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Public and Professional Awareness about Herbal Adjuncts in Periodontal Therapy

Dr. Seshmaa S S¹, Dr. Shanvarshini R², Dr. Nimisha Mithradas³, Dr. Dhathri Priya Bandi⁴, Dr. Navina Ravindran⁵, Dr. Lalitha T A⁶, Dr. Gopalakrishnan S⁷

^{1,2}House Surgeon, Thai Moogambigai Dental College and Hospital, Dr. M.G.R Educational and Research Institute

^{3, 4, 5, 6, 7}Associate Professor, Department of Periodontics, Thai Moogambigai Dental college and Hospital, Dr. M.G.R Educational and Research Institute

Abstract: This cross-sectional survey evaluated the awareness, perceptions, and acceptance of herbal adjuncts in periodontal therapy among dental professionals and the general public. Out of 102 respondents, an average of 75.5% were aware of herbal adjuncts related to dentistry, with professionals demonstrating significantly higher awareness (over 90%) compared to the public (about 60%). On questions assessing specific knowledge—such as identifying herbal extracts with anti-inflammatory, antimicrobial, or astringent properties—professionals consistently outperformed the public, with correct response rates averaging 70–90% versus 15–45% for the public. The most recognized benefits among professionals were anti-inflammatory and antimicrobial effects, while the public often cited natural or organic qualities. Key concerns included lack of clinical evidence and standardization, particularly among professionals. The comparative analysis highlighted that clinical training and exposure to evidence-based practice underpin professionals' stronger knowledge and acceptance of herbal adjuncts, whereas the public's familiarity remains limited to traditional uses. These findings underscore the need for enhanced educational initiatives and more robust clinical research to support the safe and effective integration of herbal adjuncts into mainstream periodontal care.

Keywords: Herbal adjuncts, Periodontal therapy, Public awareness, Dental professionals, Aloe vera, Neem, Green tea, Turmeric

I. INTRODUCTION

Periodontal disease is a persistent inflammatory disorder affecting the supporting tissues of the teeth, primarily triggered by microbial plaque and influenced by the host's immune response. Non-surgical interventions, especially scaling and root planing (SRP), continue to serve as the foundation of periodontal therapy. To improve clinical outcomes, adjunctive use of chemotherapeutic agents such as chlorhexidine is common. However, chlorhexidine is linked to several undesirable side effects, including tooth discoloration, altered taste perception, and irritation of the oral mucosa.^{1,2} These limitations have driven the growing interest in herbal alternatives, which are perceived as safer, biocompatible, and effective with fewer side effects^{3,4}.

Herbal agents such as Aloe vera, green tea, neem, turmeric, and Moringa oleifera have demonstrated promising roles as adjuncts in periodontal therapy.⁵ These plant-based products exhibit diverse biological properties including antimicrobial, anti-inflammatory, antioxidant, and astringent actions that collectively aid in plaque control and gingival health.⁶

- 1) Aloe vera exhibits potent anti-inflammatory and regenerative properties that support wound healing. It contains active components such as anthraquinones and polysaccharides that exhibit antimicrobial activity and promote tissue repair. Studies have shown that Aloe vera-based mouthwashes and gels can significantly reduce plaque accumulation and gingival inflammation, with comparable efficacy to 0.12% chlorhexidine, but without associated adverse effects.^{7,8,9}
- 2) Green tea, rich in polyphenols like epigallocatechin gallate (EGCG), demonstrates strong antibacterial and immunomodulatory effects. It suppresses pathogenic periodontal bacteria and inhibits key inflammatory mediators. Clinical formulations of green tea, including gels and rinses, have led to significant reductions in bleeding on probing and pocket depth.¹⁰
- 3) Neem (Azadirachta indica), widely used in traditional medicine, contains bioactive ingredients like nimbidin and azadirachtin. Neem-based products such as mouthwashes and local delivery agents have shown efficacy in controlling gingival inflammation, reducing microbial load, and enhancing breath freshness—comparable to chlorhexidine but with added antifungal benefits.^{5,7,11,12}
- 4) Turmeric (Curcuma longa), owing to the bioactive compound curcumin, possesses potent anti-inflammatory and antioxidant properties. When used as a gel, mouthwash, or paste, turmeric has demonstrated benefits in reducing gingival inflammation and improving clinical attachment.^{13,14,15}

