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WORLD NEEM ORGANISATION (WNO)

Several interesting and hitherto unknown aspects of neem's potential have been unveiled by scientists in different disciplines. An innovative nanopesticide delivery system containing neem seed extract was developed that improves pesticide effectiveness. Active edible biocomposites preparations using Pullulan and Gum Arabic, functionalized with Chitosan Nanoparticles and Neem Essential Oil proved to be effective edible coating material for fresh-cut guava preservation that maintained storage quality parameters. A novel species of fungus was isolated as an endophyte from neem bark in Mulshi, Maharashtra using genome sequencing and metabolomic analysis. Metabolic profiling revealed a variety of compounds of great importance across multiple industries, particularly in pharmaceuticals and cosmetics due to its diverse secondary metabolites and unique genetic features. Neem has been identified as one of the culturally important species endowed with potent medicinal properties in the Rema-Kalenga Wildlife Sanctuary (RKWS) in Bangladesh. Neem oil and neem nanoparticles were demonstrated to exhibit antibacterial and antibiofilm potential against common pathogens isolated from root canal samples and are therefore good candidates for use as endodontic medications. Neem-based mouthwash was found to be effective in reducing tooth sensitivity. Neem in combination with turmeric decreased malarial parasite load and increased chemosuppression and hence promising in the treatment of malaria. The neem limonoid, nimbolide administered as a niosomal dermal delivery formulation was found to be effective in psoriasis treatment. Neem seed oil was demonstrated to display potent antidiabetic properties in a mouse model by decreasing lipid levels and suppressing inflammation. Gedunin, another neem limonoid inhibits the growth of skin melanoma cells and induces cell death thereby exerting anticancer effects. Derivatives of epoxyazadiradione were shown to exhibit potent cytotoxic effects against a panel of human cancer cells.

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Influence of nanopesticide surface chemistry on adsorption to plant cuticle and wax layer: The role of zeta potential and wetting

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Nanopesticidal adsorption on plant surfaces is a critical determinant of their application efficacy, persistence, and ecological impact. In this study, we systematically investigate the impact of surface chemistry on the attachment of nanopesticides for seven different nanocarriers: ethyl lauroyl arginate (ELA, cationic), cocamidopropyl betaine (CAPB, zwitterionic), tween 80 (TW80, nonionic), β-cyclodextrin (βCD), sodium dodecyl sulfate (SDS, anionic), whey protein isolate (WPI), and poloxamer 407 (PXL, nonionic). Azadirachtin from neem seed extract was employed as a model pesticide active ingredient. The nanopesticides were characterized using dynamic light scattering, UV–visible spectroscopy, static contact angle (SCA, θ), and zeta (ζ) potential measurements. Pepper leaves (ζ = −11.6 mV) and candelilla wax (ζ = −2.6 mV) films were utilized to analyze the effect of nanocarrier chemical composition on nanopesticide adsorption. Fluorescence microscopy was utilized to quantify the adsorption of nanopesticides (with fluorophore tagging) on the substrates. It was found that the choice of nanocarrier significantly influenced the adsorption behavior. Nanopesticides with ELA corona, which was cationic with a zeta potential of ~+19 mV and θ of ~ 61°, exhibited the highest affinity towards the leaf cuticle and wax substrates, attributed to favorable electrostatic interactions forces. Conversely, nanopesticides with SDS (ζ = −48 mV; θ = 45°), WPI (ζ = −24 mV; θ = 54°), and PXL (ζ = −31 mV; θ = 64°) corona demonstrated the least adsorption. These findings indicate a weak correlation between the wetting behavior of nanopesticide suspensions and nanopesticide adsorption on plant and wax surfaces, as well as a strong correlation between nanopesticide zeta potential and nanopesticide adsorption. These findings heuristically recommend that aqueous cationic and zwitterionic nanocarriers for pesticides provide superior adsorption characteristics on pepper leaves and candelilla wax surfaces. Aqueous macromolecular carriers such as PXL and WPI have performed less effectively in adherence compared to shorter chain amphiphiles with similar zeta potential and wetting characteristics, indicating that the steric and osmotic chain effects of hydrophilic macromolecules hinder the adsorption relative to shorter chains.
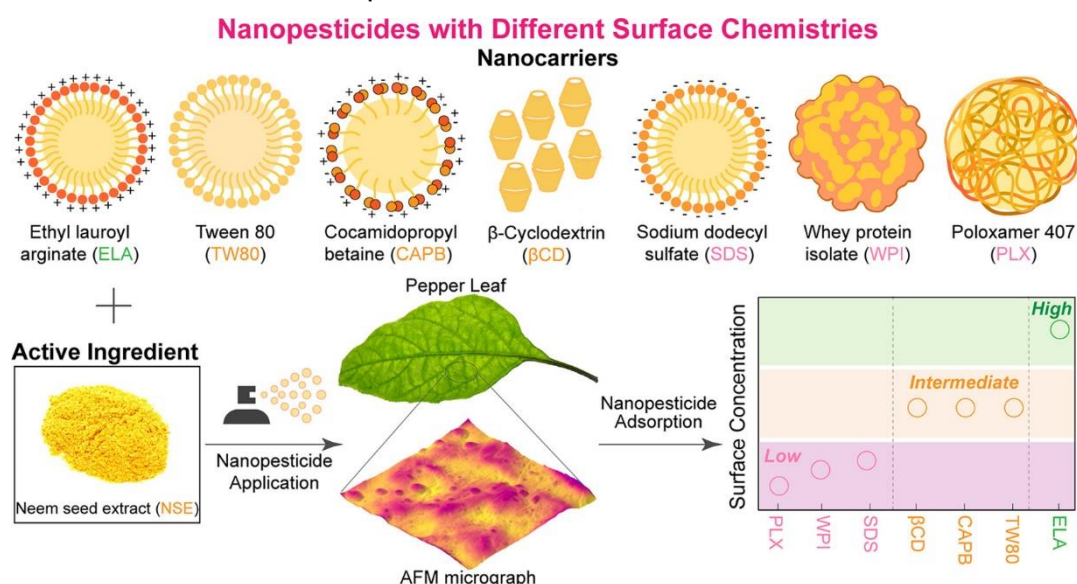
[Determination of insecticidal potential of selected plant extracts against fall armyworm (*Spodoptera frugiperda*) larvae.](#)
Saleem U, Asrar M, Jabeen F, Makhdoom Hussain S, Hussain D.Heliyon. 2024 Oct 18;10(20):e39593. doi: 10.1016/j.heliyon.2024.e39593. eCollection 2024 Oct 30. PMID: 39498049

