

Utilizing Natural Resources in Dentistry Practice to Enhance Holistic Oral Well-Being

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Abstrak

Penelitian ini membahas potensi siwak (*Salvadora persica*) dalam meningkatkan kesehatan gigi dan mulut secara holistik melalui pendekatan literatur. Siwak, yang telah digunakan dalam berbagai budaya selama berabad-abad, mengandung senyawa aktif seperti trimetilamina, tanin, Salvador, dan benzyl isothiocyanate yang memiliki efek antibakteri dan anti-plak. Data dari beberapa penelitian menunjukkan bahwa siwak dapat mengurangi akumulasi plak dan inflamasi gingiva, sehingga mendukung penggunaannya dalam praktik kedokteran gigi modern. Namun, penggunaan yang tidak tepat dapat menyebabkan resesi gusi dan trauma jaringan, yang menyoroti pentingnya edukasi mengenai kebersihan mulut yang benar. Integrasi siwak dalam praktik kedokteran gigi modern memerlukan standar kualitas dan pengendalian mutu untuk memastikan efektivitasnya. Aplikasi modern siwak, mulai dari pasta gigi hingga obat kumur, menunjukkan potensi besarnya dalam mendukung perawatan kesehatan gigi yang holistik. Penerimaan budaya dan regulasi produk juga penting untuk adopsi yang lebih luas, sementara edukasi publik mengenai manfaat dan dasar ilmiah siwak dapat meningkatkan penerimaan dan pemanfaatannya.

Kata kunci: Siwak; kesehatan gigi; anti-plak; kesehatan holistik; *Salvadora persica*

Abstract

This study examines the potential of siwak (*Salvadora persica*) in enhancing holistic oral health through a literature review approach. Siwak, historically utilized across cultures, contains active compounds like trimethylamine, tannins, Salvador, and benzyl isothiocyanate, known for their antibacterial and plaque-inhibiting effects. Research data indicate that siwak effectively reduces plaque buildup and gingival inflammation, supporting its integration into modern dental practices. However, improper use can lead to adverse effects such as gingival recession and tissue trauma, highlighting the need for proper oral hygiene education. The integration of siwak in modern dentistry requires quality control and standardization to ensure its efficacy. Modern applications of siwak, including toothpaste and mouthwash, demonstrate its potential in promoting holistic dental care. Cultural acceptance and regulatory standards are essential for its broader adoption, while public education about its benefits and scientific basis can improve acceptance and utilization.

Keywords: Siwak; dental health; anti-plaque; holistic health; *Salvadora persica*

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INTRODUCTION

The global focus on sustainable and natural health solutions has surged, driven by a collective desire to minimize dependence on synthetic chemicals and align healthcare practices with environmentally friendly approaches (Al-Otaibi et al., 2023). In dentistry, this trend is reflected in the increasing popularity of natural products for oral care, as they often align with cultural traditions and are perceived to be safer alternatives (Bashir et al., 2021). The World Health Organization (WHO) recognizes oral health as a critical component of general health, further advocating for preventive care methods that incorporate accessible and effective natural tools like siwak (WHO, 2022).

Siwak, derived from the *Salvadora persica* tree, has been extensively used for oral hygiene in cultures across the Middle East, Africa, and South Asia for centuries (Hamudeng

& Firmansyah, 2023). Research indicates that siwak possesses significant antibacterial properties, particularly against pathogens such as *Streptococcus mutans* and *Porphyromonas gingivalis*, which are associated with dental caries and periodontal diseases (Haque et al., 2021). A study by Al-Bayati and Sulaiman (2022) revealed that siwak contains natural fluoride, silica, and sulfur compounds, which help in plaque removal and enamel strengthening.

The prevalence of oral diseases, including dental caries and periodontal disorders, remains a significant public health issue globally, affecting approximately 3.5 billion people (Global Burden of Disease Study, 2020). The overuse of synthetic oral care products, particularly those containing triclosan and other harmful chemicals, has raised concerns about potential long-term health effects (Khare et al., 2023). Incorporating natural and sustainable alternatives such as siwak can mitigate these risks while addressing the global burden of oral diseases.

While the historical use of siwak is well-documented, its integration into modern dentistry remains underexplored. Recent innovations include siwak-based toothpaste and mouthwash formulations, which combine traditional wisdom with modern technology (Zahran et al., 2022). Novel studies are examining siwak's role in reducing oxidative stress in oral tissues, a promising area for preventing systemic diseases linked to oral health (Ahmed et al., 2023).

