

HARNESSING HERBAL WISDOM: THE ROLE OF AYURVEDA IN DENTAL WELLNESSRashmi Arora^{1*}, Anusha Dubey², Lomesh Tiwari³, Sneha Wade⁴, Macalino Mathias Faia⁵^{1,2,3,4,5,*}College of Dental Science and Hospital, Rau, Indore, M.P. 453331.***Corresponding Author: Rashmi Arora**

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ABSTRACT

Ayurveda, a 5,000-year-old system of medicine that originated in India, presents a holistic and integrative approach to healthcare by emphasizing the balance of bodily humours, known as doshas—Vata, Pitta, and Kapha. This ancient science considers oral health as a vital component of overall well-being, linking dental conditions to imbalances in these doshas. Modern dentistry, while technologically advanced, often relies on synthetic medications and procedures that may have undesirable side effects. Ayurveda, with its foundation in natural substances and minimally invasive practices, offers a complementary pathway. This review aims to comprehensively explore Ayurvedic principles relevant to dentistry, delve into the pharmacological and therapeutic potential of Ayurvedic herbs, outline classical oral hygiene practices, and examine modern scientific evidence supporting these traditional interventions. The use of herbal medicines such as Neem, Tulsi, Triphala, Clove, and Turmeric is reviewed in-depth, along with their active phytochemicals and mechanisms of action. Furthermore, the paper discusses the multifaceted benefits of Ayurvedic dentistry, including its holistic and preventive approach, reduced reliance on chemicals, and cost-effectiveness. It also addresses the challenges hindering the widespread adoption of Ayurvedic principles in contemporary dental care, such as lack of scientific validation, standardization of herbal preparations, and integration barriers with modern medicine.

KEYWORDS: Dentistry, Ayurveda, Herbal remedy, Periodontics, Dental care.**INTRODUCTION**

Ayurveda, often referred to as the "science of life," is one of the oldest and most comprehensive systems of medicine, developed in India over five millennia ago. Unlike modern medicine, which often focuses on symptom management, Ayurveda aims at addressing the root causes of disease by maintaining harmony between the body, mind, and spirit. At its core, Ayurveda operates on the principles of balancing three biological energies or doshas: Vata (air and ether), Pitta (fire and water), and Kapha (water and earth). These doshas regulate every physiological and psychological function in the human body. When balanced, they ensure health; when imbalanced, they lead to disease.^[1] While Ayurveda encompasses all aspects of health, its application in oral health and dentistry is both significant and unique. The branch of Ayurveda that deals with disorders above the clavicle, including dental issues, is known as Shalakya Tantra. Within this, Dantha Swasthya, or dental health,

holds an essential place. Although not a separate branch like modern dentistry, Ayurveda has historically provided extensive guidelines for maintaining oral hygiene and treating dental conditions using natural substances and non-invasive techniques.^[2,3] Modern dentistry has made remarkable advancements, particularly in surgical procedures, prosthetics, and diagnostics. However, it is often critiqued for its over-reliance on synthetic drugs, invasive procedures, and chemical-based products, many of which have side effects. This has led to a resurgence of interest in natural and holistic treatments, especially Ayurveda, which offers preventive and curative solutions rooted in nature. Ayurveda focuses on lifestyle regulation, dietary management, detoxification, and the use of herbal medicines—all of which contribute to a healthier oral environment.^[4] The integration of Ayurveda into dentistry is not merely a revival of ancient practices but a forward-thinking approach that aligns with the principles of modern integrative medicine.

Practices like Dant Dhavana (chewing medicinal sticks for brushing), JihwaLekhana (tongue scraping), and oil pulling (Kavala/Gandoosha) are being increasingly validated by scientific research. Moreover, herbs like Neem, Turmeric, Clove, and Tulsi are being incorporated into commercial toothpaste, mouthwashes, and gels due to their proven antimicrobial and anti-inflammatory properties.^[5,6] This paper endeavours to provide a comprehensive review of Ayurveda in dentistry by examining classical Ayurvedic concepts, traditional oral hygiene practices, herbal therapeutics, and recent clinical evidence. It also evaluates the benefits and limitations of Ayurvedic interventions and proposes strategies for their integration into mainstream dental care. As the global healthcare landscape evolves towards more personalized, preventive, and patient-centred care, Ayurveda's time-tested wisdom has the potential to complement and enhance modern dental practices.

