www.ijarp.com ISSN 2456-9992 Page: 01-11
International Journal Advanced Research Publications
Research Review
Volume: 02
Issue: 05

DESIGN AND EVALUATION OF A STABLE POLYHERBAL MOUTHWASH FOR EFFECTIVE PLAQUE INHIBITION AND ORAL CARE

*[1]Kh Anees Mustafa, [2]Rohit Rathore, [3]Dr. Tanya Sharma

[1]Student of B. Pharmacy 4th year, Mewar University, Gangrar, Chittorgarh, (R.J.) 3120901-India.

[2]Assistant professor Mewar University, Gangrar, Chittorgarh, (R.J.) 3120901- India.

[3]HOD of Pharmacy, Mewar University, Gangrar, Chittorgarh, (R.J.) 3120901-India.

Article Received: 16 April 2026, Article Revised: 06 May 2026, Published on: 26 May 2026

***Corresponding Author: Kh Anees Mustafa**

1Student of B. Pharmacy 4th year, Mewar University, Gangrar, Chittorgarh, (R.J.) 3120901- India.

DOI: https://doi-doi.org/101555/ijarp.7559

ABSTRACT

Although chemical mouthwashes with alcohol and chlorhexidine are regarded as the "gold standard" for oral cleanliness, adverse effects such mucosal dryness, teeth discolouration, and altered taste perception frequently restrict their long-term usage. In order to create a safer, more comprehensive alternative for dental treatment, this study investigates the shift toward natural polyherbal formulations, drawing on traditional Ayurvedic and Chinese medical practices.

KEYWORDS: Oral hygiene, phytochemicals, curcuma longa, Azadirachta indica, polyherbal mouthwash, and physical stability.

INTRODUCTION:

Clinical effectiveness and long-term safety are now at odds in modern dental care. Chemical mouthwashes with alcohol and chlorhexidine are still the "gold standard" for controlling plaque, although long-term use of them is often associated with negative side effects such dry mucosa, discolored teeth, and changed taste perception. In order to establish a biocompatible substitute, this study investigates a shift toward polyherbal compositions that revive traditional Chinese and Ayurvedic medicinal practices. The goal of the research is to create a stable, potent rinse with antibacterial, anti-inflammatory, and analgesic properties by using

the synergistic bioactive phytochemicals of five important botanicals: neem, turmeric, clove, peppermint, and liquorice.thorough dental care.(1)

