

A Review on Various Medicinal Properties and Activities of Neem

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Abstract: Neem is important in today's global context because it provides answers to the major problems facing humankind. Azadirachta Indica is a popular fast-growing evergreen tree commonly found in India, Africa and the United States. This review primarily provides a bird's-eye view of biological activity and its prophylactic, promotional, medicinal and uses. In all these reviews, he also states that "neem is the only solution to a thousand problems" such as anti-allergy, anti-skin, anti-food, anti-fungal, anti-inflammatory, anti-renal pelvis, anti-scab. Heart, diuretics, pesticides, larvicides, nematodes, spermicides and other biological activities.

Keywords: Neem, Azadirachta Indica, Activity, Azadirachtin, Uses, and Nimbi dins.

INTRODUCTION

Azadirachta indica is a popular fast-growing evergreen tree commonly found in India, Africa and the United States. ⁽¹⁾ It has been used in Ayurvedic medicine for over 4000 years due to its medicinal properties. Neem is called "Arista" in Sanskrit and means "perfect, perfect and immortal". ⁽²⁾ Arista is the Sanskrit name for the neem tree and is considered "Salbarogaribarini" because it means "survivor of the disease". This tree is considered a "village pharmacy" in India. The importance of the neem tree was recognized by the National Academy of Sciences in 1992, which published a report entitled "Neem, a Tree for Solving Global Problems."⁽³⁾

It grows in most of Southeast Asia and West Africa. Recently, some trees have been planted in several Central American countries, including the Caribbean and Mexico. Indians have long worshiped the neem tree. Over the centuries, millions of people have cleaned their teeth with neem twigs, smeared skin diseases with neem leaf juice, took neem tea as a tonic, and neem to keep nasty insects away. Placed leaves in bed, book, grain storage, cupboard, wardrobe⁴. The number of benefits of neem can be found in ancient documents such as "Charak Samhita" and "Susruta Samhita". Commonly called "Indian Lily" or "Margoza", it belongs to the family Meliaceae, Subfamily Meliaceae, and Mahoganyaceae. Neem is the most versatile and diverse tree in the tropics and has great potential. It has the most useful non-wood products (leaves, bark, flowers, fruits, seeds, gums, oils, neem cakes) than any other tree species. Known anti-allergic, anti-skin, anti-feeding, anti-fungal, anti-inflammatory, anti-renal pelvis, anti-skin, heart, diuretic, insecticidal, larval killing, nematode, sperm killing and other biological activities. For these activities, Neem has found a tremendous use to make it a green treasure. ⁽³⁾

Neem is important in today's global context because it provides answers to the major problems facing humankind. Neem (Azadirachta indica) is considered harmless to humans, animals, birds, beneficial insects and earthworms and has been approved for use in food crops by the US Environmental Protection Agency⁵. The Neem (Azadirachta indica) of the family Meliaceae is a potential medicinal evergreen tree found in most tropical countries.⁽⁴⁾

Bioactive compounds isolated from different parts of the plant include azadirachtin, meliacin, gedunin, salanin, ninth bin, varacin, and many other derivatives of these compounds. Meliasin forms the bitter principles of neem seed oil, the seed also contain Tygnic acid (5-methyl-2-fatty acid), which causes the odor peculiar to oil. These compounds belong to a natural product called triterpenoids (limonoids). Although the active ingredient is slightly hydrophilic, it is freely lipophilic and easily soluble in organic solvents such as hydrophilic substances, alcohols, ketones and esters.⁽⁵⁾

ORIGIN AND DISTRIBUTION OF NEEM;

Two species of Azadirachta have been reported, Azadirachta indica

A. Juss –native to Indian subcontinent and Azadirachta excelsa Kack. – confined to Philippines and Indonesia.

Neem is a member of the Mahogany family. Taxonomic position of neem –



Order -Rutales
Suborder -Rutinae
Family -Meliaceae
Subfamily -Melioidae
Genus- Azadirachta
Specie- Indica
Latin -Azadirachta indica

