



A Review on Traditional Plant *Azadirachta indica*: Natural Source for Disease Curability and Health Promotion

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Neem (*Azadirachta indica*) is a medicinal plant, mostly found in the Himalayan region. The neem leaf is commonly and historically used in medicine to treat a variety of illnesses such as eye disorders, nose bleeding, loss of appetite and liver problems etc. Because of its various pharmacological and therapeutic effects, it is included in the Ayurvedic pharmacopoeia. As a result, this review provides current information on ethno-medicinal uses, phytochemistry, pharmacological effects, adverse effects of *Azadirachta indica* with future advancement. Several references were checked for identification, in-depth literature including online databases, documents, and blogs. Around 29% of the compounds in *Azadirachta indica* have been isolated and characterised. The limonoids in the neem tree have a wide variety of antimicrobial and insecticidal properties. Complex azadirachtin, salanin are active principles extracted from neem seed. These metabolites' biochemical pathways in the neem tree are completely unknown. *Citrus sinensis* is related to the neem tree phylogenetically. 62 percent of neem genomic was anchored into citrus chromosomes according to comparative study. The azadirachtin, nimbin, salanin and nimbidin from neem tissues were quantified by using LC-MS. This paper shows the various use of neem in different disorder.

Keywords: *Neem; herbal plant; use; traditional; chemical constituent.*

1. INTRODUCTION

The mahogany tree i.e. *Azadirachta indica* also known as Neem, Indian lilac; belongs to the Meliaceae family. It belongs to genus *Azadirachta* and is endemic to the subcontinent of India [1]. Tropical and semi-tropical climates are ideal for growing it. This tree can also found in Southern Islands. The fruit and seed parts used to make Neem oil. Neem is a quickly developing tree that typically arrives at a stature of 15-20 m, and under truly great conditions up to around 30-35 m. Generally speaking, it is an evergreen tree, however under outrageous conditions, like broadened dry periods, it might shed the greater part of essentially its leaves as a whole. The branches spread broadly. The genuinely thick crown is roundish or oval and may arrive at a measurement 15-20 m in old unattached examples. The storage compartment is generally short, straight and may arrive at a bigness of 1.5-3.5 m. The bark is hard fissured or textured and whitish-dim to ruddy brown. The sap wood is greyish-white [1].

2. HOME REMEDIES OF NEEM

A Home cure is characterized as a basically pre-arranged medicine or tonic regularly of dubious viability regulated without solution or expert oversight.

Antifungal and Antibacterial Paste: The leaves of neem can be used to cure fungal and bacterial infections. Make a paste of tree leaves and apply to the infection for relief. Paste of Neem leaves is also used for treating chickenpox boils [2].

Neem Oil: The calcium and other mineral content are very high in neem leaves. Neem oil can be applied to the body especially legs and hands for stronger bones. Also, oil from neem is beneficial for patients with arthritis as it relieves the pain and reduces the inflammation [2].

Natural Insecticide: Neem leaves are excellent mosquito and insect repellent. Burn neem leaves to keep mosquitoes away from your home and surroundings. This trick is mostly used by cattle rearers to keep all sorts of insects away from the cattle [3].

Oral Health: Chewing neem leaves is beneficial for maintaining good oral health. It keeps the infections away from your gums, gives you fresh breath, lessens tooth decay, kills bad bacteria in your mouth and maintains the pH level of your saliva [3].

Boost Immunity with Neem Tea: Neem tea boost immunity in body against diseases such as common cold and fever. It is found in studies that neem tea can be as effective as quinine for treatment of malaria affected cells in the body [4].

Homemade Toothbrush: Small branches or twigs can be used for brushing your teeth. The same has been used for decades and the same benefits can be availed by using neem toothpaste nowadays [5].

Hair Mask: Neem hair mask has a very healthy and lasting effect on your hair. It makes your hair strong and shiny. Prepare a paste of neem leaves and apply the same to your hair for better results. The same can also be used to treat dandruff and fungal infections of your scalp (Deepmala et al., 2017).

Removes Acne: Neem oil removes acne and provides relief when applied to skin acne. Due to its anti-inflammatory properties, neem oil is found very effective for curing dry skin, itches and pimples, etc. [6].

Table 1. Different doses in ayurveda

Ayurveda is a very much recorded System of Health Care Practiced in Indian Sub-Continent. Ayurvedic prescriptions are meds expected for interior or outer use, for or in the analysis, treatment, relief or anticipation of sickness or turmoil in people or animals.