The fall armyworm, *Spodoptera frugiperda* (J.E. Smith), is a devastating pest that attacks a wide range of crops, including sugarcane, rice, and maize. The purpose of this study is to evaluate the toxicity potential of native plant extracts (*Azadirachta indica*, *Eucalyptus globulus*, *Parthenium hysterophorus*, *Cannabis sativa*, *Citrullus colocynthis*, *Nicotiana tabacum*) against *S. frugiperda.* Four different concentrations (50, 100, 200, and 400 ppm) of the ethanolic plant extracts was evaluated against *S. frugiperda* third-instar larvae to determine their median lethal concentration (LC_{50}). After 72 h of exposure, the LC_{50} values of *A. indica*, *E. globulus*, *P. hysterophorus*, *C. sativa*, *C. colocynthis*, *N. tabacum*, and positive control (Spinetoram) were 186.104, 518.438, 320.027, 334.259, 252.651, 720.980 and 189.369 ppm respectively. The maximum percent mortality was caused by the highest concentration (400 ppm) of *A. indica* (64 ± 0.18), *E. globulus* (48 ± 0.22)*, P. hysterophorus* (56 ± 0.18), *C. sativa* (56 ± 0.18), *C. colocynthis* (60 ± 0.00), *and N. tabacum* (40 ± 0.28), after 72 h of treatment while Spinetoram induced 100 ± 0.00 percent mortality of *S. frugiperda* and only 4 ± 0.18 percent mortality was recorded in a control group. Results showed that all plant extracts were found to be effective against *S. frugiperda.* The compounds from the two most effective ethanolic plant extracts were identified by using Gas chromatography-mass spectrometry analysis (GC-MS). The key compounds identified in neem leaf extract and kortuma fruit extract are predominantly biologically active molecules. Many of them were volatile compounds that belonged to different chemical categories, such as fatty acids, hydrocarbons, esters, terpenoids, phenolic compounds, and amines. Terpenes exhibited a wide range of different biological activities, such as serving as insecticides and antifeedant. The presence of various functional groups in the plant extract was determined by conducting a Fourier Transform Infrared Spectroscopy (FTIR). Farmers should employ these kinds of environmental friendly insecticides to lessen the impact of fall armyworm because these products are cheaper to use and better for the economy and the environment.

