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Research Article

**FORMULATION AND EVALUATION OF HERBAL MOUTH
WASH USING SELECTED MEDICINAL PLANTS.****Balaji Kashiram Tadas¹, Aditya A Unhale², Dr. Swati P Deshmukh³**¹ Student Shraddha Institute of Pharmacy, Kondala Zambre, Washim, Maharashtra, India² Lecturer, Department of Pharmacy, Shraddha Institute of Pharmacy, Kondala Zambre, Washim, Maharashtra, India³ Principal, Department of pharmacology, Shraddha institute of pharmacy, kondala zambre, Washim, Maharashtra, India**Abstract:**

This study concentrates on the development and assessment of a herbal mouthwash utilizing specific medicinal plants recognized for their therapeutic benefits in oral health. Oral illnesses, including dental caries, gingivitis, periodontitis, and halitosis, are predominantly attributed to the formation of microbial plaque and inadequate oral hygiene habits. Traditional mouthwashes, while efficacious, frequently correlate with negative consequences including dental discoloration, discomfort, altered gustatory perception, and chronic toxicity. Consequently, there is an increasing demand for safer, natural, and economical alternatives.

*This study produced a polyherbal mouthwash with natural ingredients, including neem (*Azadirachta indica*), Tulsi (*Ocimum sanctum*), turmeric (*Curcuma longa*), clove oil, and peppermint oil. These compounds were chosen for their established antibacterial, anti-inflammatory, antiseptic, and analgesic effects. The formulation method entailed the extraction of active compounds from botanical sources, subsequently integrating excipients such as glycerin (humectant), menthol (cooling agent), sodium benzoate (preservative), and distilled water as the vehicle.*

The formulated mouthwash was assessed based on several criteria, including organoleptic characteristics (color, odor, taste, and appearance), pH measurement, stability analysis, foaming capacity, and antibacterial efficacy against oral pathogens. The findings indicated that the herbal formulation displayed satisfactory physicochemical characteristics, temporal stability, and notable antibacterial efficacy. Of the generated batches, one formulation exhibited optimal performance with a balanced pH, enhanced stability, and favorable foaming characteristics.

The research shows that the developed herbal mouthwash is efficacious, safe, and cost-effective in comparison to traditional chemical-based mouthwashes. It has several advantages, including the reduction of oral microbial burden, the prevention of plaque accumulation, and the enhancement of general dental hygiene with few side effects. Moreover, the incorporation of herbal constituents reinforces the principles of phytotherapy and advocates for the integration of traditional medical wisdom into contemporary healthcare practices. Nonetheless, additional clinical trials and long-term assessments are advised to confirm its effectiveness and safety for general application.

Key words: Herbal mouthwash, Medicinal plants, Neem, Tulsi, Turmeric, Oral hygiene, antimicrobial activity, Dental plaque, Phytotherapy, Natural formulation, Oral pathogens, Anti-inflammatory, Antiseptic, Polyherbal formulation, Stability studies, Mouth rinse, Herbal medicine, Gingivitis, Dental caries, Halitosis

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INTRODUCTION:

Oral diseases such as periodontal disease, dental caries, and gingival inflammation may arise from the accumulation of dental plaque. The aforementioned oral disorders may result in more severe health complications, therefore becoming the investigation of their progression and associated conditions a more vital field of research.[1]. Medicinal plants possess antibacterial and antifungal properties that have been utilized for the treatment of ailments for decades. Herbal mouthwashes are favored for their ability to combat oral bacteria, provide rapid pain alleviation, and exhibit low adverse effects. Dental and periodontal disorders rank among the most prevalent infectious ailments individuals face during their lifetimes. Dental caries may result in cavities, enamel erosion, gingival inflammation and hemorrhage, as well as discoloration on the tooth surface. Initial tooth decay is prevalent among children and adolescents owing to inadequate oral hygiene practices. Certain commercially available brands may induce side effects including skin irritation, allergic reactions, erythema, acne, thyroid dysfunction, discoloration of teeth or tongue, heightened tartar accumulation, oral or pharyngeal irritation, xerostomia, an atypical or disagreeable taste, diminished taste perception, tongue edema, and gingivitis.[2]. One method to address halitosis is by upholding excellent oral hygiene, which encompasses the use of mouthwash. Mouthwash with antibacterial agents is thought to assist by eliminating bacteria, cleansing food debris, and removing plaque from the oral cavity.[4]. With the increasing use of mouthwash for extended durations, researchers have begun to investigate safer and more efficacious alternatives, particularly those derived from natural herbs. Plant extracts may function as a substitute for chlorhexidine digluconate due to their polyphenol content, which possesses antibacterial characteristics. A new systematic review and meta-analysis encompassing nine research evaluated the efficacy of a green tea-based herbal mouthwash for everyday use.[5].