Ayurvedic Drugs are acquired from the regular source that is from creature, plants and minerals. There are different doses of neem in Ayurveda with different quantity which can be used for various kinds of disorders.

S.NO.	Dosage form	Quantity	References
1	Powder	3-6 gm	[7]
2	Juice	10-20 ml	[7]
3	Decoction	20-50 ml	[7]

3. TAXONOMY OF NEEM PLANT

Kingdom: Plantae
 Subkingdom: Tracheobionta
 Super Division: Spermatophyta
 Division: Magnoliophyta
 Class: Dicotyledons
 Subclass: Rosidae
 Order: Sapindales
 Family: Meliaceae

Genus: *Azadirachta*
Species: *Azadirachta indica*
[8].

4. GEOGRAPHICAL DESCRIPTION

Geographical description is the investigation of spots and the connections among individuals and their surroundings. Geographers investigate both the actual properties of Earth's surface and the human social orders spread across it. The investigation of the dispersion of world vegetation, with specific accentuation because of

the natural factors that decide this appropriation. Neem trees are present in at least 30 countries throughout Asia including India, Burma, Thailand, Bangladesh, Cambodia, Indonesia, Iran, Malaysia, Nepal, Pakistan, Sri Lanka, and Vietnam, as well as Africa, Australia, and Central and South America [8].

Neem is thought to be indigenous to the Indian subcontinent and dry areas of South Asia. It has spread to parts of Africa, the Caribbean, and a number of South and Central American countries [9].