Ayurvedic Philosophy Relevant to Oral Health

Ayurvedic philosophy is based on the concept of maintaining health through the balance of three biological energies or doshas: Vata, Pitta, and Kapha. Each dosha is associated with specific physical and mental characteristics, and their balance is considered essential for overall health, including dental well-being.^[1,6] Ayurveda views oral health as a reflection of systemic health, with imbalances in the doshas manifesting as dental and oral issues. The oral cavity is seen as an important site for both diagnosis and treatment, and Ayurvedic texts describe numerous conditions and therapies related to dental care.^[7,8]

The Role of Doshas: According to Ayurvedic doctrine, doshas govern all physiological processes in the body, including those in the oral cavity. Each dosha (Fig.1) corresponds to particular oral characteristics and disorders.



Figure 1: Elements and Doshas in Ayurveda.

- **VataDosha (air and ether):** Vata governs movement and communication in the body. In the oral cavity, an imbalance in Vata can lead to dryness of the mouth (xerostomia), receding gums, tooth sensitivity, cracking of the lips, and neuralgic tooth pain. Vata-related dental problems are often characterized by roughness, brittleness, and pain.^[9]

- **Pitta Dosha (fire and water):** Pitta controls metabolism and transformation. In the mouth, a Pitta imbalance may result in inflammation, bleeding gums, mouth ulcers, and a burning sensation. These conditions are often associated with increased acidity and heat in the body, manifesting as aggressive periodontal diseases or aphthous ulcers.^[10]
- **KaphaDosha (earth and water):** Kapha is responsible for structure, lubrication, and cohesion. An excess of Kapha leads to excessive salivation, plaque formation, thick coatings on the tongue, and swollen or spongy gums. Kapha disorders tend to progress slowly but result in chronic conditions like periodontitis if not managed properly.^[11]

Understanding dosha imbalances allows Ayurvedic practitioners to customize treatment strategies, using herbs, dietary modifications, and lifestyle interventions to restore balance and improve oral health.^[12]

Bodhaka Kapha

BodhakaKapha, a subtype of Kaphadosha, plays a vital role in the oral cavity. It is responsible for maintaining moisture in the mouth, facilitating taste perception, protecting the oral mucosa, and initiating digestion by interacting with food. An imbalance in BodhakaKapha can compromise these functions, leading to dry mouth, loss of taste, and increased susceptibility to infections. BodhakaKapha also has systemic connections, influencing the health of organs such as the pancreas, brain, heart, and joints.^[13] Modern research supports the idea that poor oral health is associated with systemic diseases like diabetes, cardiovascular disorders, and Alzheimer's disease. Ayurveda's concept of Bodhaka Kapha provides a theoretical foundation for these associations, underscoring the importance of oral hygiene in overall health maintenance.

Agni (Digestive Fire)

Agni, or digestive fire, is another fundamental concept in Ayurveda. It represents the body's metabolic power, responsible for digestion, assimilation, and transformation of food into energy. When Agni is strong, nutrients are efficiently absorbed, and tissues are well-nourished. However, weak or impaired Agni leads to the accumulation of toxins (Ama), which can manifest as dental caries, bad breath, or gum disease. From an Ayurvedic perspective, oral health cannot be isolated from the digestive process. The mouth is the first site of digestion, and disorders in Agni often present early symptoms in the oral cavity. Ayurvedic practices such as tongue scraping, oil pulling, and the use of specific herbs are designed to stimulate Agni, reduce Ama, and promote optimal oral and systemic health.^[14]

Classical Ayurvedic Oral Hygiene Practices

Oral hygiene is a cornerstone of Ayurvedic health, forming an integral part of daily routine (Dinacharya)

and preventive healthcare. Ayurveda outlines a series of oral hygiene practices, many of which are deeply rooted in tradition but are also supported by contemporary scientific research. These practices include DantDhavana (tooth cleaning), JihwaLekhana (tongue scraping), and Kavala or Gandoosha (oil pulling). Unlike modern oral hygiene, which often relies on synthetic products and chemical formulations, Ayurvedic oral care uses natural herbs, plant extracts, and oils with known therapeutic properties. These methods are not only effective in maintaining oral health but also help in improving digestive function and overall systemic health.