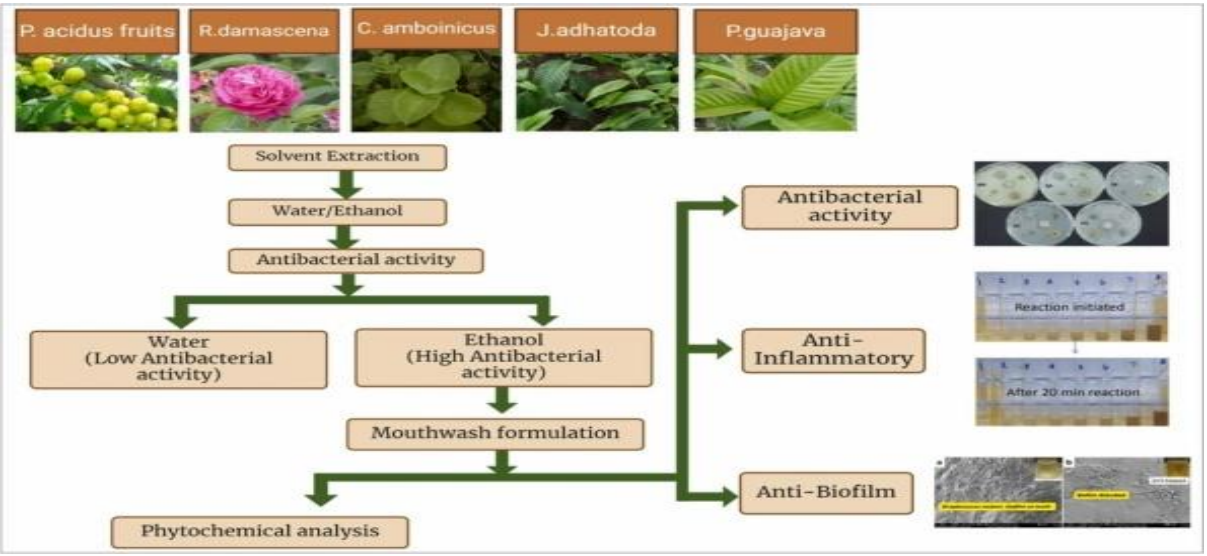

Figure no: 1 Clinical effectiveness and long-term safety are now at odds in modern dental care.

Principal Goals

This study's main objective was to create a polyherbal mouthwash with antibacterial, anti-inflammatory, and analgesic properties without the typical negative effects of chemical rinses, such dry mouth (from alcohol-based solutions) or tooth discolouration (from chlorhexidine). Historical Context: Chinese and Ayurvedic doctors have been practicing oral hygiene since 2700 BC. From Hippocrates' salt and vinegar concoctions to the industrialisation of goods like "Odol" in 1892, evolution progressed. The issue: Although chemicals like fluoride and chlorhexidine work well, prolonged usage can change taste perception and cause systemic toxicity if consumed.(2)

Key Herbal Ingredients

The study utilized a specific blend of herbs known for their bioactive **phytochemicals**:(3).

Ingredient	**Biological Source**	**Active Constituent**	**Primary Function**
Neem	*Azadirachta indica*	Nimbin, Nimbdin	Inhibits plaque and bacterial growth.
Turmeric	*Curcuma longa*	Curcumin	Bacteriostatic and anti-inflammatory.
Clove	*Eugenia caryophyllus*	Eugenol	Analgesic; stimulates circulation.
Peppermint	*Mentha piperata*	Menthol	Provides fragrance and antimicrobial action.
Liquorice	*Glycyrrhiza glabra*	Glycyrrhizin	Natural sweetener and flavouring agent.

Approach and Formulation

Six distinct formulations (F1–F6) were created for the study by adjusting the primary plant extracts' concentrations. Preparation: Distilled water was used to soak powdered herbs. Incubation: To guarantee optimal phytochemical extraction, extracts were stored at 37C for 48 hours. Refining: Coco glycoside (a surfactant) and salt (a preservative) were used to filter, boil, and stabilise the mixes, testing: At both 12°C and 25°C, the formulations were examined for pH levels and physical stability (homogeneity and appearance].(4)

