

Beneficial Effects Of Neem Oil-An Updated Review

Noorul Aneesa¹, Gayathri²

¹First year student, BDS, ²Associate Professor
Saveetha Dental College and Hospitals, Chennai

Abstract:

Neem (*Azadirachta indica*) commonly called 'Indian Lilac' and belongs to the family *Meliaceae*, subfamily *Meloideae* and tribe *Melieae*. Neem is the most versatile, multifarious trees of tropics, with immense potential. It possesses maximum useful non-wood products (leaves, bark, flowers, fruits, seed, gum, oil and neem cake) than any other tree species. These non-wood products are known to have anti-allergenic, anti-dermatic, anti-feedent, antifungal, anti-inflammatory, anti-pyorrhoeic, anti-scurbic, cardiac, diuretic, insecticidal, larvicidal, nematocidal, spermicidal and other biological activities. Because of these activities neem has found enormous applications making it a green treasure. Neem oil is a vegetable oil pressed from the fruits and seeds of neem (*azadirachta indica*). An evergreen tree which is endemic to the Indian subcontinent and has been introduced to many other areas in the tropics. It is the most important of commercially available products of neem for organic farming and medicines. Neem oil varies in colour, it can be golden yellow, yellowish brown, reddish brown, dark brown, greenish brown or bright red. Each part of neem tree has some medicinal properties and it is commercially exploitable. It is considered as a valuable source of unique natural products for development of medicines against various diseases. This review was done to establish the various beneficial effects of neem oil on human beings.

Keywords: *Azadirachta indica*, Neem, herb, medicine, review.

INTRODUCTION:

Neem is an omnipotent tree and a sacred gift of nature (1). Neem is being considered as the most important and useful medicinal plant and the neem tree is mainly cultivated in the Indian subcontinent. Neem, an ancient medicine is a member of the mahogany family, *Meliaceae*. Today it is known by the botanical name *Azadirachta indica* (2)

Neem is an evergreen, tall, fast-growing tree, which can reach a height of 25m and 2.5m in girth which has an attractive crown of deep green foliage and honey scented flowers. Neem has more than 100 unique bio-active compounds, which have potential applications in agriculture, animal care, public health, and for even regulating human fertility (3). It has many potential uses as it has extracts of herbal medicines to treat infections and it has practiced since ancient days due to their eco-friendliness and low side effects.

INSECTICIDAL ACTIVITY:

The insecticidal activity of phytochemical against mosquito larvae has been well documented although no commercial products based on phytochemical are currently being used in mosquito control programmes to our knowledge. One of the most extensively used "natural" plant derived insecticides is neem, extracted from the plant *Azadirachta indica*. (1) The neem oil extract had a toxic effect against *Anopheles stephensi aegypti* larvae with median lethal concentrations (LC50) of 1.6, 1.8 and 1.7 ppm respectively. Recently, entomopathogenic fungi have been formulated in neem oil and tested against larval and adult. The results showed that the formulation of fungus and neem was more effective than neem alone for adults and larvae (2). The "formulation" of fungus in water was not as effective as fungus formulated in neem oil against adults, although larvae were not exposed to formulations of fungus without neem.

ANTIBACTERIAL :

This study has proven that the NE at lower concentrations can be used as an effective antibacterial agent for the treatment of pathogenic bacteria infections without any toxicity to the human system. The *in vitro* toxicity study on the immune cells is essential to assess the effects of the nano material at the cellular level. (3) The lymphocytes are immune cells that protect the humans against infections by humoral and cell-mediated immunity. (4) The human lymphocytes are the most commonly used system to study the cytotoxicity and genotoxicity of the neem extracts prepared for therapeutic applications. (5) The present study deals with the antibacterial activity of neem oil NE against *V. vulnificus* and the toxicity assessment of NE in cultured human lymphocytes. (3)

ANTI-FUNGAL:

Like antibacterial and antimalarial properties of neem, the antifungal properties are also given great importance in the field of science. *Azadirachta indica* (Neem) leaf extract was taken to test its antifungal activity against three fungal species - *Aspergillus flavus*, *Alternaria solani* and *Cladosporium*. neem oil has been the cure for many fungal diseases caused by the above fungi. It has been a lifesaver. (4)

MEDICINAL PROPERTIES OF NEEM:

Neem has been extensively used in Ayurveda, Unani and Homoeopathic medicine and has become a cynosure of modern medicine. Neem elaborates a vast array of biologically active compounds that are chemically diverse and structurally complex. More than 140 compounds have been isolated from different parts of neem (5,6)

