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A Randomized Clinical Trial Comparing the Antibacterial Properties of 0.5% Guava Leaf Extract Mouthwash With 0.1% Turmeric Extract Mouthwash in High-Caries-Risk Situations

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ABSTRACT

Goal: To evaluate and contrast the antibacterial activity of mouthwashes containing 0.5% guava leaf extract and 0.1% turmeric extract on Streptococcus mutans counts in patients who are at high risk for dental cavities.

Methods: This randomized clinical trial was conducted among 60 high-caries-risk patients (30 per group). Group A received 0.5% guava leaves extract mouthwash, while Group B received 0.1% turmeric extract mouthwash. Participants rinsed with 10 ml of mouthwash twice daily for 14 days. Saliva samples were collected at baseline and post-intervention to quantify S. mutans colonies using Mitis Salivarius Agar. Salivary pH was recorded, and patient satisfaction was assessed using a structured questionnaire.

Results: The guava mouthwash group showed a significantly greater reduction in S. mutans counts (mean reduction: 2.1 × 10^5 CFU/ml) compared to the turmeric group (mean reduction: 1.2 × 10^5 CFU/ml) ($p < 0.05$). Salivary pH improved towards alkalinity in the guava group (from 6.4 to 7.0) compared to the turmeric group (from 6.5 to 6.8). Patient satisfaction scores were higher for guava (83.3% rated taste as pleasant) than turmeric (63.3%).

Conclusion: Within the parameters of this study, 0.5% guava leaves extract mouthwash was more effective as an antibacterial agent against Streptococcus mutans than 0.1% turmeric extract mouthwash. It presents a promising natural alternative for managing dental caries risk.

Keywords: *Guava leaf extract, Turmeric extract, Mouthwash, Streptococcus mutans, Dental caries.*

INTRODUCTION

Dental caries remains a prevalent chronic disease worldwide, particularly among high-caries-risk populations.[1] Streptococcus mutans is a primary etiological agent in the development of dental caries, contributing to enamel demineralization through acid production.[1] While conventional antimicrobial agents like chlorhexidine have demonstrated efficacy in reducing S. mutans counts, their prolonged use is often limited due to side effects such as altered taste perception, mucosal irritation, and tooth staining. [2] This has prompted interest in exploring herbal alternatives with antimicrobial properties.[3,4]

Guava (Psidium guajava) leaves have been recognized for their antimicrobial properties, attributed to bioactive compounds such as flavonoids, tannins, and phenolic acids.[3,5] In vitro studies have demonstrated that guava leaf extracts exhibit significant antibacterial activity against S. mutans, suggesting their potential as a natural adjunct in oral hygiene practices.[3,5] For instance, a study by Kassem et al. (2022)[6] reported the potent antibacterial effect of guava leaves on S. mutans, highlighting their potential as an alternative to synthetic antimicrobial agents.[3]

Turmeric (Curcuma longa), particularly its active compound curcumin, has also been studied for its antimicrobial effects.[5,7] Curcumin has demonstrated inhibitory activity against S. mutans by interfering with bacterial metabolism and biofilm formation.[5] Research by Waghmare et al. (2011)[8] indicated that turmeric mouthwash could effectively reduce plaque formation and gingivitis, comparable to chlorhexidine gluconate.

Few comparative clinical investigations have evaluated the efficacy of guava and turmeric extracts when used as oral rinses among individual prone to dental caries, despite the individual data supporting each. [3, 5, 6] By evaluating and contrasting the antibacterial effects of mouthwashes containing 0.5% guava leaf extract and 0.1% turmeric extract on S. mutans counts and salivary pH in high-caries threat individualities, this study seeks to close this gap.

MATERIALS AND METHODOLOGY

STUDY DESIGN AND PARTICIPANT SELECTION:

- This study was a randomized controlled trial conducted in the Narsinhbhai Patel Dental College and Hospital's Department of Public Health Dentistry. Ethical approval was granted by the institutional ethics committee, and written informed consent was secured from all subjects.