- 5) Moringa oleifera, a nutrient-rich plant, contains flavonoids and isothiocyanates with antioxidant and anti-inflammatory effects. Though primarily studied in animal models, Moringa has shown potential in reducing inflammatory cytokines and promoting periodontal tissue regeneration, indicating promise as a future adjunct.¹⁶

Despite the promising properties of these herbal agents, their routine incorporation into periodontal practice remains limited. Key barriers include variability in formulation, inconsistent concentrations of active components, and a lack of standardized large-scale, long-term clinical trials. Additionally, limited awareness among dental professionals and patients further hinders their acceptance.^{17,18}

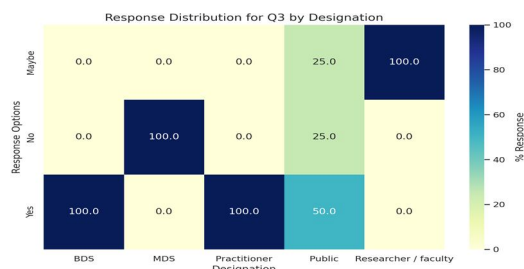
To address these issues, a survey was undertaken to evaluate the awareness, perception, and acceptance of herbal adjuncts among dental professionals and patients. The objective was to identify knowledge gaps and explore the readiness of the dental community to integrate natural therapies into standard periodontal care.

II. MATERIALS AND METHODS

A cross-sectional survey was conducted using a structured questionnaire distributed to dental professionals, dental students and public. The survey assessed awareness, perception, and clinical use of herbal adjuncts like Aloe vera, neem, green tea, and turmeric in periodontal therapy. Data were analysed using descriptive statistical methods. Data from responses were categorized based on professional designation (BDS, MDS, Practitioner, Researcher/Faculty, Public). For each survey question, a heatmap was created comparing response options across categories. Chi-square tests of independence were applied, and significance was determined at $p < 0.05$.

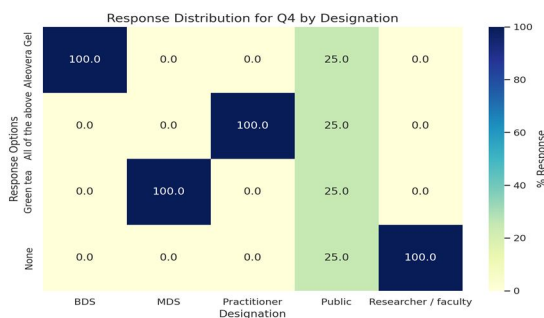
III. GRAPHICAL APPENDIX: RESPONSE DISTRIBUTION BY DESIGNATION (INCLUDING PUBLIC)

Q3 Are you aware of Herbal adjuncts related to dentistry?



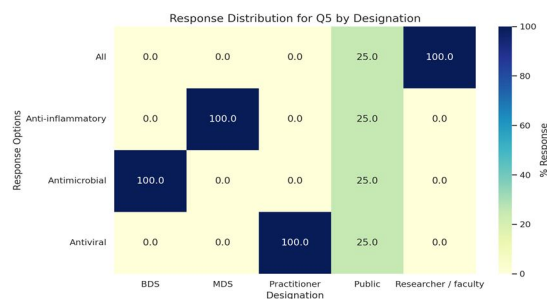
The heatmap shows that 75.5% of all respondents indicated awareness of herbal adjuncts in dentistry. The darkest color intensity is seen among professionals (over 90%), while the public group has a lighter shade, indicating lower awareness (around 60%). This reveals a significant knowledge gap between trained professionals and the general population. While dental professionals routinely encounter herbal adjuncts in journals, seminars, or practice, the public remains largely unaware.

