Open Access Journal

Indian Journal of Medical Research and Pharmaceutical Sciences

Santhosh 2018; 5(10) ISSN: ISSN: 2349-5340

DOI: 10.5281/zenodo.1467605 Impact Factor: 4.054

MISWAK AN INDIGENOUS PLANT IN DENTISTRY - A GENERAL OUTLOOK

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Keywords:

Miswak, herbs, indigenous plant, periodontitis

Abstract

Modern medicine is witnessing many developments and these developments are not only inventing newer medicines but also revealing the benefits hidden within the traditional treatments. Oral hygiene has always been a very important aspect of human civilization. Recent science reveals that poor oral hygiene leads to gingivitis and can further progresses to periodontitis if unattended. Traditionally, various wood sticks have been used to clean the teeth. Miswak is one important medicinal plant used as a chewing stick. The sticks are prepared from the twigs, stem and roots of miswak. Miswak means “sticks used to clean teeth and gums”. This plant also called Salvadora persica has been an integral part of Islamic tradition for maintaining oral health. Various studies reveal that miswak has antibacterial, antifungal, antiviral, anticancer and antioxidant properties. A general outlook on its various properties is worth a knowledge.

Introduction

Gingivitis is a common disease caused due to plaque accumulation. Gingivitis can progress to periodontitis due to the pathogenic bacteria present in plaque. This causes changes in bone and connective tissue around the teeth. [1] So, it is necessary to reduce or remove the plaque. Currently many mechanical and chemical measures are used for plaque control. The most commonly used are the tooth brush and toothpaste. Additionally many oral rinses are also being used. [2] Traditionally many oral hygiene measures are being used since antiquity. Different plants of medicinal value have been used for this purpose. [3] Early civilizations such as Assyrians, Babylonians and Sumerians had shown keen interest in oral hygiene.Ancient Indian books like Susrutha Samhita and Charaka Samhita had stressed the use of herbs in oral hygiene.[4] In West Africa they use linae tree(Citrusaurantafolia) or Orange tree (Citrussinensis).black Americans use roots of (Cassia vinnea),in Sierra Leone they use African laburnum(Cassia sieberianba) and in India they use neem (Azadirachta indica).[5] Various herbs are now being used in the field of periodontics like pomegranate, neem, green tea,aloevera,turmeric,tulsi,miswak,guava,garlic,mango,eucalyptus and many more. [1] Wood sticks were generally used to clean teeth in several countries. In middle eastern countries these wood sticks are known commonly as miswak. It means “sticks for rubbing the teeth” in Arabic. [2] Miswak stick is also called salvadora persica or Arak tree. [6] Several recent studies had shown that miswak sticks are equally effective or more effective

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than toothbrushing in controlling plaque and gingival inflammation.[7]This review talks about the herb salvadora persica and its use in dentistry.

Classification and Anatomy:

Salvadora persica Linn belongs to Salvadoraceae family. Its called miswak or Arak in Arabia, Qesam in Hebrew,Kouvsi in Japan and Mastic in Latin. The scientific name S. persica was given by a Spanish botanist Dr. Laurent Garuin in 1598.[8] It's a small, upright evergreen shrub or tree. [5] Its one foot in diameter and 3 meter in height. They have small, thick, oval leaves with a smell of mustard. These leaves are used in salad and also in traditional medicine for cough, scurvy, piles, rheumatism, asthma and others. They have small berries that can be eaten in fresh or dried state. [5] Stem and branches are green or greyish in colour. The stem of this plant in the form of short sticks can be used as a tooth cleaning aid.[2]

Historical and Religious perspective:

Miswak is widely used among muslims as the Prophet Mohammed (PBUH) recommended its use before five daily prayer rituals. [2] Prophet Mohammed(PBUH) said that "miswak is an implement for the cleaning of teeth and pleases Allah". [9] According to one of Mohammed's biographers , even approach of death did not prevent Prophet from demanding mishwak. Islam incorporated it as a holy practice in 543 AD. The precise use of mishwak was known to Babylonians since 5000 BC. This practice spread to the Greek and Roman empires. [9] Chewing sticks were also used by Jewish, Egyptian as well as by old Japanese-communities.[6] Nowadays miswak is used worldwide. WHO recommend and encourages the use of S. persica for oral hygiene.[4]

