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A SHORT REVIEW ON SALVADORA PERSICA L. – A MEDICINALLY IMPORTANT, MULTIPURPOSE PLANT OF INDIAN SUBCONTINENT

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ABSTRACT

Plant-derived medicines have been a part of our traditional health care system, and the antimicrobial properties of plant derived compounds are well documented. Herbal medicinesare more effective and less harmful, as they have negligible side effects. They exhibit low mammalian toxicity and can be handled easily. Salvadora persica L. of the family Salvadoraceae is an evergreen shrub, 4-6 m tall with a short trunk, white bark and smooth green leaves. In Indian subcontinent this family is represented by only one genus with two species viz. S. persica and S. oleoides. The popular chewing stick commonly known as 'miswak' is prepared from younger branches S.persica and has been used for teeth cleaning since ancient times. Further, it is also considered as one of the most popular medicinal plants throughout the Indian subcontinent, as well as the wider Muslim world. In addition to its well known oral health properties, the different parts of the plant exhibit different properties and treat many other ailments. We have tried here to collect and compile as much information as possible from reliable sources.

KEYWORDS: S. persica, Oral Health, Meswak

INTRODUCTION

Plants are natural source of antibacterial agents. Plant-derived medicines have been a part of our traditional health care system since time immemorial and the antimicrobial properties of plant derived compounds are well documented. Herbal medicines are more effective and less harmful as they show negligible side effects. They exhibit low mammalian toxicity and can be handled easily[23]. Different parts of S. persica contain different bioactive compounds and thus show variable therapeutic properties.

GEOGRAPHICAL DISTRIBUTION

Two species of Salvadora i.e., S. persica and S. oleoides are available in India. Recently, a new species Salvadora alii has been described from Sindh, Pakistan[9]. The genus S. persica is native of Sub-tropical to Tropical Africa. It has also been reported to be grown widely in Egypt, Tanzania, Middle East, Egypt, India, China, Persia and Malaysia. In India Salvadora species are widely distributed in Rajasthan, Gujarat, Haryana, Punjab and to some extent in Andhra Pradesh, Karnataka and Tamil Nadu. It is also found in the Sunderban mangroves of West Bengal and Bhitarkanika mangroves of Orissa and in the regions of Chilika lagoons.[25] It is locally called as Mustard Tree, Toothbrush Tree and Salt Bush in English; Jhak, Jhal and Chotapilu in Hindi; Pilu or Piludi and Moti-Jal in Gujarati; Grape of the desert in Rajasthan; Kotumgo and Tobota in Oriya; Perungoli and Ughaiputtai in Tamil and Goni in Kannada. Traditionally, the twigs of this plant are widely used as toothbrush in the Middle East, Africa and India[29].

HABIT AND HABITAT

The genus Salvadora is a member of the family Salvadoraceae. The species belonging to Salvadora are evergreen shrubs or small sized trees with twisted/crooked and glaucous trunk, with a life span of 25 years. The branches are usually pale green. The root bark appears light brown outward and the inner surface is white. Flowers are small, greenish yellow and bisexual. The plants produce three types of berries viz. pink, white and dark. Out of three types pink berries are found to have higher oil content (38-40%)[3, 13].

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Salvadora spp are xerophytic plants and are placed under the group of facultative halophytes. They grow in varied climatic and soil conditions but particularly well adapted to arid and semi-arid zones. The species have wide adaptability from sand dunes of deserts to heavy soils, non-saline to highly saline soils and dry regions to marshy and waterlogged areas. This species is extremely well adapted to arid conditions and is salt tolerant and as well as drought resistant24. They thrive well in temperatures up to 45∘C and annual rainfall varying from 200 to 1000mm.

THERAPEUTIC SIGNIFICANCE

LEAVES

The leaves are eaten as a vegetable in the eastern tropical Africa and are used in the preparation of sauce and tender shoots and leaves are eaten as salad. Leaves are bitter in taste. Leaves are used in traditional medicine for treating cough, asthma, scurvy, rheumatism. The leaves act as Deobstruent, astringent to the bowels, tonic to the liver, diuretic, analgesic, anthelmintic. They are also useful in ozoena, piles, scabies, leukoderma, lessening inflammation, and strengthening the teeth. Leaves are pungent and are considered in Punjab as an antidote to poison of all sorts and in south of Bombay as an external application in rheumatism. The juice of the leaves is also used in scurvy. Crushed leaves placed in cow urine together with leaves of Pergularia tomentosa are used to clear hair from tanned hides, allowing the hair to be removed with a knife[16, 19, 28].

FRUITS

Fruits have a sweet, 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 1.7-1.8 % sugars when ripe. A fermented drink is reported to be made from the fruits. Fruits possess deobstruent, carminative, diuretic, lithontriptic, and stomachic properties and are used in biliousness and rheumatism. In Sind, it is believed that fruits are effective in snake bite. The seeds contain about 30-40 per cent oil and fat rich in lauric acid and myristic acid (over 50 per cent of the fatty acids of the oil) which can be a substitute for coconut oil in soap, detergent, illuminants, varnishes, paints as well as in food industry[16, 19].

ROOT

Root bark is used as a vesicant and is employed as an ingredient of snuff. A paste of the roots is applied as a substitute for mustard plaster and their decoction is used against gonorrhea and vesical catarrh. A decoction of the bark is also used as a tonic in amenorrhea and the dose of the decoction is half a teacupful twice daily and acts as a stimulant in low fevers and in emmenagogue[16, 19].

