Neem: A Wonder Tree

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Neem (Azadirachta indica) is an evergreen tropical tree that comes from the family of Meliaceae. Grown on all kinds of soils including clayey, dry, saline, alkali and other wastelands, it is found abundantly in Asia, Africa, Australia, North, Central and South America.

The tree is well known particularly in the Indian subcontinent because of its extensive use in the traditional schools of Ayurveda and Unani medicine. Well known for more than 4000 years, it is widely used in many home remedies. Its Sanskrit name, ‘Arishtha’ means reliever of sickness. Some common synonyms of this name are neta- leader of medicinal plants, pichumarda- anti-leprotic, ravisamba- has healing effect, krimighan- anti-microbial, sheetal- has soothing effect on people (6). All these names suggest its astonishing qualities in treating human ailments.

Used not only in alternative medicine, neem is fast becoming a cornerstone of modern medicine. There has been a lot of research on this plant and its varied uses have amazed the world. Every part of this plant, that is, its leaf, flower, bark, seed, fruit, kernel, wood and twig is commercially exploitable (1). It has been shown that the chemical composition of the plant comprises only of carbon, hydrogen and oxygen, and has no chlorine, phosphorus, sulphur, or nitrogen.
Western scientists have isolated more than 140 biologically active compounds called limonoids from the oil, seed, bark and leaf of neem and have demonstrated their efficacy in biological, medicinal, agricultural and even industrial applications.

Recent studies have shown that these simple looking green leaves restrict the growth of many pathogenic organisms – bacteria, viruses, fungi and protozoa. The compounds found in neem function differently on different parts of life processes (8). Its leaves, seeds and bark have potent anti-bacterial properties and can act against a wide variety of bacteria including *Mycobacterium tuberculosis*, *Vibrio cholera*, *Klebsiella pneumoniae* and streptomycin-resistant strains (1).

Among viruses, neem suppresses the growth of dengue virus and prevents multiplication of *Coxsackie B* virus, one of the most infectious viruses in humans. Traditionally, smallpox, chicken pox and warts have been treated with a paste of neem leaves where it is directly applied on the infected skin (8).

Certain compounds in neem help in curing fungal ailments like athlete’s foot, ringworm, candida, eczema, and scabies. It is highly effective against *Trichophyton* (fungus that infects hair, skin and nails), *Epidermophyton* (a ‘ringworm’ that affects skin and nails), *Microsporum* (a ‘ringworm’ that invades hair and skin), *Trichosporon* (fungus of intestinal tract), *Geotrichum* (yeast-like fungus that causes infection of bronchi, lungs and mucous membranes) and *Candida* (yeast-like fungus that can lead to lesions in mouth, vagina, skin, hands and lungs) (1).

Studies have also shown that neem helps in preventing malaria. Research using *in vitro* studies has shown that neem is more effective in treating malaria than chloroquine, a drug to which the parasite is gradually becoming resistant (1).

These anti-infective properties of neem have been successfully harnessed by hugely popular neem-based soaps and ointments. Neem toothpastes are another popular neem-based product in the current market, and researchers have shown that extracts from neem stick and neem bark reduce the adhesion and growth of *Streptococcus mutans*, the bacteria that causes tooth decay and dental caries (3). It is no wonder that neem twigs are used for cleaning teeth in rural areas of South Asia and Africa. More than that, organic compounds from its leaves have antibacterial and anti-histaminic properties; these can reduce inflammation and destroy ulcer causing bacteria such as *Helicobacter pylori* and have proven successful in treating stomach ulcers (7).

Besides anti-infective properties, neem also has anti-inflammatory, anti-oxidant and anti-cancer properties. The bitter Nimbidin, an important component of neem, has strong anti-inflammatory properties and can suppress the functions of macrophages and neutrophils involved in inflammation. It is a common practice to use a decoction or a poultice from its leaves and bark in gout, rheumatism, arthritis, pain etc (6). Anti-oxidants in neem can boost the body’s immune system thereby, increasing its resistance to fight infections and cancers. Many studies show that neem is effective in killing cancerous cells in carcinomas affecting the colon, stomach, lung, liver, skin, oral, prostate and breast. Its anti-cancer potential is attributed to inhibition of the synthesis of prostaglandins and other metabolites essential for tumor progression (7). Use of neem for blood cleansing has been happening since antiquity. It protects liver from damage by reducing impurities in blood. More research is required to be performed so that neem can be used commercially for these indications.

Added to this, neem leaves have strong anti-fertility effects. Aqueous extracts of old and tender neem leaves can completely immobilize and kill human spermatozoa within 20 seconds (7). It is perhaps the cheapest contraceptive available that can be used for birth control.

Neem has been known to be insecticidal and it is an age old practice to use neem leaves to protect clothes and food grains against moths, insects, and other pests. In 1962, a breakthrough study established its multitudinal insecticidal benefits, especially its role as an anti-feedant against migratory and desert locusts and more than 500 other pests (4). Neem as a biopesticide is a safe and a biodegradable alternative to synthetic pesticides and lacks adverse effects such as pest resistance, environment contamination, toxic residue in food, feed and fibre, and chronic toxicity. It is interesting to note that neem extracts do not kill insects directly but they alter insects’ behaviour and life processes. They hamper their...
capacity to metamorphose, feed or breed (8). Moreover, insects have not yet shown any form of genetic resistance to neem, as so often happens with synthetic pesticides.

The ‘bio-piracy’ conflict of ten years between US Department of Agriculture and multinational WR Grace, and the Indian government over patent rights on fungicidal properties of neem shows the growing interest of modern medicine in traditional remedies (9). A lot of research has been done on neem in modern medicine but a lot more is required to utilize its full potential. There is also a need to spread more awareness about this incredibly versatile medicinal tree. It is time to resurrect the age old medicinal system of Ayurveda and incorporate it in the modern lifestyle for better economic and therapeutic utilization. Truly, neem could be the antidote to all diseases!

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References


