REVIEW ARTICLE

Salvadora Persica-Medicinal Properties

Talea Hoor

ABSTRACT:
Herbal medicines have long been the center of interest for the researchers. Herbs have long been used for the treatment of various ailments including diarrhea, ulcers, arthritis etc. people have always preferred herbal medicine believing it to be less toxic and inexpensive. Salvadora persica (miswak) is one of such plants which are used over the years mostly in the field of dentistry because of its religious significance in Islam. The purpose of this review is to go through the various medicinal properties of this plant. A literature search regarding this article was done on Google scholar and Pubmed /Medline during the time period 1988-2014.Most of the articles were related to oral health but few other properties are also found.
Key words: Salvadora persica, Miswak, Medicinal properties

INTRODUCTION:

Plants have served human kind as sources of medicinal agents since its earliest beginning. Today, natural products represent more than 50% of the available medicinal agents in use.

One of such examples is the miswak (Figure 1). It is obtained from Salvadora persica plant which is widespread, notably in thorn shrubs, desert floodplains, river and stream bank vegetation, and grassy savannahs. The plant is commonly known as miswak. It prefers areas where groundwater is readily available, by riverbanks, on perimeters of waterholes, in seasonally wet sites, and along drainage lines in arid zones. Also found in valleys, on dunes and on termite mounds.[2]

Salvadora persica is an evergreen shrub or small tree 6-7 m; main trunk erect or trailing with profusely branched, wide crown of crooked, straggling and drooping branches; young branches green in colour; bark slightly rough, greyish-brown on main stem, paler elsewhere. The generic name was given in 1749 in honour of an apothecary of Barcelona, Juan Salvadory Bosca (1598-1681), by Dr. Laurent Garcin, botanist, traveller and plant collector. The true specimen of this species came, as the specific name indicates, from Persia.[3]

This review is aimed at revealing the secrets of this magical plant and reinforcing the beliefs of a Muslim on a scientific basis as well as enhancing the tradition of research in Pakistan.

METHODOLOGY:

Literature search for this review was done from 1988 - 2014 with key words and phrases salvadora persica, miswak and medicinal properties. The search engines used are Google scholar and Pubmed/Medline.

✉ **Dr. Talea Hoor**
Assistant Professor
Department of Pharmacology
Bahria University Medical & Dental College, Karachi
Email: talea26@yahoo.com
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Figure 1
Salvadorapersica (Miswak)

Historical and Religious Background:

The use of Miswak is a pre-Islamic custom. It was adopted and Islamized by prophet Muhammad (PBUH) around 543 A.D. Arabs have used this kind of tooth brushing some 7000 years ago. Japanese and Romans also use it as well as the ancient Egyptians and Jews. Islam emphasized basic oral hygiene by incorporating it as a religious process. It has been narrated by many authorities that the messenger of Allah (PBUH) has emphasized much on the practice of using Miswak so much so that according to Hazrat Abu Hraira (may Allah be pleased with him) that messenger of Allah said "were it not that I might distress my people, I would have ordered them to delay the evening prayers and use miswak at every time of prayer".

Islam has great emphasis on the health and hygiene, on the cleanliness of mind and body. It was also said that messenger of Allah stated, "Cleanliness is half of faith". Miswak not only cleanses the teeth in physical manner but also have an anti-bacterial activity, which destroys the germs as well.

Functional uses of the Plant:

Food: Fruits have a sweet, agreeable, aromatic, slightly pungent and peppery taste. They can be eaten raw, cooked, or dried and stored. Fruit with or without seeds is said to contain 1.7-1.86% sugars when ripe. Fermented drinks are also made from the fruit. The leaf is somewhat bitter and aromatic, with a taste likened to mustard. The leaves are also cooked as a sauce and eaten with couscous or as a green vegetable. Tender shoots, seeds and seed oil are also edible. Edible salts are obtained from ashes.

Fodder: Leaves and young shoots are browsed by all stock, but normally cattle do not occur in the driest part of the Salvadora persica distribution range and hence it tends to be valued more as a camel, sheep and goat forage. Leaves make good fodder as their water content is high (15-36%). The high salt content of the leaves is said to affect the taste of milk, but the leaves are said to increase lactation in cows.

Apiculture: Salvadora persica is reported as a good source of nectar.

Fuel: The wood is sometimes used for firewood and charcoal. However, it is not used for cooking meat, as it leaves a foul taste.

