



***Achyranthes aspera*: An Ancient Treasure**

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ABSTRACT

Nature is replete with the sources which can act as solution to many of our problems. Plants have the potential to be used as the remedies to various health related issues. Ayurveda, an ancient branch of science provides us knowledge about the properties of plants which aid in therapeutic benefits. As per WHO, nearly 80% people rely on these home remedies used in their tradition since ages. General health also includes taking care of your oral health as well. Oral diseases are very prevalent in the entire world. Understanding the importance of oral health, it should be prioritized. Among the various plants available for maintenance of oral hygiene, *Achyranthes aspera* is also considered as well. The plant has its place in *Amaranthaceae* family. The plant extract is extracted from almost all the parts of the plant and various solvents are used for retrieving it. The plant extracts are used topically or locally in order to get maximum benefits for various oral health related issues namely dental caries and periodontitis. In this article we would be focusing on the effects and possibility of incorporating .This plant for the improvement of oral health.

KEY WORDS: *Achyranthes aspera*, *Amaranthaceae*, Dental caries, Periodontitis.

Received 01.08.2022

Revised 11.09.2022

Accepted 26.10.2022

INTRODUCTION

Good health is of prime importance in one's life. In order to maintain a good overall health, the use of traditional medicines is in existence since ages. In our ancient culture, the use of medicinal plants and herbs forms the basis of treatment of various ailments associated with human body. General health is correlated with oral health as well. Although human medicine has made marked progress still microbial diseases is considered as a major threat to a large population. Due to reduced availability of medical facility and widespread drug resistance, there exist higher influence of such diseases in a developing nation like India. This has led to the discovery of various researches pertaining to an advanced antimicrobial agent. India is replete with the science of Ayurveda, the science which encompasses various plants with medicinal values for the purpose of treating diseases.

Periodontal disease refers to the pathology associated with the periodontium, with periodontitis being the most common. Periodontitis is an inflammatory condition which is associated with multiple factors which are responsible for destruction of supporting tissues around the teeth [1]. The major etiologic factor which is responsible for the pathogenesis of periodontitis is the presence of microbes at the tissue sites which release toxins that are detrimental to the tissues. Both the gram positive as well as gram negative bacteria are responsible for the destructive changes. With the deepening of the gingival sulcus there would be conversion of the condition from gingivitis to periodontitis and increase in the severity of the disease process. The ecological shift from gram positive to gram negative can be appreciated with increasing depth of the periodontal pocket. The management of the periodontal disease ranges from the non-surgical phase pertaining to control of inflammatory changes at the soft tissue level to the surgical phase pertaining to reconstruction of lost tissue structure at sites with the pronounced periodontal tissue destruction. Formation of Reactive oxygen species during the disease process is considered to be destructive to the tissues. There are certain enzymes present in some plants which play an integral part in controlling the ROS thus resulting in better healing of tissues [2].

Keeping these properties into consideration certain plants are selected for their added benefits, one such example is *Achyranthes aspera*. It is the most commonly used plant in Ayurveda both for management of oral and systemic ailments. The English name for this plant is Prickly chaff flower. The plant is associated with *Amaranthaceae* family [3] and is the herb which has geographical distribution in the tropical as well as subtropical areas of the world. The parts of the plant such as the root, the seeds, the shoot all

comprises of valuable medicinal properties [4]. Due to its importance as herbal remedy it has been widely used in various countries of South Africa and Asia [5].

TRADITIONAL UTILITY FOR THERAPEUTIC PURPOSE

The plant is used in various customs due to its therapeutic potential. The plant is used as a home remedy in management of cases of cough and asthma. It can be used in the patients of Pneumonia by boiling the crushed plant in water. The root of the plant can be used in cases of bowel complaints. The thick paste obtained from mixing the powdered seeds or flowering spikes with water is used topically in case of inoculation of poison from a snake or reptile. It is helpful in reduction of swelling, improving digestion and emitting phlegm. The burnt residue of the plant can be used topically in case of warts and ulcers. The paste made from the root can be used for various ailments related to eyes. The fresh paste made out of leaves can act as an analgesic in case of wasp bite. The plant can be used in management of various liver and skin related disorders. The twigs obtained from the stem as well as the roots can be used for brushing teeth [6].

RETRIEVING THE PLANT EXTRACT

Almost all the parts of the plant are used for extracting the active components which can be used for the prevention of various diseases related to oral cavity. Soxhlet apparatus is the apparatus of choice for retrieving the plant extract. Different solvents are used for the process in order to gain extracts of different polarity e.g., aqueous, petroleum ether, methanol and benzene. The antimicrobial potency can also be affected by the polarity of the solvent used for derivation of the extract from the plant source. The solvent used should be approximately 10 times to that of the dried and powdered plant part which is to be used. Most commonly, the root and the stem part of the plant are used in these type of extraction methods. The extract retrieved should be filtered and then stored at a temperature of 4°C approx. The extract should be kept at this temperature till it is being used. The extract derived can be placed at the target site in order to attain the desired results and to know the potency of the drug [7].

USE OF *ACHYRANTHES ASPERA* IN DENTAL PRACTICE

The parts of the plants which are commonly used in dentistry in order to maintain oral health are stem and root. Due to the major role of the plant as an antimicrobial agent, it is commonly used for oral hygiene maintenance. In certain parts of India, the plant is used for relieving pain in case of toothache. It also contributes in management of halitosis, teeth whitening and maintenance of strong and healthy gums. Due to the anti-cariogenic potential of this plant it is widely used as a tooth cleaning aid in India since ages.