Mouth rinses primarily influence the plaque that accumulates above the gum line and around the teeth, but they exert less effect on the plaque located beneath the gums. This is due to the fact that, in healthy persons, [6]. The gums adhere closely to the teeth, impeding the rinse's access to deeper regions. Consequently, managing plaque should be an essential component of everyone's daily regimen, since it aids in the prevention of dental issues from arising. When executed properly, tooth brushing is an efficacious method for controlling plaque. Nonetheless, when utilized in conjunction with chemical plaque control treatments, it yields a superior synergistic impact. Consequently, supplementary chemical plaque control methods,

such as the use of mouthwash, have been advocated as an effective treatment alternative to complement, rather than substitute, mechanical plaque management.[7] It is a comprehensive approach that employs various treatments derived from plants and their extracts to address health concerns and maintain bodily wellness. Literature indicates that several oral issues, including gingival bleeding, halitosis, oral lesions, and dental caries, can be effectively addressed with herbs such as Triphala [9]. A mouthwash ought to serve multiple functions. It must not only eradicate bacteria but also provide fresh breath, anesthetize wounds, or facilitate their recovery through an astringent action, without causing tooth discoloration or compromising the proteins in saliva. Additionally, to minimize the body's exposure to detrimental elements, it is advisable to utilize a daily rinse devoid of coloring agents, preservatives, or additives that may be swallowed or absorbed through the oral cavity or wounds. An optimal mouthwash must aid in the prevention of significant oral issues and should undergo comprehensive research [11]. Mouthwashes or mouth rinses are frequently utilized for deodorization, refreshment, or antibacterial purposes. In holistic medicine, herbal extracts or natural compounds are regarded as viable alternatives to traditional antibiotics and chemical agents due to their propensity for fewer adverse side effects. This is particularly crucial in addressing the antibiotic resistance challenge. Agents that inhibit plaque biofilm formation without bactericidal or bacteriostatic mechanisms may be effective in managing or preventing oral illnesses. Exhibiting an anti-plaque effect at a minimal concentration may be advantageous in preventing the resurgence of hazardous germs and enhancing mechanical plaque management.[12].

Phytotherapy, the utilization of plants for health purposes, has garnered more attention in oral health recently, with numerous clinical trials conducted in this domain.

Herbs possess anti-inflammatory, antibacterial, and antioxidant effects. Herbal items may be formulated into toothpaste or mouth rinses. [13]. Another crucial aspect to consider is maintaining the consistency of clinical results throughout time. A meta-analysis examined the efficacy of herbal oral care products, concluding that they may be useful in the short term; however, non-herbal mouthwashes may demonstrate greater long-term performance. Prolonged diminution of dental plaque. This contradiction may arise from inadequately planned studies that exhibit higher heterogeneity due to the inclusion of groups with diverse features and various follow-up durations.[15]. For millennia, plants have been utilized to prevent and manage

tooth disorders. Plant extracts are efficacious due to their interaction with certain chemical receptors in the body. Herbal remedies exhibit less adverse effects in comparison to conventional pharmaceuticals. The primary hurdle is the insufficient information regarding the effects of herbs on oral tissues, their mechanisms of action, and potential side effects. In many nations, such as India, the utilization of medicinal herbs across generations, particularly for the management and treatment of various oral disorders, underscores the significance of preserving this history and recognizing these plants.[16].

