions in order to provide a thorough understanding of its therapeutic use. To give your design legitimacy and relevance, it's also critical to include any recent clinical trials or investigation research that enhance guava's effectiveness in treating mouth ulcers. You might obliquely describe future possibilities or implicit areas that require more research to promote discussion and advancement in this area. Guava has become popular for its therapeutic qualities. Additionally to many other minerals, it is high in fiber, vitamin C, and antioxidants. In traditional medicine, the leaves are used to cure respiratory issues, diabetes, and diarrhea. The antimicrobial qualities of guava could enhance dental health. However, before to utilizing it for therapeutic purposes, one should speak with a physician. (5)

Benefits:

Mouthwash can be included in an effective oral hygiene therapy, depending on its ingredients and your personal objectives. Among the possible advantages are:

1. Enamel strengthening:

Fluoride-containing mouthwashes can help strengthen tooth enamel and guard against dental decay, according to Dr. Stinton. However, it's preferable to rinse first and then brush if you're using both mouthwash and toothpaste with fluoride. "rinsing after brushing could wash away the stronger cavity protection benefits of over-the-counter mouthwashes because they have less fluoride than toothpaste."extending to every edge of your mouth Mouthwash can get into places that are difficult to clean with a toothbrush or floss by itself.Dr. Stinton asserts that while rinses shouldn't take the place of brushing and flossing, they can aid in the destruction of dangerous bacteria you might have overlooked. have failed to notice."

2.Getting Rid of Bad Breath :

Using antibacterial mouthwash could help freshen your breath if bacteria are the source of your bad breath. However, be sure you're addressing the root cause by paying attention to the elements. Some over-the-counter mouthwashes use flavorings to cover up bad breath immediately. Dr. Stinton says, "You need a rinse that targets the bacteria causing halitosis in order to treat it." (6)

The drawbacks of mouthwash:

However, there are a few things to think about before including a rinse into your regimen:

1. Getting rid of microorganisms:

A bit too quickly Although you may be aware of the "good" bacteria in your gastrointestinal tract, there is also a vibrant population of microorganisms living in your mouth. The bacteria in your mouth are collectively referred to as your "oral microbiome," and they are crucial to maintaining your health. Some aid in blood pressure regulation and nutritional breakdown, while others offer anti-inflammatory benefits. the problem is that antibacterial mouthwash doesn't differentiate between good and bad bacteria that we need and bad, smelly bacteria that we want to get rid of More research is needed, but using too much mouthwash can disrupt the microbiome in your mouth.

2.Dryness,burning,and,irritation:

Although certain people find it comforting to feel their mouth burn after using mouthwash, this isn't undoubtedly a good thing. Some people may find the burning or tingling sensation that alcohol-based mouthwashes often produce to be too heavily powerful. "This could increase tooth and gum sensitivity, cause discomfort, or worsen mouth sores." If you prefer not to have this burning sensation, look for a remedy without alcohol.

3.Teeth stains:

Despite what might seem like a contradiction, some mouthwashes actually make teeth stains worse. According to studies, rinses containing chlorhexidine or cetylpyridinium chloride, which are frequently used to treat gingivitis or foul breath, may color teeth brown. See your dentist or pharmacist about strategies to lessen this adverse effect if you've been prescribed one of these mouthwashes and are worried about stains. (6)

Anatomy of oral cavity:

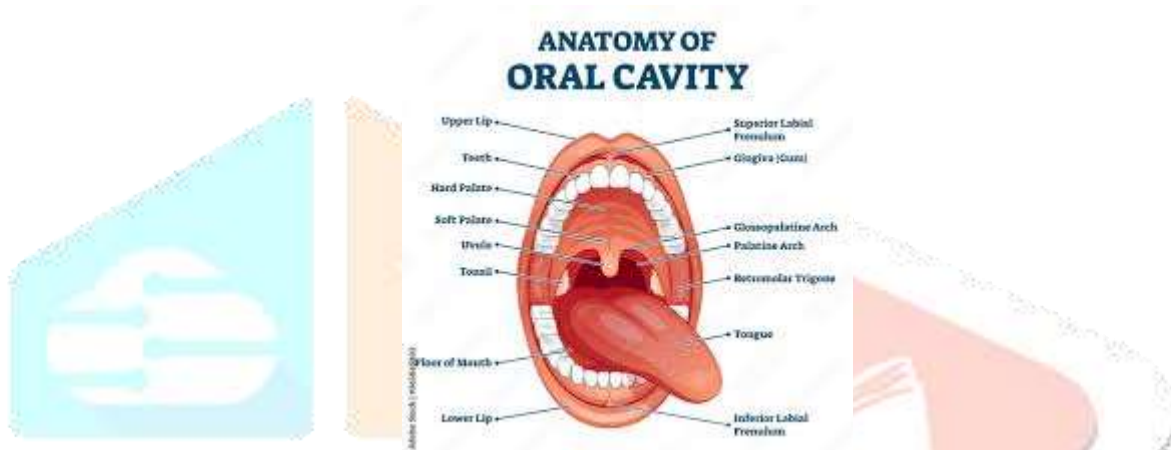
the first portion of the stomach-related tube is approached by the mouth cavity. Its primary function is to serve as the portal for the rich in nutrients lot and to initiate the stomach-related process by causing salivation and for the healthy bolus to be forced into the throat. It also serves as a chemosensory organ, a site of sound modification for the development of conversations, and an optional respiratory conductor. Also crucial for verbal generation are the lips' variety in whistling, singing, expectoration, playing winds and metallic equipment, and human social interaction (such as kissing, smiling, mopping, and exposing teeth). A singular's quality of life can be seriously impacted by even little disruptions in the oral hole's functioning. The oral cavity proper and vestibule are divided by the oval in shape oral depression. It is restricted by the oropharynx posteriorly, the bottom of the mouth insufficiently, the lips anteriorly, the cheeks along the side, and the

sensation of taste superiorly. The oropharynx begins inferiorly beneath the tongue's circumvallate papillae and superiorly at the junction of the harsh and delicate senses of taste. The maxillary and mandibular bones address the hard basis of the mouth opening.

The lips, gingivae, retromolar trigone, teeth, cheek mucosa, tongue, hard sense of taste, and floor of the mouth are all included in the oral cavity. Even though they are not a component of the oral cavity, the main salivary organs are closely related to the structures within it. The oral cavity depends on the tongue. The soft palate, base of the tongue, posterior pharyngeal walls, and palate are all part of the oropharynx; the oral cavity does not contain the oropharynx. (7)

Mouth:

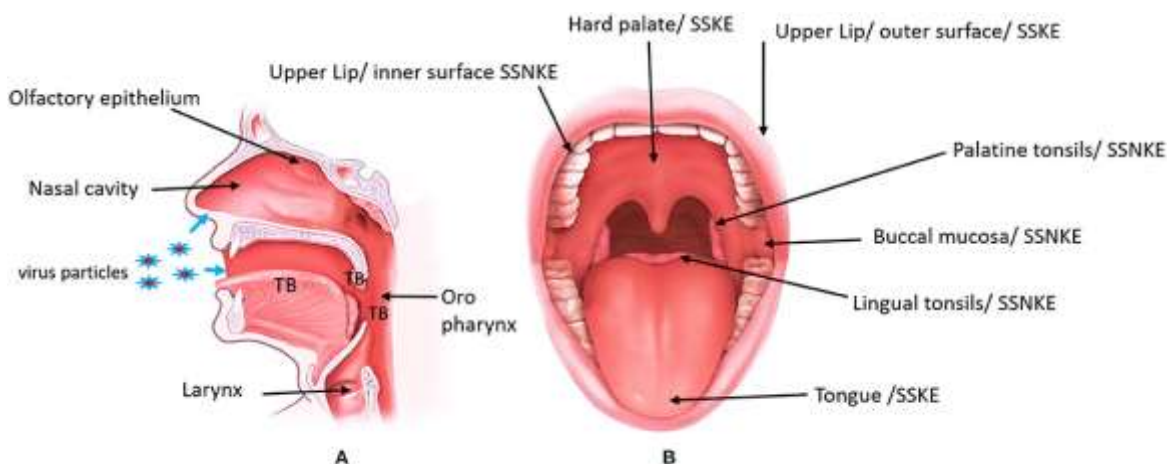
The oral or buccal cavities are other names for the mouth in human anatomy. aperture that the body uses to take in food and oxygen. The mouth opens at the lips to the outside and empties into the neck at the back. Their boundaries are defined by the glottis, hard and soft palates, lips, and cheeks. It is divided into the oral cavity and the vestibule, which encompasses the space between the cheeks and teeth. The latter is mostly occupied by the tongue, a large muscle that is tightly bound to the floor of the mouth by the frenulum linguae.



