Neem Research Newsletter

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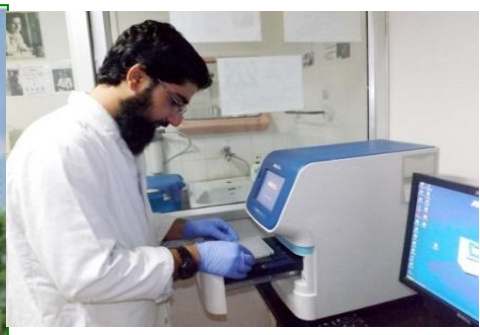

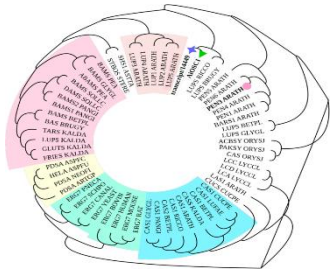

WORLD NEEM ORGANISATION (WNO)

From

The Editor's Desk……

In this issue of the Neem Newsletter, abstracts of two comprehensive review articles on the diverse applications of neem are presented. One of the reviews sheds light on neem from the standpoint of the traditional system of Indian medicine *vis-à-vis* its taxonomical position, macroscopic and organoleptic characteristics, bio-activities, use as bio-pesticide and bio-fertilizer, active phytoconstituents, and pharmacological studies. Additionally, it presents a compilation of folklore recipes and Ayurvedic, Homeopathic, Siddha and Unani formulations that contain Neem as an ingredient. The other review highlights the role of neem gum in sustainable technologies and emerging fields like self-healing materials and smart polymers. It addresses challenges in scaling production, regulatory compliance, and technical constraints.

In the field of agriculture, the efficacy of neem-based treatment against the spiraling whitefly, Aleurodicus dispersus Russell, an invasive pest, was shown to be fast-acting and environmentally safer option. The first report on chilli leaf curl virus infection of neem has been reported from Karnataka demonstrating cross species transmission and host range expansion. A study from Bangladesh introduced a dataset named "BDHerbalPlants" with 1792 raw, high-quality images and 14,336 augmented data images of herbal plants that included neem. Over 30 endophytic isolates from various tissues of neem were examined for their antagonistic activity against *Xanthomonas campestris*, known to cause diseases such as bacterial black leaf spots in various economically important crops. The findings highlight the beneficial impact of endophytic bacteria as a biocontrol, providing a sustainable alternative to pesticides.

Combined application of neem extract and zerovalent iron nanoparticles enhanced the phytoremediation potential of *Brassica napus* L. in removing heavy metals from surgical industry wastewater. Another study explored the green synthesis, characterization, and application of teff straw-assisted ZnO nanoparticles, using neem leaf extract as a capping agent, for methylene blue dye removal from textile wastewater. The results demonstrated 92.5% removal efficiency, proving teff straw-assisted ZnO nanoparticles as a sustainable, eco-friendly alternative for wastewater treatment.

In the area of human health, the neem compound azadiradione was demonstrated to be effective against Leishmania targets. Combining herbal extracts such as neem and turmeric with nanotechnology significantly enhanced antimicrobial activity against urinary tract infections. Neem was also shown to reduce acne symptoms and improve skin health. Herbal medications, namely neem extract and tulsi extract, had considerable antibacterial efficacy against *Enterococcus faecalis* and may function as viable supplements to traditional endodontic disinfectants. Zinc oxide nanoparticles synthesized with aqueous crude extract of neem exhibited good antimicrobial properties against antimicrobial-resistant *E. coli*, and was enhanced through conjugation with ampicillin. The antihypertensive effect of neem against isoproterenol-induced myocardial infarction was demonstrated in a rat model. In another study, the photophysical properties, biomolecular interaction, and anti-tumor property of neem flower extracts were investigated. The petroleum ether extract of neem flower exhibited significant anti-tumor efficacy. *Pseudomyxoma peritonei*, a rare malignancy was reported to show significant improvement with Ayurvedic intervention.

S. Nagini

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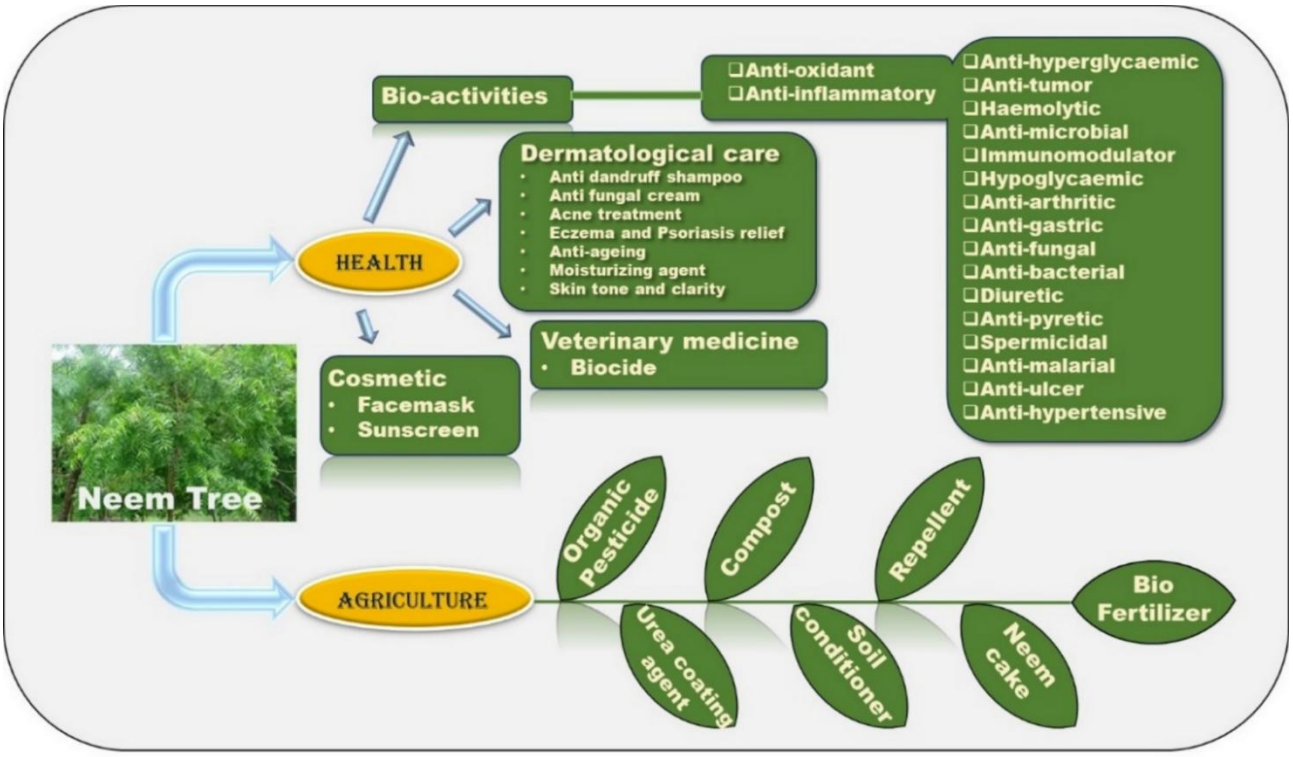
Neem- Diverse Applications

Neem (*Azadirachta indica* A. Juss): a multifaceted tree & an elixir in the traditional system of Indian medicine.