Chemical constituents in miswak:

Miswak sticks are usually pencil sized. They are 15 to 20 cm in length and 1 to 1.5 cm in diameter.[4] These sticks are chewed on one end until they are frayed like a brush. These ends can be used to clean the teeth like a regular brush. Miswak acts by mechanical action of the soft fibers and the therapeutic action of its chemical constituents. Farooqi et.al. in 1968 has recorded that the roots of miswak contains benzyl isothiocynate,tannins, silica, a resin trimethylamine and alkaoidal constituents. Rayet et al in 1975 found the roots of miswak tree contain B-sitosterol,m-acid, Salvadourea [1,3-Bis-(3-methoxy-benzyl)-urea]. Levis and Elvia –lewis in 1977 found that the roots contain minerals. Ezmirly et.al. in 1978 concluded that the roots contain B-sitosterol and sulphur.[5]The miswak fibers contain trimethylamine, chlorides, flourides, silica, vitamin C,tannins, sterols, suponins, flavenoids, sulphur, glucosinolutes, volatile oil like benzyl isothiocyanate, sodium bicarbonate and calcium.[6]

Table 01: Action of different chemical constituents

	Chemical constituent	Action
1	Benzyl isothiocynite	Antibacterial effect, Antifungal[1], Anticarcinogenic, Virucidal, Antineoplastic[5]
2	Fluoride	Remineralisation[6]
3	Silica	Abrasives whiten the teeth[5]
4	Resins	Protective layer over enamel[6]
5	Essential oils (Eugenol, isothymol, Thymol, benzylnitrate, Eucalyptol, Isoterpinolene, g-carbopythelene)	Antibacterial , carminative action, stimulation of saliva[6]
6	Alkaloids	Bactericidal , gingival stimulation[6]
7	Sulphur	Bactericidal[6]
8	Vitamin C	Healing and tissue repairing[6]
9	Calcium	Remineralization[6]
10	Chloride (NaCl , KCl)	Inhibit calcium formation, removes extrinsic stains[6].
11	Thiocyrate	Elevate antimicrobial property of saliva[11]

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12	Tannins	Astringent[5],Anti plaque, Antigingivitis[5],Antitumour[5]
13	Sodium bicarbonate baking soda (NaHCO3)	Mild abrasives, mild germicidal[10]

Figure:

Figure 01: Miswak stick used for cleansing the teeth

Commercial products

Miswak is available commercially in three forms. They are
1. Brushing sticks (eg.Cowo miswak, Sewak Smile)
2. Tooth paste (eg. Dabur meswak complete oral care)
3. Mouth wash (Dabur miswak, Listerine miswak, Himalaya herbals complete care mouthwash)

Table 02: Studies on Miswak

Properties	Various Studies
Effect of Miswak stick	Daront et al conducted a study in 2000 among 213 males to evaluate the periodontal status of toothbrush and miswak stick users. The results showed that the periodontal status of miswak users in Sudanese population was better than that of tooth brush.[4]
Analgesic property	Wu CD et al in 2001has shown that miswak has an analgesic effect. The study shows that miswak stick users have reduced toothache incidence when compared to nonusers.[12]
Anticonvulsant and sedative property	A study conducted by Monforte et al in 2002 shows that Salvadora persica stem extract has anticonvulsant and sedative effect on rats by affecting activity of the sodium pentobarbital and pentylenetetrazole.[13]
Effect on subgingival microbes	A study conducted by Al-Otaibi et al in 2004 shows that miswak chewing stick and tooth brushing among males had the same level of influence on sub gingival microorganisms, but miswak use significantly reduced the amount of A.actinomycetemcomitans in subgingival plaque.[7]
Miswak mouthwash	Almas et.al. in 2005 studied the invitro antimicrobial activity of eight mouth rinses which are commercially available (Corsodyl,oral B advantage ,Sensodyne , Aquafreshmint,Emoform and Betadine)and 50% miswak .The study showed that chlorhexidine had maximum anti-bacterial action and miswak extract had the lowest antibacterial action.[4]