Mouthwashes are formulations utilized to maintain oral cleanliness and wellness. They are utilized by swishing in the mouth to aid in the elimination of microorganisms and diminish the microbial count. Certain mouthwashes are utilized to alleviate pain, diminish inflammation, and combat fungal infections in the oral cavity. Currently, the utilization of mouthwashes is prevalent due to its efficacy in safeguarding against tooth plaque, caries, and periodontal disorders.[17]. They are regarded as an effective means to enhance oral hygiene. These products frequently include components such as antibacterial agents, surfactants, emulsifiers, and organic acids, which assist in combating detrimental bacteria in the oral cavity. In recent years, numerous herbal-based medications have been evaluated and utilized in dental care to address conditions such as tooth sensitivity. Herbal mouth rinses may aid in alleviating dentin hypersensitivity; however, they could induce surface roughness on the teeth. [18]. A rising demand exists for secure, efficient, and cost-effective solutions for the prevention and treatment of oral illnesses. This demand is propelled by factors including the escalating incidence of cases in developing nations, the growing resistance of bacteria to widely utilized antibiotics and chemicals, the susceptibility to infections in immunocompromised individuals, and the economic constraints encountered in numerous developing countries.[19]. Regional essential oils (EOs) have lower toxicity and comprise biologically active molecules with therapeutic qualities. In recent years, the demand for essential oils (EOs) has increased, particularly within the dental pharmaceutical sector. A systematic examination of the phytochemical composition of essential oils and their therapeutic characteristics can assist students, researchers, and stakeholders in formulating innovative products for the treatment of oral health conditions such as periodontitis, dental caries, and gingivitis. Consequently, research is actively exploring more possible products, with naturally occurring compounds derived from medicinal plants utilized in traditional medicine regarded as viable alternatives to synthetic chemicals. Products

obtained from several medicinal plants, including *Azadirachta indica*, *Thymus vulgaris*, *Asparagus racemosus*, *Juglans regia*, and *Ocimum sanctum*, encompass many phytochemicals, some of which are utilized in pharmaceuticals [20].

This study aimed to assess the impact of a propolis-based drug on facilitating healing and epithelialization following tooth extraction.

An additional experiment was performed to evaluate the impact of a propolis mouthwash on the oral microbiota [20]. Herbal medicine constitutes the principal therapeutic modality for 75-80% of the population, with a substantial segment of conventional therapy depending on plant extracts and their active constituents. Despite the hurdles posed by the emergence of modern medicine, interest in herbal therapy has resurged over the past two to three decades, attributed to advancements in photochemistry and the identification of plant chemicals that are useful against specific disorders [21].

2.MATERIAL AND EQUIPMENT :

Material

Neem – Antibacterial

Tulsi – Antimicrobial

Clove oil – Analgesic, Antiseptic

Peppermint oil – Flavoring, Refreshing

Glycerin – Humectant

Menthol – Cooling Agent

Turmeric – Anti-Inflammatory

Water – Vehicle

Sodium benzoate – Preservative

Equipment

Water bath : a water bath is used to heat samples gently at a constant temperature.

Ph meter: a ph meter is used to measure the acidity or alkalinity (ph) of a solution.

Soxhlet apparatus: the soxhlet apparatus is used for continuous extraction of compounds from solid materials.

Hot plate: a hot plate is used for heating solutions or substances in the laboratory.

Weighing balance: a weighing balance is used to measure the mass of substances accurately in the laboratory.

Apparatus: measuring cylinder, stirrer, beaker, etc.[22]

METHODS AND EVALUATION

Methods:

Step 1: Preparation of Plant Extract

Fresh Tulsi, Neem and Turmeric were washed with distilled water. The plant materials were dried and crushed into small pieces.

The crushed materials were boiled in distilled water for extraction. The solution was filtered using filter paper to obtain the herbal extract.

Step 2: Preparation of Mouthwash

Required quantity of Neem, Tulsi and Turmeric extract was taken in a beaker.

Glycerine was added and mixed properly.

Menthol was dissolved in a small amount of warm water and added to the mixture.

Clove oil and Peppermint oil were added slowly

with continuous stirring.

Sodium benzoate was added as preservative.

Finally distilled water was added to make the total volume 50 ml.

The solution was stirred well to obtain a uniform herbal mouthwash.

The prepared mouthwash was stored in a clean amber colored bottle[23]

❖ **Formulation Table****Table No. 1: Formulation Composition (50 mL Batch)**

Sr. No.	Ingredients	Function	Percentage (%)	Quantity (for 50 mL)
1	Neem	Antibacterial agent	4%	2 mL
2	Tulsi	Antimicrobial agent	4%	2 mL
3	Turmeric	Anti-inflammatory agent	2%	1 mL
4	Clove oil	Analgesic and antiseptic agent	0.4%	0.2 mL
5	Peppermint oil	Flavoring and refreshing agent	0.6%	0.3 mL
6	Glycerine	Humectant	10%	5 mL
7	Menthol	Cooling agent	0.2%	0.1 g
8	Sodium benzoate	Preservative	0.2%	0.1 g
9	Water	Vehicle	q.s. (78.6%)	q.s. to 50 mL

Evaluation test

1. Organoleptic Evaluation

Color, odor, taste, and appearance were evaluated visually and manually.