STEM

Stem of S. persica is widely used in different parts to treat various ailments and disorders. Young stems of 3-5 mm are used as toothbrushes. A toothstick is also said to relieve toothache and gum disease. The bark is said to contain antibiotic property which suppress growth of bacteria and the formation of plaque in the mouth[18, 28].

The following are the various activities shown by the stem and root parts of S.persica.

1. Hypolipidemic activity

The stems of S. persica are widely used as tooth cleaning sticks in Arabic countries and decoctions show hypocholesterolemic properties. The effects of prolonged administration of a lyophilized stem decoction of S. persica were evaluated in diet induced rat hypercholesterolemic[25].

2. Antiulcer activity

S. persica possessed significant protective action against ethanol and stress-induced ulcers. The elements of gastric mucosa tended to be re-established normally in tested rats[34].

3. Anticonvulsant activity

The effect of S. persica as an anticonvulsant was identified by using stem extracts. The stem extracts show the potentiating of sodium pentobarbital activity and on generalized tonic- clonic seizure produced by pentylentertazol (PTZ) on the rat is reported. The extracts of S. persica Linn. extended sleeping-time and decreased induction-time induced by sodium pentobarbital. In addition, it showed protection against PTZ-induced convulsion by increasing the latency period and diminishing the death rate[32].

4. Antibacterial activity

S. persica contains substances that possess plaque inhibiting and antibacterial properties against several types of carcinogenic bacteria as well as aerobic and anaerobic bacteria which are frequently found in the oral cavity. The growth and acid production of these bacteria is thus inhibited. It has also been found that S. persica posseses anti-plasmodial activity and is used as

part of remedies to treat malaria[7]. It was recently found out that Meswak extract displayed a strong antimicrobial effect, both in vitro and in vivo, which significantly inhibited the growth of Gram negative bacteria from the dental plaque than Gram positive ones[20]. Previous studies have reported that S. persica extracts were effective against Streptococcus mutans[35] and Streptococcus faecalis, even using low extract concentrations. As reported by Sher et al.[38] and supported by others, the extract of S. persica is found to be effective against S. pyrogenis, S. faecalis, P. aeruginosa and Lactobacillus acidophilus. Meswak extract raised the plaque pH, suggesting a potential role in caries prevention[5, 12, 39].

5. Antimycotic activity

The extract of S. persica showed positive results against oral fungal infections. Using disc diffusion and microdilution assays, Noumi et al.[34] conducted a study for the first time, in order to investigate the anticandidal activities of fresh and dry S. persica. Their results showed that diluted acetone extract of dry S. persica has some antifungal activity against some oral C. albicans, C. glabrata and C. parapsilosis strains (zone of inhibition range: 10.33-15 mm), using the extract concentration of 300 g/ml. However, previously the work of Al Bagieh and Almas[4] showed that aqueous extracts of miswak could reduce the growth of C. albicans for up to 36 h, and at a concentration of 15%.

6. Release of calcium and chloride into saliva

Gazi et al. investigated the immediate and medium-term effect of miswak on the composition of mixed saliva. They reported that miswak produced significant increases in calcium (22- fold) and chloride (6-fold), and significant decreases in phosphate and pH, saturation of saliva with calcium inhibits demineralization and promotes demineralization of tooth enamel, whereas high concentration of chloride inhibits calculus formation[15, 22].

7. Analgesic effect

Mansour et al.[31] studied the analgesic effect of miswak decoction when injected into mice. They found that miswak was more effective against thermal stimuli than against chemical stimuli and also acts as an analgesic[4, 8, 10, 21].

8. Cytotoxicity

Mohammad et al. investigated the cytotoxic potential of S. persica on gingival and other periodontal structures using the agar overlay method. Results showed no cytotoxic effect by a freshly cut and used miswak[1, 17, 30, 33].

SEEDS

Seeds have bitter and sharp taste. They are used as purgative, diuretic and tonic. The oil from seed is applied on the skin in rheumatism[16, 19].

Tooth paste brands

Realizing the importance of S. persica in oral hygiene many tooth paste manufacturing company around the world used S. perica as one the major ingredients. Some of the known commercial toothpaste brands are: Meswak (Dabur India ltd, India), Sarkan toothpaste (UK), Quali-miswak toothpaste (Switzerland), Epident toothpaste (Egypt), Siwak-F toothpaste (Indonesia), Fluroswak miswak (Pakistan) and Dentacare Miswak plus (Saudi Arabia)[11, 40].

OTHER ADVANTAGES

Besides medicinal claims, S. persica is planted as shelter belts and serve as windbreak to protect farm habitation, gardens, orchards and in sand dune and saline soils reclamation. S. persica is reported as a good source of nectar. The wood is soft, white, and easy to work and is not liable to termite attack. It is used for coffins and clubs[2, 6, 14, 27, 37].

CONCLUSION

S. persica has been an important herbal plant in different parts of the world for its various therapeutic properties. Recently, these properties have been utilized in developing commercial products for export market. Literature does not reveal any cultivation of this plant. Over exploitation from the wild should be regulated and the plant should be brought under cultivation so that the cultivator and the manufacturers are mutually benefited thus reducing the pressure on the wild population.

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