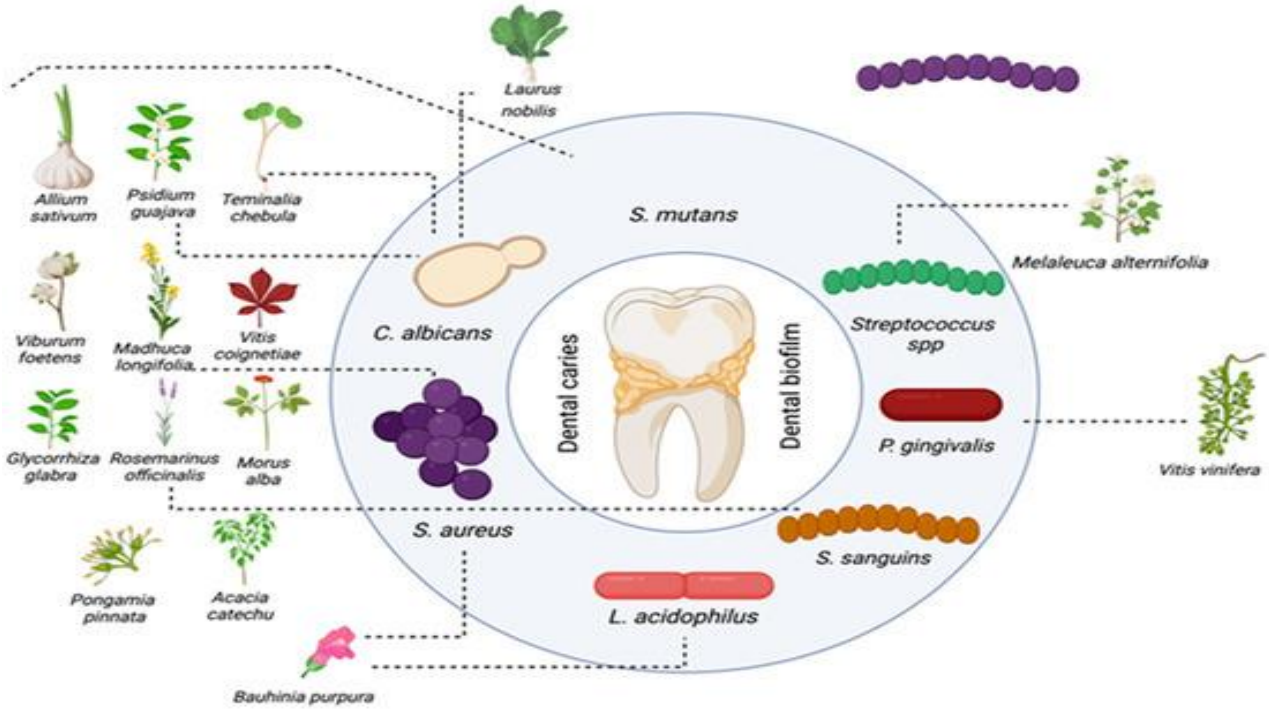

Figure no 2: The study utilized a specific blend of herbs known for their bioactive phytochemicals.

Oral Disease Epidemiology

Almost 3.5 billion individuals worldwide suffer from oral illnesses, which are among the most common non-communicable diseases (NCDs). Dental Caries: Due to excessive sugar intake and insufficient plaque cleaning, permanent tooth decay is the most prevalent ailment in the world. (5)Periodontal Disease: It is estimated that 19% of adults worldwide suffer from severe gum disease, which can result in tooth loss Regional Disparities: The burden is quickly increasing in low- and middle-income nations where access to cheap hygiene products (such as the mouthwash used in this study) and preventative dental care is restricted, whereas prevalence is high in high-income countries due to processed diets.(6)

Oral Cavity Anatomy and Disease Pathology

Examining the intricate oral environment is necessary to comprehend the "site of action" for a polyherbal mouthwash.(7).

The Oral Microbiome.

There are more than 700 different types of bacteria in the mouth. These are in balance in a healthy condition. However, dangerous bacteria like Streptococcus mutans flourish when biofilm (plaque) accumulates.(8) The little space between the gum line and the tooth is called the gingival sulcus. It is the main location of inflammation. Mouthwashes are essential for treating gingivitis because liquids may enter this area more effectively than brushes alone.(9)

Mucosal Membrane:

The mouth's lining is extremely porous. This explains the "stinging" or dryness caused by alcohol-based rinses, as well as the important anatomical benefit of neem and turmeric's biocompatibility—they calm rather than irritate the tissue(10)

Common Oral Diseases

The polyherbal formulation targets three primary pathological states:

Disease	Description	Target Herbal Action
Gingivitis	Inflammation of the gums caused by plaque.	**Turmeric & Neem** (Anti-inflammatory)
Dental Caries	Acid-producing bacteria eroding enamel.	**Neem & Clove** (Antibacterial)
Periodontitis	Chronic infection affecting the bone and ligaments.	**Clove & Peppermint** (Analgesic & Antimicrobial)

Synthetic antiseptics like chlorhexidine. Complex molecular structures provided by phytochemicals like nimbin and curcumin make it more difficult for bacteria to become resistant to them. Resolving the "Chemical Gap": Due to alcohol's negative effects (xerostomia/dry mouth), many patients stop taking their dental care regimens. Patient Fighting Antimicrobial Resistance (AMR): Bacterial resistance can result from the overuse of compliance is increased with a natural substitute.(11).

