

## An Overview of Neem (*Azadirachta Indica*) and Turmeric (*Curcuma Longa*)

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### ABSTRACT

Herbal medicines have less side effects in comparison with traditional medicines, but side effects occur and are safer to use than conventional medications. Herbal medicines have two special characteristics that distinguish them from chemical drugs; use of crude herbs and prolonged usage.<sup>[1]</sup> Neem (*Azadirachta indica*) has much importance. Usefulness of neem has already mentioned in several literature. Ayurveda has mentioned its use in many disease conditions. Now public awareness for herbal products are increasing highly so it has been found demand of neem products are increasing day by day. Neem is a plant whose every parts holds multiple usage. Researcher has reported many medicinal benefits of neem. Neem is known for its anti diabetic, anti-inflammatory, anti cancer effect. Neem is used in many Hindu rituals. This review work represents several usage of neem which will provide a great knowledge to people and let them know about the wonder of neem.<sup>[2]</sup> Curcumin is a constituent (upto ~5%) of the traditional medicine known as turmeric. Interest in the therapeutic use of turmeric and the relative ease of isolation of curcuminoids has led to their extensive investigation. Curcumin has recently been classified as both PAINS (pan-assay interference compounds) and an IMPS (invalid metabolic panaceas) candidate. The likely false activity of curcumin in-vitro and in vivo has resulted in >120 clinical trials of curcuminoids against several diseases.<sup>[3]</sup>

**Keywords:** Neem, Turmeric, Applications.

**NEEM (AZADIRACHTA INDICA)**

### I. INTRODUCTION

Neem is a tree in the mahogany family Meliaceae. It is one of two species in the genus

*Azadirachta*, and is native to India and Burma, growing in tropical and semi-tropical regions. It is a fast growing tree that can reach a height of 15-20 m, rarely to 35-40 m. It is evergreen but under severe drought it may shed most or nearly all of its leaves. The branches are wide spread. For thousands of years the beneficial properties of Neem (*Azadirachta indica* A. Juss) have been recognized in the Indian tradition. Each part of the neem tree has some medicinal property.<sup>[4]</sup>

The World Health Organization refers to "Good-Health" as a state of physical and mental well-being not altered by any disease or ailment. Ancient Sanskrit had a particular expression for this state: "Nimba", which over time, derived into Neem. Nowadays, Neem is used to reference the *Azadirachta indica* (Neem) tree, traditionally thought to bring "good health" to those who take them. Through this review we aim to highlight the latest work done on the extracts of Neem, focusing on certain major aspects, such as their importance as antioxidants, and their potential role in mitigating diabetes and cancer. Beforehand we will give a brief overview on several of the most relevant bioactive compounds typically found in many extracts, although though our work, we will continue referring to other compounds as it is understandable that both starting materials and extraction processes differ greatly. Furthermore, we emphasize that much of the current work continues to be experimental and as such, there is a section devoted to the toxicity effects, which should always be considered, encouraging further research to develop better products for human use. Finally, we discuss a section on industrial applications, as exemplified by its uses as antimicrobial and fungicide agents, its effects as a contraceptives,

derivatives for epoxy-resins, and other current medical use.<sup>[5]</sup>

**TAXONOMY OF AZADIRACHTA INDICA:**

- Kingdom - Plantae
- Division - Magnoliophyta
- Class - Dipsacales
- Order - Rutales
- Sub-order - Rutinae
- Genus - Azadirachta
- Species - Indica

**HISTORY**

Along with Ayurveda most of world’s other reputed medicinal system like Unani, Chinese, and European “Materia Medica” have announced and acknowledged neem tree as “Panacea of all Disease”. However in India it is famous with many other names like ‘Divine Tree’, “Heal All”, “Nature’s Drugstore”, and “Village Dispensary”. Traditional Ayurvedic uses of neem include the treatment of fever, leprosy, malaria, ophthalmia and tuberculosis. Various folk remedies for neem include use as an anthelmintic, antifeedant, antiseptic, diuretic, emmenagogue, contraceptive, febrifuge, parasiticide, pediculocide and insecticide. Traditional routes of administration of neem extracts included oral, vaginal and topical use. It is honored colloquially in these circles as ‘The Village Pharmacy’, millions with exposure to the tree brush their teeth with its twigs, use its juice on their skin disorders and place its leaves throughout their homes to keep away insects. Few

most important traditional uses of the different parts of plants are below stated.