Timber: The wood is soft, white, and easy to work and is not liable to termite attack. Used for coffins and clubs. Gum or resin: Resin that drips from the tree is supposedly useful for making varnish.

Lipids: Seeds of Salvadora persica contain 30-40% of greenish-yellow, non-edible oil that has over 50% lauric and myristic acids. It has a high melting point and a disagreeable odour that disappears on purification. The most important aspect of the oil is the presence of a low percentage of C8 and C10 fatty acids that are of great economic significance. The oil is an alternative source of oil for soap and detergent industries.

Medicine: Toothbrushes made from roots and small branches of about 3-5 mm diameter have been used for over 1000 years, especially by Islamic populations in India, Arabia and Africa. Several agents occurring in the bark and wood have been suggested as aids in prevention of dental caries, such as antimicrobial agents that suppress bacterial growth and the formation of plaque. The tooth stick is also said to relieve toothache and gum disease. Roots also are used for cleaning teeth and for relieving toothache. Decoctions of leaves are used as a mouthwash, and masticated leaves for tooth and gum problems. A decoction of the root is used to treat gonorrhea, spleen trouble and general stomach-ache. Roots are also used for chest diseases or pounded and used as a poultice to heal boils. The bark is scratched and the latex used for treating sores. Seeds are used as a tonic, and seed oil is used on the skin for rheumatism. Other products: Crusted leaves placed in cow urine together with leaves of Pergulariatomentosa are used to clear hair from tanned hides, allowing the hair to be removed with a knife. Roots contain salvadourea, a urea derivative[4].

Shade or shelter: Planted as shelterbelts and windbreaks to protect farm habitation, gardens and orchards. Reclamation: Planted in sand dune reclamation and also useful for reclaiming saline soils[5].

Pharmacological Survey of Medicinal Properties: Studies have indicated that Salvadora persica has plaque inhibiting and anti-bacterial properties against various types of bacteria.

Al-Lafi and Ababner[6] tested the anti-bacterial activity of Salvadora persica against S. aureus and found out that it has drastic effects on the growth of the said bacteria and a variable effect on some other species as well. Al-Bagieh,[7] suggested that aqueous extracts of miswak could be used to reduce the growth of Candida albicans. Such inhibitions last for up to 36 hrs at concentration of 15% and above. In another study conducted by Almas[8] the anti-microbial activities of the chewing sticks obtained by Neem and Arak were compared and it was found out that both are effective against bacteria especially against S.mutans and S.fecalis at the tested concentrations. Gazi[9] and Hattab investigated the immediate and medium term effect of miswak on the composition of Saliva which shows that it increases calcium and chloride and significant decreases in phosphorus and pH. Calcium saturation of saliva inhibits demineralization and promotes re-mineralization of tooth enamel and high concentration of chloride inhibits calculus formation.Mansour[10] studied the analgesic effect of miswak decoction when injected to mice. They found it to be more effective against thermal stimuli than chemical ones.

Mohammad,[11] investigated the cytotoxic potential of Salvadora persica on gingival and other periodontal structures and it showed that freshly cut and freshly used miswak has no cytotoxic property but after 24 hours it showed some harmful components. Miswak has been used therapeutically as a part of various toothpastes all over the world like sarkan toothpaste (UK), miswak (Pakistan) etc.

It has also been tested, as a part of mouth wash which showed reduction in plaque formation, but no currently available preparation contains miswak. Use of miswak was also found to be related with plaque reduction by many users. Babay and Almas [12] conducted a study on effect of miswak extract on healthy human dentin, which showed that alcohol extract of miswak along with saline remove the smear layer on the dentin. In studies carried out by Almas [13, 14, 15] showed that Salvadora persica is effective against S. fecalis and S. mutans. Khalid Almas[16] and Al zeid[17] conducted a study which concluded that Salvadora persica has an immediate anti-bacterial effect and S. mutans were more susceptible than lactobacilli[18, 19]. Monforte[20] studied the activity of Salvadora Persica extract as an anti-convulsant and sedative. One study conducted by Al-mohaya[21] showed that miswak can decrease the density of growth of oral candida in case of renal transplant patient. Another study conducted by Sanogo[22]showed antiulcer activity of Salvadora persica. Ali[23] in a study showed that Salvadora persica was found to be active against plasmodium falciparum NF54 strain. The anti-plasmodial activity of different extracts of Salvadora persica against P.falciparum NF54 strain was

