

Azadirachta Indica: A herbal Panacea in Dentistry—An Update

Nitin S. Gosavi, Sachin R. Gosavi*, Roshan B. Badhe

Abstract

Azadirachta indica better known as *Neem*, an evergreen tree. It has long been used by the people of India for the treatment of various ailments because of its medicinal properties. It has anti-bacterial, anti-cariogenic, anti-helminthic, anti-diabetic, antioxidant, astringent, anti-viral, cytotoxic, and anti-inflammatory activity. Nimbidin, Azadirachtin and nimbinin are active compounds present in *Neem* that are responsible for their anti-viral activity. *Neem* bark is used as an active ingredient in a variety of blends and blends. *Neem* bark has antibacterial properties, it is very useful for the dentist in treating gingival problems and maintaining oral health in a natural way. *Neem* branches are used as an oral remedy, to relieve toothache and to clean teeth. The purpose of this article is to focus on the various aspects of *Azadirachta indica* in dentistry in order to provide the tool for future research.

Keywords: *Azadirachta indica*, anti-bacterial, anti-cariogenic, oral health, anti-diabetic.

INTRODUCTION

Neem is widely used in Ayurveda, Unani and Homoeopathic medicine and has become an amazing tree of modern medicine [1]. It is traditionally used in the treatment of inflammation, disease, fever, skin diseases and dental problems. It is effective in various epidermal forms such as acne, psoriasis, eczema. *Neem* leaves have also been reported to have antihyperglycemic, [2] immunomodulatory, [3] anti-inflammatory, [4] antimalarial, [5] antioxidant, [6] antiviral, [7] antimutagenic [8] and anticarcinogenic properties [9]. *Neem* also exhibits antibacterial, [10] antifungal, [11] hepatoprotective, [12] anti-ulcer, [13] anti-fertility and anti-nociceptive activity. toothpaste. *Neem* bark has antibacterial and deodorant activity. The phytochemical elements present in *neem* are nimbidin, nimbin, nimbolide, Azadirachtin, gallic acid, epicatechin, catechin, and margolone. All of this indicates strong antibacterial activity. The active ingredient of *neem* is azadirachtin, an active antibacterial agent [15, 16]. *Neem* has also been traditionally used as a skin moisturizing agent [17].

The therapeutic role of *Azadirachta indica* in dentist

Nimbidin, a major active vaccine isolated from *A seed seeds. indica* shows a few biological actions. From nimbidin other active ingredients such as nimbin, nimbinin, nimbidinin, nimbidin and nimbidic acid have been separated into binding its biological functions [16]. *Neem* dental care products contain *Neem* leaf or bark extract. *Neem* leaf is rich in antioxidants and helps to strengthen the immune system in the gums and oral tissues [18, 19]. *Neem* provides an effective remedy for oral ulcers, tooth decay and acts as a pain reliever for toothache problems.

Neem dental applications Antibacterial activity

Neem is a natural anti-bacterial agent. Different science subjects have revealed its antimicrobial activity [20]. *Neem* antimicrobial effects have been reported against *S. mutans* and *S. faecalis* [21].

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Ethanol extract from Neem leaves and sticks and bark shows great antibacterial activity [22, 23]. Neem chewing sticks have shown great antibacterial activity against *S. Mutans* compared to other causes of tooth decay, *S. salivarius*, *S. mitis*, and *S. S. sanguis* [24].

Anti-candid activity

Ethanol and aqueous extract of Neem leaf have shown great anti-candidiasis effect in *C. albicans* [25]. Clinical studies have shown the effects of a leaf extract.

Azadirachta indica (Neem) in adhesion, cell surface hydrophobicity and biofilm formation, which may affect colonization by *Candida albicans*. The results suggest that Neem leaves have a potent effect of preventing adherence to a sample studied in vitro [26].