**ACTIVE COMPOUNDS OF AZADIRACHTA INDICA (NEEM)**

Azadirachta indica L. (neem) shows therapeutics role in health management due to rich source of various types of ingredients. The most important active constituent is Azadirachtin and the others are Nimbolinin, Nimbin, Nimbidin, Nimbidol, sodium Nimbinate, Gedunin, Salannin, and quercetin. Leaves contain ingredients such as nimbin, nimbanene, 6-desacetylnimbinene, Nimbandiol, nimbolide, ascorbic acid, n-hexacosanol and amino acid, 7-desacetyl-7-benzoyl azadiradione, 7-desacetyl-7-benzoylgedunin, 17-hydroxyazadiradione, and Nimbiol. Quercetin and βsitosterol, polyphenolic flavonoids, were purified from neem fresh leaves and were known to have antibacterial and antifungal properties and seeds hold valuable constituents including Gedunin and Azadirachtin.

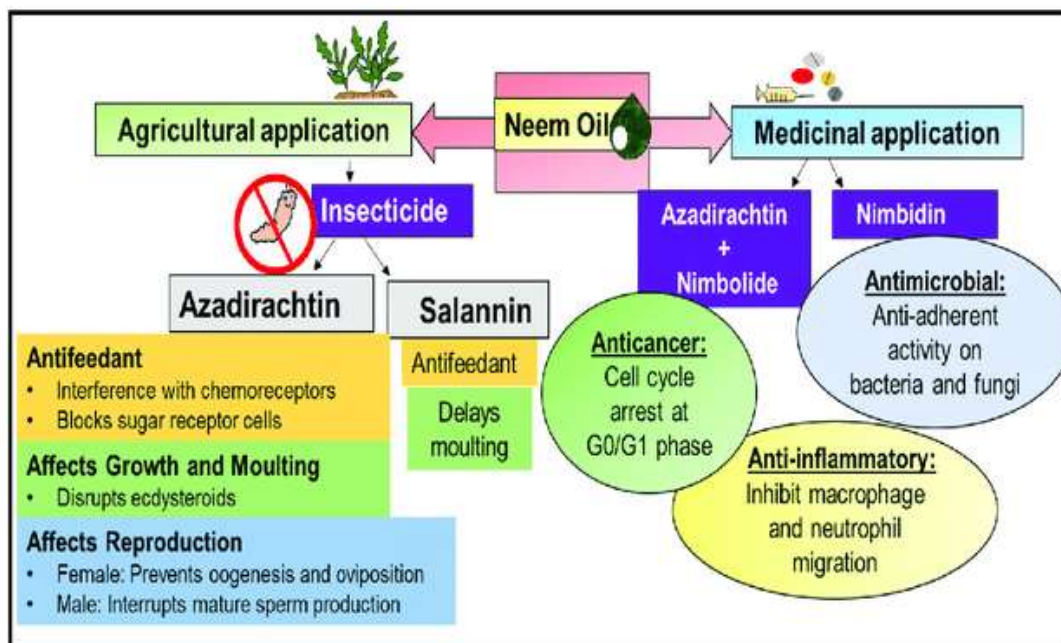
**HEALTH BENEFITS OF NEEM**

- Increases immunity
- Moisturizes skin
- Improves digestion
- Oral health
- Promotes hair growth
- Fights signs of aging
- Anti-septic properties
- Eye Trouble
- Anti-fungal & Anti-bacterial
- Blood purification<sup>[6]</sup>

**VARIOUS PARTS USED IN NEEM TREE<sup>[7]</sup>**

PARTS	MEDICINAL USES
Leaf	Leprosy, eye problem, skin problems.
Bark	Analgesic, alternative and curative of fever.
Flower	Bile suppression, elimination of intestinal worms.
Fruit	Relieves piles, intestinal worms, leprosy.
Twig	Relieves cough, asthma, piles.
Gum	Effective against skin diseases like ring worms, scabies, ulcers.
Seed pulp	Leprosy and intestinal worms.
Oil	Intestinal worms and leprosy.
Root, bark, leaf, flower and fruit together	Blood morbidity, Skin ulcer, itching.

