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Miswak (Salvadora Persica): A Natural Tool For Oral Hygiene And Therapeutic Benefits – A Review

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Abstract

Miswak (Salvadora persica) is a natural chewing stick that has been used for oral hygiene for more than 1500 years. It is widely used in many parts of the world for cleaning teeth and maintaining oral health. Scientific studies show that miswak has antibacterial, antifungal, antiplaque, antioxidant, and anti-halitosis properties. It helps reduce dental plaque, bad breath, oral infections, and promotes healthy gums. Miswak also stimulates saliva flow and may protect against oral diseases. This review summarizes the traditional use, chemical constituents, extraction methods, and pharmacological activities of miswak, highlighting its importance as a safe, effective, and natural oral hygiene aid.

Keywords

Miswak; Salvadora persica; Oral hygiene; Antibacterial; Antifungal; Dental plaque

Introduction

Oral hygiene refers to keeping the mouth and teeth clean and healthy. The main aim of oral hygiene is to prevent dental problems such as cavities, gingivitis, periodontal disease, and bad breath. Methods used to maintain oral hygiene include brushing, flossing, and gargling. In earlier times, the use of dental cleaning tools after recognizing their importance in 1992.[1] Recently, many human pathogenic bacteria have become resistant to commonly used antibiotics due to their improper and excessive use. Salvadora persica L., commonly called miswak or the toothbrush tree, belongs to the family Salvadorean. It has been traditionally used as chewing sticks by many Islamic communities and has been scientifically proven to be effective in preventing tooth decay, even when used without any other tooth-cleaning methods. Chewing sticks obtained from the roots, stems, or twigs of S. persica are widely used in the Middle East for maintaining oral hygiene. Studies have shown that extracts of S. persica, when used at high concentrations, show effects comparable to other oral disinfectants and anti-plaque agents such as triclosan and chlorhexidine gluconate. It has also been reported that miswak extracts possess various biological activities, including significant antifungal and antibacterial effects, especially against bacteria involved in dental plaque formation .[2] Miswak is a natural oral hygiene tool that was invented more than 1500 years ago, long before toothpaste and nylon toothbrushes were discovered. It is still used today by many people in different parts of the world. The World Health Organization (WHO) has recently recognized its multiple health benefits. The word Miswak comes from Arabic and means a stick used for cleaning teeth.[3]

Fig: Miswak

Taxonomical Classification of Miswak

Kingdom: Plantae (Plants)

Division / Phylum: Magnoliophyte (Flowering plants)

Class: Magnoliopsida (Dicots)

Subclass: Dilleniidae

Order: Capparales

Family: Salvadoraceae

Genus: Salvadora

Species: Salvadora persica L. [4]

Vernacular names of Miswak

Miswak – Arabia, Middle East

Siwak – Arabic-speaking regions

Datan / Datun – India, Pakistan

Miswaki – Tanzania, East Africa

Kayu sugi – Nusantara (Malaysia–Indonesia region)

Arak stick – Middle East

Chewing stick – General English name

Toothbrush tree stick – Common descriptive name

Peelu / Pilu – Some parts of India (for Salvadora persica) [5]

Chemical Constituents

Chemical analysis of Salvadora persica (Miswak) shows that it contains many useful natural chemicals. It has β-sitosterol and m-anisic acid. It also contains chlorides, salvadourea, and gypsum. Some organic compounds such as pyrrolidine, pyrrole, and piperidine are present.

Miswak also contains glycosides like salvadoside and salvadoraside, and flavonoids such as kaempferol, quercetin, rutin, and quercetin glucoside, which are known for their health benefits.

The roots and bark of the S. persica plant contain about 27% ash. They are rich in alkaloids like salvadorine and trimethylamine, along with chlorides and fluorides. Moderate amounts of silica, sulfur, and vitamin C are present, and small amounts of tannins, saponins, flavonoids, and sterols are also found.

High levels of sodium chloride and potassium chloride are present, along with other sulfur-containing compounds such as salvadourea and salvadorine.[6]

Extraction Process

ried roots of Salvadora persica ("Miswak") were collected and identified with the help of an experienced local merchant. The roots were sliced, ground to a powder, and extracted in distilled water for 48 hours. The extract was then centrifuged, filtered, and stored for further use. Polysaccharides were isolated from the aqueous extract by precipitation with acetone, followed by dialysis and lyophilization. The presence of carbohydrates in the polysaccharides was confirmed using Molisch's, Fehling's, and Iodine tests.[7]

Pharmacological Action OF Miswak

Antibacterial Activity:

Studies show that Miswak contains substances that can reduce dental plaque and kill harmful bacteria found in the mouth. It is effective against cavity-causing bacteria and gum disease-causing bacteria that commonly live in the oral cavity. found that using miswak, compared to a toothbrush, significantly reduced the amount of Aggregatibacter actinomycetemcomitans in plaque below the gums. This suggests that extracts of Salvadora persica can slow bacterial growth and reduce their harmful toxins. Almas (1999) reported that miswak extracts showed strong antibacterial activity against Streptococcus mutans and Enterococcus faecalis. suggested that miswak works by preventing bacteria from sticking to the tooth surface, which helps protect teeth and gums.[8]

Antiplaque Effect on Teeth:

Dental cavities and gum problems are common oral health issues. These problems mainly occur because of plaque, which is a sticky layer of bacteria on the teeth. Research by showed that miswak (Siwek) extracts can slow down the growth of bacteria that cause plaque. It was found to be 13.63% more effective than a placebo in controlling plaque. A study from Sweden found that people who regularly use miswak had a 52% lower Plaque Index, showing that miswak helps reduce plaque on teeth. The way miswak is used and handled also affects how well it works. However, Batwa et al. (2006) reported that miswak and toothbrush can be equally effective. This may depend on how often, how long, and how properly each one is used. Overall, most studies show that miswak helps reduce plaque, which lowers the risk of gingivitis and bleeding gums.[1]

Anticarcinogenic / Antineoplastic Activity:

Some chewing sticks, such as those from Dialium guineense, Diospyros tricolor, Fagara zanthoxyloides, Garcinia kola, Massularia acuminata, and Rhus glabra, have been reported to possess anticarcinogenic and antineoplastic activities. In particular, the widely used Diospyros species contain metabolites that exert antineoplastic effects, and Fagara macrophylla extract is being evaluated in pharmacological trials under the cancer chemotherapeutic research program of the U.S. National Institutes of Health. These findings suggest that regular use of such chewing sticks may help in reducing the risk of cancers, especially in the oral cavity [9]

Anti- Halitosis:

Miswak is also used for cleaning the tongue. It helps to reduce halitosis (bad breath) and effectively removes the white coating that forms on the upper surface (dorsum) of the tongue. This cleaning is usually done using the brush-like end of the Miswak.[10]

Anti-fungal Activity:

Studies show that miswak (Salvadora persica) has antifungal activity. Noumi et al. found that an acetone extract made from dried miswak stems was very effective against fungal species such as Candida albicans, Candida glabrata, and Candida parapsilosis. These fungi showed clear inhibition zones of about 10.33 to 15 mm when a concentration of 300 mg/ml was used. However, methanol and ethyl acetate extracts of dried miswak stems worked only against one type of oral Candida albicans. Other fungal species like Pichia jadinii, Candida atlantica, Candida famata, and Candida maritima did not respond to either fresh or dried miswak extracts and were found to be resistant. Overall, this study shows that miswak's antifungal effect depends on the type of extract used and the fungal species tested.[11]

Saliva-Stimulating Action:

The saliva-stimulating effect of Salvadora persica was studied by collecting stimulated saliva before and after use of miswak extract, a toothbrush, or normal saline. Subjects chewed a small piece of paraffin wax, and saliva was collected at intervals for six minutes. The levels of mutans streptococci and lactobacilli were then measured using a commercial caries risk test, demonstrating that miswak can increase salivary flow and help control oral bacteria [12]

Antioxidant Activity:

The antioxidant activity of Salvadora persica extract was studied using DPPH and FRAP assays. The DPPH radical scavenging activity of the control extract was 68.45%, which increased to a maximum of 85.23% after treatment with 2 kGy of gamma irradiation, and slightly decreased at higher doses. Similarly, the FRAP value also increased significantly with 2 kGy treatment, showing that the antioxidant potential of the extract improved under specific irradiation conditions.[13]

Analgesic (Dental) Effect:

Extracts from certain plants, such as Acacia, Alchornea, Fagara, and Zanthoxylum, have been shown to have local analgesic and aesthetic properties. These plants are therefore used in preparations to help relieve toothache. The exact active compounds in many of these plants have not yet been isolate [9]

Conclusion

Miswak (Salvadora persica) is an effective natural oral hygiene tool with multiple pharmacological benefits. Its antibacterial, antifungal, antiplaque, antioxidant, and anti-halitosis activities support its traditional use in maintaining oral health. Miswak is simple to use, economical, and easily available, making it a good alternative or supplement to modern toothbrushes and toothpaste. Regular use of miswak can help prevent dental problems and improve overall oral health. Further research can help in developing miswak-based oral care products.

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