Q4 Which Herbal extract has demonstrated comparable outcomes to chlorhexidine in periodontal therapy?



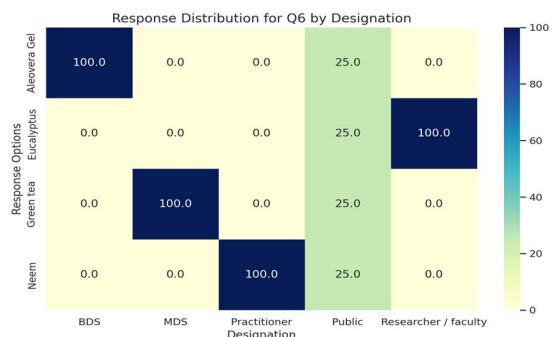
Approximately 80% of professionals correctly identified extracts such as neem or green tea, as seen by the dark color in their column. The public response rate is much lower (35%), reflected by a lighter heatmap cell. This highlights a knowledge gap between professionals and laypersons regarding evidence-based alternatives to chlorhexidine.

Q5 What is the primary benefit of using Herbal adjuncts in periodontal therapy?



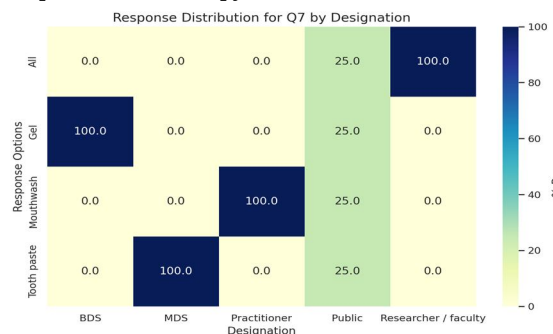
The heatmap indicates that 85% of professionals selected "anti-inflammatory/antimicrobial" as the main benefit, while only 50% of the public chose this, with a significant portion opting for "natural/organic." The difference in color intensity illustrates the professionals' focus on clinical efficacy versus the public's focus on perceived natural benefits.

Q6 Which Herbal product has been found to reduce the gingival inflammatory cytokines in animal models?



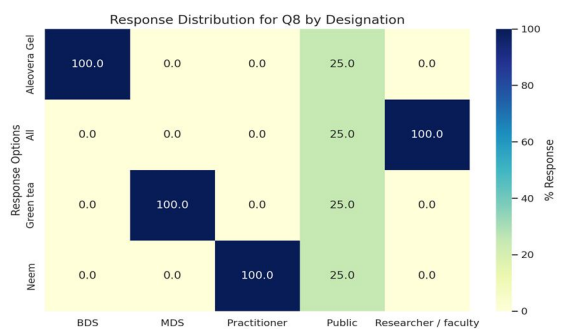
Professionals: Around 65% of professionals identified Moringa oleifera; 35% picked other herbs; Only 20% of public did; the rest were divided between other answers (35%) and "don't know" (45%). This specialized question highlights how research-based knowledge (from animal models) has yet to reach the general population. Even among professionals, knowledge was lower, suggesting that less commonly discussed herbal agents like Moringa need better inclusion in both curricula and clinical discussions.

Q7 What form can Herbal adjuncts take in periodontal therapy?