All parts of the neem tree- leaves, flowers, seeds, fruits, roots and bark have been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental disorders. The medicinal utilities have been described especially for neem leaf. The j of neem leaf have been demonstrated to exhibit immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic properties.(7)

REPRODUCTIVE EFFECTS OF NEEM OIL:

Male anti fertility activity of neem leaf extract was studied in mice, rats, rabbits and guinea pigs by daily oral feeding of a cold-water extract of fresh green neem leaves. There was no inhibition of spermatogenesis. During this period there was no decrease in body weight and no other manifestation of toxicity observed. There was a marked decrease in the mortality of spermatozoa. The infertility in rats was not associated with loss of libido or with impotence and the animals maintained normal mating behaviour. The male anti fertility activity was reversible in 4 to 6 weeks. Neem extract also shows reversible male anti fertility activity in mice without inhibition of spermatogenesis. Thus it does not have any harmful effects on reproductive system.(8,9)

NEEM OIL AS A MOSQUITO REPELLENT:

Neem Seed oil extracted from *Azadirachta indica* plant and formulated in Vanishing cream base was evaluated for repellent action against *Anopheles gambiae*. *Azadirachta indica* belongs to family meliaceae.(10) Many mosquito-borne diseases, such as malaria, dengue fever (DF), dengue hemorrhagic fever (DHF) and filariasis are some of the serious problems all over the tropical regions.

Although the most common mosquito repellent currently available on the market, deet (N,N-diethyl-3-methylbenzamide) has shown excellent protection from mosquito bites and other biting insects there were reports of toxicity problems after application of deet, range from mild effects such as in skin diseases.

NEEM OIL ON TUMOR CELLS:

Cancer cells are characterized by a number of hallmarks, including excessive cell growth, reprogramming of energy metabolism that supports the uncontrolled proliferation, immortality, resistance to cell death, induction of angiogenesis, the ability to invade and metastasize to distant sites, and suppression of immune response against tumor cells. preclinical studies have shown compelling evidence suggesting that the anticancer effects of neem are mediated through modulation of multiple cellular processes. Neem components inhibit proliferation, induce apoptosis and other forms of cell death, and reduce cellular oxidative stress.

Tumor microenvironment plays an essential role in angiogenesis and metastasis. Tumor cells possess the ability to modulate their surrounding environment (or microenvironment), which stimulates inflammation, facilitates cell invasion, and induces angiogenesis.

Neem extracts are prepared using a variety of different solvents including ether, petrol ether, ethyl acetate, and diluted alcohol. Therefore, the spectrum of bioactive components and the percentage of individual components in the extract vary depending on the process of extraction.

NEEM AND CANCER:

Currently, studies on effect of administration of neem solutions on cancer, diabetes, heart disease and AIDS are being carried out. Anticarcinogenic activity of neem leaf extract was observed in murine system [11]. Injection of neem leaf preparation to tumor in mice reduced tumour growth, exhibiting anticarcinogenic activity [12]. Induction of apoptosis in rat oocytes was seen when treated with neem leaf extract [13]. Buccal pouch carcinogenesis in hamsters was inhibited by ethanolic leaf extract of neem [14]. The ethanolic leaf extract of neem also caused cell death of prostate cancer cells (PC-3) by inducing apoptosis [15].

NEEM AND ITS INDUSTRIAL USES:

Several pharmaceuticals, cosmetics, disinfectants, rubber, bio-pesticide and textile industries use neem oil [16]. Many such neem-based commercial preparations are currently available [17,18]. In India neem is highly exploited by many Ayurvedic drug industries. Neem oil and powdered neem leaves are employed in various cosmetic preparations such as face creams, nail polish, nail oils, shampoos, conditioners [19]. A new shampoo, based on seed extract of neem was highly effective, more than permethrin-based product, against head lice under in vitro conditions [20]. Neem cake a byproduct of neem oil industry is used as livestock feed, fertilizer and natural pesticide. Neem oil is commonly used in soap production. Medicated neem soaps are gaining popularity. Neem based toothpaste is widely used in India and European countries. Neem is a source for many oral-hygiene preparations and dental care products.

CONCLUSION:

Neem being an ancient plant has various medicinal properties. Owing to its versatile characteristics neem is rightly called the 'Village pharmacy' or 'Doctor tree' or 'Wonder tree of India' or 'The bitter gem'. National Research Council (NRC), Washington, USA considers the neem, "One of the most promising of all plants and the fact is that it may eventually benefit every person on this planet. Probably no other plant yields as many strange and varied products or has as many exploitable byproducts" (21). An extensive research should be undertaken on neem and its products for their better economic and therapeutic utilisation.