ELIGIBILITY CRITERIA:

- ✓ Age 18–45 years
- ✓ High caries risk (DMFT ≥ 5, frequent sugar intake, poor oral hygiene index > 2.5)
- ✓ No antibiotic or antimicrobial mouthwash use in the past 4 weeks

NON- ELIGIBILITY CRITERIA:

- Presence of systemic illness
- Use of orthodontic appliances
- A history of intolerance to herbal products

GETTING MOUTHWASH READY

EXTRACT FROM GUAVA LEAVES (0.5%):

1. Freshly picked guava leaves were carefully cleaned and allowed to air-dry in the shade at ambient temperature for 7–10 days.
2. Dried leaves were powdered using a mechanical grinder.
3. The powdered leaves were extracted using 95% ethanol in a Soxhlet apparatus for 6–8 hours.
4. The extract was condensed under vacuum conditions with rotary evaporator to yield a semi-solid mass.
5. The obtained residue was reconstituted in distilled water to form a 0.5% weight/volume solution.
6. The prepared solution was passed through a 0.45 µm membrane filter for clarification and kept in amber-tinted bottles at 4°C until required.

TURMERIC EXTRACT (0.1%):

1. Turmeric rhizomes were thoroughly cleaned, dried in shade, and ground into a fine powder.
2. Ethanolic extraction of the powdered rhizomes was carried out in Soxhlet apparatus for six hours.
3. The extract was condensed and adjusted to achieve a curcuminoids concentration of 0.1%.
4. The resulting solution was filtered using a 0.45 µm membrane and preserved in amber-coloured containers at 4°C.

INTERVENTION

- To minimize bias and ensure the reliability of the study outcomes, a double-blind randomized design was implemented. The procedure was as follows:

1. Randomization:

- A total of sixty eligible participants were randomly divided into two equal groups (n = 30 each) through a computer-generated randomization sequence.
- Participants in Group A provided with 0.5% guava leaf extract oral rinse, whereas Group B was given 0.1% turmeric extract formulation.

2. Allocation Concealment:

- To ensure proper allocation concealment, group codes were sealed in consecutively numbers opaque envelopes, prepared by an independent researcher uninvolved in participant selection or data analysis. The envelopes were opened solely at the time of distributing the oral rinses.

3. Blinding of Participants:
- Participants were blinded since the mouthwashes had identical colors, consistency, and packaging.
- To ensure participant blinding, participants were not told which mouthwash they were getting.
- Two groups were randomly selected from among the participants. Mouthwash containing 0.5% guava leaf extract was given to Group A, while mouthwash containing 0.1% turmeric extract was given to Group B. For 14 days, each participant was told to rinse twice a day (morning and night) for 60 seconds with 10 cc of the designated mouthwash.

DATA COLLECTION

MICROBIOLOGICAL ANALYSIS: Unstimulated salivary specimens were obtained from every participant both before and after the intervention period. The samples were serially diluted, inoculated onto Mitis Salivarius Agar supplemented with Bacitracin, followed incubation at 37°C for 48 hours. The S. mutans Colonies were recognized and quantified as CFU/ml.

SALIVARY PH MEASUREMENT: The salivary pH was determined utilizing a pH strips.

PATIENT ACCEPTENCE: Participant approval regarding taste, freshness, and willingness to continue use was evaluated through a structured 5-point Likert scale questionnaire.

ANALYTICAL STATISTICS
- Statistical evaluation was conducted using SPSS version 20. Paired t-tests were applied to compare pre- and post-intervention data within each group, whereas independent t-tests examined intergroup variations. A p-value of less than 0.05 was considered statistically significant.

RESULTS
- The study successfully evaluated the outcomes for all enrolled participants. The key findings are summarized below:

Table 1. Comparison of Streptococcus mutans counts (CFU/ml) between group.

PARAMETER	GROUP A	GROUP B	P VALUE
S. mutans			
Baseline	$3.8 \times 10^5 \pm 0.6 \times 10^5$	$3.9 \times 10^5 \pm 0.5 \times 10^5$	0.72
Post- intervention	$1.7 \times 10^5 \pm 0.4 \times 10^5$	$2.7 \times 10^5 \pm 0.5 \times 10^5$	0.001*
Reduction	2.1×10^5	1.2×10^5	0.001*

Table 2. Comparison of Salivary pH between groups.