An estimated 25 million trees have grown across India (15), 5.5% of which are found in Karnataka, ranking third after Uttar Pradesh (55.7%) and Tamil Nadu (17.8%). Other states in India where the Neem tree grows include Andhra Pradesh, Assam, Bihar, Delhi, Gujarat, Haryana, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Meghalaya and Orissa. There are states, Punjab, Rajasthan, West Bengal and Andhra Pradesh. Of the Union. India is the number one producer of neem seeds, producing approximately 4,42,300 tonnes of seeds annually, 88,400 tonnes of neem oil and 3,53,800 tonnes of neem cake. ⁽²⁾

Biological Activities of Some Neem Compounds;

Numerous compounds have been isolated from different parts of neem, some of which have been tested for their biological activity as shown. In Table 1

S.N	COMPOUND NAME	SOURCE	BIOLOGICAL ACTIVITY	REFERENCE
1	Nimbi din	Seed oil	Anti-inflammatory Antiarthritic Antipyretic Hypoglycaemic Antigastric ulcer Spermicidal Antifungal Antibacterial Diuretic	8 9 10 11 12,13 14 15 15 16
2	Sodium nimbidate		Anti-inflammatory	8,9
3	Azadirachtin	Seeds oil	Antimalarial	17
4	Nimbin	Seed oil	Spermicidal	18
5	Nimbolide	Seed oil	Antimalarial Antibacterial	19 20,21
6	Gedunin	Seed oil	Antimalarial Antifungal	21 22
7	Mahmoodin	Seed oil	Antibacterial	23
8	Gallic acid, (-) epicatechin and catechin	Bark	Anti-inflammatory Immunomodulatory	24
9	Margolone, margolonone and isomargolonone	Bark	Antibacterial	25
10	Cyclic trisulphide and cyclic tetrasulphide	Leaf	Antifungal	26
11	Polysaccharides		Anti-inflammatory	27
12	Polysaccharides G1A, G1B	Bark	Antitumour	28
13	Polysaccharides G2A, G3A	Bark	Anti-inflammatory	29
14	NB-2 Peptidoglycan	Bark	Immunomodulatory	30,31

Table No.1

Nimbidine, an important crude bitterness compound extracted from *Azadirachta indica* seed kernel oil, has shown multiple biological activities. Several tetranortriterpenes containing nimbin, nimbidinin, nymboldin, and ninbic acid have been isolated from this crude principle. ⁽³⁾Nimbidine and sodium nimbidine have significant dose-dependent anti-inflammatory activity against carrageenan-induced acute foot edema and formalin-induced arthritis in rats. ^(6,7)

Significant anti-ulcer effects have been observed with nimbidine in the prevention of acetylsalicylic acid, indomethacin, stress or serotonin-induced gastric lesions, and histamine or system amine-induced duodenal ulcers. ^(9,10) Oral administration of nimbidine showed a significant hypoglycaemic effect in fasted rabbits. ⁽⁸⁾ Nimbidine also acts as an antihistamine by inhibiting basal, histamine and carbachol-stimulated gastric acid production and blocking H₂ receptors, thereby potentially serving as an anti-ulcer agent. In 1959, the spermicidal activity of nimbin and nimbin in rats and humans was reported. ⁽⁹⁾ Nimbidine also exhibited antifungal activity by inhibiting the growth of *Trichophyton rubris*. In vitro, it can completely inhibit the growth of *M. tuberculosis* and has been shown to be bactericidal. ⁽¹¹⁾ The diuretic effect of sodium nimbidate in dogs has also been reported. ⁽¹²⁾

Nimboldin acts against malaria by inhibiting the growth of *Plasmodium falciparum*. ⁽¹³⁾ Nimboldin also exhibits antibacterial activity against *Staphylococcus aureus* and *Staphylococcus aureus*. ^(14,15) Genuin isolated from neem seed oil has been reported to have both antifungal properties and antimalarial activities ^(16,15)