Dant Dhavana (Tooth Cleaning)

Dant Dhavana, or tooth cleaning, is an age-old practice mentioned in classical Ayurvedic texts such as the Charaka Samhita and Sushruta Samhita. It involves the use of herbal chewing sticks or powders to clean the teeth and gums. These sticks, known as Dantapavan, are typically made from twigs of medicinal plants known for their antimicrobial, astringent, and anti-inflammatory properties.

Commonly recommended plants for Danta pavan include.

- **Neem (*Azadirachta indica*):** Renowned for its potent antibacterial, antifungal, and anti-inflammatory properties. Its twigs have been traditionally used as toothbrushes (Fig. 2)
- **Yashtimadhu (*Glycyrrhiza glabra*):** Effective for individuals with Vata dosha; it soothes receding gums and reduces inflammation.
- **Arjuna (*Terminalia arjuna*):** Recommended for individuals with Pitta dosha due to its cooling and astringent nature.
- **Kantakari and Arka (*Calotropis procera*):** Ideal for Kapha dosha individuals to reduce plaque and mucus accumulation.^[15]

The proper way to use a chewing stick involves selecting a fresh twig approximately 9 inches long and as thick as a little finger. The end is chewed until it forms bristles, then used to brush the teeth. This method provides both mechanical cleansing and medicinal benefits. Additionally, the process of chewing stimulates salivary flow, aiding in the digestion and enhancing oral immunity. Dant Dhavana also includes the use of herbal tooth powders made of ingredients like Triphala, Trikatu, Saindhava lavana (rock salt), and clove oil. These powders, when combined with honey or sesame oil, form an effective dental cleaning agent. The mechanical action helps remove plaque, while the herbal compounds offer therapeutic benefits.



Figure 2: Neem.

Jihwa Lekhana (Tongue Scraping)

Jihwa Lekhana, or tongue scraping, is another crucial Ayurvedic oral hygiene practice. The tongue is considered a mirror of internal health, and its coating often reflects the state of the digestive system. According to Ayurveda, scraping the tongue removes Ama (toxins) that accumulate overnight, thus promoting fresh breath and optimal digestion.

Traditional tongue scrapers (Fig. 3) are made from metals such as copper, silver, or stainless steel. They are curved to allow gentle yet effective removal of the tongue's coating. Scraping should be done in the morning, before food or drink, with a tool approximately 12 fingers in length and blunt-edged to avoid injury.

Benefits of Jihwa Lekhana include.

- Removal of foul odours (halitosis)
- Enhanced taste perception
- Stimulation of digestive enzymes
- Detoxification of internal organs reflected on the tongue

Scientific studies have validated the effectiveness of tongue scraping in reducing anaerobic bacteria and improving oral hygiene. The practice is particularly beneficial for individuals with Kapha imbalances, who often experience thick tongue coatings and excessive mucus.^[16]



Figure 3: Traditional tongue scrapers.

Kavala and Gandoosha (Oil Pulling)

Kavala and Gandoosha (Fig. 4) are Ayurvedic therapies involving the swishing and retention of oil or medicated liquids in the mouth. While both serve similar functions, they differ slightly in technique.

- **Kavala:** Involves taking a small amount (about a tablespoon) of oil into the mouth, swishing it around vigorously for 5–10 minutes, and then spitting it out.

- **Gandoosha:** Involves filling the mouth completely with oil, holding it without swishing for a few minutes until eyes begin to water or a slight nasal discharge occurs, and then expelling it.

Commonly used oils include sesame oil, coconut oil, and medicated oils like Irimedadi taila. These oils possess antimicrobial, anti-inflammatory, and antioxidant properties that help maintain oral hygiene.

Therapeutic benefits of oil pulling include.

- Reduction of plaque and gingival inflammation.
- Strengthening of teeth, gums, and jaw.
- Relief from dry mouth and oral ulcers.
- Detoxification of oral tissues and systemic health improvement.

Modern clinical trials have shown that oil pulling is as effective as chlorhexidine in reducing *Streptococcus mutans*, a key pathogen in dental caries. It also helps reduce oral mal odour and improves gum health.^[17] These practices, rooted in holistic principles, not only maintain oral cleanliness but also contribute to systemic detoxification and health. Their revival in modern dental routines offers a promising alternative to synthetic oral care products.^[18]



Figure 4: Oil Pulling - A classical Ayurvedic oral hygiene practice.