Economic Accessibility

This research opens the door to affordable healthcare in emerging dental markets by utilizing herbs that are widely available, such as Azadirachta indica (neem) and Glycyrrhiza glabra (liquorice).(12)

Holistic Stability

By emphasizing physical stability (pH and homogeneity), "traditional remedies" are guaranteed to satisfy contemporary pharmaceutical requirements and be suitable for mass-market commercialization.(13).

Discoveries and Outcomes

Physical Stability:

Because to the high clove extract content, all formulations originally looked dark brown.(14)

Storage Temperature:

At room temperature, or 25°C, stability was at its peak. The colour of formulations kept at 12°C changed from dark to light brown, most likely as a result of oxidation caused by the "disabling" of natural antioxidant machinery at lower temperatures. (15)

Effectiveness:

While being mild on delicate oral tissues, polyherbal rinses shown considerable potential in lowering oral pathogens such Streptococcus mutans**.** (16)**.**

METHODS

A synergistic mixture of neem (Azadirachta indica), turmeric (Curcuma longa), clove (Eugenia caryophyllus), peppermint (Mentha piperata), and liquorice (Glycyrrhiza glabra) was used to create a polyherbal mouthwash. Aqueous extraction was used to create six distinct formulations (F1–F6) over the course of 48 hours at 37°C.(17) Coco glycoside, a surfactant, and sodium chloride, a preservative, were used to stabilise the mixes. At 12°C and 25°C, physical stability, pH levels, and organoleptic characteristics were assessed.(18).

Findings

The formulations, which targeted pathogens including Streptococcus mutans, showed strong antibacterial and anti-inflammatory properties. The polyherbal rinses maintained optimum homogeneity at room temperature (25°C), according to stability tests. However, samples kept at 12°C showed a change in colour from dark to light brown, indicating that lower temperatures can damage the extracts' inherent antioxidant mechanism and cause oxidation.(19) Every composition avoided the caustic side effects of alcohol-based products and kept a functioning ph. polyherbal mouthwashes offer a useful, reasonably priced, and biocompatible alternative to synthetic oral antiseptics. By including bioactive phytochemicals like nimbin, curcumin, and eugenol, these formulations efficiently decrease plaque and provide analgesic benefits. Further improvement of storage conditions and antioxidant

stabilisation may help turn these "grandmother's remedies" into conventional dental medicines.(20).

CONCLUSION

Polyherbal mouthwashes are a practical, affordable, and safer substitute for chemical solutions, according to the study's findings. (21) These compositions offer a comprehensive approach to oral hygiene with little adverse effects by using easily accessible herbs. The researchers speculate that these "new age" herbal rinses might be effectively marketed to the general public with more optimisation.(22) This study explores the transition from traditional chemical mouthwashes to polyherbal formulations, examining their efficacy, history, and physical stability. As dental health is increasingly seen as a cornerstone of general well-being, the study highlights the potential for natural "grandmother's remedies" to match or exceed the efficacy of the current "gold standard" chemical antiseptics.(23).