Sudipto Debnath, Manosi Das, Susmita Mondal, Biresh K. Sarkar & Gajji Babu

***Discov. Plants* 2, 156 (2025). https://doi.org/10.1007/s44372-025-00196-2**

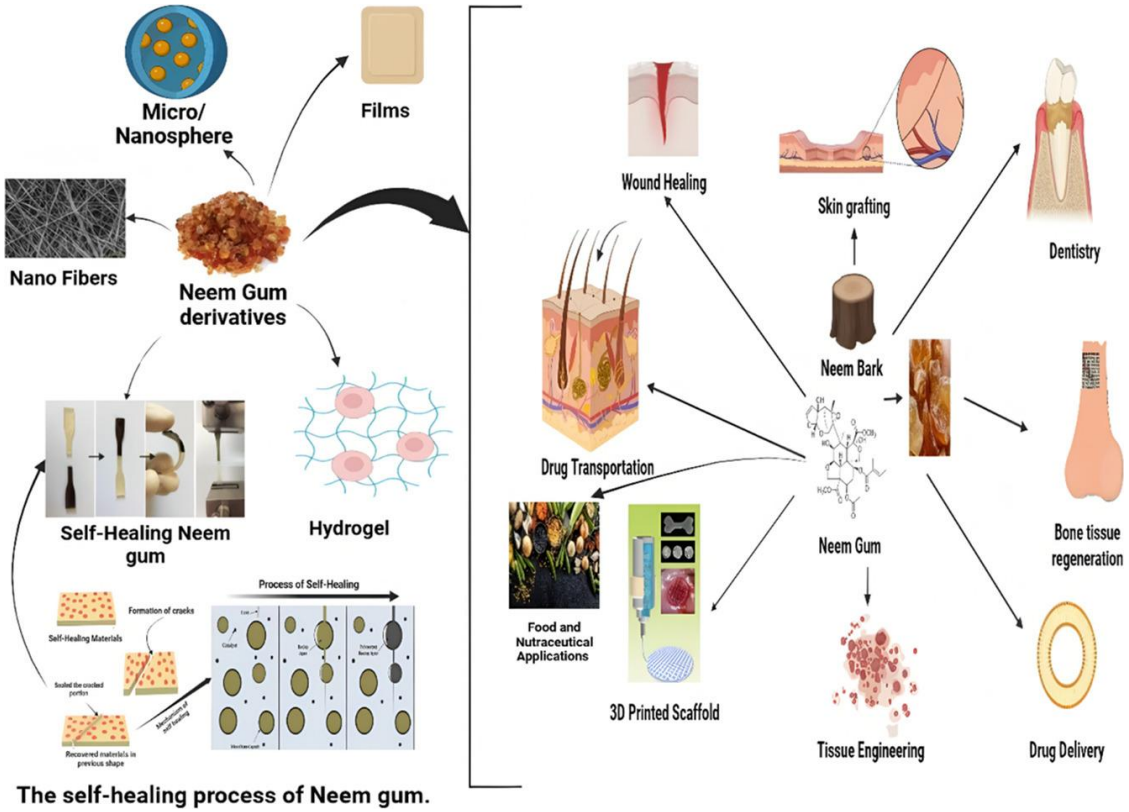
Neem, called '*Arista*' in Sanskrit, meaning 'reliever of sickness', often referred to as 'the bitter gem', is one of the most celebrated plants in the Indian Traditional Healthcare system for its diverse medicinal properties. Scientifically, *Azadirachta indica*, is classified in the Mahogany (**Meliaceae**) family. Neem stands out as a beacon of promise for the twenty-first century. Each part of the Neem tree, i.e., its flowers, leaves, fruits, seed, seed oil, Neem cake, and gum, has therapeutic properties. Researchers have identified nearly 300 distinct phytochemicals within the Neem tree, having diverse pharmacological effects like antimicrobial, antiviral, antifungal, anti-inflammatory, anti-plasmodial, antiseptic, antipyretic, anti-diabetic, and anti-ulcer activities thereby justifying the symbolic term 'elixir' written in the title of this review. Neem is mentioned in ancient Ayurvedic treatises like *Charaka Samhita*, *Susruta Samhita*, *Ashtanga Hridaya* (a book authored by *Vaghbata*) and in *nighantus* (medical lexicon) written over the ages. In Ayurveda, plenty of formulations contain Neem as an ingredient. This review sheds light on *Azadirachta indica* A. Juss (Neem plant) from the standpoint of the traditional system of Indian medicine *vis-à-vis* its taxonomical position, macroscopic and organoleptic characteristics, bio-activities, use as bio-pesticide and bio-fertilizer, active phytoconstituents, and pharmacological studies. Additionally, it presents a compilation of folklore recipes and Ayurvedic, Homeopathic, Siddha and Unani formulations (ASU & H) that contain Neem as an ingredient.



Neem gum and its derivatives as potential polymeric scaffold for diverse applications: a review.

Ghosh S, Bal T.Int J Biol Macromol. 2025 May;310(Pt 1):143012. doi: 10.1016/j.ijbiomac.2025.143012. Epub 2025 Apr 9.PMID: 40216102

Naturally occurring polymers, particularly polysaccharides, are gaining significant attention for their eco-friendly, non-toxic nature and abundant availability. Neem Gum (NEG), a natural exudate from the neem tree (Azadirachta indica), is secreted as a defense mechanism to protect against microbial invasion and physical damage. Unlike common polysaccharides, NEG exhibits a distinct composition rich in bioactive constituents, including heteropolysaccharides and secondary metabolites, contributing to its diverse functional and therapeutic potential. These unique characteristics make NEG a promising biopolymer for applications in pharmaceuticals, food, cosmetics, and environmental industries, where it serves as a binding, emulsifying, gelling, and stabilizing agent. Recent advancements have focused on developing NEG composites and derivatives with enhanced properties and broader applications. Structural modifications like grafting and carboxymethylation have improved its utility in drug delivery, wound healing, and biodegradable materials. Modified NEG derivatives exhibit superior antimicrobial, anti-inflammatory, and antioxidant effects, expanding their biomedical potential in tissue engineering and controlled drug release. NEG-based hydrogels and films show promise in eco-friendly packaging and self-healing biomaterials. This review compiles NEG's diverse applications, highlighting its role in sustainable technologies and emerging fields like self-healing materials and smart polymers. It addresses challenges in scaling production, regulatory compliance, and technical constraints.