Ayurvedic Herbs in Dentistry

Ayurvedic herbs have played a significant role in maintaining oral hygiene and managing dental diseases for centuries. These herbs, derived from nature, are known for their diverse pharmacological properties, including antibacterial, anti-inflammatory, antifungal, analgesic, and antioxidant activities. The growing interest in herbal dentistry is fuelled by concerns over the side effects and long-term consequences of chemical-based oral health products. Ayurvedic herbs offer an effective, safe, and sustainable alternative. This section explores the most commonly used herbs in Ayurvedic dentistry and their clinical significance.

1. Neem (*Azadirachta indica*): Neem is one of the most revered herbs in Ayurveda, widely recognized for its powerful antibacterial, antifungal, antiviral, and anti-inflammatory properties. In the context of oral health, neem is effective in preventing plaque formation,

reducing gingival inflammation, and controlling halitosis. The twigs of neem have traditionally been used as toothbrushes due to their fibrous texture and inherent medicinal qualities. Neem extract contains active ingredients such as nimbidin, nimbin, and azadirachtin, which inhibit the growth of oral pathogens including *Streptococcus mutans*, a primary bacterium responsible for dental caries. Studies have shown that neem-based mouthwashes can significantly reduce plaque and gingival scores, showing results comparable to chlorhexidine, the gold standard in dental rinses. Furthermore, neem oil and leaf powders are frequently included in Ayurvedic toothpaste for their healing and antimicrobial action.^[19,20]

2. Clove (*Syzygium maticum*): Clove is another well-established Ayurvedic herb widely used in dental care. Its primary active compound, eugenol, exhibits potent analgesic, anti-inflammatory, and antiseptic properties. Clove oil is commonly applied to relieve toothache, treat gum infections, and reduce oral bacteria. In endodontics, eugenol has been used in root canal procedures and temporary fillings for its anaesthetic effect.^[21] Clove extracts have also been demonstrated to possess antioxidant capacity, which helps in reducing oxidative stress and inflammation in periodontal tissues. Moreover, clove-based formulations are often used in herbal toothpaste, mouth sprays, and oral gels (Fig. 5).^[22]



Figure 5: Clove and its Formulations.

3. Turmeric (*Curcuma longa*)

Turmeric (Fig. 6) is a golden-yellow root valued for its active component curcumin, which has strong anti-inflammatory, antimicrobial, and wound-healing properties. In Ayurveda, turmeric has been used to treat various oral disorders, including gingivitis, periodontitis, and mouth ulcers. Turmeric mouthwashes and pastes are often recommended for their ability to reduce gum swelling, alleviate pain, and speed up healing. It also exhibits anti-carcinogenic effects and has been studied for its role in preventing oral cancers, especially in individuals with habits such as tobacco chewing. Additionally, turmeric can help neutralize bad breath and promote healthy oral mucosa.^[23,24]



Figure 6: Turmeric.

4. Triphala

Triphala is a polyherbal formulation composed of three fruits: Amalaki (*Embllica officinalis*), Haritaki (*Terminalia chebula*), and Bibhitaki (*Terminalia bellirica*) (Fig. 7). It is a potent antioxidant and has demonstrated anti-inflammatory and antimicrobial properties. Triphala mouthwash has been clinically shown to reduce dental

plaque and gingival inflammation. One of the key advantages of Triphala is its safety profile. Unlike chlorhexidine, which can cause staining and taste alteration, Triphala can be used for prolonged periods without side effects. It is also beneficial in enhancing oral immunity and promoting healing in periodontal tissues.^[25,26]

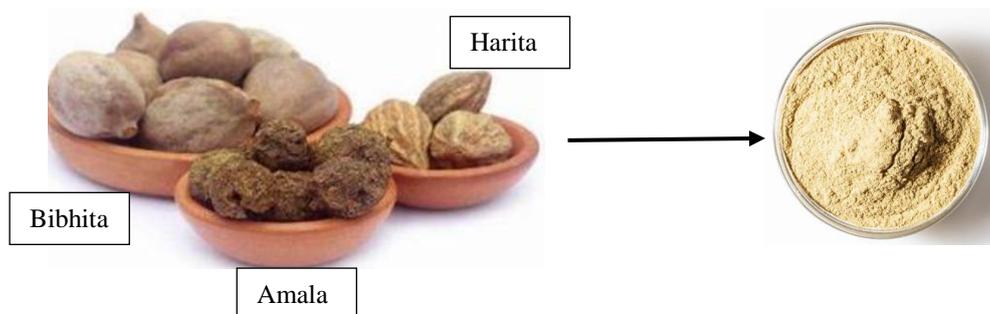


Figure 7: Composition of Triphala churna.