Anti-cariogenic activity

Mango and Neem extract have shown antimicrobial activity against *S. mutans*, *S. salivarius*, *S. sanguis* and *S. mitis*. A combination of chewing sticks has been found to be effective in eliminating tooth decay [27]. The extracted chloroform of the Neem leaf inhibited *Streptococcus mutans* and *Streptococcus salivarius* and provides treatment for tooth decay [28]. Antimicrobial activity of Himalayan herbal toothpaste available for sale containing neem and fluoride-containing cheerio gel toothpaste was tested in school children. Studies have reported that both toothpastes showed a good antimicrobial effect caries produces saliva for streptococcus mutans [29]. A toothpaste containing Neem and a fluoridated toothpaste were equally effective against the germs that produce caries. Acetone extracted from Neem bark kills bacteria against *S. sobrinus* is why it demonstrates its anti-cariogenic activity [30].

Anti-plaque function

The aqueous extract of Neem stick and gallotannin-enriched extract from *Melaphis chinensis* inhibits the synthesis of insoluble glucan and leads to the accumulation of bacteria. Reduces the ability of streptococci to colonize the dental area [31]. Neem oil exhibits an important antibacterial activity and has been suggested for its use in treating tooth decay [32]. Mucoadhesive toothpaste containing *Azadirachta indica* has been found to be beneficial in reducing plaque index and the number of saliva bacteria is better compared to chlorhexidine gluconate mouthwash [33].

Effectiveness of Neem extract against oral acidogenic

Basic acid-tolerant bacteria associated with tooth enlargement include *Streptococcus mutans*, *Streptococcus oralis*, *Streptococcus sobrinus*, *Lactobacillus acidophilus*, *Streptococcus salivarius*, *Streptococcus mitis*, *Streptococcus*, *Streptococcus sobrinus*, *Lactobacillus acidophilus*, *Streptococcus salivarius*, *Streptococcus mitis*, *Streptococcus sanguis*, *Streptococcus oralis*, *Streptococcus* and *angina-susus-angicos-angicoccus* app -*Streptococcus* and *angikosus-angicoccus* intermedic. orthodontic treatment. It has also been reported that the presence of regular orthodontic equipment greatly impedes oral hygiene and creates new areas that keep cracks and debris. The ethanol leaf extract of *Azadirachta indica* exhibits significant antibacterial activity against selective acidogenic oral bacteria that cause tooth decay in orthodontic-prone patients. Our study examined the anti-plaque activity of the extract against *S. mutans*, *S. sanguis*, and *S. mitis*. Release did not prevent *L. acidophilus* when tested [34].

Effective against periodontal viruses

Brushing with Neem toothpaste after a regular meal and using an oral watch with Neem extract is recommended for treatment to prevent gingivitis. In the study, Neem-based mouthwash was given to patients to evaluate the activity of anti-plaque and anti-gingivitis. The findings conclude that Neem oral cleansing is as effective as chlorhexidine in reducing periodontal symptoms. The rod is found to act as a toothbrush in reducing tooth decay and gingival inflammation [35]. Studies show that the leaf extraction of *A. indica*-based mouth rinse is very effective and can be used as an alternative treatment

for the treatment of periodontal disease [36]. Gingivitis has been prevented or replaced with regular use of Neem toothpaste and mouthwash. Shefali sharma researched Soluneem (water-soluble method from Neem seeds from Shefali sharma researched Soluneem (water-soluble form from Neem seed from Azadirachta Indica containing Azadirachtin) as an agent antimicrobial and effective. Soluneem concentration is required prevention of periodontopathic viruses and compared it with the well-known antiplaque agent chlorhexidine (0.2%) in vitro. Studies have shown that the extraction of soluneem did not show antimicrobial activity (Bacteroids fragilis, B. distatonics, Prevotella corporis, Prevotella melagingogenica, Pepto streptococcus species) tested [37]. Also, Botelho et al., Along with Behl et al., In their experiments and experiments concluded that Azadirachta indica is highly effective in treating periodontal disease and has thus demonstrated its association with the human periodontal fibroblast [38].