[Chitosan nanoparticles and **neem** essential oil functionalized pullulan/gum Arabic active edible biocomposites for fresh-cut guava preservation.](#)
Das K, Sharma S, Kumar S, Mahajan S, Banerjee SK, Katiyar V.Int J Biol Macromol. 2024 Nov 4:136936. doi: 10.1016/j.ijbiomac.2024.136936. print.PMID: 39505172

The study demonstrates the preparation of active edible biocomposites using Pullulan (PUL) and Gum Arabic (GA), functionalized with Chitosan Nanoparticles (NCS) and Neem Essential Oil (NEO). These biocomposites addressed the issues of high hydrophilicity and poor barrier properties in packaging. The effects of varying NCS concentrations (1 %, 2 %, and 3 %) on various film properties were studied, while keeping PUL, GA, and NEO concentrations constant. The biocomposite containing NEO and 3 % NCS (PUL/GA/NCS3/NEO), significantly improved surface properties, transforming it from

hydrophilic (water contact angle 55.49 ± 2.31°) to hydrophobic (115.01 ± 1.86°). Additionally, tensile strength increased by ~12.77 MPa, elongation at break by ~6.26 %, thermal stability (T_{offset}) by ~22.49 °C, and water vapour barrier by ~45.95 %, alongside enhanced UV-shielding, antimicrobial and antioxidant properties. The EDX analysis confirmed the biocomposite safety, with 55.7 % carbon (C), 3.6 % nitrogen (N), and 40.8 % oxygen (O). Moreover, in vitro biocompatibility tests on Human Embryonic Kidney (HEK-293) cells indicated non-cytotoxicity, with 86.82 ± 2.28 % viability after 72 h. Furthermore, the practical application of PUL/GA/NCS3/NEO solution was tested as an edible coating material for fresh-cut guava preservation. The coated guava better maintained storage quality parameters in terms of colour, weight loss, firmness, microbiological shelf-life and antioxidant activity, under both ambient and refrigerated conditions.

The pupal parasitoid *Trichopria drosophilae* (Hymenoptera: Diapriidae) has been evaluated as a biological agent of *Drosophila suzukii*. Integrated pest management strategies mostly rely on combined application of multiple insecticides and natural enemies. This study assessed the toxicity of eight common insecticides against *D. suzukii* in fruit orchards and the effects of semilethal and sublethal doses on *T. drosophilae*. The eight insecticides had higher toxicities to *D. suzukii* larvae with lower LC_{50} values than those for adults. Adults and larvae showed high susceptibility to emamectin benzoate, spinetoram, lambda-cyhalothrin, abamectin, and sophocarpidine. The median lethal doses (LC_{50}) of lambda-cyhalothrin and imidacloprid to *T. drosophilae* adults were 60.41 mg/L and 100.58 mg/L, higher than the toxicities of the other six insecticides. Applying chlorantraniliprole, emamectin benzoate, sophocarpidine, abamectin, azadirachtin, and spinetoram resulted in low toxicity to *D. suzukii* pupae. However, the exposure of *D. suzukii* pupae or larvae to these insecticides at semilethal and sublethal doses decreased the parasitism or eclosion rate of *T. drosophilae*. These results improve our understanding of the effects of insecticide residues on *T. drosophilae* development and provide a basis for the combined use of chemical and biological options for managing *D. suzukii*.

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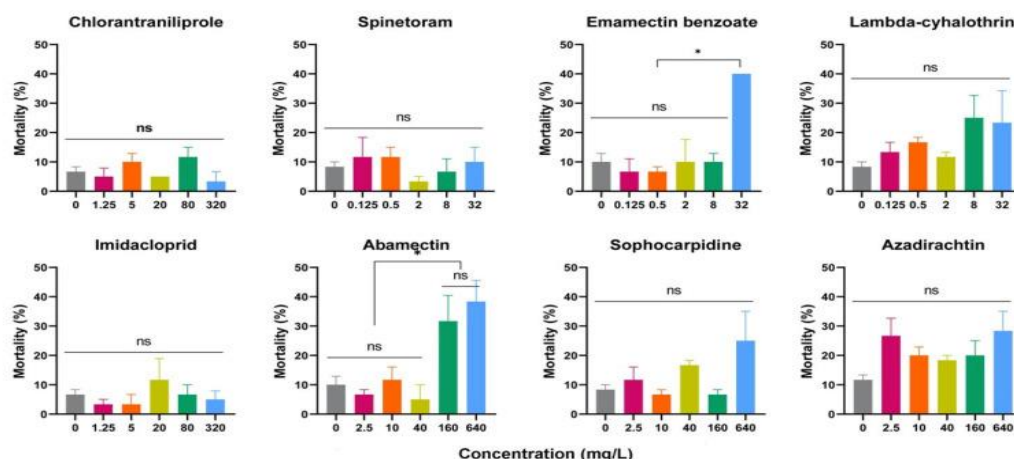
[Elaboration and Characterization of Electrodes from Robinia pseudoacacia and **Azadirachta indica** Charcoal Powder with Coconut Bio-Pitch as a Binder.](#)
Zingbe E, Kongnine DM, Agbomahena BM, Kpelou P, Mouzou E.Materials (Basel). 2024 Oct 23;17(21):5156. doi: 10.3390/ma17215156.PMID: 39517432

