



REVIEW ARTICLE

THERAPEUTIC ASPECTS OF MISWAK STICK

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ABSTRACT

The prevention of dental caries and periodontal disease can be achieved with meticulous removal of dental plaque. Oral hygiene practices differ from country to country and from culture to culture on the basis of religious beliefs. These beliefs may influence diet, cleaning aids or the use of home remedies for oral hygiene. The use of natural plant sticks for teeth cleaning is one common fact practiced in different cultures. Among these natural brushes, Miswak stick holds the most historical and therapeutic values in literature. This review article discusses the therapeutic properties of Miswak and their effect on oral health.

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INTRODUCTION

Oral hygiene measures have been practiced by different populations and cultures around the world since antiquity (Lewis, 1977). The use of Chewing sticks has been documented in history from 3500 BC to the present date. Babylonians were first to use chewing sticks more than 7000 years ago, followed with their use by Greek and Roman empires, Jews, Egyptians and many other peoples (Jaishree, 2017). In present day, it is still a common practice for teeth cleaning in many developing and developed countries including India, Pakistan, Africa, the Middle East and the America (Wu, 2001). Among 180 plant species suitable for preparing toothbrushing sticks, Miswak harvested from *Salvadora persica* (SP) is used most extensively (Dahiya, 2012). SP is a wild plant that grows in the region extending from north western India to Africa with wide geographical distribution (Periodontol, 2008). "Miswak" is an Arabic word meaning "tooth-cleaning stick" that comes with free availability and unique chemical composition (Periodontol, 2008). The religious and spiritual impact of miswak probably is the principal reason for using it in Islamic countries. Many luxury brands of Miswak are also available in Arabs countries.

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In areas where it is not available, sticks from other trees like orange (*Citrus sinensis*), lime (*Citrus aurantifolia*), and neem (*Azadirachta indica*) can also be used as teeth-cleaning aid (Ra'ed, 1999). World Health Organization (WHO) also have recommended and encouraged the use of chewing sticks as an effective oral hygiene tool (World Health Organisation, 1984). According to WHO, chewing sticks may play an important role in the promotion of oral hygiene. Many researches have suggested that the fibres of stick contain a number of medically beneficial properties including abrasives, antiseptics, astringent, detergents, enzyme inhibitors, and fluoride (Almas, 1995). The present article is to present a comprehensive review on pharmacological and therapeutic features of miswak sticks proving it as an efficient cleaning aid to maintain oral health.

Morphology and chemical composition of Miswak

Miswak is basically a pencil-sized stick 15 to 20 cm long with a diameter of 1 to 1.5 cm from Arak *Salvadora persica* tree (Almas, 1995). Chewing of Miswak separates fibres and giving it a brush like appearance that helps in cleaning the teeth and massaging the gums. The recommended length for a stick is about 15 cm so that it can easily be grasped along with ease to carry around, whereas, the diameter is preferred to be less than 1 cm (Almas, 1995). Miswak stick fibres contains silica, Sodium bicarbonate and Resins whereas the aqueous extracts

contain Tannic acid, Alkaloids, Essential oils and Vitamin C along with Calcium and fluoride ions (Chawla, 2015). Silica and Sodium bicarbonate acts as abrasive material that removes stains and deposits from the tooth surface and germicidal effect. Benzyl iso thiocyanate is a major component of Miswak, has strong bactericidal effect against oral pathogens involved in periodontal disease (Husain, 2015). Tannic acid has astringent effect on mucus membrane and found to be good anti-plaque and anti-gingivitis (Chawla, 1983; Husain, 2015). Resins serve a physical function and form a layer over the enamel which protects it from microbial action (Chawla, 2015; Husain, 2015). Alkaloids show bactericidal effect and stimulate the gingiva. Essential oils have anti-septic effect and stimulate the flow of saliva. Vitamin C helps in healing and repair (Chawla, 1983 and Husain, 2015). Calcium and fluoride ions promote remineralisation of tooth structure and have mild anti-bacterial action (Chawla, 2015 and Husain, 2015).

Anti-plaque properties of Miswak

The stem and roots of miswak are spongy and can easily be crushed between the teeth. Pieces of the root usually swell and become soft when soaked in water (Eid, 1991). Thus, the chewing sticks have a dual function with mechanical cleansing action of stick fibres by friction between plant fibres and tooth surface whereas chemical plaque control is due to its antimicrobial aqueous composition (Almas, 2001). The miswak appeared to be more effective than tooth brushing for removing plaque from the embrasures, thus enhancing interproximal health (Almas, 2001). It has been demonstrated in vitro that the aqueous extracts of miswak have growth inhibitory effects on several oral microorganisms. Lower gingival bleeding was seen in habitual Miswak users (Danielson, 1989).

Analgesic effects of miswak

Miswak has many components with analgesic, astringent and anti-inflammatory properties, making it an effective treatment for primary periodontal diseases (Al-Lafi, 1988). Miswak is more effective against thermal stimuli via skin pain receptors than chemical stimuli via the visceral receptors. Hence it has analgesic relief against oral pain (Monforte, 2002). It has been established that the one who uses Miswak regularly had a low incidence of toothache compared to toothbrush users (Miswak, 1968).