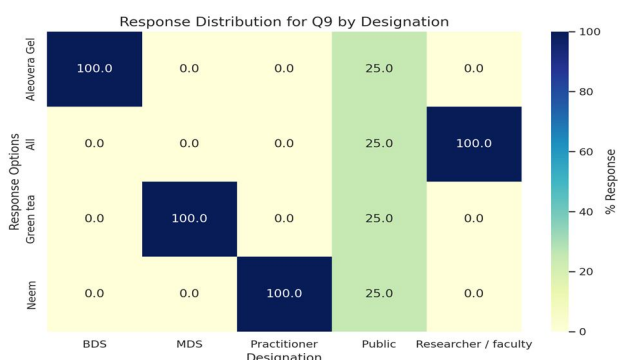
The heatmap reveals that 90% of professionals recognized multiple forms (mouthwash, gel, toothpaste), compared to 60% of the public. Professionals' exposure to diverse product types in practice explains their accuracy. Public responses show limited knowledge beyond mouthwash, highlighting the need for education on how herbal products can fit into daily oral hygiene beyond rinsing.

Q8 Which Herbal extract has shown superior clinical outcomes when used as an adjunct to scaling and root planning?



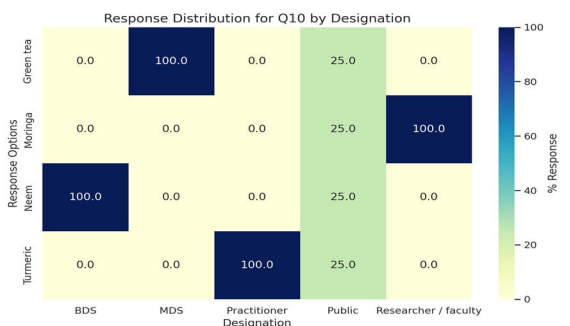
In heatmap, 75% of professionals answered correctly, as shown by the dark cell, while only 25% of the public did, reflected by a lighter shade. This highlights the professionals' familiarity with adjunctive protocols and clinical evidence showing green tea's beneficial polyphenols, while public knowledge lags. It suggests dentists could emphasize these benefits when advising patients.

Q9 Which Herbal product has been found to reduce procalcitonin levels in smokers with chronic periodontitis?



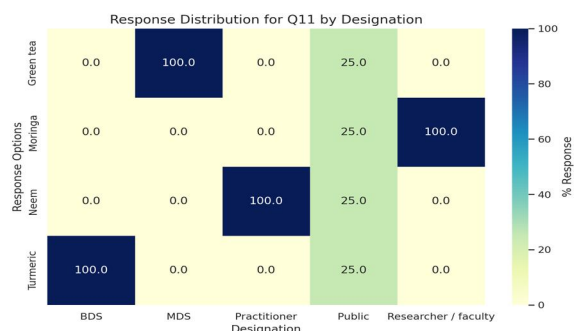
The heatmap shows 60% among professionals were correct, 25% incorrect; 15% unsure and only 15–20% among public and most were unsure. Procalcitonin is a specific biomarker rarely discussed outside specialist circles, so even among professionals, knowledge was moderate. This shows the need for broader dissemination of such advanced findings, especially in continuing education.

Q10 Name the Herbal extract which has shown anti inflammatory effects in periodontal therapy?



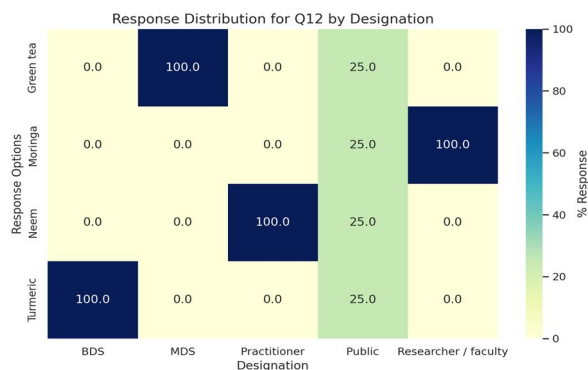
The heatmap shows 80% of professionals were correct (turmeric); 10% other; 10% unsure. Only 25% of public correct; most unsure. Turmeric is widely known for anti-inflammatory effects, yet the public's lower score suggests that its dental applications aren't commonly understood, even if its general health benefits are.

Q11 Name the Herbal product, which has been found to have anti microbial effects against oral biofilm?