The self-healing process of Neem gum.

Comparative Toxicity and Residual Activity of Botanical and Synthetic Insecticides Against Multiple Life Stages of Aleurodicus dispersus (Hemiptera: Aleyrodidae).

Boopathi T, Anusha N, Prasuna JG.J Appl Toxicol. 2025 Jul 29. doi: 10.1002/jat.4873. Online ahead of print.PMID: 40730368

The spiraling whitefly, Aleurodicus dispersus Russell (Hemiptera: Aleyrodidae) is a highly polyphagous and invasive pest that poses serious challenges to crop protection, particularly in tropical and subtropical agroecosystems. Given the rising concern over pesticide resistance and environmental risks associated with conventional insecticides, this study was conducted under controlled laboratory conditions to compare the efficacy of selected botanicals, fish oil rosin soap (FORS), organic salt, and synthetic insecticides against multiple life stages of A. dispersus. Standardized bioassays-including direct spray, dry film (simulating residual contact toxicity), and ovicidal assays-were employed to evaluate stage-specific responses in nymphs, adults, and eggs. Azadirachtin 5.0% and Azadirachtin 0.15% achieved over 96% adult mortality in the dry film method, suggesting notable residual efficacy. Among synthetic insecticides, Acetamiprid 20% SP showed the highest ovicidal activity (70.2% by day 10) and the lowest LC_{50} (184.80 ppm). Neem-based treatments like Azadirachtin 0.03% and NSKE 5% demonstrated slower but significant toxic effects (LC_{50} range: 2834.21-9359.42 ppm). Probit analysis supported consistent dose-response relationships. Rather than suggesting immediate field adoption, the findings highlight promising candidates for further evaluation under semi-field and field conditions. This is one of the first comprehensive studies to simultaneously assess direct, residual, and ovicidal effects of both botanical and synthetic insecticides against A. dispersus, offering valuable insights for integrating fast-acting and environmentally safer options in whitefly management programs.

Cross species transmission and recombination dynamics of chilli leaf curl virus: implications for host range expansion and LAMP-based detection.

Devaraj, Ashwathappa KV, Madhu GS, Venkataravanappa V, Manthesh V, Reddy MK, Lakshminarayana Reddy CN.3 Biotech. 2025 Aug;15(8):260. doi: 10.1007/s13205-025-04434-y. Epub 2025 Jul 19.PMID: 40693173

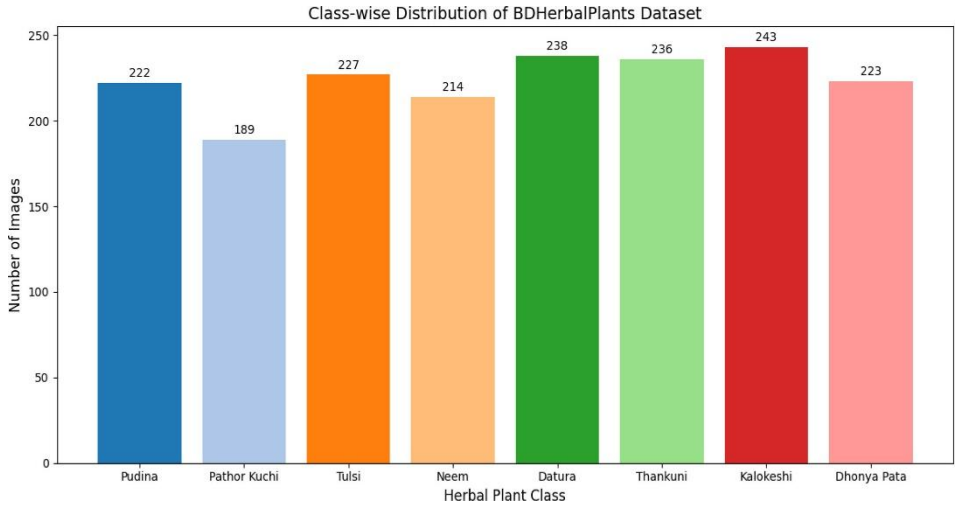
Plants of okra, marigold, pineapple, neem, datura, duranta, mirabilis, pedilanthus, helichrysum, and castor exhibiting various symptoms were collected from different locations in Karnataka (India). To confirm begomovirus infection, PCR amplification was performed on 45 symptomatic samples from various crops using begomovirus-specific primers. The complete genomes of chilli leaf curl virus (ChLCuV) and its associated betasatellite were successfully amplified, cloned, and sequenced from all ten affected crops. SDT analysis of the DNA-A segment from the ten ChLCuV-infected crops revealed distinct nucleotide identity patterns were observed. For instance, the okra isolate showed high homology with ChLCuV (99% nucleotide identity), while isolates from neem, marigold, castor, helichrysum, pineapple, and datura exhibited maximum nucleotide identity with chilli leaf curl Ahmedabad virus (ChLCuAV). In addition, isolates from pedilanthus, duranta, and mirabilis showed over 91% nucleotide identity with chilli leaf curl India virus

(ChLCINV), previously reported in chilli from India and Oman. Moreover, the betasatellite amplified from pineapple, helichrysum, datura, okra, neem, pedilanthus, castor, mirabilis, and marigold showed over 95% nucleotide identity with several isolates of tomato leaf curl Bangladesh betasatellites (ToLCBDB). RDP analysis of the viral genome and betasatellites indicated significant recombination, suggesting that the begomoviruses infecting these ten diverse host species have evolved through genetic exchanges with pre-existing begomoviruses. Furthermore, a LAMP assay was developed and successfully detected begomovirus infections in symptomatic samples from all ten crops, demonstrating its potential as a rapid and reliable diagnostic tool for field-level detection. This is the first report of ChLCuV, ChLCuAV, ChLCINV and betasatellites infecting okra, marigold, pineapple, neem, datura, duranta, mirabilis, pedilanthus, helichrysum, and castor in India.

BDHerbalPlants: augmented and curated herbal plants image dataset for classification.

Khandaker S, Rahman MM.Data Brief. 2025 Jul 11;61:111885. doi: 10.1016/j.dib.2025.111885. eCollection 2025 Aug.PMID: 40727026

This extensive dataset of herbal plants can be highly beneficial for the potential development of agricultural research and practical plant identification tasks. This article introduces a dataset named "BDHerbalPlants" with 1792 raw, high-quality images and 14,336 augmented data images of herbal plants. It contains images of eight distinct herbal plants from different regions, including Dhaka and Tangail. The eight plants are Eclipta prostrata, Ocimum tenuiflorum, Centella asiatica, Mentha arvensis, Kalanchoe pinnata, Azadirachta indica, Coriandrum sativum, Datura stramonium. Each image is carefully captured and labeled after verifying by experts. The significance of this dataset is showcased using popular pre-trained models such as Xception, DenseNet201, and RegNetY032 DL models. This herbal plant data has immense potential to be seamlessly integrated into Deep learning (DL) tasks and play a significant role in the healthcare and pharmaceutical industry. It serves as valuable data for future research for agricultural Informatics and classifying herbal plants that can be found in woods but are challenging to identify without field knowledge.