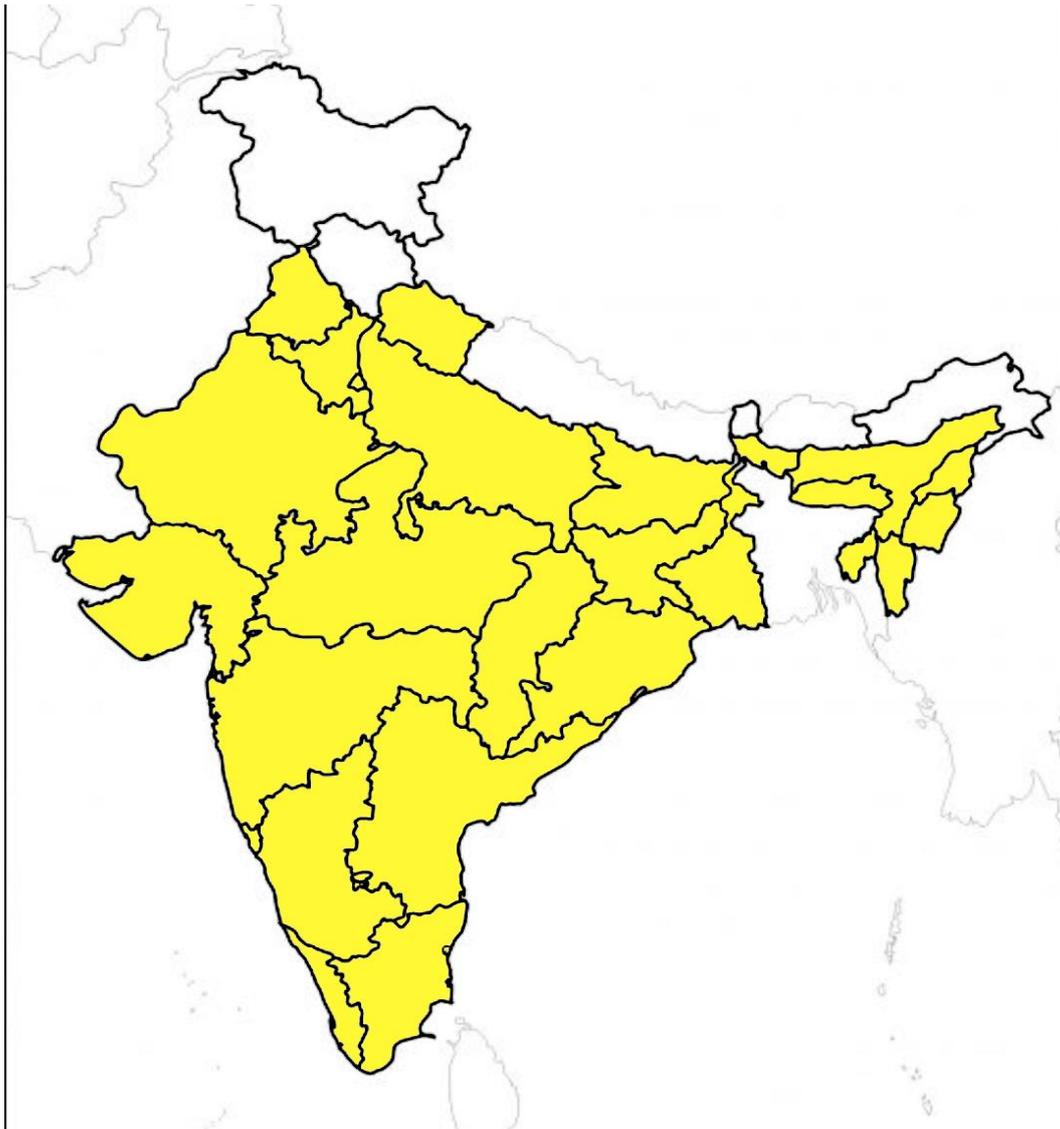


Fig. 1. *Azadirachta indica* natural habitat. The yellowish shaded area in graph represents Natural habitat of this plant in India

5. MORPHOLOGICAL DESCRIPTION OF *Azadirachta indica*

The tree is estimated at height of 15-20 meters and has a lifespan of around 200 years [10]. Because of its strong roots, the branches of tree are spread out widely and forming the crown of oval shape. The bark of the neem tree is brownish in colour. The leaves are green in colour, but they have a purple-red colour when the plant is young [11]. *Azadirachta indica* produces small, fragrant white flowers about 25 centimetres long. The yellow fruit is small and edible [11].

It is an evergreen tree that can be found in Egypt. It's the fastest grown tree with widely spaced branches, a short, straight trunk with a diameter of 0.8-1.2 m, rough bark, and flowers in May that can reach a height of 5-15 m [12].

5.1 Parts of Neem Plant are

Leaf: The petiolate, alternative, compound imparipinnate leaf measures 38-45 cm in length and has 7-19 leaflets. The petiole is green in colour, long and cylindrical, and has a swollen, enlarged core. It has a length of 6-9cm and a

width of 0.1-0.3 cm. The rachis is a long, cylindrical, green-coloured structure measuring 15-20 cm long with a diameter of 0.15-0.3 cm.

Stem: The branches of neem are brown in colour, hard, cylindrical, with rough surfaces covered with moderately thick brown bark and 1.5- 3.5 m in length and they are considered as old branches. The young branches are green in colour with fibrous fracture. The stem possesses a characteristic odour and a bitter taste [13].

Bark: The bark of neem is brown in colour, hard, moderately thick, curved, quill in shape and silvery brown inner bark. The outer bark shows longitudinal and transverse wrinkles and fissures. The bark is odourless and has an astringent bitter taste.

Fruit: *A. indica* is a plant that is found mostly over India. The fruits are smooth, edible, measure [1.2 to 2.0] cm in length. Fruit production of neem begins at 3-5 years. Epicarp is a brown with thin epidermis. Mesocarp is [0.3-0.5] cm thick pulp which is sweet and yellowish and also fibrous. Endocarp is the part of fruit, that is white, shell is hard and elongated seed with a brown seed coat [14].



Fig. 2. (A) &(C) leaf (B) Stem (D)&(E) Tree of *Azadirachta indica*

Table 2. Use of different part of plant

Neem includes different parts like leaf, stem, root, bark, fruit, gum, seed. These parts have different uses in the treatment of various kind of disorders. In this table, it shows uses of different parts of plant.

S.No.	Part	Use	References
1	Leaf	Leprosy, Eye disorder, Intestinal worms, Skin ulcer.	[15]
2	Twing	Cough, Masses, Urinary disease, and Diabetes.	[16]
3	Bark	Analgesic, antipyretic.	[17].
4	Fruit	Urinary disorder, Eye problems, Leprosy, skin infection.	[18]
5	Gum	Ringworms, Wounds etc.	[16]
6	Seed	Leprosy and Intestinal worms [9]	(Swami, et al, 2019)