REFERENCES

1. Review AS. Essential Oils Compared to Chlorhexidine With Respect to Plaque and Parameters of Gingival Inflammation: A Systematic Review. 2010;82(2).
2. Indian traditional medicinal herbs against dental caries – an unsung past to a bright future. 2016;1:1–6.
3. Wang C, Yang S, Tsai HJENJ, Loh HLINE. M E T A - A N A L Y S I S Preventing Alveolar Osteitis After Molar Extraction Using Chlorhexidine Rinse and Gel : A Meta-Analysis of Randomized Controlled Trials. 2021;29(1):1–11.
4. Targets M. Natural Products and Human Diseases.
5. Wieczorek PP, Fedin R. Mentha piperita : Essential Oil and Extracts , Their Biological Activities , and Perspectives on the Development of New Medicinal and Cosmetic Products. 2023;
6. Problems M. Dental and Medical Problems. 2025;62(2).
7. Ahmed SI, Hashmi A. FORMULATION AND EVALUATION OF HERBAL MOUTHWASH. 2025;8(2):1–5.
8. Brunello G, Becker K, Scotti L, Drescher D, Becker J, John G. The Effects of Three Chlorhexidine-Based Mouthwashes on Human Osteoblast-Like SaOS-2 Cells . An In Vitro Study. 2021;
9. Kane SF. on systemic health. 2017;(December).
10. Sparabombe S, Monterubbianesi R, Tosco V, Orilisi G, Weber FE. Efficacy of an All-Natural Polyherbal Mouthwash in Patients With Periodontitis : A Single-Blind Randomized Controlled Trial. 2019;10(May):1–7.
11. Karim B, Bhaskar DJ, Agali C, Gupta D, Gupta RK, Jain A. Effect of Aloe vera Mouthwash on

Periodontal Health : Triple Blind Randomized Control Trial.

12. Rani N, Singla RK, Narwal S, Kumar N, Rahman M. Medicinal Plants Used as an Alternative to Treat Gingivitis and Periodontitis. 2022;2022.
13. Patil A, Mudda JA, Tehseen S, Post MDS, Student G, Dental S, et al. Original Research Paper Dental Science COMPARATIVE EFFICACY OF ALOE VERA MOUTHWASH AND CHLORHEXIDINE IN PATIENTS WITH MILD TO MODERATE GINGIVITIS . Ansari. 2020;(4):9–12.
14. James P, Hv W, Parnell C, Harding M, Lamont T, Cheung A, et al. Chlorhexidine mouthrinse as an adjunctive treatment for gingival health (Review). 2017;
15. 1Pop A, Iurian SM, Benedec D, Moldovan ML. Research Advances in the Use of Bioactive Compounds from Vitis vinifera By-Products in Oral Care. 2020;1–32.
16. Ingale AR, Gaware VM, Khaire RD, Shraddha S, Kashid VA. A Review On : Herbal Mouthwash an Effective Way For Oral Care. 2023;8(3):2578–83.
17. N CB, Gomes AJ. Systemic manifestations of oral diseases. 2011;15(2):144–7.
18. Solderer A, Kaufmann M, Hofer D, Wiedemeier D, Attin T, Pr S, et al. Efficacy of chlorhexidine rinses after periodontal or implant surgery : a systematic review Efficacy of chlorhexidine rinses after periodontal or implant surgery : A systematic review Clinic of Preventive Dentistry , Periodontology and Cariology , Center of Dental Manuela.kaumann@zzm.uzh.ch. 2019;21–32.
19. Shailesh R, Kiran T, Ps D, Sd K. A research paper on formulation and evaluation of herbal mouthwash. 2025;14(2):583–9.
20. Cover J. Author [s] Statement ..... Article information ..... 2026;11(1):1–15.
21. Karanjule V, Shinde N, Baheti D. FORMULATION AND EVALUATION OF. 2022;10(5):355–65.
22. Strydonck V. UvA-DARE (Digital Academic Repository) Chlorhexidine and the control of plaque and gingivitis. 2013.
23. Anwar MA, Sayed GA, Hal DM, Abd MS, Hafeez E, Shatat AAS. Herbal remedies for oral and dental health : a comprehensive review of their multifaceted mechanisms including antimicrobial , anti - inflammatory , and antioxidant pathways [Internet]. Vol. 33, Inflammopharmacology. Springer International Publishing; 2025. 1085–1160 p.
Available from: https://doi.org/10.1007/s10787-024-01631-8