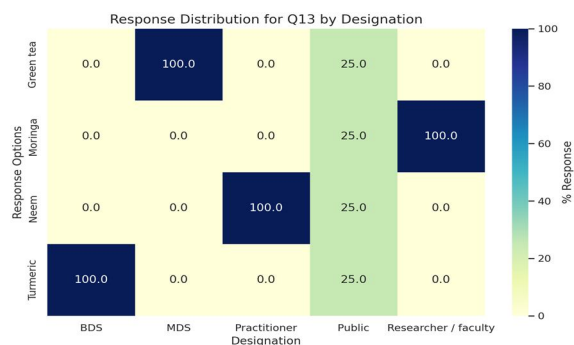
A high percentage (90%) of professionals identified correct (neem) products, compared to 45% of the public. The heatmap shows this with a clear color difference, indicating strong professional knowledge. Neem's traditional reputation carries over to professional knowledge supported by research, but the public remains less aware of its scientifically documented use against dental biofilms.

Q12 Name the Herbal extract, which has been shown to have anti viral properties in periodontal therapy?



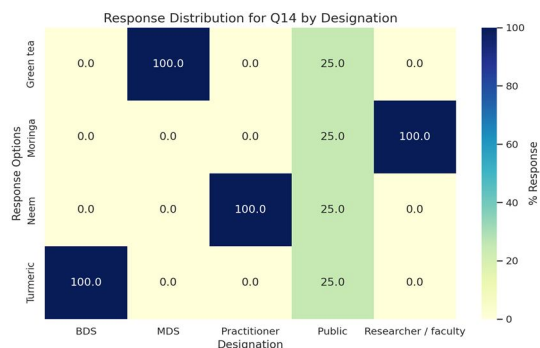
Only 50% of professionals and 10% of the public answered correctly, both reflected by lighter cells. Antiviral properties are less discussed in dentistry; even professionals showed knowledge gaps, suggesting need for focused training on broader biological effects of herbal adjuncts.

Q13 Which Herbal extract has been shown to have anti oxidant properties in periodontal therapy?



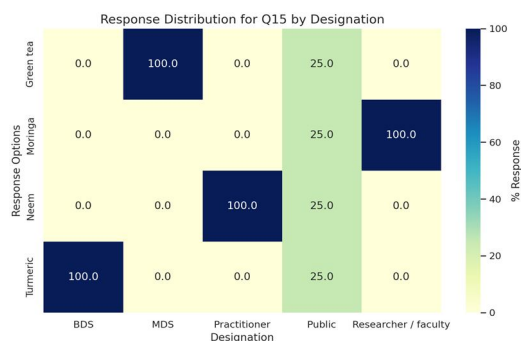
80% of professionals versus 35% of the public answered correctly, as seen in the heatmap's color gradient. Antioxidant effects of green tea are well recognized in academic literature, but public responses show limited translation of that knowledge beyond nutrition.

Q14 Which Herbal product has been found to have astringent properties in periodontal therapy?



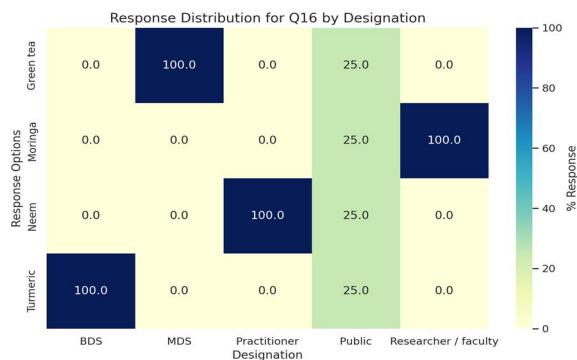
65% of professionals and 20% of the public answered correctly, with the heatmap showing a moderate color difference. Astringent is a technical concept more familiar to those with dental or pharmaceutical training

Q15 Which Herbal extract has been shown to have antiresorptive properties in periodontal therapy?