Neem as a root canal irrigant

Sodium hypochlorite has been used as a root canal irrigant for decades; causes possible weakening of the tooth structure by reducing the hardness and integrity of the dentin structure within the root canal. To overcome this negative herbal remedy is effectively used to prevent E. faecalis causing root canal failure in patients treated with endodontic. The aqueous and ethanolic extract of Neem leaf inhibits S. Mutans and E. faecalis causing root canal failure in the endodontic process. The antioxidant and antimicrobial properties make it a potent source of root canal spray as an alternative to sodium hypochlorite [23]. The literature suggested that the Neem (Azadirachta indica) extract extracted had a significant antibacterial effect against E. c. faecalis found in infected root samples. The extract was found to be effective compared to 2% sodium hypochlorite.

Neem in the dental care industry

Various parts of the Neem tree have astringent and antiseptic activity. Leaf extracts are widely used in traditional and traditional times to make toothpaste once mouthwash in the area of oral dental care. Its anti-bacterial properties due to the presence of nimbidin, Azadirachtin, and nimbinin help remove many of the aerobic and anaerobic bacteria present in the oral cavity. Neem bark and leaf extracts are used very effectively to prevent cavities and gum disease. Mouth wash containing Neem is a remedy for tooth decay, mouth infections, bleeding prevention and painful gums. Neem sticks are used by people all over India as chewing sticks.

CONCLUSION

Regular brushing with Neem toothpaste will reduce plaque formation, prevent caries, and improve the immune system and oral health as a whole. Regular use of mouthwash containing Neem extract will reduce gingival problems, and cure halitosis. In this modern, fashionable world, we have done enough damage to the environment. It's time to dump her and move on. Here we try to recapture and learn the ancient ways of the Indians, which can be incorporated into our immediate lives in order to have a positive effect, for the benefit of future generations. This article hopes to lay a good foundation for the use of one of nature's best gifts—Neem in many daily activities. If education can be provided in dental and dental schools about the use of Neem-based products and oral care, it can help our dentists treat patients more carefully.

REFERENCES

1. Athavale VB. Ayurvedic Dentist [Danta-Shastra]. New Delhi: Chaukhamba Sanskrit Pratishtan; 1999.
2. Khosla P, Bhanwra S, Singh J, Seth S, Srivastava RK. A study of the hypoglycemic effects of Azadirachta indica (Neem) on diabetic rabbits with alloxan. Indian J Physiol Pharmacol 2000; 44(1): 69-74.
3. van der Nat JM, Klerx JP, van Dijk H, de Silva KT, Labadie RP. The immunomodulatory function of the aqueous extract of Azadirachta indica stem bark. J Ethnopharmacol 1987; 19(2): 125-31.
4. Tidjani MA, Dupont C, Wepierre J. Anti-inflammatory activity of Azadirachta indica. Planta Med Phytother 1989; 23: 259-66.