Oral Mucosa :

The mucous membrane that lines the tissues inside the mouth cavity's borders is referred to as the "oral mucosa".

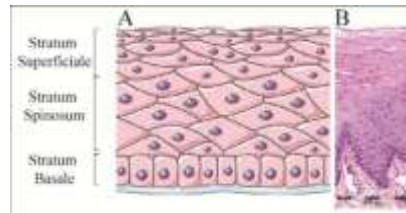
The oral mucosa, or the skin lining the mouth, covers most of the oral cavity aside from teeth. The mucosa lining the oral cavity continues into the skin at the lips, and at the throat it continues into the mucosa lining the remaining portion of the stomach. The oral mucosa is composed of two tissue components: the epithelium that covers it and the underlying connective tissue.



Layer's of Oral Mucosa :

Oral mucosa is composed of four layers –

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



Throat:

The pharynx, also referred to as the throat, is a muscular funnel-shaped conduit inside the body. It connects the mouth and nose to the oesophagus, which leads to the stomach, and the larynx, which leads to the trachea and eventually the lungs. The pharynx is located in the middle of the neck. It starts at the base of the skull and is around 4.5 inches long. Part of the throat's pharynx is the Nasopharynx, which permits air to pass through and connects the top of the throat to the nasal cavities. The oropharynx is the passageway that connects the middle of the throat to the oral cavity. It allows fluids, air, and food to pass through. Laryngopharynx: The region near the larynx at the base of the throat. It regulates the passage of air to the lungs as well as the flow of food and liquids into the oesophagus. (8)



Materials & Methods:

a. Materials Used:

Guava Extract, Cinnamon Oil, Clove Oil, Peppermint Oil, Methyl Paraben, SLS, PEG 400, Distilled Water.

Table 1: Ingredients and their Functions. (9)

Sr.no.	Ingredients	Function
1.	Guava Extract	Anti-Inflammatory Agent
2.	Cinnamon Oil	Bactericidal
3.	Clove Oil	Analgesic, Anti-Inflammatory Agent
4.	Peppermint Oil	Freshner, Antibacterial, Antifungal
5.	Methyl Paraben	Preservative
6.	SLS	Foaming Agent
7.	PEG 400	Solubilizing Agent
8.	Distilled Water	Vehicle

a) **Guava (10) :****Table 2: Information about Guava.**

Synonym:	Psidium; genus Psidium; true guava; Psidium guajava; fruit tree; guava bush
Biological Source:	In many tropical and subtropical locations of Psidium guajava, guavas are a common tropical fruit that are grown.
Family:	Myrtaceae
Chemical Constituents:	<p>Pink guava fruit contains octanol and ethyl octanoate. γ-pinene, β-pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene, β-bisabolene, caryophyllene oxide, β-copanene, farnesene, humulene, selinene, cardinene, and curcumene, as well as mallic, nerolidiol, β-sitosterol, ursolic, crategolic, and guayavolic acids, cineol, quercetin, 3-L-4-4- avicularin, or arabinofuranoside, and associated Three -L-4-pyranoside (Essential oil), tannin, eugenol, resin, and caryophyllene (1a α-, 4a α-, 7 α-, 7a β-, and 7b α-) [e]-decahydro-1H-cycloprop azulene, guajavolide (2 α-,3 β-,6 β-,23-tetrahydroxyurs-12-en-28,20 β-olide; 1), and guavenoic acid (2 α-,3 β-,6 β-,23-tetrahydroxyurs-12,20) Diphen-2-oic acid, triterpeneoleanolic acid, flavonone-2'-ene, prenol, dihydrobenzophenanthridine, and cryptonine</p>