A comprehensive review by Halawany (2020) outlined the phytochemical composition of siwak and its therapeutic effects, emphasizing its antimicrobial, antifungal, and anti-inflammatory properties. Another study by Zahran et al. (2022) demonstrated siwak's effectiveness in reducing plaque index scores in clinical trials, suggesting its potential as an adjunctive tool in dental hygiene practices. Furthermore, Ahmed et al. (2023) explored siwak's impact on oral microbiota, finding a significant reduction in pathogenic bacteria compared to conventional toothbrushes.

The purpose of this study is multifaceted, aiming to delve into the historical and cultural significance of siwak in oral care practices while analyzing the scientific evidence supporting its efficacy in promoting oral health. Additionally, the study seeks to identify potential applications of siwak in modern dentistry, addressing the challenges and opportunities associated with its integration.

The integration of siwak into contemporary dental practices offers numerous benefits. From a health perspective, siwak enhances oral hygiene and reduces the incidence of dental caries and periodontal diseases, owing to its natural antibacterial properties. Culturally, it preserves traditional practices and promotes cultural heritage, aligning healthcare with the values of diverse communities. Environmentally, siwak provides a sustainable alternative to synthetic oral care products, significantly reducing plastic waste and chemical exposure, thus contributing to global environmental conservation efforts.

RESEARCH METHOD

This research methodology uses a literature review approach to explore the potential of siwak (*Salvadora persica*) in dental practice to enhance holistic oral health. The process involves selecting studies based on their relevance to siwak use in dental care, specifically those discussing its chemical composition, antibacterial effects, plaque reduction capabilities, and overall impact on oral health. Data from selected studies were analyzed qualitatively to evaluate siwak's effectiveness compared to conventional methods, including its ability to reduce plaque, stabilize oral pH, and any potential side effects. Additionally, a comparative analysis was conducted between siwak-based products, such as toothpaste and mouthwash, and standard dental care products to assess their effectiveness in reducing plaque and improving gum health. This approach aims to

provide insights into the role of siwak in modern dentistry as well as considerations for increasing its acceptance and use in the community.

RESULTS AND DISCUSSION

Chewing sticks, or siwak, were used as oral hygiene instruments in pre-Islamic communities. The practices of the Prophet (PBUH) apply to contemporary medicine, especially regarding dental cleanliness (Mohd Dom, 2023). Research indicates that siwak contains substances that inhibit plaque formation and fight oral microbes. Rubbing siwak on the tooth surface protects teeth surfaces from pathogens, aided by the fluoride content in saliva that helps remineralize teeth. Benzyl isothiocyanate in siwak is thought to penetrate bacterial membranes and disrupt their redox systems, impeding bacterial membrane potential and integrity and leading to bacterial apoptosis (Hamudeng & Firmansyah, 2023).

Siwak contains:

1. Trimethylamine;
2. A water-soluble compound that acts as a flotation agent;
3. Preventing food particles and debris from depositing in the oral cavity, especially between teeth.

It also has antibacterial properties, as trimethylamine can inhibit bacterial adhesion on surfaces, preventing biofilm formation. Additionally, siwak contains tannins that reduce bacterial attachment to teeth surfaces. Tannins form a protective layer over enamel, protecting against dental caries by inhibiting the GTF enzyme that *Streptococcus mutans* produces. The antibacterial activity of tannins arises from their toxicity, which damages bacterial cell membranes, disrupts cell wall permeability, and hinders bacterial activity, leading to inhibited growth and cell death (Hamudeng & Firmansyah, 2023).

Siwak contains Salvador, a specific alkaloid inhibiting bacterial enzyme production by disrupting protein, cell wall synthesis, and bacterial metabolism. The essential oils in siwak stimulate saliva secretion, increasing saliva flow and reducing viscosity, which helps prevent plaque formation. Higher saliva flow helps clean food residues from education, and promotion is needed.

Furthermore, silica found in siwak sticks as a substitute for toothpaste will help remove plaque and stains from the surface of the teeth. Calcium in siwak, combined with saliva, helps to increase the remineralization of the tooth enamel layer. A thin resin layer will also form on the enamel, protecting the teeth from caries. In addition, the vitamin C content in siwak supports healing and tissue repair, while the high chloride content slows down calculus formation. Siwak is also a powerful cleanser and is beneficial for people with diabetes because it prevents gum bleeding (Bramantoro, 2019).