Biocontrol Activity of Endophytic Isolates Bacillus safensis and Pseudomonas lactis From **Azadirachta indica** Against the Pathogen Xanthomonas campestris pv. vesicatoria in Tomato Plants.

Fernandes S, Bhoj A, Kulkarni P, Vaidya P, Ranade Y, Sharma P.Biotechnol Appl Biochem. 2025 Jul 16. doi: 10.1002/bab.70023. Online ahead of print.PMID: 40665739

Biocontrol plays a pivotal role in mitigating biotic stress and promoting plant growth by utilizing beneficial microorganisms that exhibit antagonistic activity against phytopathogens. Xanthomonas campestris is a bacterial pathogen known to cause diseases such as bacterial black leaf spots in various economically important crops. Therefore, in the current study to identify effective biocontrol agents, over 30 endophytic isolates from various tissues of Azadirachta indica were examined for their antagonistic activity against X. campestris pv. vesicatoria. Among these, two potential isolates, Bacillus safensis (strain LE8) and Pseudomonas lactis (strain LE11), based on their inhibitory effects, were subsequently selected for further analysis to contribute to sustainable agricultural practices. The in vitro as well in vivo treatments to tomato leaves with these potential isolates showed both preventive as well as curative effects. The current investigation confirmed a notable reduction in disease symptoms, showcasing their effectiveness as a biocontrol agent. Our findings highlight the beneficial impact of endophytic bacteria as a biocontrol, providing a sustainable alternative to pesticides.

Neem for Sustainable Environment & Green Chemistry

Combined application of *Azadirachta indica* leaf extract and zerovalent iron nanoparticles (nZVI) enhances phytoremediation potential of *Brassica napus* L. in surgical industry wastewater.

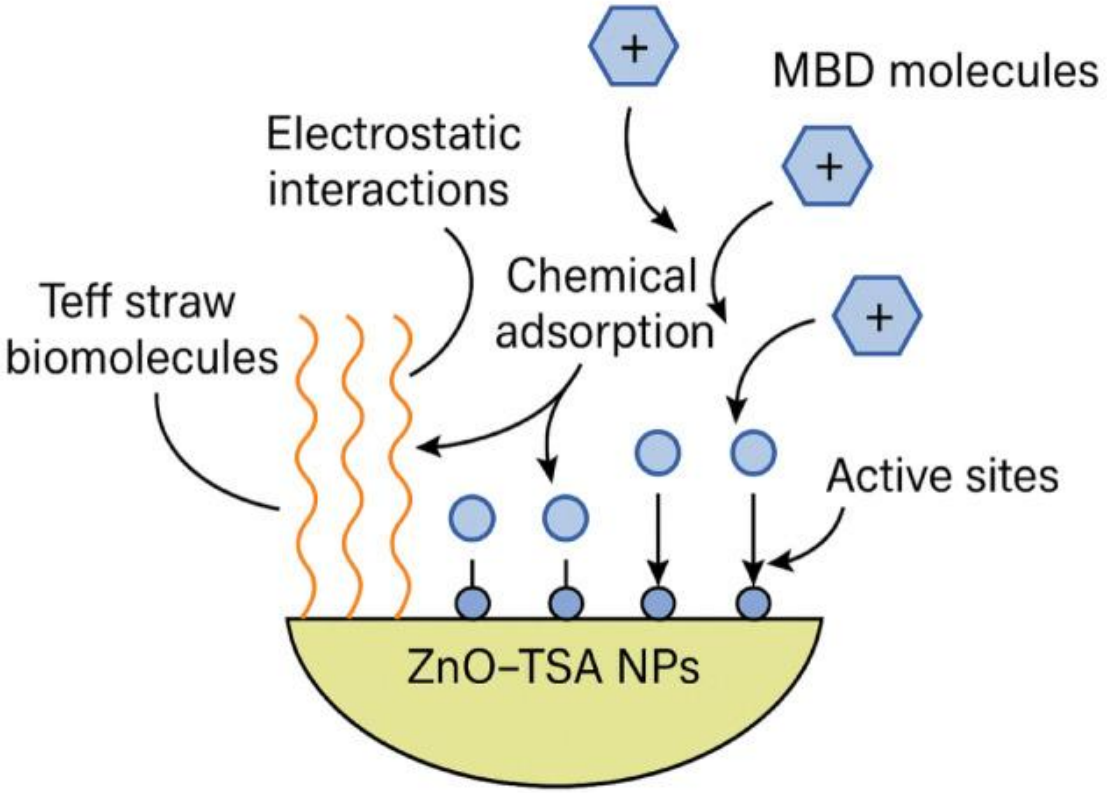
Farid M, Zulfiqar A, Farid S, Alshehri MA, Alomrani SO, Asam ZUZ, Sarfraz W, Ghafoor A, Ali S.Int J Phytoremediation. 2025 Aug 1:1-13. doi: 10.1080/15226514.2025.2537201. Online ahead of print.PMID: 40747993

This study investigated the potential of *Brassica napus* L. to remediate heavy metals from surgical industry wastewater through the application of neem (*Azadirachta indica* L.) leaf extract and nZVI. Plants exposed to untreated wastewater exhibited significant reductions in growth and photosynthetic pigments. However, the combined application of neem extract and nZVI improved plant height by 318%, number of leaves by 300%, leaf area by 329%, and root length by 63% at 100% wastewater concentration. The treatment also decreased oxidative stress indicators, including hydrogen peroxide (H_2O_2) by 16% in leaves and 8% in roots, malondialdehyde (MDA) by 21% and 39%, and electrolyte leakage (EL) by 27% and 50%, respectively. In contrast, antioxidant enzyme activities increased, with peroxidase (POD) enhanced by 47% in leaves and 81% in roots, superoxide dismutase (SOD) by 97% and 59%, ascorbate peroxidase (APX) by 55% and 29%, and catalase (CAT) by 38% and 52%. The accumulation of heavy metals also rose substantially under the combined treatment, with Ni, Cd, and Pb increasing by 33-126%, 23-106%, and 52-74% in roots; 29-87%, 36-140%, and 50-155% in stems; and 46-73%, 36-74%, and 71-186% in leaves, respectively, compared with control plants.

[Removal of methylene blue dye from textile industry wastewater using green synthesized Teff straw assisted ZnO nanoparticle.]