APPLICATIONS OF NEEM<sup>[8]</sup>



**Antioxidant Activity**

Free radical or receptive oxygen species are one of the fundamental offenders in the genesis of different illnesses. Notwithstanding, neutralization of free radical activity is one of the imperative strides in the maladies counteractive action. Antioxidants stabilize/deactivate free radicals, regularly before they assault focuses in biological cells and furthermore assume job in the activation of anti oxidative protein that assumes job in the control of harm brought about by free radicals/receptive oxygen species. Therapeutic plants have been accounted for to have antioxidant activity. Plants natural products, seeds, oil, leaves, bark, and roots demonstrate an essential job in illnesses aversion because of the rich source of antioxidant. Leaf and bark concentrates of *A. indica* have been considered for their antioxidant activity and aftereffects of the examination plainly shown that leaf and bark extracts/fractions of neem developed in the lower regions have significant antioxidant properties. Another critical examination was performed dependent on leaves, fruits, flowers, and stem bark extracts from the Siamese neem tree to evaluate the antioxidant activity and results recommend that extricates from leaf, blossom, and stem bark have strong antioxidant potential.

**Anti cancerous Activity**

Malignant growth is multi-factorial malady and significant medical issue around the

world. The modification of molecular/genetic pathways assumes job in the improvement and movement of malignant growth. The treatment module dependent on allopathic is compelling on one side yet in addition indicates adverse effect on the typical cell. Prior investigations detailed that plants and their constituents show inhibitory consequences for the development of malignant cells via modulation of cell expansion, apoptosis, tumour suppressor gene and different other molecular pathways. Neem contains flavonoids and different other ingredients that play an essential job in restraint of malignant growth advancement. Extensive number of epidemiological examinations suggests that high flavonoid admission might be related with a diminished danger of malignancy.

**Hepatoprotective Effect**

Therapeutic plants and their ingredients play a significant activity as hepatoprotective with no antagonistic ensnarement's. An examination was performed to inquire about the hepatoprotective employment of Azadirachtin-An in carbon tetrachloride (CCl<sub>4</sub>) impelled hepatotoxicity in rodents and histology and ultra structure results certified that pretreatment with Azadirachtin-A dose dependently diminished hepatocellular corruption. Other than after-effects of the examination exhibit that pretreatment with

Azadirachtin-An at the higher dose levels bearably restores the rat liver to normal.

### Wound Healing Effect

Different plants/their constituents accept a basic occupation in the damage recovering effect. An examination was made to evaluate the damage patching activity of the concentrates of leaves of *A. indica* and *T. cordifolia* using extraction and cut injury models in Sprague Dawley rodents and results revealed that concentrate of the two plants basically propelled the damage mending activity in both extraction and entry point damage models

### Antifungal Activity

Investigation was made to assess the adequacy of different concentrates of neem leaf on seed borne parasites *Aspergillus* and *Rhizopus* and results affirmed that development of both the contagious species was fundamentally repressed and controlled with both alcoholic and water extract. Moreover, alcoholic concentrate of neem leaf was best.

### Antiviral Activity

Results exhibited that neem bark (NBE) remove basically blocked HSV-1 entry into cells at obsessions stretching out from 50 to 100 g/mL. Furthermore, blocking development of NBE was seen when the concentrate was preincubated with the disease anyway not with the objective cells proposing a quick enemy of HSV1 property of the neem bark. Leaves concentrate of neem (*Azadirachta indica* A. Juss.) (NCL-11) has shown virucidal development against coxsackievirus contamination B-4 as proposed by methods for disease inactivation and yield decline look at other than interfering at an early event of its replication cycle.