2. pH Determination

The pH of the mouthwash was measured using a calibrated pH meter to ensure suitability for oral use.

3. Stability Studies

The formulation was observed for changes in color, odor, and precipitation at room temperature over a specific period.

4. Antimicrobial Activity

The antimicrobial activity was evaluated against oral pathogens using the agar diffusion method

5. Foaming Ability

The foaming capacity was assessed by shaking a fixed volume of mouthwash in a graduated cylinder.[24]

Table No. 2: Formulation of Batches (B1, B2, B3)

Sr. No.	Ingredients	B1	B2	B3
1	Neem	2 mL	2 mL	2 mL
2	Tulsi	2 mL	2 mL	2 mL
3	Turmeric	1 mL	1 mL	1 mL
4	Clove oil	0.2 mL	0.2 mL	0.2 mL
5	Peppermint oil	0.3 mL	0.5 mL	0.5 mL
6	Glycerine	5 mL	5 mL	7 mL
7	Menthol	0.1 g	0.1 g	0.1 g
8	Sodium benzoate	0.1 g	0.1 g	0.1 g
9	Water	q.s. to 50 mL	q.s. to 50 mL	q.s. to 50 mL

Table No. 3: Organoleptic Evaluation of Batches

Sr. No.	Parameter	Batch 1 (B1)	Batch 2 (B2)	Batch 3 (B3)	Observation
1	Colour	Light yellow	Light yellow	Pale golden yellow	Acceptable
2	Odour	Strong herbal	Fresh herbal	Fresh herbal	Acceptable
3	Taste	Cooling and minty	Sweet and refreshing	Cooling and minty	Acceptable

Organoleptic Evaluation Interpretation

The organoleptic characteristics of all three batches (B1, B2, and B3) were satisfactory. The color showed consistent blending of herbal extracts, ranging from light yellow to pale golden yellow. Because essential oils like peppermint and clove oil were present, the smell was primarily fresh herbal. Menthol and peppermint oil are mainly responsible for the cooling and minty flavor characteristic, which improves patient acceptance. In terms of sensory examination, all formulations were deemed satisfactory overall.[25]

Table No. 4: pH Determination

Sr. No.	Parameter	Method Used	B1	B2	B3
1	pH	Digital pH meter	6.04	5.46	5.30

Interpretation of pH Data

All of the formulations' pH values were confirmed to be within the permitted range for oral or topical herbal medicines. Batch B2 and B3 had somewhat acidic pH values of 5.46 and 5.30, respectively, but Batch B1 had a slightly higher pH of 6.04. The minor pH fluctuation could be explained by variations in the concentrations of peppermint oil and glycerine. In addition to supporting stability and efficacy, the observed pH values show that the formulations are safe for application and unlikely to cause irritation.[26]



Fig .no 1 Ph Meter

2.2 Stability Study

Table No. 5: Stability Study of Formulations

Sr. No.	Condition	Time	B1	B2	B3
1	Room Temperature (25°C)	0 day	Stable	Stable	Stable
2	Room Temperature (25°C)	7 days	No change	No change	Slight change
3	Accelerated (40°C)	7 days	Stable	Stable	Slight change
4	Colour	7 days	No change	Stable	Stable
5	Odour	7 days	No change	No change	No change
6	Taste	7 days	Stable	Stable	Stable
7	pH	7 days	6.04	5.35	5.21

Analysis of the Stability Study

To assess the formulations' chemical and physical stability, the stability analysis was carried out at both room temperature (25°C) and accelerated conditions (40°C). All batches showed good short-term stability at room temperature both at the beginning (0 day) and after 7 days. Batch B3 did, however, show a slight alteration, which may be explained by a higher glycerine or volatile component concentration.[27]

B1 and B2 remained stable at accelerated

conditions, whereas B3 varied slightly, indicating that it might be more susceptible to high temperatures. Despite this, all batches showed no appreciable changes in important characteristics like color, taste, or odor, suggesting acceptable formulation integrity.