Rorissa GL, Tesema EA, D M RP, Hunde AR, Beyena SY, Biru MA, Mekonnen DT, Adnualem TL.Sci Rep. 2025 Jul 19;15(1):26230. doi: 10.1038/s41598-025-11746-9.PMID: 40683966

Methylene blue dye contamination poses serious environmental and health risks, necessitating efficient removal methods. Conventional Zinc Oxide (ZnO) nanoparticles synthesized chemically face issues like toxicity, instability, and agglomeration, reducing their effectiveness. This study explores the green synthesis, characterization, and application of teff straw-assisted ZnO nanoparticles, using neem leaf extract as a capping agent, for MBD removal from textile wastewater. Characterization via X-ray diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FTIR) confirmed functionalization, with an average crystalline size of 27.196 nm. Adsorption experiments analyzed the impact of pH, adsorbent dose, contact time, and initial dye concentration, while Response Surface Methodology (RSM) with a Central Composite Design (CCD) optimized conditions, achieving 99.77% removal efficiency at pH 6.9, 68.5 mg/L dye concentration, 0.265 g adsorbent dose, and 77.87 min contact time, fitting the Freundlich isotherm model (R^2 = 0.99). Real textile wastewater treatment showed 92.5% removal efficiency, proving teff straw-assisted ZnO nanoparticles as a sustainable, eco-friendly alternative for wastewater treatment.



Neem for Human Health

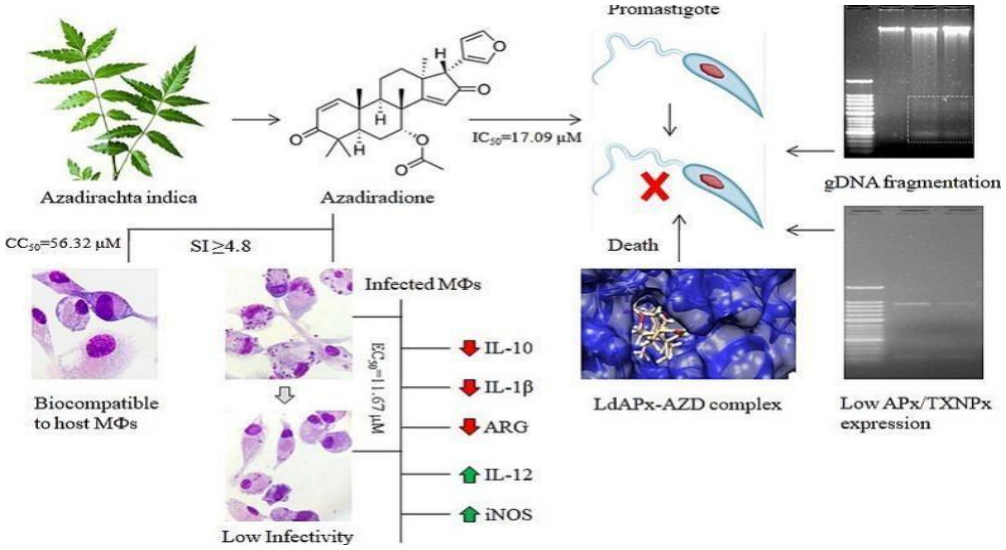
Exploring the phytomedicine properties of azadiradione against leishmaniasis: in silico and in vitro insights.

Vijayakumar S, Kumari S, Ranjan R, Kumar A, Kumar V, Vedika S, Pandey K, Singh PN, Alti D.Int Immunopharmacol. 2025 Jul 28;163:115283. doi: 10.1016/j.intimp.2025.115283.

Background: Leishmaniasis continues to pose a significant global health challenge, exacerbated by the increasing resistance to current therapeutic agents such as miltefosine and amphotericin B. This growing resistance highlights the urgent need for alternative treatment strategies. In this context, phytomedicine has emerged as a promising avenue for novel antileishmanial therapies. In our previous study, the crude extract derived from neem (Azadirachta indica) leaves exhibited notable antileishmanial activity. Subsequent analysis using LC-MS/MS enabled the identification of bioactive constituents within the active fraction, including azadiradione (AZD), a drug with potential therapeutic effects unexplored against leishmaniasis.

Results: AZD exhibited dose-dependent growth inhibition along with structural disruption and DNA fragmentation in promastigotes with an IC_{50} of 17.09 μM. In silico docking and simulation with AZD identified Leishmania peroxidases (e.g., ascorbate peroxidase and tryparedoxin peroxidase) as probable molecular targets, with subsequent downregulation of their expression confirmed in vitro. The CC_{50} on human macrophages (MΦs) and EC_{50} on intracellular amastigotes were determined as 56.32 μM and 11.67 μM for AZD, respectively. The dose-dependent reduction in MΦs' infectivity demonstrates the drug potential of AZD against the pathogenic stage of Leishmania. However, the selectivity index (SI) of AZD was calculated as 4.83, indicating a moderate Leishmania-specific drug potential of AZD. The decrease in IL-10, IL-1β, and arginase expression and the increase in IL-12 and iNOS expression reinforce the immunoregulatory potential of AZD in favour of the host. Further investigations are required to optimize the dosage and improve the selectivity of AZD before proposing it for the treatment of Leishmania infection.

Conclusion: This study demonstrated the novel findings related to the drug potential of AZD with defined Leishmania targets and host protective cytokine response. Studies on animal models may deliver further insights into its therapeutic potential.



Modern Solutions to UTIs: The Role of Nanotechnology and Herbal Treatments.

Kumar A, Kumar A, Islam MM, Borgohain R, Raikwar S.Curr Drug Targets. 2025 Jul 21. doi: 10.2174/0113894501371882250713174322. Online ahead of print.PMID: 40696550

Introduction: Urinary tract infections (UTIs) range from mild to severe cases, commonly caused by uropathogenic Escherichia coli (E. coli). The growing concern about antibiotic resistance demands alternative treatment strategies. Nanotechnology, particularly nanocarriers, presents a promising solution by enhancing drug delivery, antibacterial activity, and targeted therapy. This review focuses on the emerging role of combining herbal remedies with nanotechnology for more effective and personalized management of UTIs, aiming to overcome the limitations of conventional antibiotic therapies.

Methods: The review involved an extensive search of scientific databases and relevant literature, including studies published to date from PubMed, Science Direct, and Google Scholar. Urinary tract infections (UTI), antibiotic resistance, nanotechnology, drug delivery, targeted drug delivery, and herbal drugs were among the search phrases used.

Result: According to studies, combining herbal extracts such as neem and turmeric with nanotechnology significantly enhances antimicrobial activity against UTI pathogens. These nanoformulations show enhanced bacterial inhibition, reduced inflammation, and increased therapeutic precision with minimal side effects.