Carbon-based electrodes have recently been most widely used in P-MFC due to their desirable properties such as biocompatibility, chemical stability, affordable price, corrosion resistance, and ease of regeneration. In general, carbon-based electrodes, particularly graphite, are produced using a complex process based on petroleum derivatives at very high temperatures. This study aims to produce electrodes from bio-pitch and charcoal powder as an alternative to graphite electrodes. The carbons used to manufacture the electrodes were obtained by the carbonisation of *Robinia pseudoacacia* and *Azadirachta indica* wood. These carbons were pulverised, sieved to 50 μm, and used as the raw materials for electrode manufacturing. The binder used was bio-pitch derived from coconut shells as the raw materials. The density and coking value of the bio-pitch revealed its potential as a good alternative to coal-tar pitch for electrode manufacturing. The electrodes were made by mixing 66.50% of each carbon powder and 33.50% of bio-pitch. The resulting mixture was moulded into a cylindrical tube 8 mm in diameter and 80 mm in length. The raw electrodes obtained were subjected to heat treatment at 800 °C or 1000 °C in an inert medium. The electrical resistivity obtained by the four-point method showed that N1000 has an electrical resistivity at least five times lower than all the electrodes developed and two times higher than that of G. Fourier-transform infrared spectroscopy (FTIR) was used to determine the compositional features of the samples and their surface roughness was characterised by atomic force microscopy (AFM). Charge transfer was determined by electrical impedance spectroscopy (EIS). The FTIR of the electrodes showed that N1000 has a spectrum that is more similar to that of G compared to the others. The EIS showed the high ionic mobility of the ions and therefore that N1000 has a higher charge transfer compared to G and the others. AFM analysis revealed that N1000 had the highest surface roughness in this study.

[Discovery of *Alanomyces manoharacharyi*: A Novel Fungus Identified Using Genome Sequencing and Metabolomic Analysis.](#)
Rana S, Singh SK.J Fungi (Basel). 2024 Nov 14;10(11):791. doi: 10.3390/jof10110791.PMID: 39590710

In this study, a new species of *Alanomyces* was isolated as an endophyte from the bark of *Azadirachta indica* from Mulshi, Maharashtra. The identity of this isolate was confirmed based on the asexual morphological characteristics as well as multi-gene phylogeny based on the internal transcribed spacer (ITS) and large subunit (LSU) nuclear ribosomal RNA (rRNA) regions. As this was the second species to be reported in this genus, we sequenced the genome of this species to increase our knowledge about the possible

applicability of this genus to various industries. Its genome length was found to be 35.01 Mb, harboring 7870 protein-coding genes as per Augustus and 8101 genes using GeMoMa. Many genes were annotated using the Clusters of Orthologous Groups (COGs) database, the Kyoto Encyclopedia of Genes and Genomes (KEGG), Gene Ontology (GO), Swiss-Prot, NCBI non-redundant nucleotide sequences (NTs), and NCBI non-redundant protein sequences (NRs). The number of repeating sequences was predicted using Proteinmask and RepeatMasker; tRNA were detected using tRNAscan and snRNA were predicted using rfam_scan. The genome was also annotated using the Pathogen-Host Interactions Database (PHI-base) and AntiSMASH. To confirm the evolutionary history, average nucleotide identity (ANIb), phylogeny based on orthologous proteins, and single nucleotide polymorphisms (SNPs) were carried out. Metabolic profiling of the methanolic extract of dried biomass and ethyl acetate extract of the filtrate revealed a variety of compounds of great importance in the pharmaceutical and cosmetic industry. The characterization and genomic analysis of the newly discovered species *Alanomyces manoharacharyi* highlights its potential applicability across multiple industries, particularly in pharmaceuticals and cosmetics due to its diverse secondary metabolites and unique genetic features it possesses.