### Dentistry

An investigation was made to survey the adequacy of neem dependent on mouth flush with respect to its anti gingivitis impact and concentrate affirmed that *A. indica* mouth flush is similarly viable in diminishing periodontal records as chlorhexidine. Another investigation was completed to assess the antimicrobial properties of natural concentrates of neem against three bacterial strains causing dental caries and results demonstrated that oil ether and chloroform remove indicated solid antimicrobial action against *S. mutans*. Chloroform remove demonstrated solid

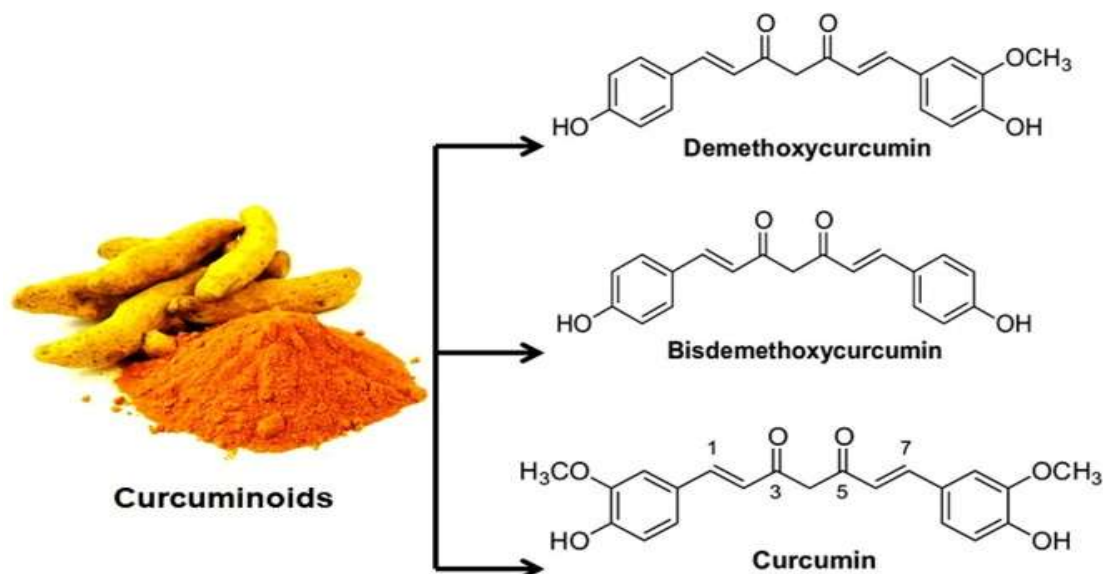
action against *Streptococcus salivarius* and third strain *Fusobacterium nucleatum* was highly sensitive to both ethanol and water extricate.<sup>[2]</sup>

### TURMERIC (CURCUMA LONGA)

Turmeric (the rhizome of *Curcuma longa* L., Zingiberaceae) commonly called as Haldi in Hindi, is a well known plant drug in Ayurveda and Unani medicines'. It has been widely used as a dietary pigment and spice in the Indian subcontinent. Traditionally, it is used for the treatment of a wide variety of diseases and conditions including those of the skin, pulmonary and gastrointestinal systems, aches, wounds, sprains and liver. During last half century, extensive research has proved that most of the activities associated with turmeric, are due to curcumin. Curcumin is a tautomeric compound exists in the enolic form in organic solvents and keto form in water. The molecular formula is C<sub>21</sub>H<sub>20</sub>O<sub>6</sub>, molecular weight is 368.4 g/mol and melting point is 183°C. Curcumin has been used extensively in ayurvedic medicines as it is non-toxic to the greater extent and exhibits a variety of therapeutic properties, including antioxidant, analgesic, anti-inflammatory, and antiseptic. Curcumin or diferuloylmethane or 1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadien-3,5-dione, is a polyphenolic natural compound and the major constituent of the rhizome of the turmeric. Previous studies showed that there is a difference in the curcumin content among different lines of *C. longa* species. Typically, turmeric contains approximately 77 percent diferuloylmethane (curcumin I), 17 percent desmethoxycurcumin (curcumin II), and 6 percent bisdemethoxycurcumin (curcumin III). Curcumin is an orange-yellow crystalline powder, practically insoluble in water and ether, but soluble in ethanol, dimethyl sulfoxide, and acetone. Biological properties exhibited by curcumin include anti-fungal, anti-inflammatory, anti-oxidant, anti-angiogenic, anti-HIV, neuroprotective, chemopreventive, and anti-tumor.<sup>[9]</sup>