Discussion: The synergistic use of herbal remedies and nanocarriers offers a novel approach to managing UTIs. Nanotechnology not only enhances drug delivery but also improves diagnostic accuracy through fluorescence markers and biomolecule tagging. This strategy effectively addresses growing antibiotic resistance and supports the development of personalized treatments. The combination of natural bioactives and advanced delivery systems offers a safer, more effective alternative to conventional antibiotics in treating UTIs.

Conclusion: The integration of nanotechnology and herbal therapies revolutionizes UTI management through precision medicine. This approach enhances treatment efficacy, diagnostic accuracy, and patient outcomes, offering a personalized solution to combat antibiotic resistance and urinary tract abnormalities with improved targeting and minimal side effects.

Nature's Remedy: A Comprehensive Review Exploring Herbal Treatments and Natural Approaches for Preventing Acne Vulgaris.

Shingari M, Sharma A, Mittal V.Recent Adv Antiinfect Drug Discov. 2025 Jul 14. doi: 10.2174/0127724344345143250709035643. Online ahead of print.PMID: 40662556

Background: Acne vulgaris is a prevailing inflammatory condition of the skin affecting areas with dense sebaceous glands, like the upper back, chest, face, and arms. It impacts approximately 85% of Americans aged 12 to 25, which can persist into adulthood. The condition is identified with pustules, comedones, papules, and nodules, comprising psychological and social effects comparable to chronic diseases like asthma.

Objectives: This study explores the potential of herbal treatments as alternatives to conventional allopathic therapies for acne vulgaris, aiming to address underlying causes with fewer side effects.

Methodology: A comprehensive literature review was conducted, examining clinical studies, traditional medicinal sources, and recent research on various herbs, including *Melaleuca alternifolia (tea tree), Curcuma longa (turmeric), Azadirachta indica (neem), Aloe barbadensis (aloe vera), Camellia sinensis* (green tea), *Salvia rosmarinus* (rosemary), and *AmaranthushypochondriacusLinn*(amaranths). Both topical and internal applications were considered, with a focus on topical treatments for ease of use. The databases PubMed, Web of Science, Cochrane Library, Google Scholar, ResearchGate, and ScienceDirect were the main sources of the data and content included in this review article. This helped to preserve transparency and increased the credibility of this review article.
Results: Herbal medicines are gaining traction due to their minimal adverse effects and holistic approach. This study highlights promising results from several herbs in reducing acne symptoms and improving skin health, emphasizing the need for further clinical trials to substantiate these findings.
Conclusion: Herbal therapies offer a viable alternative for managing acne vulgaris, potentially providing a holistic solution beyond symptomatic relief. Continued research is important to understand their effectiveness and mechanisms of action fully.

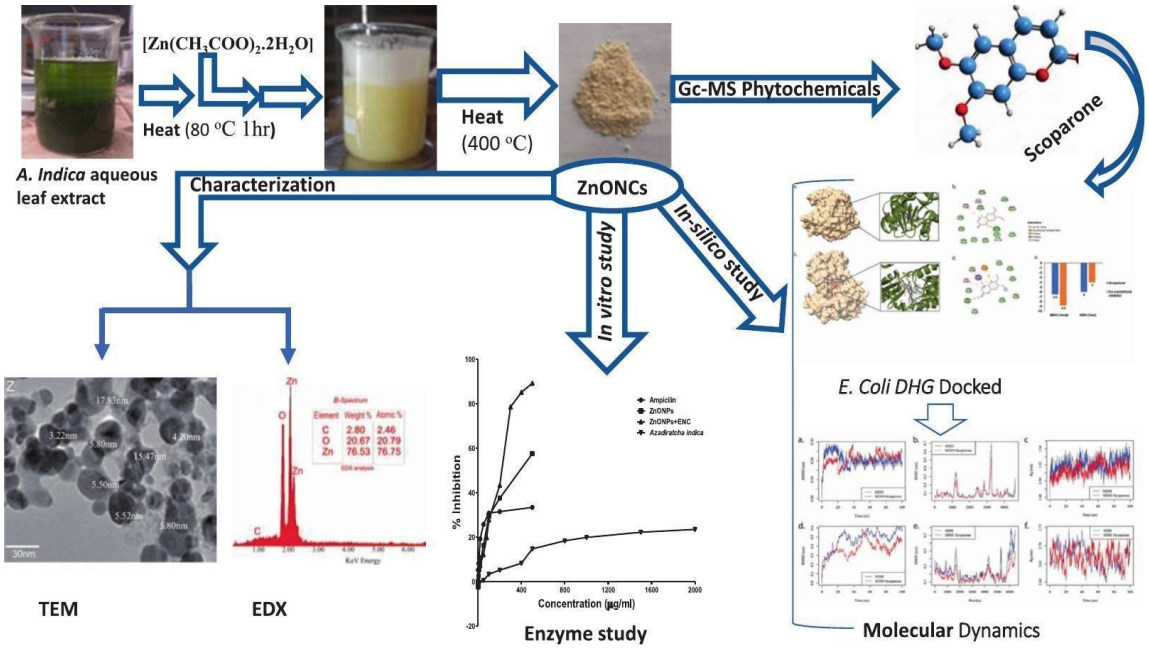
Comparative Evaluation of Herbal Extract and Chlorhexidine as Root Canal Irrigants Against Enterococcus Faecalis- An *In vitro* Study.
Kumar P, Kararia N, Raju MS.J Pharm Bioallied Sci. 2025 Jun;17(Suppl 2):S1643-S1645. doi: 10.4103/jpbs.jpbs_203_25. Epub 2025 Jun 18.PMID: 40655798

Background: Effective cleaning and adequate closure of the root canal are essential for successful endodontic therapy. Diverse pharmaceuticals, including both natural and synthetic alternatives, are used for disinfection purposes. This research sought to assess the antibacterial efficacy of herbal remedies (neem extract and tulsi extract) and chlorhexidine against Enterococcus faecalis in endodontics.
Materials and methods: The antibacterial efficacy was assessed using the agar diffusion technique. Forty samples were categorized into four groups, each including 10 samples: Group I-2% chlorhexidine, Group II-neem extract, Group III-tulsi extract, and Group IV-distilled water (control). The zones of inhibition for E. faecalis were quantified and evaluated by one-way analysis of variance (ANOVA) at a significant threshold of $P < 0.05$.
Results: Of the evaluated medications, chlorhexidine demonstrated the most extensive zone of inhibition, followed by neem extract and tulsi extract. The control group (distilled water) had no antibacterial action. Statistical analysis revealed a substantial disparity in the antibacterial effectiveness across the groups ($P < 0.05$).
Conclusion: Herbal medications, namely neem extract and tulsi extract, had considerable antibacterial efficacy against E. faecalis; nevertheless, chlorhexidine proved to be the most effective agent. Herbal options may function as viable supplements to traditional endodontic disinfectants.