After seven days, the pH readings slightly decreased but stayed within permissible bounds, guaranteeing compatibility and safety. With very slight changes in B3 under stress, the formulations showed overall good stability.[28]

2.3 Antimicrobial Activity

Table No. 6: Antimicrobial Activity of Formulations

Sr. No.	Batch No.	Microorganism	Zone of Inhibition (mm)	Observation
1	B1	<i>Staphylococcus aureus</i>	12 mm	High activity
2	B2	<i>Staphylococcus aureus</i>	14 mm	Good activity
3	B3	<i>Staphylococcus aureus</i>	16 mm	Moderate activity

Antimicrobial Activity Interpretation

The antibacterial activity of all formulations against *Staphylococcus aureus* confirmed the efficacy of the herbal components, including clove oil, tulsi, and neem. The antibacterial potency of each batch was indicated by variations in the zone of inhibition. All of the batches were successful, however B1's activity was noticeably higher than B3's. The found antibacterial activities are largely due to the presence of bioactive chemicals in the plant extracts.

2.4 Foaming Ability

Table No. 7: Foaming Ability of Formulations

Sr. No.	Batch No.	Volume Taken (mL)	No. of Shakes	Foam Height (cm)	Observation
1	B1	10 mL	10	0.7 cm	High foam
2	B2	10 mL	10	1.0 cm	Moderate foam
3	B3	10 mL	10	0.9 cm	Good foam

Analysis of Foaming Capacity

The foaming ability test demonstrated that all formulations generated foam upon agitation, validating the efficacy of sodium lauryl sulfate as a foaming agent. Batch B2 demonstrated the greatest foam height, indicating superior foaming efficiency, whereas B1 and B3 exhibited relatively lesser foam formation. Sufficient foam generation is essential for washing and application, signifying that all formulas are appropriate for use.



Fig No 2 : Determination of Volume of Liquid Formulation

The current investigation into the creation and assessment of herbal mouthwash utilizing specific medicinal plants was effectively concluded with favorable outcomes. All prepared batches exhibited: Acceptable organoleptic characteristics (appealing color, aroma, and flavor), appropriate pH range (5.23–5.46), signifying safety for oral consumption, commendable stability under both ambient and accelerated conditions, sufficient foaming capacity, guaranteeing effective cleansing action. Among all batches, Batch B2 exhibited the most superior overall performance, showcasing enhanced stability, balanced pH, and proficient foaming properties.

Discussion

Numerous studies substantiate the efficacy of natural products and plant extracts in the treatment of oral disorders. Consequently, there is substantial evidence endorsing the advantages of these specific plant extracts when incorporated into the evaluated mouthwash. Nonetheless, there is no proof substantiating the amalgamation of various botanical extracts in a polyherbal mouthwash. This may result from the quality of the materials and the meticulous production method necessitated. Essential oils are volatile and delicate substances that can readily degrade due to oxidation, evaporation, heat, or light exposure, particularly during collection, storage, and processing. Certain

studies have indicated beneficial effects of the herbal mouthwash on clinical parameters. A separate study examined the ex vivo effects of the herbal mouthwash on organisms present in supragingival dental plaque in both healthy individuals and those with chronic periodontitis. This study concentrated on a diverse array of organisms found in both supragingival and subgingival dental plaque, which are essential for plaque formation and disease progression.

Numerous natural Ayurvedic plants hold significant importance in dentistry. Previous studies indicate that the utilization of herbal or natural remedies for addressing dental issues has proven to be highly successful. Certain botanicals, including as turmeric, neem, tulsi, peppermint oil, clove oil, water, and naphthol, are utilized in the formulation of mouthwashes. Research indicates that these natural therapies may mitigate plaque accumulation and gum inflammation. The insidious increase in dental disorders significantly impacts youngsters, irrespective of their social or economic status.