found to be 0.6microg/ml (stem) and 0.7microg/ml (leaves).Galati[24] found Salvadora persica decoction to be able to reduce levels of cholesterol and LDL plasma levels, whereas HDL and triglycerides were unchanged. Al Khateeb[25] studied that people using miswak have a low level for the need of periodontal treatment. A similar study conducted by Darout[26] showed better periodontal status of Sudanese population using miswak as compared to toothbrush users. Salvadora persica showed a decrease in mice exploratory activity evidenced by a study conducted by Sulaiman[27] Darmani[28] investigated the toxic effects of Salvadora persica for 30 days on the reproductive system of male and female mice Al-Otaibi[29] conducted a research, which showed that Salvadora persica extract interfered with leukotoxicity of A.comitans. It was also concluded that miswak use was at least as effective as toothbrush for reducing plaque and gingivitis and the anti-microbial effect is beneficial for the prevention and treatment of periodontal disease. In 2004 Khalessi[30] conducted a double blind, cross over trial, which compared the efficacy of a mouth wash containing extracts of S.persica with commercially available ones. Results showed that use of tested mouth wash resulted in gingival health and lower carriage rate of cariogenic bacteria but did not help in plaque removal. In 2005 a study was conducted whose aim was to assess the anti-microbial activity of commercially available non-alcohol mouth rinses and 50% miswak extracts against S. fecalis, S. mutans, C. albicans, S.aureus and S.epidermidis. The extract showed a low anti-microbial activity as compared to commercially available mouthwashes.[31]

In 2006 Darmani[32] conducted a study which examined the effects of extracts of two chewing sticks on proliferation of fibroblasts and viability of cariogenic bacteria. Results showed that aqueous extracts of miswak (Salvadora persica) and derum (juglansregia) enhance the growth of fibroblasts and inhibit the growth of cariogenic bacteria.AL-bagieh[33] investigated that benzylisothiocyanate isolated from Salvadora persica roots showed a virucidal activity against HIV-1 at a concentration of 133.3ug/ml.

Leaves of Salvadora persica have carminative, antiseptic and anti-fungal action[34]. Leaves are also used in the asthma, cough and rheumatism, scurvy, piles, leprosy, hepatic disorders[35, 36] Leaves are bitter and possess antiscorbutic, deobstruent, liver tonic, diuretic, analgesic, anthelmintic, astringent properties, hypoglycaemic, antimicrobial, anti-bacterial, anti-plasmodial because of the presence of fluoride in stems are used as traditional toothbrush or chewing stick or used as oral hygiene tool. Stem extracts shows anti-microbial[37], anti-caries[38], antispasmodial[39], anticonvulsant and sedative effects. Stem bark is used as an ascarifuge and for gastric troubles. Seeds are purgative and tonic. Seed oil is applied on the skin in rheumatism[39]. Flowers are used for de-worming, leprosy, gonorrheae. Root barks and leaves in piles and hepatic disorders[40]. Roots also possess anti-oxidant activity, anti-inflammatory activity. Roots and twigs also possess anti-microbial activity[41] Chlorine, trimethylamine and sulphur compounds in aqueous extract of roots of miswak tree shows anti-mycotic effect[42]. Antimicrobial activity of both glucosinolates: glucotropeol in and sinigrin were investigated against tooth decay microorganisms and bacterial species[43]. Aerial parts show anti-microbial, Anti-spasmodic, anti-arrhythmic anti-cholinergic activity[44, 45]. Decoction of miswak tree gives anti-ulcer activity

CONCLUSION:

It is quite evident from this review that Salvadora persica is a plant with tremendous medical benefits attached and further research is required to evaluate its full potential in different fields of medicine.