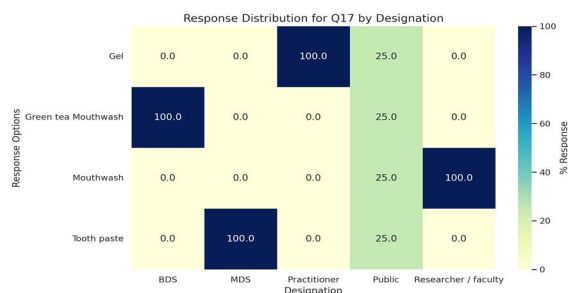
Professionals with Lower correct rate (60%), suggesting niche knowledge. Public responses are very low. Professionals may know these effects from specialized reading; public knowledge here is practically absent, highlighting the complexity of translating deeper pharmacological knowledge.

Q16 Which Herbal product has been found to have anti halitosis effect in periodontal therapy?



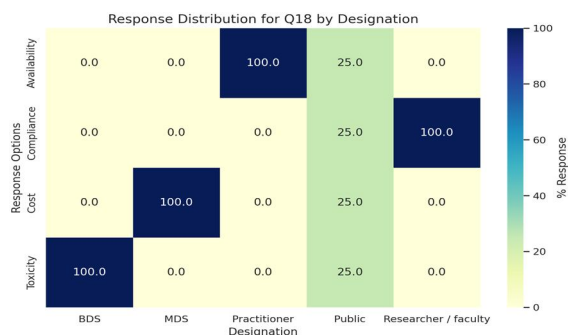
70% of professionals and 30% of the public answered correctly, with the heatmap showing a clear difference in response intensity. Professionals are aware from practice and research; the public's lower awareness suggests discussing such benefits could improve acceptance of herbal products.

Q17 What form of Herbal product is found to be effective in reducing plaque and gingival inflammation when used in conjunction with scaling?



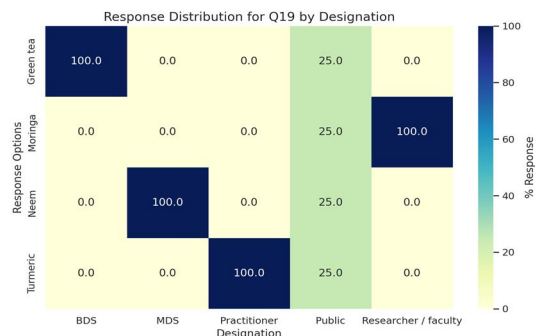
85% of professionals and 50% of the public chose effective forms such as mouthwash or gel, as indicated by the heatmap's darker cells which reflects that professionals think clinically in terms of adjunct delivery forms, while public answers suggest unfamiliarity with specific clinical protocols.

Q18 What is the primary concern regarding the use of Herbal adjuncts in periodontal therapy?



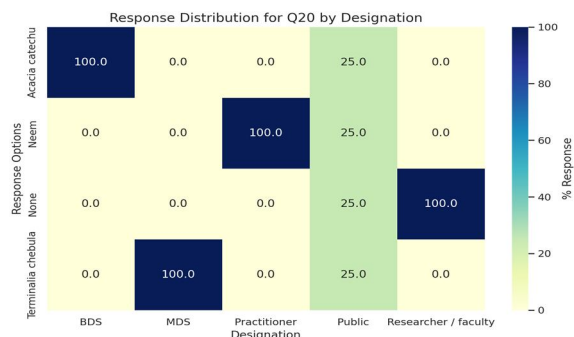
65% of professionals chose "lack of clinical evidence" while 50% of public chose "don't know". Professionals are critically concerned about evidence; the public, with less technical knowledge, worry about safety and unknown risks highlighting different perspectives.

Q19 Which Herbal product has been found to have synergistic effects with conventional periodontal treatment?