### CHEMICAL CONSTITUENTS

- Curcuminoids
- Curcumin (Curcumin I)
- Demethoxy Curcumin (Curcumin II)
- Bis Demethoxy Curcumin (Curcumin III)
- Cyclocurcumin<sup>[10]</sup>



### HEALTH BENEFITS OF TURMERIC

- Natural anti- inflammatory
- Anti cancer effect
- Powerful anti oxidant
- Protect Heart disease
- Treat or prevent Diabetes
- Prevent Alzheimer's Disease
- Treat Depression
- Improves skin health
- Prevent Eye Degeneration
- Prevent age-related chronic diseases
- Treating Rheumatoid Arthritis
- Protects your body from free radicals
- Help in Osteoarthritis<sup>[11]</sup>

### APPLICATIONS OF CURCUMIN

#### Anti-cancer agent

Curcumin exerts anticancer effects in different biological pathways involved in mutagenesis, apoptosis, and metastasis. Curcumin helps in the elimination of reactive oxygen species, shows anti-inflammatory properties as a result of Cyclooxygenase enzyme (COX) inhibition and inhibits cell signal transduction through various mechanisms. These activities lead to observe an antineoplastic effect, which includes inhibition of tumor cell proliferation and suppression of chemically induced carcinogenesis. Cancer is one of the major public health menaces and the second leading cause of death in the world. The important mechanism by which curcumin has shown its anti-cancer activity is by inducing apoptosis and inhibiting proliferation and invasion of tumor by suppressing a variety of cellular signaling

pathways. It is an inhibitor of the transcription factor NF- $\kappa$ B and downstream gene products (c-myc, Bcl-2, COX-2, NOS, Cyclin D1, TNF- $\alpha$ , interleukins and MMP-9). Curcumin has been shown to suppress cancerous cell growth.<sup>[12]</sup>

#### Antioxidant

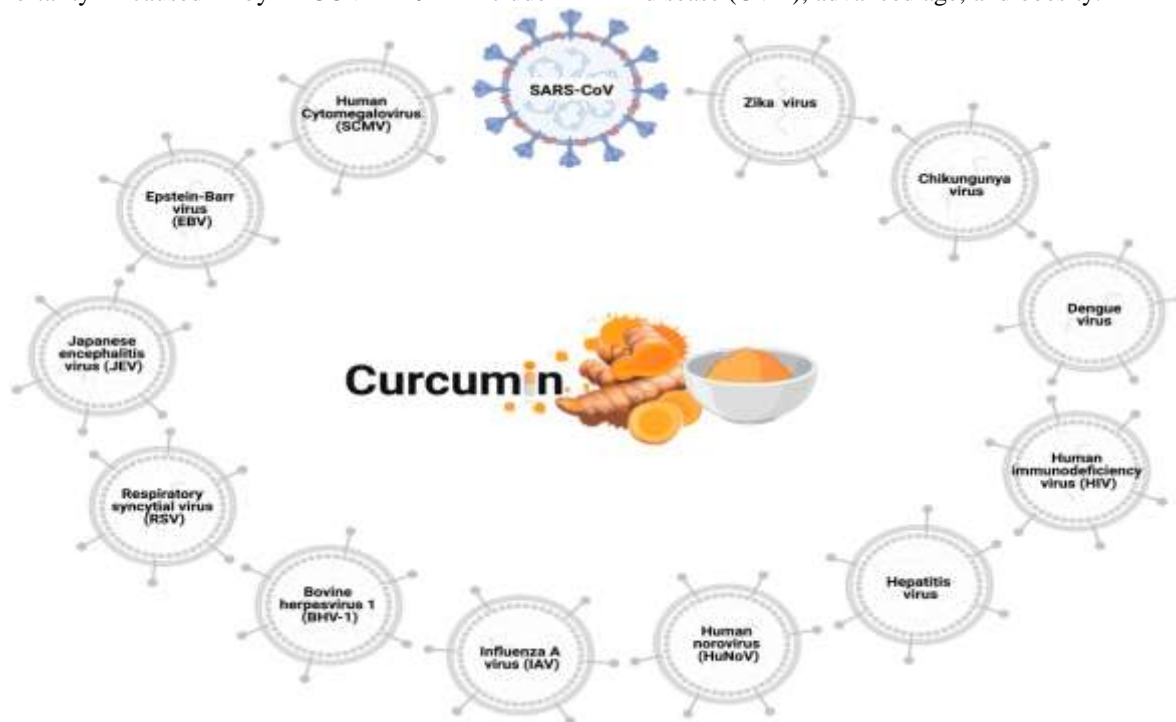
Free radicals are extremely reactive molecules with mismatched electrons that tend to react with vital organic compounds like fatty acid, protein, or DNA. The oxidative damage could lead to the serious life-threatening diseases and cancer. Curcumin has a potent antioxidant property which works as a scavenger for free radicals and increase the capability of our immune system to fight against oxidative damage Curcumin conjointly boosts the activity of the inhibitor enzymes that work against the free radicals and blocks them directly. Curcuminoids present in turmeric are strong antioxidants as they function in three ways: 1) It makes the balance between the pro-oxidant and anti-oxidant species in the body; 2) It increases the level of anti-oxidant enzymes and 3) scavenge the free radicals' that causes oxidative damage. Curcumin inhibit the peroxidation of lipids, synthesis of Lipoxygenase (LOX), arachidonic acid and Cyclooxygenase (COX) enzymes which are involved in steroidal hormone synthesis.