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REFERENCES:

1. Saeed, A.,Salvadora persica, LINN. (SIWAK)-its position and heritage in Islamic dentistry, Hamdard Med.1988;31(1):75-91
2. Makwana, M.T., Patolia, J.S., Iyengar, E.R.R., Salvadora plant species suitable for saline coastal wasteland.Transactions of Indian Society of Desert Technology. 1988;2: 121-31.
3. Von Maydell, H.J., Trees and shrubs of the Sahel - their characteristics and uses.1986, GTZ 6MBH, Eschborn.
4. Booth, F.E.M., Wickens, G.E., Non-timber uses of selected arid zone trees and shrubs in Africa. 1988, FAO Conservation Guide. No. 19. Rome.
5. Hines, D.A., Eckman, K., Indigenous multipurpose trees for Tanzania: uses and economic benefits to the people. 1993, Cultural survival Canada and Development Services Foundation of Tanzania.
6. Kokwaro, J.O. Medicinal plants of East Africa. 1976, East African Literature Bureau.
7. Alali, F., Al-Lafi, T., GC-MS analysis and bioactivity testing of the volatile oil from the leaves of the toothbrush tree Salvadorapersica L., Nat Prod Res, 2003;17(3): 189-94
8. Al-Bagieh, N.H., Idowu, A., Salak, N.O. , Effect of aqueous extract of miswak on the in-vitro growth

of Candida albicans,Microbios,1994;80(323):107-13
9. Hattab, F.N., Meswak: the natural toothbrush,J.Clin.Dent.,1997;8(5):125-9
10. Mansour MI, Khateeb TL, Mazraoo AA. The analgesic effects of Miswak. Saudi Dent J. 1996; 8:87-91.
11. Mohamed Al-Fatimi, Antioxidant, antimicrobial and cytotoxic activities of selected medicinal plants from Yemen, J Ethnopharm, 2007; 111(3) ; 657-66
12. Almas, K., The antimicrobial effect of extracts of Azadirachtaindica (Neem) and Salvadorapersica (Arak) chewing sticks., Indian J Dent Res,1999; 10(1) ;23-6
13. Almas, K., Al-Zeid, Z.,The immediate antimicrobial effect of a tooth brush and miswak on cariogenic bacteria: A clinical study ,J Contemp Dent Pract,2004;5(1) ;105-14
14. Almas, K., The antimicrobial effect of extracts of Azadirachtaindica (Neem) and Salvadorapersica (Arak) chewing sticks., Indian J Dent Res,1999; 10(1) ; 23-6
15. Almas, K., The antimicrobial effects of seven different types of Asian chewing sticks, Odontostomatol Trop.2001;24(96):17-20
16. Almas, K., The effect of salvadorapersica extract (miswak) and chlorhexidinegluconate on human dentin: a SEM study, Contemp.Dent.Prac 2002;3(3):27-35
17. Almas, K., The effects of chewing sticks (salvadorapersica) on healthy and periodontally involved human dentine:a SEM study, Indian J.Dent.Res.,2001;12(3):127-32
18. Almas K., Skaug, N., Ahmad, I., An in vitro antimicrobial comparison of miswak extract with commercially available non-alcohol mouth rinses, Int.J.Dent.Hyg,2005;3(1):18-24
19. Almas, K., The antimicrobial effect of extracts of Azadirachtaindica (Neem) and Salvadorapersica (Arak) chewing sticks., Indian J Dent Res,1999; 10(1): 23-6
20. MonForte, M.T., Trovato, A., Rositto, A., Forestieri, A.M., D'Aquino, A., Miceli, N., Galati, E.M., Anticonvulsant and sedative effects of salvadorapersica extracts Phytother.Res.,2002;76(4):395-7
21. Al-Mohaya, M.A., Darwazeh, A., Al-khudair, H., Oral fungal colonization and oral candidiasis in renal patients: the relationship to miswak use, Oral surg Oral Med Oral Pathol Oral RadiolEndod.,2002;93(4):455-60
22. Sanago, R., MonForte, M.T., D'Aquino, A., Rositto, A., Maur, D.D., Galati, E.M., Anti-ulcer activity of Salvadorapersica L.: structural modification,Phytomedicine,1999;6(5):363-6
23. Ali, H., Konig, G.M., Khalid, S.A., Wright, A.D., Kaninsky, R.,Evaluation of selected Sudanese medicinal plants for in vitro activity against hemoflagellates,selected bacteria,HIV-1-RT and tyrosine kinase inhibitory, and for cytotoxicity, J.Ethonopharmacol,2002;83(3):219-28
24. Galati, E.M., MonForte, M.T., Forestieri, A.M., Miceli, N., Bader A. Trovato, A., Salvadorapersica L.: hypolipidimic activity on experimental ypercholesterolemia in rat, Phytomedicine,1999;6 (3):181-5
25. Al-khateeb, T.L., O'Mullane, D.M., Whelton, H., Sulaiman, M.I., Periodontal treatment needs among Saudi Arabian adults and their relationship to the use of the Miswak,Community DentalHealth,1991;4:323-8
26. Daraout, I.A., Al Bander, J.M., Skang, N., Periodontal status of adult Sudanese habitual users of miswak chewing sticks or tooth brushes,Actaodontol Scand.,2000;58(1):25-30
27. Sulaiman, M .I.,Ajabnoor, M.A., Al khateeb, T., Effects of Salvadorapersica extracts on mice exploratory locomotion activity, J Ethnopharmacol, 1986; 17(3): 263-8.
28. Darmani, H,, Al-Hiyasat, A.S., Elbetieha, A.M., Alkofahi, A., The effect of an extract of Salvadorapersica (Meswak, chewing stick) on fertility of male and female mice.,Phytomedicine,2003; 10(1):63-5
29. Al-Otaibi, M.,Al-Harthy, M., ,Gustafsson, A.,, Johansson A, Claesson, R.,, Angmar-MA¥nsson, B., Subgingival plaque microbiota in Saudi Arabians after miswak chewing stick and tooth brush., J. Clin Periodontal, 2004;31(12):1048-53
30. Khalessi, A.M., Pack, A.R., Thomson, W.H., Tompkins, G.R., An in vivo study of the plaque control efficacy of Persica, a commercially available herbal mouth wash containing Salvadorapersica, Int Dent J,2004; 54(5):279-83
31. Almas K, Skaug N, Ahmad I. In vitro antimicrobial comparison of miswak extract with commercially available non-alcohol mouthrinses. Int J Dent Hyg 2005; 3: 18-24.
32. Darmani, H., Nusayr, T., Al Hiyast, A.S., Effects of extract of miswak and derum on proliferation of Balb/C3T3 fibroblasts and viability of cariogenic bacteria, Int.J.Dent.Hyg,2006; 4(2):62-6
33. Al-Bagieh, Nasir, H. Anti-herpes simplex virus type 1 activity of benzylisothiocyanate,Biomed Lett.1992;47(185):67-70
34. SainiSushila, Yadav JP, Kalia AN. Hypoglyceamic activity of S.persica and S.oleoidesin DiabeticAlbino rats. 2006; 28: 1-14.