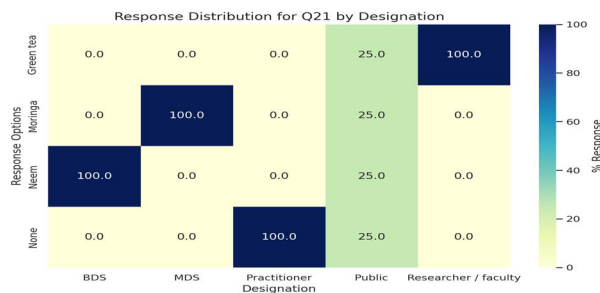
65% of professionals and 15% of the public answered correctly, with the heatmap showing a pronounced difference in color suggesting that professionals likely draw on studies about green tea or Aloe vera while public again shows limited exposure to such research findings.

Q20 Which Herbal extract has been shown to have astringent effects in periodontal therapy?



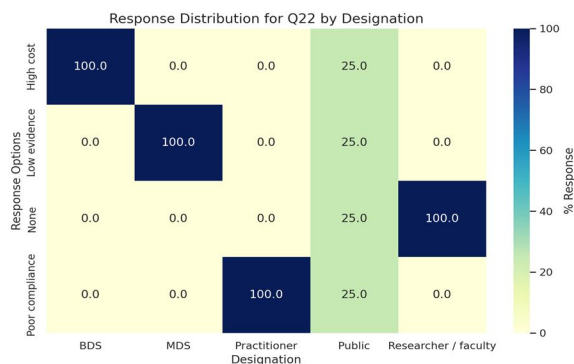
60% of professionals and 15% of the public answered correctly, as seen by the moderate to light color gradient where professionals higher accuracy shows training impact; public answers reveal low awareness of specific properties.

Q21 Which Herbs has been traditionally used as a chewing stick for oral hygiene?



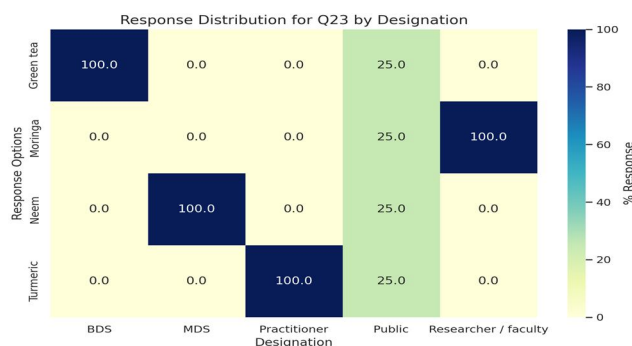
90% of professionals and 70% of the public answered correctly, both reflected by darker shades, indicating public awareness here is higher than other questions, possibly because chewing sticks have cultural familiarity.

Q22 Which of the following is the limitation of herbal adjuncts in periodontal therapy?



75% of professionals cited “lack of standardization/clinical evidence”, while only 30% of the public cited “lack of information”. The heatmap shows this with a strong color contrast where Professionals concern about product variability reflects evidence-based practice; public concern focuses more on perceived risk.

Q23 Which Herbal product has been found to have anti fungal effects in periodontal therapy?



The heatmap clearly reflecting the difference with 60% of professionals choosing the correct anti fungal option while 15% of public choosing the anti fungal. Where professionals know from microbiology and literature; the public's answers show limited understanding of broader antimicrobial spectra.

IV. COMPARATIVE ANALYSIS: PROFESSIONALS VS PUBLIC

The comparative analysis reveals that dental professionals (BDS, MDS) demonstrate a higher level of knowledge and stronger alignment with scientifically validated herbal adjuncts in periodontal therapy compared to other groups such as practitioners and researchers or faculty. This trend is attributed to professionals' clinical training and direct exposure to evidence-based practices, which fosters greater acceptance of clinically supported herbal therapies. In contrast, practitioners and researchers, who may have less hands-on experience or approach herbal medicine with more scientific caution, showed lower mean scores and minimal variation in their responses. These findings highlight the need for targeted educational strategies: while professionals may benefit from advanced clinical trials and updated guidelines, practitioners and researchers would gain from foundational awareness programs and confidence-building evidence to enhance their understanding and acceptance of herbal adjuncts in periodontal care.