[Mechanistic insight and in-vitro validation of ampicillin/scoparone-functionalized ZnO nanoparticles as antioxidant, and antimicrobial therapeutics against antimicrobial-resistant Escherichia coli.]

Callistus I I, Asika KE, Ugwor EI, Ogbonna CU, Uzoka UH, Nwabueze OS, Ezirim AU, Nkwoada AU, Oguzie CK, Okoli UA, Mejeha OK, Ekuma UO, Doris I U, Chiegboka NA, Alisi CS, Ogbulie JN.Bioorg Chem. 2025 Jul 16;163:108764. doi: 10.1016/j.bioorg.2025.108764. Online ahead of print.PMID: 40680554

Antimicrobial resistance (AMR) poses a significant threat to the global health sector. Zinc oxide nanoparticles (ZnO NPs) were synthesized with aqueous crude extract of Azadirachta indica, and the phytochemical compositions determined using Gas chromatography coupled to mass spectroscopy (GC-MS). They were further characterized using advanced spectroscopes and microscopes. The results showed arrays of ZnO NPs nanorods with maximal absorption wavelengths of 320 nm. The GC-MS revealed the presence of twenty volatile phytochemicals associated with the synthesized ZnO NPs.



Among the volatile compounds, in silico study revealed Scoparone as the most bioactive compound. The ZnO NPs were separately functionalized with Scoparone-rich portion of the extract (ZnO NPs-S), and Ampicillin (ZnO NPs-amp). Subsequently, the nanoparticles were assessed for their antioxidants, and in vitro antimicrobial properties on antimicrobial-resistant Escherichia coli. In vitro study assessed the colony counts (cfu) of the E. coli in the presence of the antimicrobials; dehydrogenase inhibitory properties of ZnO NPs-S, ZnONPs-amp, extract of A. indica, and Ampicillin (standard drug). At the concentration of 500 µm/mL, 57.89 % and 89.74 % of the enzyme activities were inhibited by ZnO NPs-S, and ZnONPs-amp respectively. In silico study revealed Scoparone component of ZnO NPs-S as the most viable competitor of nicotinamide adenine dinucleotide (NAD^+) for E. coli malate and histidinol dehydrogenases binding pockets. Antioxidant analysis revealed that ZnO NPs exhibited poor antioxidant potential. Conclusively, ZnO NPs-S exhibited good antimicrobial properties against antimicrobial-resistant E. coli, and was enhanced through conjugation with Ampicillin. For further studies, toxicological and in vivo assessment are recommended.

Methanol leaf extract of **Azadirachta indica** mitigates isoproterenol-induced myocardial infarction through the modulation of oxidative stress, and PPARalpha and BCL2 signaling in rats.

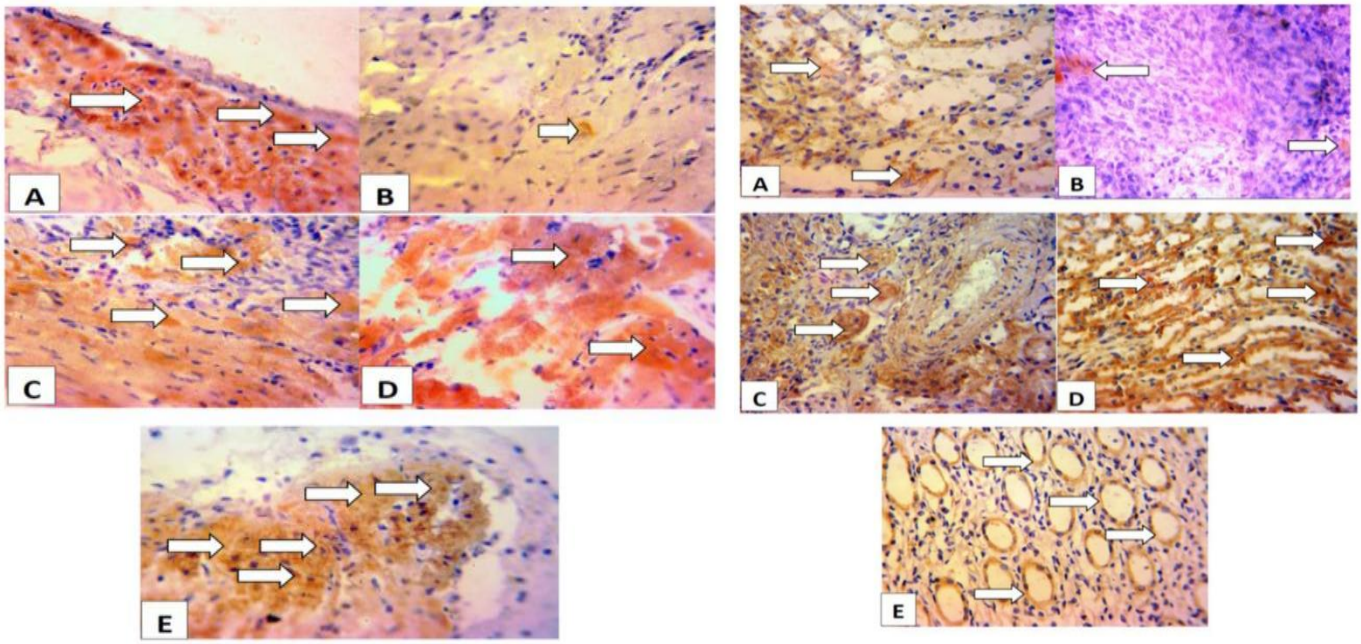
Yusuf AF, Ajibade TO, Esan OO, Asenuga RE, Onoja M, Akpan MO, Badejo JA, Omobowale TO, Oyagbemi AA, Adedapo AA, Oguntibeju OO, Yakubu MA.Avicenna J Phytomed. 2025 Jul-Aug;15(4):1328-1340. doi: 10.22038/ajp.2024.25277.PMID: 40656620

Objective: Evaluation of *Azadirachta indica*'s potential on the modulation of blood pressure parameters, antioxidant defense status, as well as immunohistochemical expressions of Peroxisome proliferator-activated receptor α (PPARα) and Bcl-2 (B-cell lymphoma 2) in rats exposed to isoproterenol was the objective of this study.

Materials and methods: Fifty rats (*Rattus norvegicus*) of the Wistar strain were used, with myocardial infarction induced by intraperitoneal administration of isoproterenol (ISO) for two consecutive days. Cardiac and renal biomarkers of oxidative stress, blood pressure parameters, electrocardiography, and immunohistochemical staining of PPARα and BCL2 were performed.