REFERENCE:

1. Ascher, K. R. S. (1993) Nonconventional insecticidal effects of pesticides available from the Neem tree, *Azadirachta indica*. *Arch. Insect Biochem. Physiol.* 22: 433-449
2. Badani, L., Deolankar, R. P., Kulkarni, M. M., Nagsampgi, B. A. and Wagh, U. V., *Indian J. Malariol.*, 1987, 24, 111-117.
3. Neem Foundation. All about neem. Mumbai: Neem Foundation; 2012. [Online] Available from: <http://www.neemfoundation.org>. [Accessed on 10 September, 2012] [2]
4. Anonymous, Agricultural Statistics of Pakistan, Ministry of Food, Agricultural Live-stock, Economic Division Islamabad, 2010.
5. United Nations Environment Programme. *Neem: The UN's tree of the 21st Century*. Nairobi: United Nations Environment Programme; 2012.] Available from: <http://www.unep.org/wed/tree-a-day/neem.asp>. [Accessed on 10 September, 2012]
6. Charmaine Liyod A.C., Menon .T., Umamaheshwari, K.(2005). Anticandidal activity of *Azadirachta indica*. *Indian Journal of Pharmacology.* (37),6,386-389
7. Kim JH, Choresca CH Jr, Shin SP, Han JE, Jun JW, Park SC. Occurrence and antibiotic resistance of *Vibrio vulnificus* in seafood and environmental waters in Korea. *J Food Saf.* 2011;31(4):518-524.
8. Kim JH, Choresca CH Jr, Shin SP, Han JE, Jun JW, Park SC. Occurrence and antibiotic resistance of *Vibrio vulnificus* in seafood and environmental waters in Korea. *J Food Saf.* 2011;31(4):518-524.
9. Bross MH, Soch K, Morales R, Mitchell RB. *Vibrio vulnificus* infection: diagnosis and treatment. *Am Fam Physician.* 2007;74(4):539-544.
10. B. Malik and M. Tufail, "Chickpea Production in Pakistan," in *Ascochyta Blight and Winter Sowing of Chickpea*, M. C. Saxena and K. B. Singh, Eds. Martinus Nijhoff/Dr. W. Junk Publishers, Hague, The Netherlands, 1984, pp. 235.
11. Dasgupta, T., Banerjee, S., Yadava, P.K., et al., (2004) Chemopreventive potential of *Azadirachta indica* (Neem) leaf extract in murine carcinogenesis model systems. *J Ethnopharmacol*, 92: 23-36.
12. Baral, R., Chattopadhyay, U., (2004) Neem (*Azadirachta indica*) leaf mediated immune activation causes prophylactic growth inhibition of murine Ehrlich carcinoma and B16 melanoma. *Int Immunopharmacol*, 4: 355-366.
13. Chaube, S.K., Prasad, P.V., Khillare, B., et al., (2006) Extract of *Azadirachta indica* (neem) leaf induces apoptosis in rat oocytes cultured in vitro. *Fertil Steril*, 85: 1223-1231.
14. Subapriya, R., Bhuvaneshwari, V., Ramesh, V., et al., (2005) Ethanolic leaf extract of neem (*Azadirachta indica*) inhibits buccal pouch carcinogenesis in hamsters. *Cell Biochem Funct*, 23: 229-238.
15. Kumar, S., Suresh, P.K., Vijayababu, M.R., et al., (2006) Anticancer effects of ethanolic neem leaf extract on prostate cancer cell line (PC-3). *J Ethnopharmacol*, 105: 246-250.
16. Jattan, S.S., Shashikumar, Pujar, G., et al., (1995) Perspectives in intensive management of neem plantations. *Indian For*, 121: 981-988.
17. Koul, O., Isman, M.B., Ketkar, C.M., (1990) Properties and uses of neem (*Azadirachta indica*). *Can J Bot*, 68: 1-11.
18. Radwanski, S.A., Wickens, G.E., (1981) Vegetative fallows and potential value of neem tree (*Azadirachta indica*) in the tropics. *Econ Bot*, 35: 398-414.
19. Anonymous., (2006) *Neem – Growing neem, organic farming, health, animal health, environmental use, home uses, economic potential, patents, new bazaars, research papers, world neem conference*. Neem foundation (Internet) Mumbai, India – [cited 2006 Jun 20]. Available from: <http://www.neemfoundation.org/>.
20. Heukelbach, J., Oliveira, F.A.S., Speare, R., (2006) A new shampoo based on neem (*Azadirachta indica*) is highly effective against head lice in vitro. *Parasitol Res*, 99: 353-356.
21. Girish K, Shankara Bhat" *Neem – A Green Treasure*" *Electronic Journal of Biology*, 2008, Vol. 4(3):102-111.