Ashwattha and Jambu – An antimicrobial duo against Oral Pathogens

Prajakta Arun Patel[1], **Dr. Asmita Jadhav**[2]
[1]*Dravyaguna Dept Smt. K.C. Ajmera Ayurved Mahavidyalaya, Dhule.*
[2]*Dept. of Dravyaguna Tilak Ayurved Mahavidyalaya, Pune.*

Corresponding Author:
Prajakta Arun Patel
Email : praj8285@gmail.com

Abstract:

Purpose – Oral and dental diseases are included in *Shalakyatantra*. Preventive aspect is explained in *Dinacharya*. Plants with *Katu, Tikta , Kashay rasa and Kaphaghna Guna* are used in various forms for cleaning teeth like gargling, oil pulling. *Triphala, Irimedadi taila, Khadir , Nimba* have enough evidence base for their use in *mukharoga*. *Ashwattha* and *Jambu* bark have been used in systemic diseases. *Ashwattha* leaves are used by many tribals and forest dwellers as remedy for tooth problems. *Jambu* leaves are used by Unani experts in dental problems. Bark of *Ashwattha* and *Jambu* is usually used, but not leaves. Hence their role can be evaluated in oral diseases.

Aims & Objectives – To propose the Role of *Ashwattha* and *Jambu* in managing Oral Diseases.

Material & Methods – Classical *Ayurvedic* literature, published scientific research evidences on both the plants were searched. Articles discussing the phytochemical constitution of plants were reviewed. It was observed that less studies have been done on oral pathogens to screen their anti-microbial activity.

Results – Leaves of *Ashwattha* contains flavonoids, terpenoids, tannins, Stigmasterol, campesterol, phytosterols & Copper, Calcium, iron, magnesium, phosphorous. Jambu leaves are rich in acylated flavonol glycosides, quercetin, myricetin, myricitin, tannin etc. These phyto-chemical constituents attribute to different activities like anti-oxidant, anti-inflammatory, anti-microbial, immune-modulatory etc.

Conclusion – *Ashwattha* and *Jambu* have significant anti-microbial activity against many oral pathogens . Both the plants are easily and readily available. If used together, can give promising results & can be economical.

Keywords – Oral diseases, *Ashwattha* (Ficus religiosa), *Jambu* (Sygyzium cumini), antimicrobial.

Introduction

Many factors play a role in the health status of an individual. One of them is maintaining proper hygiene. Health and hygiene go hand in hand. General health reflects in oral cavity. One cannot have good general health without good oral health. Hence the oral cavity has been described as “the window to general health.” It has been estimated that more than 100 systemic diseases and upward of 500 medications have oral manifestations.[1]

The oral cavity is the focal point for the interaction of the body with the external environment. Speech, chewing, swallowing, and the early stages of digestion are all vital physiological functions that involve the oral cavity. There are multiple surface types in the oral cavity, and each is colonized with a unique population of 500-700 species of bacteria, viruses, fungi, and protozoa, a good number of which are significantly virulent. The level of oral hygiene significantly impacts the makeup of the oral microbiome.[1] Oral health comprises of safeguarding the teeth; its supporting structure (Periodontium) as well as surrounding soft tissues. Oro-dental health problems can be the source of infection and may lead to other systemic problems and is a risk factor for cardiovascular diseases, cerebrovascular diseases, diabetes, peripheral arterial disease, respiratory diseases, and low birth weight.[2] According to National oral health policy survey, dental caries (tooth decay) and periodontal diseases(infection of gums) are most common oral diseases in India. The prevalence of these oral diseases is more than 50% in all age groups in India.[3]

Prevention is always better than cure. Dental treatments are costly. That's why preventing oro-dental problems can save money and other related issues of systemic health can be avoided too. Mouthwashes, creams, jells, toothpastes etc. are used to maintain oral health. Daily use of some products is contraindicated due to their chemical load. Mouthwashes can't be used for longer duration of time. The use of chlor-hexidine mouthwash is contraindicated in pregnant women and children.[4]

Ayurveda is an ancient science of India. The medicinal plants used in Ayurveda are time tasted. Their use is safe. The branches that deals with oral-dental health are *Shalakya tantra, Swastha-vritta* and Kayachikitsa. The daily regimen described in *Swasthavritta* advices the use of herbs for brushing (*Danta-dhawan*) and gargling (*Kawal-Gandusha*). Some herbs like Triphala, Yashtimadhu, Nimba have been evaluated extensively for their anti-microbial efficacy in oral

and dental disorders.[5] However other herbs like *Ashwattha* (Ficus religiosa) and *Jambu* (Sygyzium cumini) may be evaluated for their efficacy in oradental pathologies. *Ashwattha* leaves are used by many tribals and forest dwellers as remedy for tooth problems.[6] Similarly *Jambu* leaves are used by Unani experts in dental problems.[7] Bark of Ashwattha and Jambu is usually used, but not leaves. Hence role of both plants (leaves) can be evaluated in oral diseases.