Uses:	<ul style="list-style-type: none"> a) Antimicrobial properties. c) Plaque therapy. d) Inhibition of proliferation. d) Activity related to immunity
--------------	--

b) **Cinnamon (11):****Table 3: Information about Cinnamon**

Synonym:	Cinnamomum verum, Cinnamomum zeylanicum, Laurus Cinnamomum, Cinnamomum aromaticum, Cinnamomum loureiroi, Cinnamomum burmannii, Cinnamomum tamala.
Biological Source:	Traditionally used for centuries in a variety of civilizations worldwide, cinnamon comes from several portions of a tropical evergreen tree in the genus Cinnamomum.
Family:	Lauraceae
Chemical Constituents:	Different portions of the cinnamon plant contain different basic constituents: bark oil primarily includes cinnamonaldehyde, leaf oil has eugenol, and root-bark oil contains camphor. Eugenol, eugenol acetate, cinnamyl acetate, cinnamyl alcohol, methyl eugenol, benzaldehyde, cuminaldehyde, benzyl benzoate, linalool, and monoterpene hydrocarbons are some of the components commonly found in cinnamon bark oil.
Uses:	<ul style="list-style-type: none"> a)Flavouring Agent. b)Used as a Spice. c)Used for treatment of impotence,frigidity ,dyspnea,eye inflammation,vaginitis wounds & toothaches. d)Antioxidant.

c) Clove:



Table 4: Information about clove:

Synonym (12):	Laung, Syzygium aromaticum
Biological Source:	The dried flower buds of the Eugenia caryophyllus plant are used to make cloves. (4)
Family:	Myrtaceae
Chemical Constituents (12):	Cloves, or Syzygium aromaticum, are roughly 1/2 to 3/4 inches long and contain 14–20% essential oil. Eugenol, which cloves contain a lot of and can be distilled to produce essential oil, is what gives cloves their powerful scent. When administered orally for medical purposes, clove buds have been found to be safe. For more than two millennia, people have utilized cloves for medical purposes.
Uses:	a)Antioxidant b)Antifungal c)Antiviral d)Antibacterial e)Anti-inflammatory (13)

d) Peppermint (14):



Table 5: Information about peppermint:

Synonym:	Pudina, Mentha piperita, Menthol.
Biological Source:	The essential oil known as Aetheroleum Menthae Piperitae is extracted through steam distillation of the fresh aboveground parts of Mentha x piperita L. (Lamiaceae), which are located on the undersides of the leaves.
Family:	Lamiaceae
Chemical Constituents:	Menthol (30–55%) and menthone (14–32%) are the main ingredients. The most common form of menthol is free alcohol, while it can also be found in trace amounts as acetate (3-5%) and valerate esters. The remaining monoterpenes are limonene (1-4%), neomenthol (2.5–3.5%), isomenthone (2–10%), 1,8-cineole (6–14%), α -pinene (1.0–1.5%), β -pinene (12%), and methofuran (1–9%).
Uses:	a)Internal use for the symptomatic management of gastritis and other digestive problems as well as irritable bowel syndrome. externally to relieve headache and myalgia. b)Treatment for urinary tract infections, fevers, jaundice, diabetes, dysmenorrhea, and dyspepsia.

Collection Of Plant:

After being picked, fresh guava leaves were left to air dry for ten days. After that, a Grinder was used to crush and agitate the dry leaves into a coarse powder. The powder was gathered into a sealed container and kept out of direct sunlight in a cold, dry location. (15)

Extraction Process:

The guava leaf powder was heated up for 15 to 20 minutes at 90 degrees Celsius. After that, the leaves were boiled and filtered through filter paper. (15)

Phytochemical Screening:**1.Test For Carbohydrates:**

- a)Molisch Test: Filtrate + 2 Drops of alcoholic α -naphthol solution - Formation of Violet Ring.
- b)Benedict's Test: 1ml Plant Extract +Benedict's Reagent + 5 min Heat – Formation of Orange Precipitate.

2.Test For Proteins:

- a)Xanthoprotic Test: Plant Extract + Few drops of conc.HNO₃ – Formation of Yellow Colour.
- b)Biuret Test: 1ml Plant Extract + 4% NaOH & 1%CuSO₄ – Formation of Violet Pink Colour.