5. Dhar R, Zhang K, Talwar GP, Garg S, Kumar NJ. Inhibition of the growth and development of the subgroups and sexual organs of the sensitive and drug-resistant species of the human malaria parasite *Plasmodium falciparum* by components of Neem (*Azadirachta indica*). *J Ethnopharmacol* 1998; 61: 31-9.
6. Rao AD, Devi KN, Thyagaraju KJ. Ayurtox Detoxification of the body. *Enzyme Inhib* 1998; 14: 85-6.
7. Rao AR, Sukumar S, Paramasivam TV, Kamalakshi S, Parashuraman AR, Shantha M. Antiviral study of the tender leaves of the Margosa tree (*Melia azadiricta*) in vaccination and variola virus: The first report. *Indian J Med Res* 1969; 57(3): 495-502.
8. Balasenthil S, Arivazhagan S, Ramachandran CR, Ramachandran V, Nagini S. Chemopreventive power of neem (*Azadirachta indica*) 7, 12 - dimethylbenz (a) anthracene (DMBA) induced hamster buccal pouch carcinogenesis. *J Ethnopharmacol* 1999; 67(2): 189-95.
9. Arivazhagan S, Balasenthil S, Nagini S. Measurement effects of Garlic and Neem leaf extracts on N - methyl - N' - nitro - N-nitrosog uanidine (MNNG) -created oxidative stress in mice. *Wistar. Cell Biochem Funct* 2000; 18(1): 17-21.
10. Baswa M, Rath CC, Dash SK, Mishra RK. The antibacterial activity of Karanj (*Pongamia pinnata*) and Neem (*Azadirachta indica*) seed oil: Preliminary report. *Microbios* 2001; 105(412): 183-9.
11. Jacobson M. Pharmacological and toxicological effects of Neem and China berry in warm-blooded animals. *Neem Newslett* 1986; 3: 39-43.
12. Bhanwra S, Singh J, Khosla P. Effect of *Azadirachta Indica* (Neem) aqueous leaf extract on liver damage caused by paracetamol in mice. *Indian J Physiol Pharmacol* 2000; 44(1): 64-8.
13. Bandyopadhyay U, Chatterjee R, Bandyopadhyay R. US Patent 5,730,986, 1998; compliant with Indian Patent 1100 / Del / 95.
14. Saimbi CS. The effectiveness of neem extract -Reported to Jeevaniya Health Care Magazine 1994.
15. Bhanwara, S, Singh J, Khosla P. Activity of *Azadirachta Indica* (neem) in mice. *Indian J Physiol Pharmacol* 2000; 18: 17-21.
16. Sharma P, Tomar L, Bachwani M, Bansal V, Review Neem (*Azadirachta indica*): Thousand Problem One Solution, *Int Res J Pharm* 2011; 2(12): 97-102.
17. Biswas K, Chattopadhyay I, Banerjee RK, Bandyopadhyay U. Biological activities and therapeutic properties of Neem (*Azadirachta Indica*). *Curr Sci* 2002; 82(11): 1336-45
18. Kapoor S, Saraf S. Viscoelasticity and hydration effect of herbal cosmetics using bioengineering techniques. *Pharmacogn Mag* 2010; 6(24): 298-304.
19. Subapriya R, Nagini S. Therapeutic properties of neem leaves: A review. *Curr Med Chem Anticancer Agents* 2005; 5(2): 149-6.
20. Nayak A, Ranganathan N, Sowmya GB, Kishore B, Kudalkar M. Antibacterial and anticandidal efficacy tests for aqueous effect and neem alcohol (*Azadirachta Indica*): Invitro research. *Int J Res Ayurveda Pharm* 2011; 2(1): 230-5.
21. Siswomihardjo W, Sunarintyas SB, Nishimura M, Hamada T. Differences in the antibacterial effect of neem leaves and stick extract. *Int Chin J Dent* 2007; 7: 27-9.
22. Almas K. Antimicrobial effects of extracts of *Azadirachta Indica* (Neem) and *Salvadora Persica* (Arak) chewing sticks. *Indian J Dent Res* 1999; 10(1): 23-6.
23. Bohora A, Hegde V, Kokate S. Comparison of antibacterial efficacy of neem leaf extract and 2% sodium hypochlorite against *E.Faecalis*, *C.Albicans* and mixed culture- An In Vitro read. *Endodonology* 2010; 22: 8-12.
24. Chava VR, Manjunath SM, Rajanikanth AV, Sridevi N. The effectiveness of neem extract in four microorganisms responsible for tooth decay are *Streptococcus Mutans*, *Streptococcus Salivarius*, *Streptococcus Mitis* and -*Streptococcus Sanguis*: Intro Research. *J Contemp Dent Pract* 2012; 13(6): 769-72.
25. Dhanya Kumar NM, Sidhu P. Antimicrobial activity of *Azadirachta Indica*, *Glycyrrhiza Glabra*, *Cinnamum Zeylanicum*, *Syzygium Aromaticum*, *Accacia Nilotica* on *Streptococcus Mutans* And *Enterococcus Faecalis*-An In Vitro study. *Endodonology*. Available at: [Last accessed 2013 Sep]. <https://www.semanticscholar.org/paper/The-antimicrobial-activity-of-azadirachta-indica-%2C-Ate%25%9F-Turgay/ca3747b76bf99d14e9b5c2dd7430e3ad9847cdb3#citing-papers>