Table 3. Product available in the market

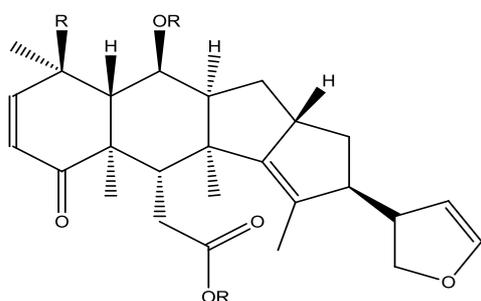
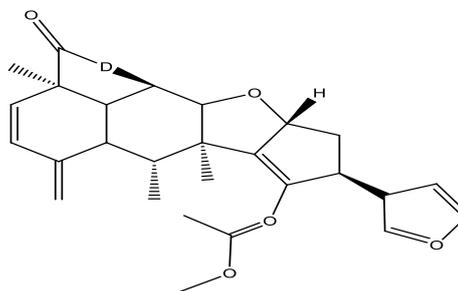
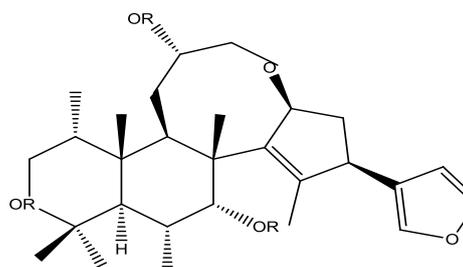
A product is anything or administration you offer to serve a client's need. Similarly, this valuable plant has different formulation which is present in the market.

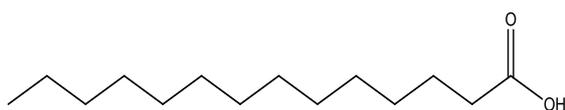
Product	Use	References
Erina	Cleanser.	[9]
Erina-EP	Shampoo.	[19]
Liver 52 protec	Animal health.	[15]
Pilex	Hemorrhoids.	[16]
Purim	Acute and chronic dermatitis.	[16]
Scavum	Scavon vet cream.	[20]
Talekt	Dermatitis.	[21]
R Com Tab.	Trauma, Ankylosing Spondylitis, Gout.	[16]
Sabo dent	Spongy gums, Gingivitis, Tooth ache.	[18]
Suvarna Hair	Flaky Dandruff, Alopecia.	[18]
Derma fex	Psoriasis, Dermatitis, Bacterial Infection.	[18]
Hemojos	Psoriasis, Acne vulgaris, Leprosy.	[17]
Ayuseptic	Wound Healing.	[17]

6. CHEMICAL CONSTITUENT

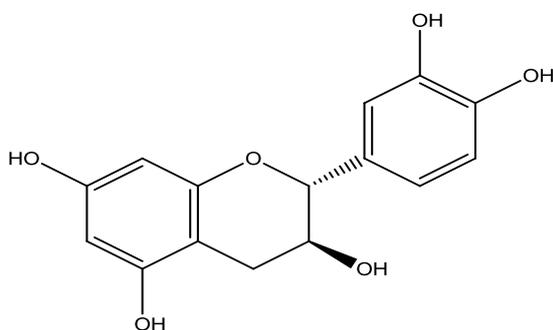
Nimbin, Nimbolide, Nimbilin, Catecgichin, Epicatechin, Palmitic acid, Azadirachtin, limonoids are active constituent of neem plant which shows different activity for different purpose [22].

6.1 Active Constituents Present in Neem are

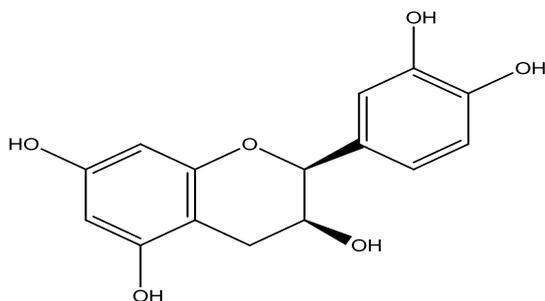
**1. Structure of Nimbin****2. Structure of Nimbolide****3. Structure of Nimbilin**



4. Structure of Palmitic acid



5. Structure of Catechin



6. Structure of Epicatechin

7. CONCLUSION

It is clear from the studies that the ethnomedicinal plant i.e. *A. Indica* have ability of prevention and treating large number of human diseases. Modern drugs of neem are made for the prevention and treatment of various diseases. Furthermore, various parts of Neem and their extracts have been discovered to be effective pesticides and insecticides. The products of neem are available in the market in very huge amount. It is widely available in most parts of Indian region. The *Azadirachta indica* tree is large perennial tree found in India. Anticarcinogenic properties has been discovered in a variety of neem preparations Methanolic extract of *Azadirachta indica* leaf was discovered very effective as antibacterial and antisecretory agent. Furthermore, Neem extract has been discovered to have anti-haemorrhagic and anti-cancer properties. This review paper helped to understand the uses of Neem in different kinds of disorder with minimal side effect.

NOTE

The study highlights the efficacy of “Ayurveda” which is an ancient tradition, used in some parts of India. This ancient concept should be carefully evaluated in the light of modern medical science and can be utilized partially if found suitable.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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