3. Test For Lipids:

a) Sudan III Test: 1ml Plant Extract + Few drops of Sudan III Solution – Formation of Red Colour.

4. Test For Alkaloids:

a) Mayer Test: 1ml Plant Extract + 2 drops of Chloroform + 2 drops of Mayer Reagent - Production of White Deposits.

5. Test For Tannins:

a) Lead Acetate Test: Filtrate + 5ml 10% lead acetate solution – Formation of White Precipitate.

6. Test For Saponins:

a) Foam Test: 1ml Plant Extract + small amount water + Sod. bicarbonate + 5 min shaking – Formation of Foam.

7. Test For Resins:

Plant Extract + 0.5 ml Acetic acid + 2 drops conc. Sulphuric acid – Formation of Yellow Colouration Disappeared on Standing.

8. Test For Triterpenes:

Few ml of Plant Extract + 5 ml of Chloroform + Warmed for 30 min. at 40 °C + Few drops of conc. Sulphuric acid - Appearance of Red Colour.

9. Test For Anthraquinones :

2ml Plant Extract + 10 ml Benzene + 5ml of 10% Ammonia solution – Formation of Colour of Anthraquinones. (16)

Method For Preparation Of Mouthwash:

We'll take a weighted quantity of each element. A small amount of water was added to the extract and it was properly combined in a mortar and pestle. The other ingredients will be added gradually and thoroughly mixed. Clove oil, cinnamon oil, and mint oil will be added drop by drop and thoroughly combined, being careful not to form lumps. Next, SLS and sucrose will be added after PEG 40 has been added drop by drop and thoroughly mixed. Ultimately, preservative and water will be added for volume, and the product will be packaged in a visually appealing, tightly-sealed container. (17)

The Evaluation of a Herbal Mouthwash:

- a) **Physical evaluation:** A visual examination was used to assess physical parameters such as appearance, taste, consistency, and odour.
- b) **pH:** A digital pH meter was used to measure the mouthwash's pH after it was made using herbs. A standard buffer solution was used to calibrate the pH meter. Approximately 1 milliliter of mouthwash was weighed, diluted in 50 milliliters of purified water, and its pH was measured.
- c) **Test for microbiological growth in formulated mouthwash:** Using the streak plate method, the mouthwash formulation was inoculated into the agar medium plates, and a control was set up. After being put in the incubator, the plates are incubated for 24 hours at 37°C. Plates were removed from the incubation period and examined for microbial growth by contrasting them with the control.
- d) **Stability Studies:** Any pharmaceutical product cannot be fully formulated or manufactured without conducting adequate stability tests on the final product. By doing this, the produced product's physical and chemical stability is assessed, and ultimately the product's safety is determined.
- e) **In-vitro Antibacterial Activity:** Streptococcus mutans isolated colonies were subjected to in vitro antibacterial activity. The zone of inhibition and minimum inhibitory concentrations (MIC) were found using the Agar well diffusion technique. Blood agar plates that were already prepared were injected with the S. mutans strains. With the use of a 6 mm agar well cutter, four wells were created once the plates had dried. Twenty, forty, sixty, and eighty microliters of ready-made mouthwash were added to each well. To enable

the herbal mouth wash to passively diffuse into the agar growth medium, the agar plates were left undisturbed. The plates were then incubated for twenty-four hours at 37°C. In millimeters, the zone of inhibition was computed. (18) (19) (20)

Conclusion:

We may conclude, within the constraints of this study, that herbal mouthwash, when used in conjunction with daily dental care in patients with gingivitis, may help reduce plaque and inflammation. This study holds significant implications for developing herbal oral health therapies that are both cost-efficient and effective for low-socioeconomic areas. However, longer, more comprehensive investigations are required, as this one was only short-term in nature. Medical research has demonstrated that the natural herbs utilized in current formulations can avoid issues with dental health and foul breath. Numerous research confirm the many years that these herbs have been known to work marvels. and shield you from a range of macawhealth issues.