5. Tulsi (*Ocimum sanctum*)

Tulsi, or holy basil (Fig. 8), is known as the “Queen of Herbs” in Ayurveda. Its leaves contain essential oils like eugenol, ursolic acid, and linalool, which possess antimicrobial, adaptogenic, and anti-inflammatory effects. Tulsi extract has been found effective against a variety of oral pathogens and is particularly useful in controlling dental plaque and reducing oral bacterial load.^[27] Tulsi mouthwash, at a concentration of 4%, has shown efficacy in reducing salivary streptococci counts, making it a useful adjunct in preventive dental care. Its refreshing taste and natural aroma make it a preferred herbal alternative in mouth rinses.^[28]



Figure 8: Tulsi leaves.

6. Pomegranate (*Punica granatum*)

Pomegranate is rich in polyphenols and tannins, which contribute to its antioxidant, anti-inflammatory, and antibacterial properties. In Ayurvedic dentistry, pomegranate rind and juice are used to formulate mouthwashes that help reduce dental plaque and gingival inflammation. Studies suggest that pomegranate extract inhibits the adherence of bacteria to tooth surfaces and modulates the inflammatory response.

It is also effective in promoting fresh breath and preventing oral ulcers. Pomegranate-based herbal formulations (Fig. 9) are gaining popularity in holistic dental practices.^[29]



Figure 9: Pomegranate-based herbal dental formulation.

7. Other Notable Herbs

- **Mango leaves (*Mangifera indica*):** Contain phenolic acids; effective against oral anaerobic bacteria.^[30,31]
- **Sesame Oil (*Tila*):** Used in oil pulling; reduces plaque and inflammation.
- **Liquorice (*Glycyrrhiza glabra*):** Soothes ulcers, promotes healing, and inhibits bacterial growth.
- **Lemon (*Citrus limon*):** Used as a root canal medicament due to its antibacterial effects.
- **Kantakari seeds:** Known for their dhoopan (fumigation) effects in managing dental caries.

With increasing scientific validation and consumer interest in natural products, Ayurvedic herbs are poised to play a pivotal role in integrative dentistry.^[32]

Modern Clinical Applications and Evidence

The integration of Ayurvedic practices into modern dentistry is not only a revival of ancient wisdom but also a growing area of interest supported by scientific validation. As global awareness about the potential side effects of synthetic medications increases, patients and professionals are seeking safer, more sustainable alternatives. Ayurveda's emphasis on natural substances, preventive care, and individual constitution aligns well with the principles of modern integrative medicine. This section explores how Ayurvedic interventions are being

applied in contemporary dental settings, backed by clinical studies and evidence-based research.^[33]

• Scientific Validation of Ayurvedic Interventions

In recent years, various studies have been conducted to evaluate the efficacy of Ayurvedic herbs and therapies in dental care. These investigations have shown promising results, particularly in the areas of plaque control, gingivitis treatment, and reduction of bacterial load in the oral cavity.

The effectiveness of neem-based mouthwash with chlorhexidine in patients with plaque-induced gingivitis was compared in a clinical study by Anirban Chatterjee et al.^[34] The study revealed that the neem rinse was equally effective in reducing plaque and gingival scores over a 21-day period. Similarly, Triphala mouthwash has been evaluated for its plaque-inhibitory properties and has shown comparable effectiveness to chlorhexidine, with the added advantage of fewer side effects such as tooth staining and taste alteration.^[34,35]

Tulsi (*Ocimum sanctum*) extract has also demonstrated significant antimicrobial activity against oral pathogens like *Streptococcus mutans* and *Candida albicans*. Subramanian et al. conducted in vitro studies showing Tulsi's effectiveness against various bacterial strains commonly associated with dental caries and periodontal disease. Moreover, Triphala and turmeric extracts have shown notable improvements in oral hygiene indices in paediatric and adult populations. Oil pulling, another classical Ayurvedic practice, has been studied for its ability to reduce plaque and gingivitis. A study by Asokan et al. in 2011 showed that sesame oil pulling was as effective as chlorhexidine mouthwash in reducing plaque and *Streptococcus mutans* count in adolescents. Furthermore, coconut oil has been found beneficial in managing plaque-induced gingivitis, with improvements noted within just a week of usage.^[36]