Material and Methods :

Ashvattha (Ficus religiosa Linn.)

तेषां पत्रं हिमं स्वादु सतिक्तं तुवरं लघु ।
लेखनं कफपित्तघ्नं विष्टम्भाध्मानवातजित् ?
कषाया: स्तम्भना: शीता हिता: पित्तातिसारिणाम् ।
पल्लवा: क्षीरीवृक्षाणां ....?

कैयदेव निघंटु

Ashvattha is useful in various ailments like diarrhoea, vomiting, ulcers in oral cavity, burns, gynaecological problems etc. it is one of the ingredients of Pancha-vakala. It is used in vaatarakta, vrana chikitsa (Charak), nil-meh, vajikaran, asthi-bhagna (Sushruta), karna-roga, shotha (Vagbhat), garbha-sthapan, prameha, vrana-chikitsa (vaidya manorama), vaman, dagdha-kshat, mukhapaak (Chakradatt)[8]. Folklore and Ethno-medicinal uses like Tender leaf twigs are chewed to cure toothache have been reported.

जम्बू: कषायमधुरा श्रमपित्तदाहकंठार्तिषोशमनी क्रिमिदोषहन्त्री ।
श्वासातिसारकफकासविनाशिनी च विष्टम्भिनी भवति रोचनपाचनी च ?

राज निघंटु

Jambu is well known drug in the treatment of Prameha. It is used in atisaar, rakta-atisaar, rakta-pitta, chhardi, agnimandya, vyanga, vrana, kukunaka, krimi-karna, baal-grahani.[9] The application of Jamun leaf ash cures bleeding gums and keeps teeth healthy.[10]

The leaves of Ficus religiosa contain phytochemicals such as flavonoids, terpenoids, tannins etc., which are effective in curing ailments like hiccups, vomiting, gonorrhea etc.[11] Fresh twigs of are used as toothbrush (Daatun). It gives strength to gums and is used to kill bacteria.[6] Ethanolic extract of leaves of Ficus religiosa (300 mg/kg of body weight) showed wound healing activity in wistar albino strain rat. Significant increase in wound closure rate, skin breaking strength, granuloma breaking strength was observed.[12] Ethanolic extract of leaves (2000 mg/kg of body weight) showed anti-ulcer property in albino mice Ulcer area prevented and gastric secretion was reduced.[13] Aqueous and ethanolic extracts of F. religiosa leaves showed antibacterial effect against Staphylococcus aureus, Salmonella paratyphi, Shigella dysenteriae, S. typhimurium, Pseudomonas aeruginosa, Bacillus subtillis, S. aureus, Escherichia coli, S. typhi.[14,15] F. religiosa showed antibacterial activity against primary plaque colonizers and periodontal pathogens.[16]

Radio-protective activity was studied on radiation induced sickness and mortality in mice exposed to 10GY γ-irradiation. Leaf extract of S. cumini delayed the onset of mortality and reduced symptom of radiation sickness, provided protection against GI death and bone marrow death, thus increasing the survival percentage.[17] Khan et al., (2016) reported antifungal activity of S. cumini bark and leaves extract against Rhizoctonia solani.[18] A large amount of phenolics and flavonoids is embedded in the S.cumini leaves tissues thus confirming its anti-oxidant, inti-inflammatory, analgesic activity, cytoprotective and anticoagulant activity.[19] The plant has been reported to contain ellagic acid, triterpenoids, acetyl oleanolic acid, quercetin, isoquercitin, myricetin and kaempferol.[20] S.cumini possesses hypoglycemic, antimicrobial, hypolipidemic, anti-allergic, anti-inflammatory, cardio-protective, hepato-protective and anti-neoplastic properties. [21]