Neem for Human Health

The Rema-Kalenga Wildlife Sanctuary (RKWS) is a protected forest in Bangladesh that houses a variety of rare flora and fauna and supports the sustenance of 13 ethnic communities. This forest's indigenous and other inhabitants traditionally have a strong cultural connection to the plants, particularly medicinal plants. Due to modern allopathic medicine's rapid growth and commercial tree species prioritization, many medicinal plants are now on the verge of endangerment. Under such circumstances, it is crucial to explore how the local community perceives the importance of herbal treatments in contrast to allopathy, the underlying reasons for their perceptions, and the specific ailments for which they use the plants. The main objectives are: 1) to evaluate the perceptions of the local community towards allopathy and herbal medicine using Nussbaum's central capabilities approach, 2) to identify medicinal plant diversity, therapeutic usages, and quantitative indices, 3) to determine the factors that influence the use of medicinal plants. Repeated interviews and field surveys were conducted at the RKWS, interviewing 145 people, including the indigenous community (72.42 %) and traditional healers (8.27 %) from the surrounding seven villages. The study identified 51 medicinal plant species belonging to 39 families for their potent medicinal properties in treating various ailments. The predominant parts of the plants used in the treatments were leaves and roots. The uses were classified into 12 categories according to Nussbaum's central capabilities. The findings identified *Aloe vera*, *Phyllanthus emblica, and Azadirachta indica* as highly culturally important species. In contrast, *Terminalia arjuna, Swertia chirata, and Azadirachta indica* were found to have the highest relative importance. The underlying determinants influencing the preferences of individual users towards herbal medicine were income from agroforestry, beliefs, knowledge, and ethnicity, as revealed by the analysis of the ordinal logit model. The respondents viewed their strong inclination toward herbal medicine with many positive attitudes. Herbal medicine users held a negative perception of allopathy except for affiliation and practical reasons being viewed as the positive outcomes. Conversely, allopathic medicine users expressed mixed perceptions towards the treatment, with both positive and negative aspects being identified. Promoting the sustainable use of medicinal plants and their conservation efforts is imperative for the benefit of present and future generations in this region.

Perceptions of allopathy and herbal users using Nussbaum's central capabilities
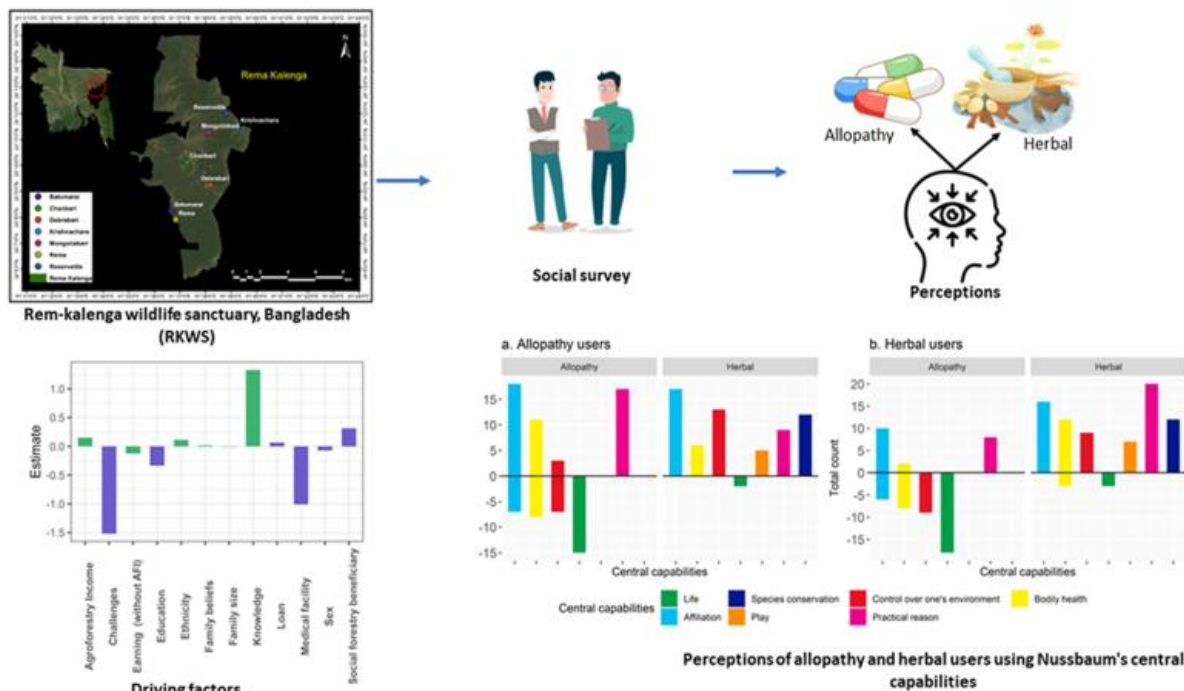
[In-vitro and In-silico evaluation of antimicrobial and antibiofilm effect of **Neem** oil and Calcium hydroxide nanoparticles against Mutans Streptococci and Enterococcus faecalis isolated from endodontic infections.](#)