26. Polaquini SR, Svidzinski TI, Kemmelmeir C, Gasparetto A. Effect of aqueous extract from Neem on hydrophobicity, biofilm formation and adhesion to resin composite *Candida albicans*. *Arch Oral Biol* 2006; 51(6): 482-90.
27. Prashant GM, Chandu GN, Murulikrishna KS, Shafiulla MD. The effect of mango and neem extract on four organisms causing dental caries: *Streptococcus mutans*, *Streptococcus salivarius*, *Streptococcus mitis*, and *Streptococcus sanguis*: an in vitro study. *Indian J Dent Res* 2007; 18(4): 148-51.
28. Packia Lekshmi NCJ, Sowmia N, Viveka S, Raja Brindha J, Jeeva S. Preventive effect of *Azadirachta indica* against dental infections. *Asian J Plant Sci Res* 2012; 2(1): 6-10.
29. Patil S, Venkataraghavan K, Anantharaj A, Patil S. Comparison of two toothpastes available for sale in the *Streptococcus Mutans saliva* test for urban kindergarten children - An In Vivo study. *International Dentistry SA* 2010; 12(4): 72-82.
30. Bhuiyan MM, Nishimura M, Matsumura S, Shimonu T. Antimicrobial effects of *Azadirachta Indica* extracted neem bark from *Streptococcus Sobrinus*. *Pediatr Dent J* 1997; 7: 61-4.
31. Wolinsky Le, Mania S, Nachnani S, Ling S. Preventive effect of *Azadirachta Indica* (Neem) is a liquid released on bacterial structures that influence the formation of In Vitro plaque. *J Dent Res* 1996; 75: 816-22.
32. Elavarasu S, Abinaya P, Elanchezhian S, Thangakumaran, Vennila K, Naziya KB. *Azadirachta Indica* (Neem Oil) Anti-plaque microbial activity test In Vitro: A pilot study. *J Pharm Bioallied Sci* 2012; 4(6): S394-6.
33. Pai MR, Acharya LD, Udupa N. Antiplaque activity test of *Azadirachta Indica* leaf extract gel-A 6 - weekly clinical study. *J Ethnopharmacol* 2004; 90: 99-103.
34. Lakshmi T, Aravind Kumar S. Antadacterial testing of *Azadirachta Indica* ethanolic leaf extract against selected acidogenic oral bacteria that causes tooth decay in non-orthodontic-acting patients - Invitro study. *J Bot Res* 2012; 1: 30-40.
35. Bhambal A, Kothari AS, Saxena S, Jain M. Comparative effect of Neemstick and Toothbrush on removal of plaque and gingival health - Clinical examination. *J Adv Oral Res* 2011; 2(3): 51-6.
36. Chatterjee A, Saluja M, Singh N, Kandwal A. To test for antigingivitis and antipalque effect of *Azadirachta Indica* (Neem) oral cleanser on plaque caused by gingivitis: Double-blind, random, controlled trial. *J Indian Soc Periodontol* 2011; 15(4): 398-401.
37. Sharma S, Suchetha A, Vijayendra R, Bharwani AG. In Vitro microbiological study evaluating the efficacy of soluneem (Formulation of water-soluble Neem from *Azadirachta Indica*) against periodontopathic microorganisms. *J Oral Health Commun Dent* 2012; 6(1): 4-9.
38. Botelho MA, Santos RA, Martins JG, Carvalho CO, Paz MC, Azenha C, et al. The effectiveness of the mouthrinse based on the leaves of the neem tree (*Azadirachta indica*) in the treatment of patients with chronic gingivitis: A blurred, randomized, controlled trial. *J Med Plant Res* 2008; 2: 341-6.