Results : The leaves of Ashwattha contains flavonoids, terpenoids, tannins, Stigmasterol, campesterol, 28-isofucosterol and phytosterols (2.8%) also minerals like Copper (Cu), Calcium (Ca), iron (Fe), manganese (MnO2), sodium (Na) magnesium (Mg), potassium(K), phosphorous (P), and zinc. Jambu leaves are rich in acylated flavonol glycosides, quercetin, myricetin, myricitin, myricetin 3-O-4-acetyl-L-rhamnopyranoside, triterpenoids, esterase, galloyl carboxylase and tannin. These phyto-chemical constituents attribute to different activities like anti-oxidant, anti-inflammatory, wound healing, anti-ulcer, anti-bacterial, anti-microbial, immune-modulatory etc.

Mukharoga (oral diseases) in Ayurveda are treated with local as well as systemic medication. Triphala, Khadir, Irimedadi Taila etc. have been evaluated extensively for their anti-microbial efficacy in oral and dental disorders. Ashwattha (Ficus religiosa) and Jambu have kashay rasa , katu viapka, ruksha guna. Mouth is kapha stahan. Both plants have kaphaghna properties which can help in preventing as well as curing oral conditions. Hence Ashwattha (Ficus religiosa) and Jambu (Sygyzium cumini) may be evaluated for their efficacy in oradental pathologies.

Discussion : Ashwattha and Jambu have been used for various ailments. Also their use is advised in Mukharoga (oral diseases). Other traditional uses of Ashwattha include diabetes mellitus, haemorragic conditions, hiccups,vomiting, gonorrhoea, diarrhea, dysentery, inflammation, bleeding etc. Jambu is used for diabetes, blisters in mouth, cancer, colic, diarrhea, digestive complaints, dysentery, piles, pimples and stomach-ache etc. Bark of Ashwattha and Jambu is used commonly. Uses of leaves are limited. Leaves of both plants contain good amount of phyto-chemicals. Also leaves

are easily available,easily reproducible, easy for collection and easy for processing as compared to bark or other plant parts. The leaves of both plants possess significant anti-microbial and anti-bacterial properties. Ashwattha (F. religiosa) leaves showed antibacterial effect against Staphylococcus aureus, Salmonella paratyphi, Shigella dysenteriae, S. typhimurium, Pseudomonas aeruginosa, Bacillus subtillis, S. aureus, Escherichia coli, S. typhi.[22] The hydroalcoholic extract of Jamun leaves was found to be active against Candida krusei and antibiotic-resistant bacterial species of P. aeruginosa, Klebsiella pneumoniae and S. aureus in addition to Enterococcus faecalis, E. coli, Kocuria rhizophila, Neisseria gonorrhoeae, P. aeruginosa, and Shigella flexneri. [23]

Ayurveda uses stems and roots of many plants. If not collected properly may lead to destructive harvesting. To avoid such issues more use of easily reproducible and abundantly available plant part must be used. Instead leaves can be used to avoid harm to trees. Ashwattha and Jambu are evergreen tress with longer life. Bark of both plants is used in Ayurvedic medicines. Leaves are used by traditional practitioners for treating dental problems. Hence it was thought that their use in oral conditions should be evaluated.

Conclusion :

Ashwattha (Ficus religiosa) and Jambu (Sygyzium cumini), have significant anti-microbial activity against many oral pathogens . Both the plants are easily and readily available. Leaves are easy to harvest. If used together, can give promising results & can be a cost effective alternative to current dental hygiene products like mouthwash, toothpaste etc.

References :