Azadirachtin, a tetranortriterpenoid plant liminoids that can be isolated from the seeds of the neem tree. Azadirachtin is a common example of a natural plant defense chemical that affects food intake through chemoreceptors (primary prevention of feeding). It consists of blocking the entry of receptors that normally respond to appetite stimulants, stimulating specific deterrent cells, or both. Decreased food intake due to toxic effects during consumption (secondary antifeedant effect) when food intake is reduced after administration of azadirachtin by bypassing chemical receptors around the mouth. Inhibition of feeding can be achieved from raw purified neem extract, neem-injected extract to pure azadirachtin. Butterflies are effectively sensitive to azadirachtin and have a feeding inhibitory effect at concentrations of 1-50 ppm. Azadirachtin also has a growth-regulating effect on the following insect larvae: *B. suspensa*. Suspension of rise, growth retardation, malformations that may contribute to mortality. This disrupts or completes endocrine events such as down regulation of blood lymphatic ecdysteroid levels by blocking the release of the prothoracic gland stimulating hormone PTTH from the brain-body heart complex. Suppression of molting due to delayed appearance of steroid peaks indicates. It also affects allotropes and juvenile hormone levels ⁽¹⁷⁾

MEDICINAL USES OF NEEM

Neem is known for its durable wood. In addition, neem non-wood products such as flowers, fruits, seeds (oil, cakes), leaves, bark and gum have a variety of uses. The antifungal, antibacterial, insecticidal and other diverse biological activities of these products are well established. Table 2 summarizes some of the medicinal properties of the various parts of Neem mentioned in Ayurveda.

Part	Medicinal uses
Leaf	Leprosy, eye problem, epistaxis, intestinal worms, anorexia, biliousness, skin ulcers.
Bark	Analgesic, alternative and curative of fever.
Flower	Bile suppression, elimination of intestinal worms and phlegm.
Fruit	Relieves piles, intestinal worms, urinary disorder, epistaxis, phlegm, eye problem, diabetes, wounds and leprosy.
Twig	Relieves cough, asthma, piles, phantom tumour, intestinal worms, spermatorrhoea, obstinate urinary disorder, diabetes.
Gum	Effective against skin diseases like ringworms, scabies, wounds and ulcers
Seed pulp	Leprosy and intestinal worms
Oil	Leprosy and intestinal worms.
Root, bark, leaf, flower and fruit together	Blood morbidity, biliary afflictions, itching, skin ulcer, burning sensation and leprosy.

Table No. 2



FIGURE-A = Twigs
 FIGURE-B = Leaves
 FIGURE-C = Fruits
 FIGURE-D = Seeds (with endocarp)
 FIGURE-E = Seeds (without endocarp)

The costs of fertilizers, pesticides, animal feeds and medicines are skyrocketing in developing countries, coupled with increasing debt and severe poverty. This situation creates great pressure to explore local resources to address these deficiencies and improve people's quality of life. One of these available resources with great potential in the 21st century is the neem tree. The purpose of these reviews is to: Elucidate the premise of neem for exploitation and use. Formulate biologically active principles, limit widespread use, and identify the potential inherent dangers of neem products.⁽⁵⁾

AFFORESTATION

Large-scale plantations of neem trees help combat desertification, deforestation, soil erosion, and reduce excessive global warming. Neem has a high photosynthetic rate and releases more oxygen than many other tree species, thus purifying the atmosphere. Neem products have a water purification effect. Neem leaf powder can be used as a bioadsorbent to remove dyes such as congo red from water. During the hot summers of northern India, temperatures below neem have been found to be about 10 degrees Celsius below ambient temperature. At agroforestry, the benefits of neem products range from shade, firewood, timber, windbreaks, windbreaks and desertification protection in the semi-arid regions of northern Nigeria. Neem has the ability to cut the canopy after pollination, re-grow and then germinate again. This makes it ideal for bar manufacturing. In Saudi Arabia, neem plantations are said to provide shade to about 2 million pilgrims when fully grown. In Nigeria, Neem forms about 90% of the trees in the plantations established in the 12 states of the Sabanna Zone under the Affort Program.⁽¹⁸⁾