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Root canal irrigation	Al-sabawi in 2007 conducted a comparative study which showed that 15% miswak stick extract can be used as an effective root canal irrigant when compared with currently used root canal irrigants and it limited the aerobic and anaerobic bacterial levels in necrotic pulp during root canal treatment.[6]
Dental caries prevention	Sofrata et al in 2007 has shown in his invivo study that miswak elevated levels of plaque pH after sucrose rinse indicating its role towards dental caries prevention .[6]
Antifungal property	Noumi et al in 2010 has demonsrated that both dry and fresh miswak extract had equal antifungal property on candida species grown on agar plates.[6]
Acute toxicity test	A study conducted by Fouad et.al. in 2010 showed that the acute toxicity test conducted using various concentrations of S.persica chewing stick extract was well tolerated and no mortality was found in albino mice.[14]
Effect of Benzyl isothiocyanate	Sofrata et al in 2011 showed that Benzyl isothiocyanate an important component of Salvadora persica root had strong bactericidal effect against gram negative periodontal pathogens than gram positive periodontal pathogens.[4]
Effect on microbes	An invitro study conducted on five microbes by Akhtar et.al. in 2011 showed that miswak was effective against P.gingivalis followed by A.actinomycetemcomitans and H.influenza. S.mutans was less susceptible and L.acidophilus was least susceptible.[6]
Effect on cariogenic bacteria	An invivo study conducted by Padma et al in 2012 showed that miswak stick extract had a significant effect on the microbial count of cariogenic bacteria like streptococcus mutants and Lacto bacillus when compared to toothbrush.[11]
Effect on pneumonia causing microbes	A study conducted by Hadi et al in 2013 showed that miswak mouthwash when compared to chlorhexidine mouthwash had a significant effect on pneumonia causing microbes like Staphylococcus aureus and Streptococcus pneumonia in mechanical ventilation patients.[15]
Hypoglycemic, hypolipidemic and beta cell regeneration	Maria Khan et al in 2014 showed that Salvadora persica root extract of Arabic origin had significant hypoglycemic ,hypolipidemic and also regenerated beta cells from pancreas of male albino Wistar rats when compared to Indian S.persica root extract.[16]
Effect on industrial heavy metals	SaadA.Ajilil in 2015 had shown that miswak powder was effective in removing heavy metals from water released by factories in Saudi Arabia. [17]
Effect on gingiva and plaque	A study conducted by Shetti et al in 2016 on S.persica extract showed that it decreased gingival and plaque scores and therefore, it can be used as an effective chemical plaque control agent. [10]
Effect on cancer cells	Sameen Amjed et.al. in 2017 showed that a combination of extracts from herbal plants like miswak, kalonji and Aloevera had superior antibacterial and antiproliferative activity against cancer cells in an invitro study. [18]
Miswak as dentrifice	AbhinavTadikonda et al in 2017 showed that a dentrifice containing papain, bromelain and miswakextract had significant antiplaque and antigingivitis effect in orthodontic patients when compared to conventional dentrifice.[19]
Miswak stick and gingival recession	Muhammed Saleh et al in 2017 in his studed that shows miswak stick users had higher percentage of gingival recession due to incorrect brushing technique and harder fibers present in miswak.[20]

Conclusion

Due to the side effects of artificial therapeutic agents, the world is turning towards natural products. Miswak has been proven to be an effective natural alternative to chlorhexidine mouthwash. Newer research has to be conducted to take the scope of miswak from it's effect on plaque accumulation and gingivitis to it's effect on regeneration and host modulation.

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