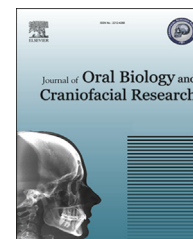


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Review Article

Miswak in oral cavity – An update

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ABSTRACT

Miswak, scientifically known as *Salvadora persica*, is a species of *Salvadora* belonging to family Salvadoraceae. It is considered as “Nature’s little toothbrush” as it is a popular chewing stick throughout Indian subcontinent. In India, it is commonly known as arak tree, meswak, peelu, kharjal or jhank. It also serves as a natural toothpaste with antibacterial, anti-caries, anti-periopathic disinfectant having anti-plaque and anti-fungal properties. Miswak sticks are being used by majority of people who cannot afford to buy the commercial western toothbrush and toothpaste mainly in rural areas of developing countries.

The present review is an attempt to define the potential of the miswak in preventing and treating the common diseases of oral cavity and teeth.

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1. Introduction

There is a long history of the use of plants to maintain good oral hygiene and improve dental health. In different parts of the world, the practice of tooth cleansing by chewing sticks has been observed. The conventional meaning of miswak (scientifically known as *Salvadora persica*) is “stick used on teeth and gums to clean them”. Many studies carried out to assess the efficiency and potential use of the miswak in dentistry, concluded that miswak may offer an alternative to a toothbrush for reducing plaque and gingivitis. A number of studies have reported that *S. persica* or miswak extract is

comparable to oral disinfectants and anti-plaque agents. Studies have demonstrated the antibacterial, anti-caries, anti-periopathic and anti-fungal properties of aqueous extracts of miswak. Due to relative accessibility, popularity and cost effectiveness, miswak chewing stick is used as an excellent and effective tool for control of dental caries and plaque.

S. persica has many synonyms such as Arak, Galenia asiatica, Meswak, Peelu, Pilu, Mustard tree, *Salvadora indica* or Natural toothbrush tree. Miswak is a species of *Salvadora* belonging to family Salvadoraceae. *S. persica* is a small tree or shrub with a crooked trunk seldom more than one foot in diameter reaching maximum height of 3 m. The leaves are

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small oval, thick and succulent with a strong smell of mustard. The fresh leaves are eaten as salad and are used for cough, asthma, scurvy, rheumatism and piles. The flowers are small, fragrant and used as stimulant and purgative. The berries are small and eaten both fresh and dried. The miswak tree is generally found in Saudi Arabia, Sudan, Southern Egypt, Chad, Pakistan and Eastern parts of India. Miswak is a popular chewing stick throughout the Indian sub-continent as well as the Muslim countries. Miswak was used by the Babylonians 7000 years ago followed by the Greek, Romans, Jews, Egyptians and Islamic empires. Today miswak is being used in Africa, South America, Asia and the Middle East including Saudi Arabia and throughout the Islamic countries.

2. Constituents of miswak

Many researchers have studied constituents of miswak and found it to contain more than ten different natural chemical compounds considered essential for good oral and dental hygiene. They are fluorides, silica, tannic acid, resins, alkaloids (salvadorine), volatile oils (simgrins), sulfur, vitamin C, sodium bicarbonate, chlorides, calcium, benzyliothiocyanate, salicylic acids, sterols, trimethylamine, saponins and flavenoids. Farooqi et al¹ isolated benzyliothiocyanate from *S. persica* root and also found saponins along with tannins, silica, a small amount of resin, trimethylamine and a fairly large amount of alkaloid. Ray et al² isolated B-sitosterol, manisic acid and salvadorea [1,3-bis-(3-methoxy-benzyl)-urea. Ezmirly et al³ reported B-sitosterol and elemental sulfur in the root of *S. persica*. They also found sulfur containing mustard oil and 4.73% of sulfur in the ash of the *S. persica* roots. Attar⁴ reported that plant fibers of *S. persica* contain sodium bicarbonate. El-Mostehy et al⁵ found the following chemical substances: Trimethylamine, an alkaloid, chlorides, high amounts of fluoride, silica, sulfur, vitamin C, tannins, saponins, flavenoids and sterols. Akhtar and Ajmal⁶ found resin and large amounts of salts containing chlorine.