• Integration into Modern Dental Products

The increasing interest in Ayurvedic herbs has led to their incorporation into commercial dental products. Many toothpaste brands now include neem, clove, turmeric, and Triphala as active ingredients. These herbal formulations are marketed as natural, side-effect-free alternatives to traditional fluoride-based products. Additionally, Ayurvedic mouthwashes, gels, and herbal chewing gums have become popular in both Eastern and Western markets.^[37] Ayurvedic herbs are also being used in endodontic procedures. Eugenol, derived from clove, is widely used in root canal sealants and temporary fillings due to its anaesthetic and antimicrobial properties. Similarly, lemon and garlic extracts are being explored for their antibacterial activity against endodontic pathogens, offering potential alternatives to conventional irritants.^[38]

• Ayurvedic Approaches in Periodontal Therapy

Periodontal diseases such as gingivitis and periodontitis are chronic inflammatory conditions that affect the supporting structures of the teeth. Modern treatments often involve scaling and root planning, antibiotic therapy, and surgical interventions. However, these methods can be invasive and carry the risk of side effects. Ayurveda offers several non-invasive alternatives that target the underlying causes of inflammation and bacterial infection. Herbal decoctions and oils are used for gum massage (*Mukh lepa*), and medicated gargles are recommended to soothe inflamed tissues. Amla (*Emblica officinalis*) and Haritaki (*Terminalia chebula*) have been used to promote collagen regeneration and healing of gingival tissues. Pomegranate extracts, rich in polyphenols, have been shown to inhibit plaque formation and reduce inflammation in gingival tissues.^[39] Clinical trials have highlighted the benefits of Ayurvedic herbs in managing periodontitis (Fig. 10). For instance, patients using Triphala mouthwash have demonstrated reductions in bleeding on probing and pocket depth. The antioxidant properties of these herbs also help in neutralizing reactive oxygen species that contribute to tissue destruction.



Figure 10: Herbal Intervention in Periodontitis.

Uses of herbs in Paediatric Dentistry

Paediatric dentistry faces unique challenges due to children's increased susceptibility to dental caries and their sensitivity to strong-tasting or chemically-formulated products. Ayurvedic remedies, being mild, palatable, and safe, are well-suited for children. Herbal mouthwashes like those made from Triphala or diluted clove oil are frequently used for paediatric oral care.^[40]

A randomized clinical trial involving school children assessed the use of herbal dentifrice containing neem and liquorice and showed significant improvement in plaque control and reduction in caries risk over three months. Such studies emphasize the feasibility and benefits of integrating Ayurvedic principles in paediatric dental routines. The emphasis on prevention aligns well with the goals of modern dentistry, particularly in reducing the global burden of dental diseases.^[41]

Comparative Analysis: Ayurvedic vs. Modern Dental Approaches

Ayurvedic dentistry is based on a holistic philosophy that emphasizes the balance of bodily energies, or doshas

(Vata, Pitta, and Kapha), and the enhancement of Agni (digestive fire), whereas modern dentistry primarily follows a symptom-based approach that is mechanical and pharmacological in nature. In terms of materials used, Ayurvedic dentistry relies on natural herbal extracts and oils such as Neem, Clove, and Triphala, while modern dentistry utilizes synthetic drugs, antiseptics like chlorhexidine, and fluorides. The techniques employed in Ayurvedic practices include oil pulling, herbal brushing (Dant Dhavana), and tongue scraping (Jihwa Lekhana). In contrast, modern dental care typically involves brushing with toothpaste, flossing, scaling, and root planning.^[42]

Ayurveda focuses on prevention, detoxification, and maintaining systemic balance. Modern dentistry, on the other hand, centres on diagnosis, restoration, and surgical intervention. The side effects associated with Ayurvedic treatments are generally minimal and may include mild allergic reactions in rare cases. However, modern dental treatments can lead to side effects such as staining, taste alteration, and in some instances, antibiotic resistance. Ayurvedic methods tend to be cost-effective, often utilizing locally available resources, while modern dental care can be expensive due to the use of advanced technology and imported materials.^[41] Scientific validation for Ayurvedic practices is limited but steadily growing through emerging clinical trials. In contrast, modern dentistry boasts a well-established evidence base. Lastly, Ayurvedic dental care is widely accessible in traditional communities and is gradually expanding in urban areas, whereas modern dentistry is typically available in clinical and hospital settings.^[43,44]