Different Streptococcal species including Streptococcus mutans, Streptococcus sobrinus and Enterococcus faecalis are commonly isolated in root canal infections including refractory, recurrent, and persistent cases. Calcium hydroxide (Ca $(OH)_2$) has been widely used in endodontics as an intracanal medicament. However, using new antimicrobial herbal alternatives offers promising potentials which can be additionally enhanced by using nanoparticles (NPs). In this study, we evaluate the antimicrobial efficacy and antibiofilm effect of Neem oil including its NPs preparations and we compare the effect of conventional Ca $(OH)_2$ to Ca $(OH)_2$ NPs using standard disc diffusion method and quantitative microtitre dish biofilm formation assay against common pathogens isolated from root canal samples. Molecular docking was used to test the binding of 10 Streptococcal macromolecules to 5 candidate neem active constituents. Neem NPs 0.125 mg/ml showed better antibacterial effect than both Neem 15 mg/ml and Neem 0.15 mg/ml. Ca $(OH)_2$ NPs 0.125 mg/ml also showed better antibacterial effect than each of Ca $(OH)_2$ 10 mg/ml and Ca $(OH)_2$ 0.1 mg/ml. Best biofilm mass inhibition was achieved by Neem oil 0.15 mg/ml at 74.55% (IQ: 67.36-87.65) and Neem NPs 0.0125 mg/ml at 59.33% (IQ: 51--75.27). For Ca $(OH)_2$, the best biofilm mass inhibition was observed with Ca $(OH)_2$ NPs 0.125 mg/ml at 54.7% (IQ: 42.37- 77.25). Both neem oil and neem NPs show promising antibacterial and antibiofilm potential against Mutans Streptococci group at low concentrations and hence are good candidates for use as endodontic medications. In silico analysis shows that both Sitosterol and Gedunin appear to be important active constituents of neem and possible drug candidates. Additionally, Ca $(OH)_2$ NPs showed significantly higher antimicrobial effect against Mutans streptococci group than conventional Ca $(OH)_2$ preparations.
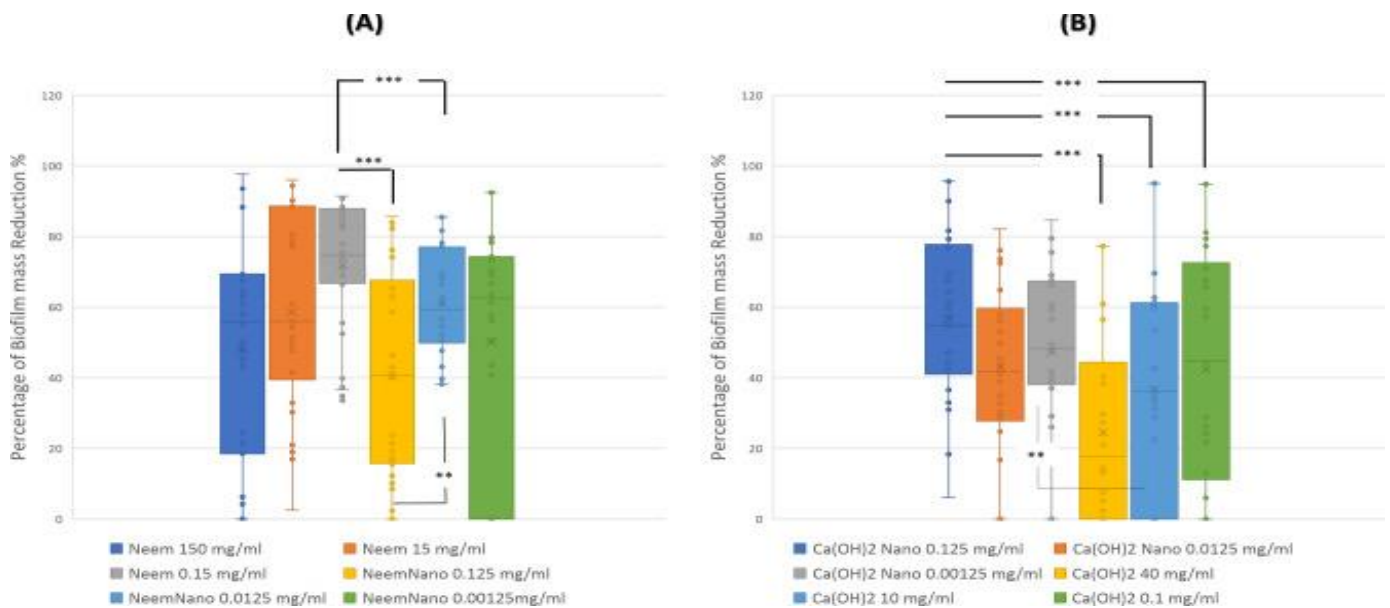
[Antimicrobial efficacy of 2% chlorhexidine gel, triphala, and **Azadirachta indica** as intracanal medicaments against Enterococcus faecalis: A randomized clinical trial.](#)
Sharma L, Sinha DJ, Puri N, Dhawan A, Prakash P, Sharif N.J Conserv Dent Endod. 2024 Oct;27(10):1004-1009. doi: 10.4103/JCDE.JCDE_435_24. Epub 2024 Oct 5.PMID: 39583271