1. Rasool Hassan BA. Importance of Personal Hygiene. Pharmaceut Anal Acta. 2012; 3(8): e126
2. Arigbede AO, Babatope BO, Bamidele MK. Periodontitis and systemic diseases: A literature review. J Indian Soc Periodontol. 2012;16(4):487–491.
3. Bali RK, Mathur VB, Talwar PP, Chanana HB. National Oral Health Survey and Fluoride Mapping 2002-03. Dental Council of India, New Delhi; 2004.
4. Gunsolley, J. C. Clinical efcacy of antimicrobial mouthrinses. J Dent. 38, S6–S10 (2010).
5. Antibacterial efficacy of triphala against oral streptococci: an in vivo study. Srinagesh J, Krishnappa P, Somanna SN.Indian J Dent Res. 2012 Sep-Oct;23(5):696. doi: 10.4103/0970-9290.107423.PMID: 23422630 Clinical Trial.
6. S. A. Bhalerao and A. S. Sharma. Ethenomedicinal, phytochemical and pharmacological profile of Ficus religiosa Roxb. Int.J.Curr.Microbiol.App.Sci (2014) 3(11) 528-538.
7. H. Sagrawat, A.S. Mann and M. D. Kharya . Pharmacological potential of Eugenia jambolana – A review. Pharmacognosy Magazine. (2006) Vol. 2, issue 6, Apr-June 2006. Page 96-106.
8. Nighantu Adarsha (Vol.-2), Bapalal G. Vaidya, Chaukhamba Bharti Academy, Edition. 3rd 2002. Page 501-507
9. Acharya Privrat Sharma. Classical uses of medicinal plants. Chaukhambha Vishwabharti Publications. 1st edition 1996. Page no. 545-546
10. Bhowmik D, Gopinath H, Kumar BP, Duraivel S, Aravind G, Kumar KPS. Traditional and medicinal uses of Indian black berry. J Pharmacog Phytochem 2013;1(5):36–41
11. Bhalerao SA, Sharma AS. Etheno-medicinal, phytochemical and pharmacological profile of Ficus religiosa Roxb. Int J Curr Microbiol Appl Sci. 2014;3(11):528-538.
12. Charde RM, Dhongade HJ, Charde MS, Kasture AV. Evaluation of antioxidant, wound healing and anti-inflammatory activity of ethanolic extract of leaves of Ficus religiosa. Int J Pharm Sci Res. 2010; 19(5): 73-82.
13. Gregory M, Divya B, Mary RA, Viji MH, Kalaichelvan VK, Palanivel V. Anti–ulcer activity of Ficus religiosa leaf ethanolic extract. Asian Pac J Trop Biomed. 2013;3(7):554-556.
14. Mousa, O., Vuorela, P., Kiviranta, J.,Wahab, S.A., Hiltohen, R., Vuorela, H. 1994. Bioactivity of certain Egyptian Ficus species. J.Ethnopharmacol., 41: 7176.
15. Farrukh, A., Iqbal, A. 2003. Broadspectrum antibacterial and antifungal properties of certain traditionally used Indian medicinal plant. World J. Microbiol. Biotechnol., 19: 653-657.
16. Hunny S.,GY Yunus, Ashok KM, Reena K., Rohit A. Monika K. 2016 Antimicrobial efficacy of three medicinal plants Glycyrrhiza glabra, Ficus religiosa, and Plantago major on inhibiting primary plaque colonizers and periodontal pathogens: An in vitro study.Indian Journal of Dental Research. 2016;27(2):200-204.
17. Shafi PM, Rosamma MK, Jamil K, Reddy PS. Antibacterial activity of Syzygium cumini and Syzygium travancoricum leaf essential oils. fitoterapia. 2002 Aug 31;73(5):414-6.
18. Khan A, Jabeen K, Iqbal S. Antifungal activity of Syzygium cumini L. against Rhizoctonia solani. Pure and Applied Biology. 2016 Jun 1;5(2):193.

19. AhmedR,TariqM,HussainM,Andleeb A, MasoudMS, AliI et al. (2019) Phenolic contents-based assessment of therapeutic potentiall of Syzygium cumini leaves extract. PLoS ONE 14(8):e0221318. https://doi.org/10.1371/journal.pone.0221318

20. RastogiRP, MehotraB. Compendium of Indian medicinal plants: volume1.1960–1969. Drug research Perspectives. 1990;10.

21. SrivastavaS, ChandraD. Pharmacological potentials of Syzygium cumini : a review. Journal of the Science of Food and Agriculture. 2013;93(9):2084–93. https://doi.org/10.1002/jsfa.6111 PMID: 23460190

22. S.B. Chandrasekar, M. Bhanumathy, A.T. Pawar, T. Somasundaram. Phytopharmacology of Ficus religiosa. Pharmacogn Rev. 2010 Jul-Dec; 4(8): 195–199 .

23. de Oliveira GF, Furtado NAJC, Filho AAS, Martins CHG, Bastos JK, Cunha WR. Antimicrobial activity of Syzygium cumini (myrtaceae) leaves extract. Brazilian J Microbiol 2007;38:381-384.