Release of calcium and chloride in to saliva

Gazi et al investigated the effect of Miswak on the composition of mixed saliva where Miswak produced significant increase in calcium (22-fold) and chloride (6-fold) and significant decrease in phosphate (Miswak, 1999). Calcium saturation of saliva inhibits demineralization and promotes re-mineralization of tooth enamel whereas high concentrations of chloride inhibit calculus formation (Gerrit Bos, 1993).

Anti- carious properties

It has been found that miswak has anti-decay properties due to presences of calcium and chloride ions. The pungent smell and chewing effects enhances its buffering capacity by increasing saliva secretion in mouth and raising the plaque PH thus inhibiting growth of cariogenic bacteria (Gerrit Bos, 1993). A

lower caries prevalence was reported among Miswak users than among toothbrush users (Gerrit Bos, 1993). Dental loss in adults is very low in adults where Miswak is used throughout life (Elvin-Lewis, 1980).

Antibacterial properties

Studies have indicated that Miswak contain substances that possess plaque inhibiting and antibacterial properties against several types of cariogenic bacteria and periodontal pathogens present in the oral cavity (Abo Al-Samh, 1996). Al-Otaibi M et al observed that the use of miswak, in contrast to toothbrush, significantly reduced the amount of *A. actinomycetemcomitans* in the subgingival plaque, which indicated that extracts from *Salvadora persica* might interfere with the growth and leukotoxicity of *A. actinomycetemcomitans* (Al-Otaibi, 2003). Almassh showed that miswak extracts had antimicrobial effects on *Streptococcus mutans* and *E. faecalis* (Almas, 1999). Elvin-Lewis et al suggested that this effect may be due to the interaction with bacteria, which prevents their attachment on the tooth surface (Lewis, 1977).

Antimicrobial Effects

The aqueous extract of miswak has been documented to have an inhibitory effect on growth of *Candida albicans* owing to its sulphate content. It has anti-microbial effect on *Streptococcus mutans* and *E. faecalis* due to interaction with bacteria which prevents its attachment with tooth surface (Elangovan, 2012). For this property, many studies have recommended the use of miswak extracts in mouth rinses and tooth pastes owing to its immense antimicrobial property.

Bad breath

Miswak helps to reduce the bad breath as saliva production is stimulated and also cleans the tongue by removing the white coating from dorsum (Elangovan, 2012).

Traditional Uses of Miswak for Therapeutic Purposes

Miswak is used as a jaw exerciser following traumatic injuries to the jaw and temporomandibular joint. It acts as a Sialogogue to induce copious saliva production which is beneficial to the oral hygiene and general health (Gazi, 1990). It may improve appetite and regulate peristaltic movements of the gastro-intestinal tract. Miswak stick helps to reduce cholesterol, gastric ulcer and anti-convulsant action. Miswak is being used as an ingredient in tooth paste, mouthwash, and endodontic irrigation solution.

Method for correct method of use

Miswak stick has two ends whereas the functional end is striped off followed by chewing to separate fibres to give a brush like appearance that helps in cleaning the teeth and massaging the gums. There are two methods documented to hold the Miswak. One is the pen-grip (three-finger technique) and the other is palm-grip (five finger) grip technique. The aim of both techniques is to make sure that all surfaces of the teeth are accessible and cleaned with convenience and controlled movements of the stick in the oral cavity otherwise that may have abrasive effect on teeth (Gazi, 1990). In order to clean the

tooth surfaces, the fibres of Miswak should be held perpendicular to the tooth surface and gently moved in vertical strokes, directed away from the gingival margins on both the buccal and lingual surfaces. Miswak should be freshly cut so that it is supple, easily chewed, and still rich in active constituents. While using a dry Miswak, the gums and other oral tissues can be damaged.

Disadvantages

Despite of having numerous therapeutic properties, the use of miswak should be carried out carefully. Miswak is considered to be an excellent aid in maintaining oral hygiene but bristles lie in long axis of tooth compared to perpendicular pattern in brush it is always difficult to reach the lingual surfaces of teeth.²⁶ As it is used for more time in oral cavity, it excessively scrubs the tooth surfaces and causes gingival recession. The tooth wear facets and class V cavities are most common finding in oral cavity with regular uncontrolled use of miswak. Other than dental problems, few systemic side effects of miswak has been documented in literature. The Aqueous extract of Miswak was reported to have significant hypoglycaemic and hypo lipidemic effects and regenerated pancreatic beta cells and showed Anticonvulsant activities (Trovato, 1998; Galati, 1997).

Conclusion

Natural toothbrushes like Miswak chewing sticks has been popular since ancient times with well-established results proving the therapeutic and pharmacological effects of various chemical components of Miswak. Though few side effects of Miswak has been reported but still the use of miswak is widely accepted in populations.

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