Challenges and Limitations in Integrating Ayurveda with Dentistry

- **Lack of Standardization** One of the primary barriers to the integration of Ayurveda with modern dentistry is the lack of standardization in Ayurvedic medicines. Herbal preparations can vary significantly in terms of concentration, purity, and quality depending on their source, processing method, and storage conditions. This inconsistency can lead to variations in therapeutic outcomes and poses challenges for clinical reliability. Additionally, there are no universally accepted protocols regarding the dosage, application methods, or administration frequency for Ayurvedic dental treatments. Without such standards, it becomes difficult for practitioners to prescribe and for researchers to conduct reproducible clinical trials.^[45]
- **Scientific and Clinical Evidence Gaps:** Although there is growing interest in Ayurvedic dentistry, the scientific validation of its practices remains limited. Most existing studies are small-scale, short-term, or lack rigorous control groups. Large-scale, multi-centred, randomized controlled trials (RCTs) are essential to establish the efficacy and safety of Ayurvedic interventions in dentistry. Furthermore, long-term studies are needed to assess the sustained

benefits, potential risks, and side effects of continued use of Ayurvedic products. The lack of robust data limits the acceptance of Ayurvedic methods within the evidence-based framework of modern healthcare.^[46]

- **Regulatory Barriers** Regulatory challenges also hinder the integration of Ayurvedic practices into mainstream dental care. Herbal dental products often do not meet the stringent quality and safety standards established by national and international health authorities such as the Food and Drug Administration (FDA) or the World Dental Federation (FDI). The absence of well-defined policies for approval, marketing, and labelling of Ayurvedic dental products limits their accessibility and credibility. Moreover, Ayurvedic dentistry is not formally incorporated into most dental education curricula, creating a gap in professional training and policy-level support.^[47,48]
- **Professional Scepticism and Awareness:** There is considerable scepticism among modern dental practitioners about the effectiveness and reliability of Ayurvedic treatments. Many dentists are unfamiliar with Ayurvedic concepts and hesitate to recommend herbal alternatives due to a lack of formal training or evidence-based guidelines. Conversely, Ayurvedic practitioners often lack in-depth knowledge of dental science, which restricts their ability to treat complex oral conditions or collaborate with dental professionals. This mutual gap in understanding and trust creates resistance to interdisciplinary cooperation and integration.^[49]
- **Consumer Perception and Misuse:** A common misconception among consumers is that all natural products are inherently safe. This belief can lead to the unregulated use of Ayurvedic remedies without proper guidance from qualified practitioners. Self-medication or incorrect application of herbal treatments may result in suboptimal outcomes or, in some cases, adverse effects. Additionally, the market is flooded with products claiming to be "Ayurvedic" without proper certification or quality assurance, leading to mistrust among both patients and professionals.

Future Prospects and Recommendations

1. **Interdisciplinary Research:** To bridge the gap between traditional Ayurvedic wisdom and modern dental science, interdisciplinary research is essential. Collaborations among Ayurvedic scholars, dental surgeons, pharmacologists, botanists, and biomedical researchers can lead to the scientific validation of herbal formulations. These collaborations can help identify active ingredients, understand mechanisms of action, and develop clinically tested products. Additionally, there is a pressing need to establish dedicated Ayurvedic dental research centres that can conduct high-quality trials, foster innovation, and generate evidence that meets global healthcare standards. Encouraging

government and private funding for such initiatives will accelerate the integration process.^[50]