References :

1. Y. V. Pawar , A.Gore , Dr. M. T. Salve The Review on Mouthwash. IRJMETS , Vol 05/ Issue11/Nov 2023.
2. B.Garapati , J. Ramamurthy , R. Shanmugam , Formulation Development and Evaluation of Anti-Inflammatory and Anti-Microbial Effects of Novel Poly Herbal Mouthwash JPTCP.
3. S.A. Deshmukh , Y.N.Gholse, Formulation Development Evaluation and Optimization of Herbal Anti-Bacterial Mouthwash, WJPR 2019 ,Vol 8, Issue 6,2019, pg no. 828-841.
4. T.Uddeshvishram , D.S.Borade , Formulation and Evaluation of Herbal Mouthwash ,IRJMETS, Vol :05/Issue :12/December 2023 ISSN :2582-5208.
5. V Shirke ,Guava Used To Treat Mouth Ulcer ,WJPR,10 Dec.2023,Pg no.900-913.
6. M.Rajendiran ,H.M.Trivedi ,D.Chen ,P.Gajendrareddy ,L.Chen,Review Recent Development Of Active Ingredients In Mouthwashes And Toothpastes For Periodontal Diseases,IRJMETS,Vol:05 /Issue:11/Nov-2023,ISSN:2582-5208.
7. A.S.Ghuge And R.A.Khandre, Formulation and Evaluation of Mouthwash using Guava leaves for Aphthous ulcer Treatment,World Journal of Biology Pharmacy and Health Science 2024, 17(01),228-241.
8. S.S.Pange , S.V.Mali , N.N.Kale , D.D.Kawade , Formulation and Evaluation of Herbal Mouthwash .IJISRT,Vol:8,Issue 5May 2023 ISSN: 2456-2165.
9. S.B.Shambharkar,V.M.Thakare,Formulation And Evaluation Of Herbal Mouthwash ,WJPR,Vol 10,Issue 9,pg no.775-791,ISSN 2277-7105.
10. M. Jagruthi , Y.S. Devika , “Role of Aqueous Leaf Extract of Psidium guajava L. on spermatogenesis and sex hormones in male Albino Rat”., Int. Res. J .,2015;2(2):281-301.
11. K.Haddi , R.A.Leda Faroni , Eugenia E. Oliveira , Green Pesticides Handbook 20 June 2017.
12. Merr. ,L.M.Perry., Germplasm Resources Information Network(GRIN) , Agricultural Research Services(ARS) ., US Dept of Agriculture(USDA).2011
13. Hema R.,Kumavel S ,Sivasubramanian C ..GCMS Study On The Poentials Of Syzygium aromaticum;Researcher,2(12),2010,1-4.
14. A.K.Sachan , D.R.Das, MD Shuaib , S.S.Gangwar, R.Sharma, An Overview of Menthae Piperitae (peppermint oil), IJPCBS , ISSN:2249-9504, Vol:3(3), Kanpur, India.
15. N.Ramola, A.Baghala, Phytochemistry and Pharmacological Activity of Psidium guajava.An Overview Published by Journal of Pharmaceutical Negative Research. [2023], Vol.14, Page no. 3275-3283.
16. Z.A.Lone & N.K.Jain,Phytochemical Screening Of Guava (Psidium guajava L)Leaves Extract And Its Medicinal Importance ,IJIEM,ISSN:2348-4918,Vol:09,Issue 06 , August 2022,Indore(MP).
17. D.Nigam,P.Verma and M.Chhajed,Formulation and Evaluation of Herbal Mouthwash against Oral Infections Disease,IJPLS,ISSN:0976-7126,Vol:11,Issue 7 July.2020,Indore(MP).
18. Rajput.M.D,Yadav.A.R,Mohite.S.K. Synthesis,Characterization of Benzimidazole Derivativesas Potent Antimicrobial Agents .IJPPR.2020;17(4):279-285.
19. Vinoth B and Manivasagaperumal R :Phytochemical analysis and antibacterial activity of Azadirachta indica.Juss. Int J of Res in Plant Sci.2012;2(3):50-55.
20. S.S.Patil,A.R.Yadav,A.R.Chopade,S.K.Mohite, Design,Development and Evaluation of Herbal Mouthwash for Antibacterial Potency against Oral Bacteria.,JUSST.Vol.22,Issue 11,Nov-2020,ISSN:1007-6735.