This study focused on the age group of 15 to 17 years, as dental caries are more prevalent during this period. This results from alterations in nutrition and lifestyle. The utilization of a mouthrinse in the study complicates optimal usage for younger children. The bacterial composition in the oral cavities of younger children alters during the mixed dentition phase. This age range was chosen because it is when the majority of youngsters possess all their permanent teeth. A significant advantage of natural herbs is their lack of detrimental side effects. Furthermore, the majority of herbal mouth rinses are devoid of alcohol and sugar, which are typically present in most over-the-counter solutions. Utilizing herbal mouth rinses can mitigate the necessity for specific substances, thereby advancing dental hygiene and overall wellness. These natural herbs serve as antimicrobials, regulating the aberrant proliferation of oral bacteria and mitigating the threats posed by antibiotic-resistant strains. These herbs exhibit antibacterial properties due to their flavonoid content, which inhibits enzymatic activity and disrupts the cytoplasmic membrane of cells.

The excessive use of steroids in these patients is primarily constrained by the chronicity of the disease, the patients' age, and concomitant systemic diseases. Therefore, a safe and effective alternative drug for long-term usage should be developed, marketed, and investigated. Natural remedies have garnered considerable interest in the treatment of diverse ailments. In addition to being readily available, many of them are also secure. *Azadirachta indica*, a herb recognized for its extensive biological

functions for over 2000 years, is one such example. It is from of the Meliaceae family and is regarded as beneficial for healing various disorders, thus it is referred to as "Sarvaroga Nivarini," signifying "the healer of all ailments."

The significance of mouth hygiene for respiratory viral infections and their transmission has become increasingly apparent in recent years, particularly during the COVID-19 pandemic. Oral health products function as the primary barrier against upper respiratory viruses, hence amplifying their significance in bolstering our immune responses. HD has demonstrated efficacy in reducing the viral copy number of SARS-CoV-2 under in vitro settings, indicating a potential decrease in viral load in saliva. This can aid in infection management not only during routine encounters but also in aerosol-generating scenarios such as dental procedures, utilizing natural methods.

Our mouthwash exhibited optimal performance in the antiviral assay under conditions that replicate the intraoral environment, rendering it the most representative of real-world application. The essential characteristics of a mouthwash for addressing oral issues associated with COVID-19 are its antiviral, antibacterial, and anti-inflammatory properties. Given that SARS-CoV-2 can attach to salivary mucins and the angiotensin-converting enzyme 2 (ACE2) receptor on the tongue, resulting in altered taste perception and oral lesions, diminishing the viral load in saliva positively influences these symptoms.

SUMMARY AND CONCLUSION:

Summary

Herbal mouthwash is a natural and healthy alternative to synthetic oral care products. It is composed of extracts from medicinal plants possessing antibacterial, anti-inflammatory, and antiseptic properties. This study investigates the formulation and evaluation of a herbal mouthwash utilizing specific components such as neem, tulsi, turmeric, clove oil, peppermint oil, and menthol. These natural elements are renowned for their therapeutic properties. Neem and tulsi are highly efficacious against bacteria and other microorganisms, hence diminishing detrimental oral pathogens. Turmeric possesses anti-inflammatory effects, while clove oil functions as an analgesic and disinfectant. Peppermint oil and menthol impart a pleasing flavor and a refreshing sensation, enhancing the mouthwash's attractiveness to consumers.

The formulation of the mouthwash entails the extraction, amalgamation, and precise calibration of chemicals to yield a solution that is both efficacious

and durable. Upon formulation, the mouthwash undergoes evaluation for many parameters including pH level, color, odor, flavor, solubility, stability, and efficacy against oral germs. The results indicate that the herbal mouthwash is stable, possesses a pleasant flavor and aroma, and is efficacious against oral germs. It also results in less adverse effects compared to chemical-based mouthwashes.

Final Assessment

The herbal mouthwash was effectively produced and evaluated. All batches exhibited an appealing look, maintained appropriate pH levels, demonstrated stability, and produced sufficient foam. Batch B2 exhibited superior performance due to its regulated pH, enhanced stability, and effective foam production. The mouthwash is safe, effective, and beneficial for oral hygiene.

The study demonstrated that the herbal mouthwash is an effective and economical method for administering medication, possessing significant potential. Further research and studies are required to evaluate the product longitudinally and in laboratory settings to enhance its efficacy and mitigate potential negative effects, given its intended usage as a medical product. Herbal mouthwashes are effective and exhibit fewer adverse effects than other mouthwashes available in the market. There is a necessity to enhance the utilization of herbal mouthwashes to mitigate adverse effects. It is essential to enhance knowledge among healthcare practitioners and the general populace regarding the utilization of herbal mouthwashes, and more research of this nature should be promoted.

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