2. **Standardization and Quality Control:** For Ayurvedic dental products to gain wider acceptance, consistency in their composition and effects is crucial. Developing pharmacopeia standards specific to Ayurvedic oral healthcare products would ensure uniformity in terms of dosage, purity, and therapeutic efficacy. Implementing Good Manufacturing Practices (GMP) in the production of Ayurvedic formulations can enhance consumer confidence and ensure safety. Standard operating procedures for harvesting, processing, and storing medicinal plants should be regulated and monitored by official health authorities to maintain quality throughout the supply chain.^[50]
3. **Educational Reforms:** Integrating Ayurvedic concepts into the mainstream dental curriculum is a necessary step toward creating awareness and acceptance among future healthcare professionals. Introducing elective modules or certification courses on Ayurvedic dentistry in Bachelor of Dental Surgery (BDS) and Ayurvedic (BAMS) programs can foster a dual understanding of both systems. Furthermore, conducting Continuing Medical Education (CME) workshops, seminars, and interprofessional conferences can promote knowledge exchange between modern dentists and Ayurvedic practitioners, encouraging collaborative clinical practices.^[51]
4. **Policy and Regulatory Inclusion:** For widespread adoption, Ayurvedic dental practices must be officially recognized by national and international health regulatory bodies. Inclusion of Ayurveda in public health policies can facilitate insurance coverage, institutional acceptance, and mainstream adoption of herbal therapies. Regulatory frameworks should be established for the certification and accreditation of Ayurvedic dental products, with clear guidelines on safety testing, quality assurance, labelling, and marketing. This would not only protect consumers but also provide legal clarity for practitioners and manufacturers.^[52]
5. **Public Awareness and Accessibility:** Creating awareness among the public about the scientifically proven benefits of Ayurvedic oral care is crucial for its acceptance and usage. Educational campaigns using mass media, social platforms, and community health programs can inform people about safe and effective Ayurvedic hygiene practices such as oil pulling, herbal tooth powders, and tongue scraping. Special focus should be placed on promoting these practices in rural and underserved populations where access to modern dental care is limited. Ayurveda can offer affordable, culturally familiar, and locally available alternatives to maintain oral health.^[53]
6. **Integration into Clinical Practice:** The future of dentistry lies in integrative and personalized care. Ayurvedic interventions can be effectively incorporated as adjunct therapies in various dental

treatments. For instance, herbal decoctions and oils can be used in periodontal therapy for gum massage, inflammation control, and tissue healing. In paediatric dentistry, mild and palatable Ayurvedic preparations can serve as safer options for children. Moreover, the integration of artificial intelligence (AI) and digital tools can enhance the customization of treatment by mapping a patient's Prakriti (constitutional type) and recommending Ayurvedic regimens accordingly. Such hybrid models can improve patient satisfaction, treatment outcomes, and overall health.^[54]

CONCLUSION

Ayurveda and modern dentistry, although rooted in vastly different historical, cultural, and philosophical foundations, are unified by a shared mission: the enhancement of oral health and the overall well-being of individuals. While modern dentistry is highly advanced in terms of technology, surgical precision, and diagnostics, it is often reactive, focusing primarily on treating symptoms and repairing damage. In contrast, Ayurvedic dentistry adopts a preventive, holistic, and individualized approach, emphasizing the maintenance of balance within the body through natural means—diet, herbal therapies, and lifestyle regulation. Ayurvedic dental practices such as oil pulling (Kavala and Gandoosha), herbal tooth cleaning (Dant Dhavana), tongue scraping (Jihwa Lekhana), and the use of plant-based remedies like Neem, Tulsi, Clove, Triphala, and Turmeric, represent a safe and sustainable approach to oral hygiene. These practices not only help in preventing common dental ailments such as plaque, gingivitis, and halitosis but also contribute to systemic detoxification and better digestive health, aligning oral care with overall health maintenance. Importantly, these two systems should not be seen as mutually exclusive. Their integration presents a compelling opportunity to create a more robust and patient-centric model of dental care. Modern scientific methods can validate, refine, and standardize Ayurvedic practices, making them more accessible and acceptable in clinical settings. Meanwhile, Ayurveda offers modern dentistry a complementary dimension that is natural, cost-effective, and focused on the root cause of disease rather than just its symptoms. However, certain barriers must be overcome for successful integration. These include the lack of standardized formulations, limited scientific data, regulatory challenges, and a gap in professional education regarding traditional medicine. Addressing these issues through interdisciplinary collaboration, research initiatives, and educational reforms will be essential. Furthermore, the role of public health policy and consumer awareness will be critical in fostering the acceptance of an integrative dental model. Looking forward, the future of dentistry could lie in adopting a holistic and personalized model—one that blends the clinical efficacy and innovation of modern dentistry with the ancient wisdom, natural remedies, and systemic health principles of Ayurveda. Such a fusion promises a

dental healthcare system that is not only more inclusive and sustainable but also deeply rooted in the values of preventive care, patient empowerment, and long-term well-being.

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