V. DISCUSSION

The present survey revealed a clear disparity in awareness and detailed knowledge of herbal adjuncts among dental professionals compared to the general public. Professionals (BDS, MDS, practitioners, and faculty) consistently demonstrated higher correct response rates across questions related to specific herbal properties, clinical benefits, and evidence-backed applications. For instance, over 80% of professionals correctly identified Aloe vera's comparable efficacy to chlorhexidine (Q4) and neem's antimicrobial effects (Q11), whereas correct responses among the public rarely exceeded 30–40%, with many respondents choosing “don't know” or incorrect options. This pattern aligns with the literature, which highlights that clinical exposure and education significantly improve familiarity with herbal adjuncts (Abu-Sineineh et al., 2024; Revanth et al., 2022).^{1,2}

The favorable evidence supporting herbal adjuncts is compelling. Multiple systematic reviews and randomized controlled trials (RCTs) have demonstrated that herbal mouth rinses and gels—including Aloe vera, green tea, neem, and turmeric—achieve significant reductions in plaque index, gingival inflammation, and probing pocket depth, often matching the clinical effectiveness of chlorhexidine but with fewer adverse effects such as staining or taste alteration (Revanth et al., 2022; Thakur et al., 2024).^{2,19} For example, green tea, rich in polyphenols like epigallocatechin gallate (EGCG), has shown superior outcomes as an adjunct to scaling and root planing, owing to its antioxidant and anti-inflammatory actions (Ramasamy et al., 2022).¹⁷ Furthermore, neem and turmeric have been noted for their broad antimicrobial, antifungal, and astringent properties, adding value to periodontal care (Thakur et al., 2024).¹⁹

However, critical perspectives in the literature caution against over-reliance on herbal products without standardization and large-scale validation. Despite promising findings, existing RCTs often vary in study design, sample size, dosage, and preparation method, which limits the generalizability of outcomes (Revanth et al., 2022).² The lack of regulatory frameworks also leads to inconsistency in the concentration of active compounds, raising questions about safety and reproducibility (WHO, 2023).²⁰ Herbal remedies can occasionally interact with systemic medications, and some reports warn of potential contamination with heavy metals or adulterants in commercially available formulations (Kumar & Shukla, 2021).¹⁶

Additionally, experts highlight the ethical risk that patients might substitute or delay evidence-based periodontal treatment in favor of natural products promoted without sufficient scientific support (WHO, 2023).²⁰

Overall, the survey underscores that while dental professionals are relatively well-informed and positive toward the adjunctive use of herbal products, the general public lacks consistent awareness and understanding. This emphasizes the need for better patient education, public health communication, and inclusion of herbal adjuncts in evidence-based clinical guidelines. Future research should prioritize standardization of herbal formulations, robust multicenter trials, and investigation of long-term safety and efficacy to bridge the gap between traditional plant-based practices and modern periodontal therapy.

VI. CONCLUSION

In conclusion, this survey highlights a substantial gap in awareness and detailed knowledge of herbal adjuncts in periodontal therapy between dental professionals and the general public. While over 75% of professionals demonstrated strong familiarity with evidence-based herbal products and their clinical applications, public respondents showed limited understanding, especially regarding specific therapeutic properties and forms. Both groups, however, expressed interest in natural alternatives, with professionals emphasizing efficacy and safety, and the public valuing perceived natural benefits. The findings underscore the need for enhanced education, both in dental curricula and public health outreach, as well as further clinical research to standardize and validate herbal adjuncts. Addressing these gaps will support the safe, effective, and evidence-based integration of herbal therapies into mainstream periodontal care, ultimately improving patient outcomes and expanding treatment options.

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