#### Anti-viral agents

Coronavirus disease 19 (COVID-19/2019-nCoV) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The clinical manifestation of COVID-19 range from asymptomatic upper respiratory tract infection to critical illness and pneumonia associated with acute respiratory distress syndrome (ARDS). The main

risk factors associated with greater severity and mortality caused by COVID-19 include

hypertension, diabetes mellitus, cardiovascular disease (CVD), advanced age, and obesity.<sup>[13]</sup>



### Anti-microbial activity

Curcumin has a potent antimicrobial activity. Curcumin inhibits the synthesis of protofilaments or increase sensitivity for  $\beta$ -lactam antibiotics. It can increase the sensitivity of several antibiotics like cefixime, cefotaxime, vancomycin, and tetracycline. Previous studies suggest that use of curcumin with antibiotics increases the Zone Of Inhibition (ZOI). Combination of curcumin with cefotaxime increases the ZOI by (24.9%), with vancomycin (26.5%), and with tetracycline (24.4%) respectively against *S. aureus* [23]. Curcumin is effective against both methicillin resistant staphylococcus aureus (MRSA) and methicillin sensitive Staphylococcus aureus (MSSA) [24]. Curcumin has capability to reverse the MRSA strain of *S. aureus* to MSSA strain by modulating the peptidoglycon in bacterial cell wall.

### Anti-inflammatory

Oxidative stress has been implicated in many chronic diseases, and its pathological processes are closely related to those of inflammation, in that one can be easily induced by another. In fact, it is known that inflammatory cells liberate a number of reactive species at the site of inflammation leading to oxidative stress, which

demonstrates the relationship between oxidative stress and inflammation.

## II. CONCLUSION

Popularity of natural products or their derivatives role in diseases cure and prevention is increasing worldwide due to less side effect properties. Neem and its fixings have therapeutics suggestion and have been customarily utilized worldwide particularly in Indian Subcontinent since old time. Clinical based examinations affirmed that neem assumes essential job in a version of different maladies. Curcumin has received worldwide attention for its multiple health benefits, which appear to act primarily through its antioxidant and anti-inflammatory mechanisms. The job of dynamic fixings as chemo preventive impact has been seen in different tumor by means of balance of various cell flagging pathways. The nitty gritty examination ought to be made dependent on creature to know the accurate mechanism of action in the diseases management.<sup>[2]</sup>

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