CHEMOTHERAPEUTIC EFFECT OF NEEM

In West Africa, India, Burma, etc., both aqueous and alcoholic extracts of bark and neem leaves are effective anti-malaria drugs, especially in chloroquine-resistant strains. One active ingredient, "gedunin," has led to an important battle against malaria, which is as effective as quinine. The mechanism is probably the redox state of the parasite red blood cells (RBC). Plasmodium parasites produce oxidants, and neem extract reduces oxidized cells to destroy malaria parasites. In addition, the bark and leaves of neem have strong antiseptic properties, justifying their use as an active ingredient in Indian and German toothpastes. Aqueous extracts from the leaves indicate the potential of laxatives by increasing defecation.

MALE ANTIFERTILITY ACTIVITY

Neem seed oil (NSO) and leaf extracts act as powerful spermicide, significantly reducing spermatogenesis, sperm motility loss, fertility counting and arrest. These conditions were reversed by withdrawing the neem product after 4-6 weeks. There is no significant effect on libido or loss of efficacy. In addition, NSO is anti-portable and abortive. Sinha et al. (1984) It was discovered that human and rhesus sperm were immobilized and died within 30 minutes of contact with NSO at an intravaginal dose of 1 ml. Vaginal biopsy did not reveal any side effects, but radioisotope studies show non-vaginal absorption and non-antiovalution (Sinha et al., 1984). These findings have enabled the "sensual" use of neem oil formulations in India as a powerful contraceptive.⁽⁵⁾

NEEM EXTRACT AS A CORROSION INHIBITOR

Metal corrosion in many industries, structures, plants, and public facilities such as electricity and water and sewage is a serious problem. Inhibitors are typically used to prevent or minimize corrosion, especially in flow cooling systems. Mixtures of organic, inorganic, or both inhibitors can suppress corrosion by chemical adsorption on metal surfaces or by reacting with metal ions to form barrier-type precipitates on their surface. increase. Due to the toxicity and / or high cost of some of the chemicals currently used as inhibitors, it is necessary to develop environmentally friendly and inexpensive ones. The effect of an aqueous extract of VAE neem (*Azadirachta Indica*) on carbon steel corrosion suppression in 1.0 M HCl solution was investigated electrochemically and by weight loss experiments at temperatures in the range 303-343 K. did. The rate of inhibition increased with increasing concentration of inhibitor. At a concentration of 2.0 g / l, the inhibition rate reached about 87% at room temperature and 80% at 303 K. The inhibition

rate decreased with increasing temperature. The thermodynamic parameters for the adsorption of this inhibitor on the metal surface were calculated using the Temkin adsorption isotherm. Aqueous extracts of neem tree leaves have been found to be excellent potential corrosion inhibitors due to their high tannin content and the abundance of complex triterpene glycosides.⁽¹⁹⁾

Neem leaf extract for the treatment of periodontitis

Neem leaf extract may help reduce the bacteria and plaque that cause the progression of periodontitis. In 2004, the International Journal of Dentistry published a study showing that subjects using Neemgel experienced improvement in periodontal disease compared to controls. A study published in the Journal of Ethnopharmacology in the same year found similar results. To take advantage of the herb's bacterial-reducing properties, use mouthwash with a few drops of neem leaf extract in water and use twice daily.⁽²⁰⁾



ANTIOXIDANT COMPOUND

The process by which free radicals are formed is a normal function of the body, but the resulting molecules are unstable and can damage other cells. Many diseases are caused by high levels of free radicals, including cardiovascular disease, eye health, cataracts, macular degeneration, age-related neurodegeneration (deterioration of brain cells and nervous system), and even cancer. Neem protects against chemically-induced carcinogens and liver damage by increasing antioxidant levels.