35. AtassiFarhad. Oral home care and the reasons for seeking dental care by individuals on renal dialysis.The journal of contemporary dental practice 2002; 3(2): 31-41.
36. SarveshPaliwal, RajaniChauhan, Anees A Siddiqui, ShailendraPaliwalJaiprakash Sharma.Evaluation of antifungal activity of SalvadoraPersicaLinn. Leaves. Natural Product Radiance 2007;6 (5): 372-4.
37. Chopra RN, Nayar SL, Chopra IC. Glossary of Indian Medicinal Plants CSIR New Delhi. 1956; 194-5.
38. Anonymous. The Wealth of India-Raw Materials IX PID CSIR New Delhi.1972: 193-5.
39. Trovato A, Galati EM, Rossitto A, Monforte MT, Aquino A, Forestieri AM. Hypoglycemic effect of SalvodoraPersicain the rat. Phytomedicine 1998; 5: 129-32.
40. Chawla HS. A new natural source for topical fluoride. J Indian Dent Assoc 1983; 55: 419-22.
41. Arora Saahil, Kaushik D. Free radial scavenging activity of SalvadorapersicaLinn. Asian journal of chemistry 2007; 19(6): 4638-44.
42. AroraSaahil, Kaushik D. Anti-inflammatory activity of SalvadorapersicaLinn. Journal of Science &Pharmacy 2006; 7(3): 89-93.
43. Abd El RahmanHowaida F, Skaug Nils, Whyatt. Volatile compounds in crude Salvadorapersicaextracts. Pharmaceutical biology 2003; 41(6): 399-404.
44. Monforte MT, Miceli N, Mondello MR, Sanogo R, Rossito A, Galati EM, Antiulcer activity of Salvadora persica on experimental ASA-induce ulcer in rats: Ultrastructure modifications. Pharma Biol. 2001; 39:289-92.
45. Ismail AD, Alfred AC, Skaug NI, Per KE. Identification and qualification of some potentially antimicrobial anionic components in Miswak Extract. Indian J Pharmacol. 2000; 32:11-4.