Context: Concerns about adverse reactions and the development of antibiotic resistance have prompted an alternative treatment strategy that utilizes traditional medicinal herbs.
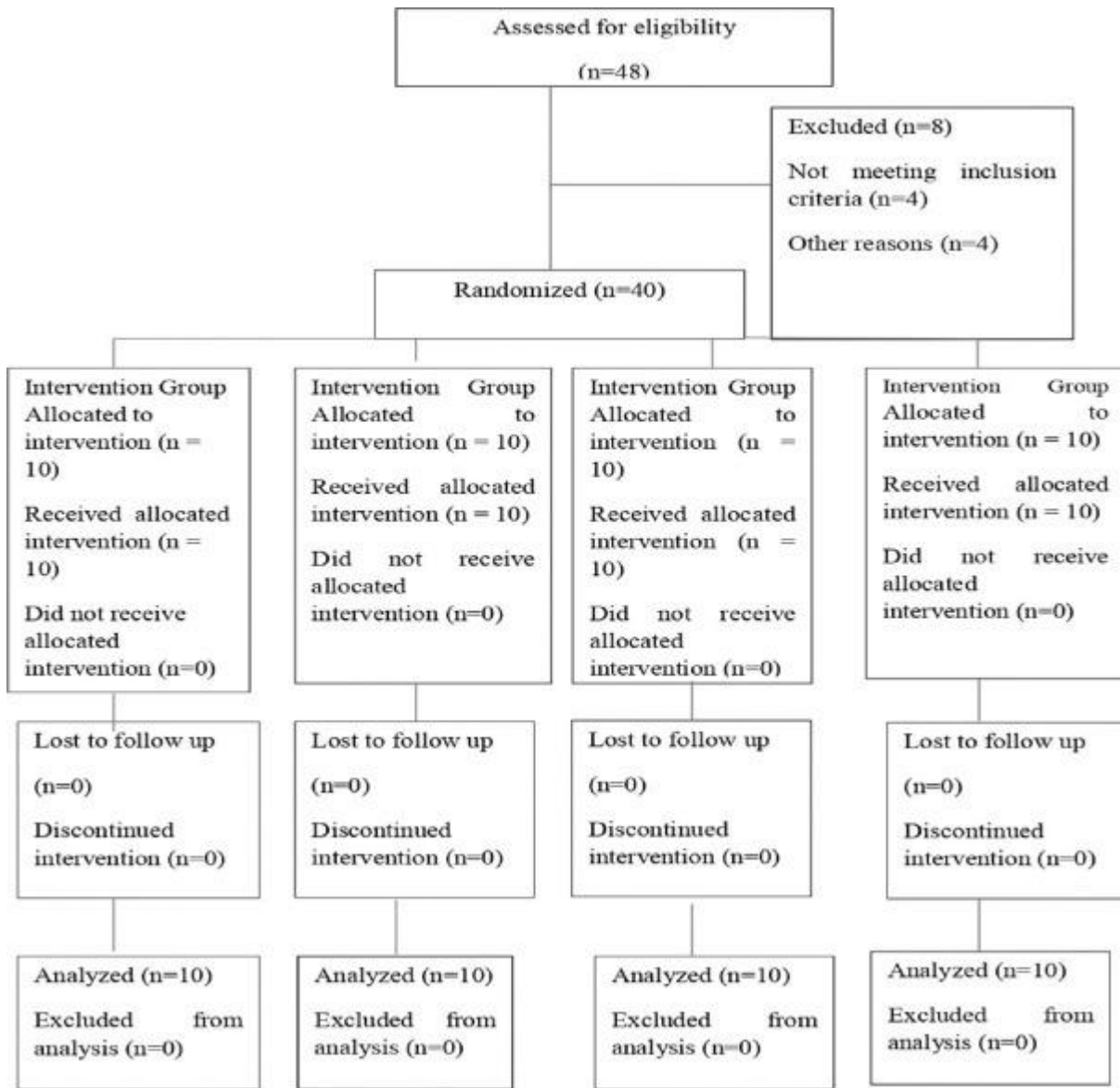**Aim:** This randomized control trial assessed the antimicrobial efficacy of 2% chlorhexidine (CHX) gel, Triphala, and *Azadirachta indica* as intracanal medicaments against *Enterococcus faecalis*. **Materials and methods:** Forty patients with nonvital teeth and single root canals were selected ($n = 10$). Following the initial access opening, the first microbial samples (S1) were collected using paper points. Second microbial samples (S2) were collected following the chemo-mechanical preparation and 1 week after introducing the intracanal medicaments. Group I: 2% CHX, Group II: *A. indica*, Group III: Triphala, and Group IV: Calcium hydroxide ($Ca(OH)_2$). S1 and S2 samples were collected, and bacterial growth was observed using the colony-forming unit (CFU) count. **Statistical analysis:** Comparison of the difference in CFU count among four groups was performed using one-way ANOVA test ($P < 0.05$) followed by *post hoc* Tukey test. **Results:** Reduction in CFU count postmedication S2 from S1 in each group was statistically significant. Percentage reduction in CFU count was highest in Triphala group followed by *A. indica* and 2% CHX group. Percentage reduction in CFU count was least in $Ca(OH)_2$ group. The *post hoc* pairwise comparison of % reduction in CFU count among four groups showed that the percent reduction was highest in Triphala group. **Conclusion:** Triphala has considerable antimicrobial efficacy against *E. faecalis*.
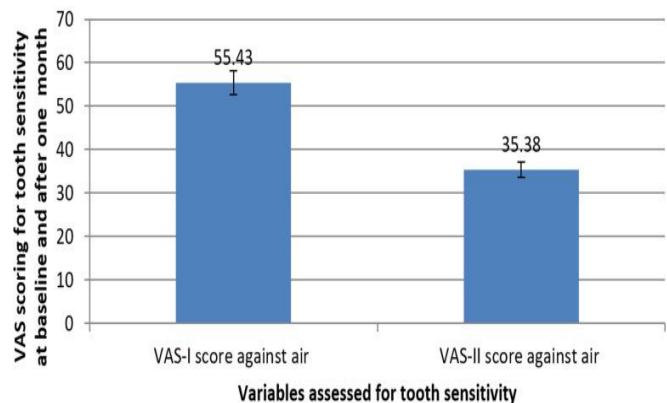
Assessed for eligibility (n=48)