3. Functions of different components of miswak

Silica in miswak acts as an abrasive material to remove stains on teeth.² When denture bases were treated with tannic acid it reduces *Candida albicans* counts.⁷ Miswak exerts an astringent effect on the mucous membrane and reduces the clinically detectable plaque and gingivitis.⁸ Resins are amorphous products which are usually hard, transparent or translucent. The alkaloid present in *S. persica* is salvadorine.⁹ It exerts a bactericidal effect and stimulatory action on the gingiva.⁵ Essential oils have characteristic aroma, carminative and antiseptic action.⁶ The sulfur compounds present in miswak have a bactericidal effect. Sodium bicarbonate is mild abrasive and used as a dentifrice.¹⁰ Calcium saturation of saliva inhibits demineralization and induces the remineralization of tooth enamel.⁸ The root of *S. persica* contains a steam distillable oil composed of 10% benzyl nitrate and 90% benzyliothiocyanate (BIT).¹¹ BIT is classified as chemo-preventive agents that prevent carcinogenic and genotoxic compounds

from reacting with the target sites on the treated tissue.⁴ BIT has virucidal activity (at a concentration of 133.3 mg/ml) against herpes simplex virus.¹² It has a broad-spectrum bactericidal activity which inhibits the growth and acid production of streptococcus mutans.¹³

4. Chemical characteristics of miswak

Studies have reported that miswak have potential to inhibit plaque formation and antibacterial action against cariogenic bacteria in the oral cavity.^{3,14} Al Lafi and Ababneh¹³ reported the antibacterial activity of miswak against oral aerobic and anaerobic bacteria and concluded that the extracts of meswak sticks had an inhibitory effect on the growth of *Staphylococcus aureus*. Almas et al¹⁴ found no difference in antibacterial action of fresh and one-month old miswak extracts. Al Bagieh et al¹⁵ concluded that aqueous extracts of miswak reduces growth of *C. albicans* at concentrations of 15% or above. They also concluded that alcoholic extract is more effective than aqueous extract for antibacterial activity. Gazi et al⁸ concluded that miswak produces significant increase in calcium and chloride. They also found significant decrease in phosphate. Calcium saturation of saliva inhibits demineralization and induces remineralization of tooth enamel whereas high concentrations of chloride inhibit calculus formation.² Mansour et al¹⁶ reported that miswak was more effective against thermal stimuli than chemical stimuli.

5. Therapeutic uses of miswak in dentistry

Miswak has various therapeutic uses in dentistry such as the juice of the stick extracted on chewing acts as antibacterial extracts as well as a jaw exerciser. Miswak is a good sialogogue. It is used to prevent smoking in adults and thumb sucking in children. It can be used in the development of dentition during eruption.⁴ It improves appetite and regulates peristaltic movements of the gastro-intestinal tract.⁶ Use of miswak in maintaining good oral and dental health as well in general dentistry is as follows:

5.1. Toothpaste, mouthwashes

Miswak is used in commercial preparation of a number of toothpaste worldwide. Some commercially available toothpaste produced from *S. persica* plant are as follows: Sarkan toothpaste (UK), QualiMeswak toothpaste (Switzerland) Epident toothpaste (Egypt), Siwak- F toothpaste (Indonesia), Fluoroswak, Miswak (Pakistan), DentacareMiswak Plus (Saudi Arabia). Mustafa et al¹⁷ reported a reduction in plaque formation by miswak based mouthwash. But no such preparation presently exists in the market.

5.2. Role in plaque reduction

Sote¹⁸ found that regular users of miswak show decreased gingival bleeding on probing compared with non-miswak users. A study on Ethiopian schoolchildren comparing miswak with conventional toothbrush found that miswak is as

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