There are many ways of using it for maintenance of oral hygiene. It can be used in the form of dentifrice, mouthwash or a local drug delivery system. In order to obtain the maximum benefits of the plant extract the concentration should be higher than the MIC (Minimum Inhibitory Concentration) of the drug. MIC is termed as the least concentration of the required to produce inhibition of bacterial growth with an absorbance level lesser than 0.05–550 nm (no evident growth). Keeping this thing into consideration, new products are formulated with appropriate concentration in order to provide maximum benefit [8].

Anti-cariogenic properties

As per WHO, Dental caries is considered as one of the most prevalent disease around the globe [9]. The decay or loss of tooth structure due to dental caries is considered to be irreversible in nature, so prevention is a far more desirable goal than the management. For the prevention of the disease, the disease causing pathogens such as *S. mutans*, *S. sanguis* and *S. mitis*, effective measures should be taken into consideration in order to control the proliferation and thus the levels of the pathogens under check. During the ancient times in the absence of toothbrush and paste, the twigs of this herbal plant were utilized for maintenance of oral hygiene.

A. aspera has shown marked reduction of *S. mutans* due its antibacterial property. The M.I.C. noted for stem and root extract of the plant is 2.5%¹⁰. It has shown a considerable amount of inhibition zone against *S. mutans* which indicates its anti-bacterial capacity. Murugan K *et al* recorded the inhibition percentage for different extracts of *Achyranthes aspera* which is ≤94% for methanol extract, ≤74%, for benzene extract, ≤62% for petroleum ether extract and ≤42% for aqueous extracts [10].

A study was conducted in the past in which the Ethanol extract derived from the plant was used against the salivary microbes due to the antimicrobial property possessed by the plant. Saliva samples were collected from children with mixed dentition having moderate caries activity [11]. Diffusion method using agar was selected for antibacterial assay. The outcome was compared with Chlorhexidine which is considered as the standard for such evaluations. The plant extract manifested with significant results in terms of medicinal properties. The leaf extract obtained from the plant showed comparable antimicrobial

activity against the salivary microflora to as that of Chlorhexidine mouthwash. Jebashree *et al* conclude in a study that the anticariogenic potential of the extract obtained using ethyl acetate was highly potent as an antibacterial agent in comparison with extracts obtained from other solvents[12].

Samson S conducted a comparative study using 0.2% Chlorhexidine and ethanolic extract of root, stem and leaves of the plant for their anti-cariogenic effect on children with moderate caries activity using agar diffusion method. The antibacterial activity is associated with inhibition of growth of pathogenic bacteria as well as quorum sensing alteration occurring resulting in marked reduction in the cariogenic activity following the incorporation of the plant extract in the oral hygiene maintenance routine.

***Achyranthes aspera* in management of Periodontal Diseases**

Achyranthes aspera due to its anti-microbial action can be used for prevention and maintenance of Chronic periodontitis. Ramnarayana Boyapati studied the role of *Achyranthes aspera* in treatment of periodontal diseases, when it is delivered subgingivally as a locally administered agent along with SRP due to its favourable effect in the form of anti-microbial activity. Three properties of the plant which helps in improving the clinical and the microbiological aspects included antimicrobial, anti-inflammatory and antioxidant activity[13]. The antibacterial action of the plant is due to the presence of alkanoids and tannins which are among the main phytochemical agents present in the plant.

The root extract which is derived from petroleum ether has a strong antimicrobial activity for the gram positive bacteria whereas the methanol and chloroform extract of the plant are used for their antimicrobial activity towards gram negative bacteria. The difference in the anti-microbial activity is due to the difference in composition of cell wall and cell membrane among different bacteria [14].

The radical scavenging activity of the plant towards the free radical formation occurring during the periodontal disease activity was due to the presence of phenolic compounds in the plant extract which was very evident in the studies conducted in the past. The two main radicals targeted by these phenolic compounds were namely 2,2 diphenyl-1-picrylhydrazyl and superoxide which are the main culprits responsible for the destruction of periodontal tissues during the disease process[15]. *A. aspera* in its gel form was used a local drug therapy for the protection of periodontal tissues from the pathogens as it is very effective in management of inflammation in tissues[16]. An animal study was conducted by Kumar *et al* [17] in which the alcoholic extract of the plants was used, the plant extract exhibited stimulation of immune system via the proliferation of T-lymphocytes[18].

The regeneration potential of the plant extract is also helpful in many ways. Due to the phenolic component present in the plant extract it is highly effective in regeneration of the lost tissues so it contributes majorly in the dealing with wounds [19]. The phenolic compounds lead to formation of a film around the exposed wound tissue causing prevention of loss of fluid from the tissues as well as formation of a chemical barrier [20]. The film also acts as a physical barrier by providing insulation to the wound area. This property of the plant helps in better healing of the treated sites.

CONCLUSION

Oral cavity provides a reflection of our oral health. It is equally important as the maintenance of good general health. Neglecting any kind can have irreversible and detrimental effects on teeth as well the supporting tissues. Oral hygiene practices are important in order to maintain a disease free oral environment. Various ancient and modern alternatives are present around us from which benefit should be taken in order to facilitate a good oral health. Herbal alternatives are gaining popularity in the medicine as well the dental fields. Keeping these things in mind various Ayurveda herbs are made of use in today's modern life by incorporating the extract of herbs in the routinely used modern products. One such ancient herb is *Achyranthes aspera* which is used for its immense medicinal properties. *Achyranthes aspera* is used in dental practice due to its antagonistic activity towards two of the major problems i.e., dental caries and periodontal diseases. The potency of the drug helps in better tackling of the above mentioned diseases related to oral cavity.

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CITATION OF THIS ARTICLE

S Malik, A Bhardwaj, S Kamra. *Achyranthes aspera*: An Ancient Treasure. *Bull. Env.Pharmacol. Life Sci., Spl Issue [2]: 2022: 523-526*