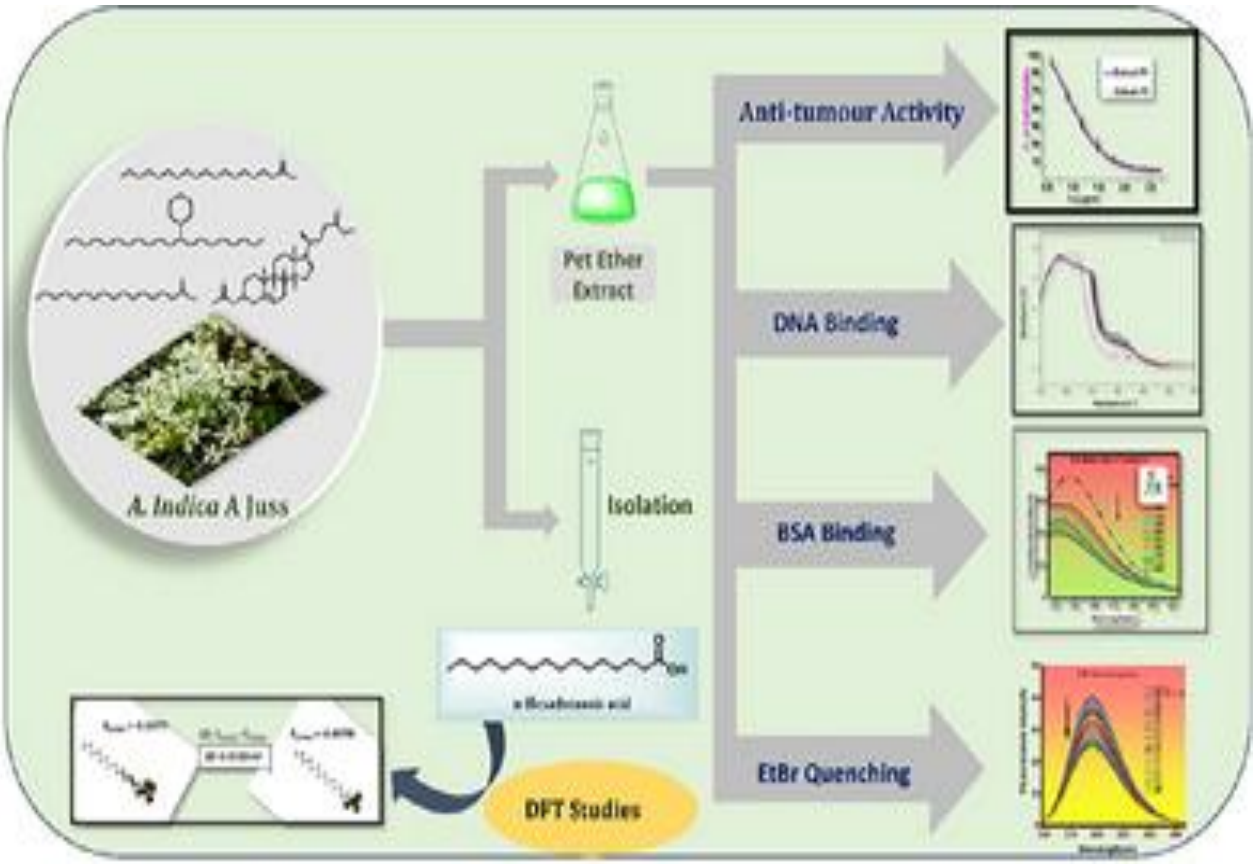
Results: ISO toxicity heightened blood pressure parameters, aggravated oxidative processes, declined antioxidant defense system, and decreased immunohistochemical expressions of PPARα and BCL2. Interestingly, *A. indica* improved antioxidant status, lowered free radical generation, mitigated serum myeloperoxidase and xanthine oxidase activities, respectively.

Conclusion: Mitigation of oxidative mechanisms and antihypertensive effects of *Azadirachta indica* suggest a positive modulatory role for the medicinal plant in isoproterenol-induced myocardial infarction.



Neem Flower Extracts as a Source of Bioactive Compounds: In-vitro Antitumor and Larvicidal Evaluation, Biomolecular Interactions, and Density Functional Theory Insights.
Mohanasundaram P, Antoneyraj MS.Chem Biodivers. 2025 Jul 10:e01147. doi: 10.1002/cbdv.202501147. Online ahead of print.PMID: 40638907

The study investigates the photophysical properties, biomolecular interaction, and in vitro anti-tumor property of Azadirachta indica flower (Neem) extracts, isolation of the n-hexadecanoic acid (HDA), and its density functional theory calculations. Petroleum ether (P1) and acetone (P2) extracts of neem flower were subjected to ultraviolet-visible and fluorescence studies; among these, P1 had better fluorescence properties than P2 with a quantum yield of 0.18. The DNA binding and ethidium bromide quenching studies revealed that the phytochemicals that are present in the extracts follow intercalator binding. P1 is found to have good binding properties with bovine serum albumin. Further, the evaluation of in vitro cytotoxicity with human epithelioid cervix carcinoma cells reveals that P1 has high antitumor activity with the lowest IC_{50} value (7.52 ± 0.53 μM). The larvicidal potency of P1 and P2 extracts was evaluated against Aedes aegypti and Anopheles stephensi, and showed very good activity with ≥95% and 100% of mortality rates by 24 and 48 h, respectively. From the potential P1 extract, HDA has been isolated and confirmed. Further, its in-silico properties were investigated to support the DNA interaction, which has been proved in the photophysical studies. All the studies confirm that the bioefficacy of P1 extract could be the implicit natural therapeutic agent of the future.



An Ayurvedic intervention for pseudomyxoma peritonei - A case report.

Sukumar D, Sreekumar T, Smitha Mohan PV, Shaji K, Athulya A.J Ayurveda Integr Med. 2025 Jul 23;16(5):101166. doi: 10.1016/j.jaim.2025.101166. Online ahead of print.PMID: 40706140

Cancer is the deadliest disease in the world and cancer treatment remains as a challenge among all systems of medicine. Pseudomyxoma peritonei is one of the rarest malignancies, devoid of any promising management strategies. Ayurvedic perspective of diagnosis and reports on treatment strategies for such malignant conditions are highly limited. In this study, a male patient with pseudomyxoma peritonei, presented with breathlessness, abdominal distension, inguinal hernia and swelling of both legs with oozing. CT and biopsy reports diagnosed the disease as Pseudomyxoma Peritonei. He was provided with ayurvedic treatment for improving Quality of Life. Paniya kshara and Bhallathaka vati were the principal contents of the medication given. Other medications are Punarnavadi kashaya, chirivilwadi kashaya, Tab Neem, Tab Haridra, Cap Rasasindoor and Cap Poornachandrodaya rasa. After 90 days of treatment, patient got relief from breathlessness, leg swelling and oozing. The abdominal circumference also reduced remarkably from 108cm to 78cm, and the Quality of Life also improved. The treatment principle adopted was based on the concepts of udara, arbuda and sopha. Cautious combination of concepts from Ayurveda can provide effective treatment strategies to treat rare diseases.