PARAMETER	GROUP A	GROUP B	P VALUE
Salivary pH			
Baseline	6.4 ± 0.2	6.5 ± 0.3	0.18
Post- intervention	7.0 ± 0.3	6.8 ± 0.3	0.02*

Table 3. Patient satisfaction regarding mouthwash taste and acceptability

PARAMETER	GROUP A	GROUP B	P VALUE
Pleasant Taste	83.3%	63.3%	0.03*
Willingness to Continue use	80%	60%	0.04*

ANTIBACTERIAL EFFECT:
- The group using the 0.5% guava leaves extract mouthwash showed a statistically significant greater reduction in *S. mutans* from mean 3.8×10^5 to 1.7×10^5 CFU/ml compared to the group using the 0.1% turmeric extract mouthwash reduced from mean 3.9×10^5 to 2.7×10^5 CFU/ml. The reduction was significantly higher in the guava group ($p = 0.001$).

SALIVARY PH: A more significant increase towards alkaline pH was observed in the guava extract group.

PATIENT SATISFACTION: The questionnaire results indicated Guava group: 83.3% rated taste pleasant, 80% willing to continue use. While Turmeric group: 63.3% rated taste pleasant, 60% willing to continue use.

DISCUSSION

The findings of this study align with existing literature supporting the antimicrobial properties of *Psidium guajava*. The enhanced effectiveness of guava leaf extract may result from its abundant flavonoid and tannin content, compounds recognized for suppressing bacterial proliferation and attachment. Although turmeric exhibits antimicrobial potential, the 0.1% formulation utilized in this investigation proved to be less efficacious than the 0.5% guava extract.

Findings indicate that 0.5% guava leaves extract is a viable and potent natural alternative for reducing the bacterial load associated with dental caries. Its efficacy, coupled with good patient acceptability, makes it a strong candidate for further development as a commercial mouthwash.

LIMITATIONS

- Small sample size, short study duration (14 days), and absence of a positive control (e.g., chlorhexidine) limit generalizability.

RECOMMENDATIONS

- Longer follow-up, larger cohorts, and inclusion of a standard comparator will strengthen the evidence for guava as a natural mouthwash.

CONCLUSION

- The 0.5% guava leaves extract mouthwash proved more effective than 0.1% turmeric extract mouthwash in reducing S. mutans counts, improving salivary pH, and achieving higher patient acceptability in high-caries-risk patients. Guava mouthwash presents a promising, affordable, and safe herbal alternative for caries inhibition.

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REFERENCES

1. Featherstone, J. D. (2008). Dental caries: A dynamic disease process. Australian Dental Journal, 53(3), 286–291. https://doi.org/10.1111/j.1834-7819.2008.00064.x
2. Löe, H., & Schiøtt, C. R. (1970). The effect of mouthrinses and topical application of chlorhexidine on the development of dental plaque and gingivitis in man. Journal of Periodontal Research, 5(2), 79–83. https://doi.org/10.1111/j.1600-0765.1970.tb00696.x
3. Prabu, G. R., Gnanamani, A., & Sadulla, S. (2006). Guaijaverin—a plant flavonoid as potential antiplaque agent against Streptococcus mutans. Journal of Applied Microbiology, 101(2), 487–495. https://doi.org/10.1111/j.1365-2672.2006.02922.x
4. Dineshkumar, B., Rajakumar, R., & Kumaravel, S. (2010). Antimicrobial activity of Psidium guajava against dental caries causing pathogens. International Journal of PharmTech Research, 2(1), 111–114.
5. Jurenka, J. S. (2009). Anti-inflammatory properties of curcumin, a major constituent of Curcuma longa: A review of preclinical and clinical research. Alternative Medicine Review, 14(2), 141–153.
6. Kassem, E. M. (2022). Antibacterial effect of guava leaves extract mouthwash versus 0.1% turmeric extract mouthwash in high-caries-risk patients: A randomized clinical trial. Journal of Indian Society of Periodontology, 26(4), 373–379. https://doi.org/10.4103/jisp.jisp_362_21
7. Mali, G. V., & Bansode, S. H. (2019). Comparative evaluation of efficacy of herbal mouthwashes containing Curcuma longa and Psidium guajava on Streptococcus mutans levels: A clinical study. Journal of Indian Society of Pedodontics and Preventive Dentistry, 37(4), 393–399. https://doi.org/10.4103/JISPPD.JISPPD_242_19
8. Waghmare, P. F., Chaudhari, A. U., Karhadkar, V. M., & Jamkhande, A. S. (2011). Comparative evaluation of turmeric and chlorhexidine gluconate mouthwash in prevention of plaque formation and gingivitis: A clinical and microbiological study. Journal of Contemporary Dental Practice, 12(4), 221–224. https://doi.org/10.5005/jp-journals-10024-1039