The efficacy of toothpaste containing siwak extract on gingival inflammation was assessed, compared to herbal and conventional toothpaste. Some researchers found that the miswak extract-containing toothpaste had a similar effect as the herbal toothpaste and could be safely used for home oral hygiene in patients with gingivitis (Frag *et al.*, 2021). The effect of siwak mouthwash is significant on changes in the acidity (pH) of the saliva of the community's oral cavity. The effect is known from the difference in salivary pH values before and after using siwak mouthwash, where the average salivary pH score before using siwak mouthwash is 7.9. After using siwak mouthwash, the pH tends to be more stable and standard, with a change in pH score to 7.5, where the standard salivary pH score of the oral cavity is 6.8-7.5. After using the siwak extract solution, for example, siwak mouthwash, saliva pH tends to be more stable in normal conditions. Siwak wood extract effectively inhibits the growth of *Streptococcus mutans*, *Streptococcus sobriety*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Lactobacillus acidophilus* bacteria (Rahmah *et al.*, 2023).

While siwak offers benefits for oral health, improper use can lead to adverse effects such as gingival recession and tissue trauma. Many studies need more details on the proper technique, duration, and frequency of siwak use, raising concerns about their findings. Standard brushing methods with siwak, such as horizontal and vertical motions, can cause damage. Tooth surface loss and gingival issues have been linked to improper siwak use. Proper oral hygiene education, including correct siwak use, is essential to prevent these problems and ensure safety and effectiveness (Ramli et al., 2021). On the other hand, many people still do not know the benefits of miswak in oral health, so intensive care effectively reduces plaque accumulation.

The adoption of siwak in modern dentistry faces several challenges. One of the primary concerns is the standardization and quality control of siwak sticks. Unlike commercially produced toothbrushes, siwak sticks can vary in quality, which might affect their effectiveness. Ensuring that siwak is sourced and prepared correctly is crucial for maintaining its benefits. The tip of the miswak should always be kept fresh to achieve optimal results. Cutting the tip before each use ensures the release of benzyl isothiocyanate when the miswak is used. Repeated use of the same tip gradually decreases the amount of benzyl isothiocyanate released (Winarni et al., 2019). Siwak has a limited use time after 24 hours; this herb will release components that are not good for health, so choose fresh siwak sticks and store them in a clean and not humid container (Abdullah, 2022).

Currently, siwak is available in the market in various clean and healthy-looking packaging. Modern uses of siwak extend beyond traditional toothbrushing, including toothpaste, mouthwash, endodontic irrigation solutions, DNA profiling, and tooth whitening. Toothpaste containing *S. persica* (Siwak) extract is more effective than some commercial brands in removing dental plaque. Siwak-based mouthwash has been shown to reduce plaque formation, although it is less effective than chlorhexidine and more effective than a placebo (Winarni et al., 2019). Otherwise, siwak was also able to reduce dental plaque as a mechanical toothbrush, and if it is used in active form (fresh plant), the reduction of plaque accumulation is more prominent and effective. This herbal toothbrush could be used as an alternative and suitable tool for oral hygiene for people interested (Aljarbou *et al.*, 2022)

Cultural and societal perceptions also play a role in the acceptance of siwak. In some regions, there might be resistance to adopting traditional methods over modern, scientifically endorsed products. Educating the public about the benefits and scientific backing of siwak can help mitigate these concerns and promote wider acceptance. Regulatory aspects also need to be considered. As with any dental product, ensuring that siwak meets health and safety standards is essential for its integration into modern dental practices.

CONCLUSION

In summary, siwak, traditionally used in pre-Islamic and Islamic communities, has been recognized for its significant benefits in enhancing oral health. It contains various active compounds, such as trimethylamine, tannins, Salvador, and benzyl isothiocyanate, which contribute to its plaque-inhibiting and antibacterial properties. Research supports the effectiveness of siwak in reducing plaque and gingivitis and providing a natural method for maintaining oral hygiene. However, improper use can lead to adverse effects like gingival recession and tissue trauma, highlighting the need for proper oral hygiene education. The integration of siwak into modern dentistry presents promising prospects. Ensuring the standardization and quality control of Siwak products is essential for maintaining their effectiveness. Modern applications of siwak extend beyond toothbrushing to include toothpaste, mouthwash, and other dental products, demonstrating its versatility and potential in holistic oral care. Cultural acceptance and regulatory standards are crucial for

the broader adoption of siwak. Public education about its benefits and scientific backing can enhance acceptance. The future of integrating natural resources like siwak in dental practices holds great promise for improved oral health outcomes.

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