REFERENCES

1. Pingale Shirish S, Hepatoprotection study of leaves powder of *Azadirachta indica* A. juss, International Journal of Pharmaceutical Sciences Review and Research, Volume 3, Issue 2, July – August 2010, page no-37-42.
2. K. Girish, Bhat S. Shankara, Neem – A Green Treasure, Electronic Journal of Biology, 2008, Vol. 4(3):102-111.
3. Biswas Kausik, Chattopadhyay Ishita, Banerjee K Ranajit, and Bandyopadhyay Uday, Biological activities and medicinal properties of neem (*Azadirachta indica*), Current Science, Vol-82, 10 June 2002, pp.1336-1345.
4. N.B. Dhayanithi, T.T. Ajith Kumar and K. Kathiresan, Effect of neem extract against the bacteria isolated from marine fish, Journal of Environmental Biology, July 2010, 31, 409-412.
5. Kabeh.J.D, Jalingo.M.G.D.S.S., Exploiting Neem (*Azadirachta Indica*) Resources for Improving the Quality of Life in Taraba State, Nigeria, International Journal of Agriculture and Biology, 1560–8530/2007/09–3–530– 532.
6. Bhargava KP, Gupta MB, Gupta GP, Mitra CR. Anti-inflammatory activity of saponins and other natural products. Indian J Med Res. 1970 Jun;58(6):724– 730.
7. Pillai, N. R. and Santhakumari, G., Anti-arthritis and anti-inflammatory activities of nimbidin, *Planta Medica*, 1981, 43, 59–63.
8. Pillai, N. R. and Santhakumari, G., Hypoglycemic activity of *Melia azadirachta* Linn (Neem), *Indian Journal of Medical Research*, 1981, 74, 931–933.
9. Pillai, N. R. and Santhakumari, G., Effects of nimbidin on acute and chronic gastro-duodenal ulcer models in experimental animals, *Planta Medica*, 1984, 50, 143– 146.
10. Pillai, N. R., Seshadri, D. S. and Santhakumari, G., *Indian Journal of Medical Research*, 1978, 68, 169–175.
11. Murthy, S.P. and Sirsi, m. 1958. Pharmacological studies on *Melia Azadirachta indica*. *Indian Journal of Physiology and Pharmacology* 2, 387-396.
12. Bhide, N.K., Mehta, D.J. and Lewis, R.A. 1958. Diuretic activity of sodium nimbidinate. *Indian Journal of Medical Sciences* 12, 141-145.
13. Rojanapo, W., Suwanno, S., Somaree, R., Glinsukon, T. and Thebtaranonth, Y., Screening of Antioxidants from some Thai vegetables and herbs, *J. Sci. Thailand*, 1985, 11, 177–188.
14. Rochnakij, S., Thebtaranonth, Y., Yenjal, C. H. and Yuthavong, Y., Nimbolide, a constituent of *Azadirachta indica* inhibits *Plasmodium falciparum* in culture, *Southeast Asian J. Trop. Med. Public Health*, 1985, 16, 66–72.
15. Khalid, S. A., Duddeck, H. and Gonzalez-Sierra, M., Isolation and characterization of antimalarial agent of the neem tree, *Azadirachta indica*, *Journal of Natural Product*, 1989, 52, 922–927.
16. Rao, B. S., Nazma and Rao, M.J, Antifungal activity of gedunin, *Curr. Sci.*, 1977, 46, 714–716.
17. Ayssar Nahl'e, Ideisan Abu-Abdoun, Ibrahim Abdel-Rahman, and Maysoon Al- Khayat, UAE Neem Extract as a Corrosion Inhibitor for Carbon Steel in HCl Solution, *International Journal of Corrosion*, Volume 2010, 1-9.

18. K. Anbumani and Ajit Pal Singh, Performance of Musturd and Neem oil blend with diesel fuel in c.i engine, ARPN Journal of Engineering and Applied Sciences, vol. 5, no. 4, april 2010, 14-20.
19. Patil Prashant, RD Gaikwad, MV Sawane, VS Waghmare, Effect of Neem Oil on Sperm Mitochondrial Activity, Online Journal of Health and Allied Sciences, ISSN 0972-5997 Volume 8, Issue 4; Oct - Dec 2009, 1-2.
20. P. Dharmani, G. Palit, Exploring Indian medicinal plants for antiulcer activity, Indian J Pharmacol, April 2006, Vol 38, issue 2, P.N. 95-99.