Excluded (n=8)
Not meeting inclusion criteria (n=4)
Other reasons (n=4)

Randomized (n=40)

Intervention Group Allocated to intervention (n = 10)
Received allocated intervention (n = 10)
Did not receive allocated intervention (n=0)

Intervention Group Allocated to intervention (n = 10)
Received allocated intervention (n = 10)
Did not receive allocated intervention (n=0)

Intervention Group Allocated to intervention (n = 10)
Received allocated intervention (n = 10)
Did not receive allocated intervention (n=0)

Intervention Group Allocated to intervention (n = 10)
Received allocated intervention (n = 10)
Did not receive allocated intervention (n=0)

Lost to follow up (n=0)
Discontinued intervention (n=0)

Lost to follow up (n=0)
Discontinued intervention (n=0)

Lost to follow up (n=0)
Discontinued intervention (n=0)

Lost to follow up (n=0)
Discontinued intervention (n=0)

Analyzed (n=10)
Excluded from analysis (n=0)

Analyzed (n=10)
Excluded from analysis (n=0)

Analyzed (n=10)
Excluded from analysis (n=0)

Analyzed (n=10)
Excluded from analysis (n=0)

Objective: To evaluate the effectiveness of Azadirachta indica based Herbal mouthwash to treat tooth sensitivity in patients.
Method: This single-blinded clinical trial was performed at School of dentistry, Shaheed Zulfiqar Ali Bhutto Medial University, Islamabad from 1st February, 2023 to 30th April, 2023. In this interventional study incorporated 120 participants with clinically visible signs of erosion, abrasion or recession. Visual Analog Scoring (VAS) Tool was used to investigate tooth sensitivity in these patients. Values of VAS for tooth sensitivity was calculated by exposing teeth of these patients to cold air blasting with triple

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syringe attached to dental unit at psi-30.0 pressure between 23±30ºC for duration of one second without using Azadirachta indica based Herbal mouthwash. Later on, these patients were provided with this Herbal mouthwash and its usage was recommended twice a day for one month. After One month, tooth sensitivity of patients was determined by VAS again. Data was analyzed by Paired T-test at 95% confidence and significance < 0.05. **Results:** VAS mean value for tooth sensitivity of patients before using *Azadirachta indica* based Herbal mouthwash was higher and found to be 55.43% ± 12.04 whereas its mean value after using Herbal mouthwash for one month reduced to 35.38% ± 11.62 which was statistically significant (*p* value=0.001). Reduction in tooth sensitivity of patients was almost 20.05% just after one month. **Conclusion:** *Azadirachta indica* based Herbal mouthwash was potent enough to reduce the tooth sensitivity in patients after one month of its usage.


[Systematic review of oral health in slums and non-slum urban settings of Low and Middle-Income Countries (LMICs): Disease prevalence, determinants, perception, and practices.](#)

Osuh ME, Oke GA, Lilford RJ, Osuh JI, Harris B, Owoaje E, Lawal FB, Omigbodun A, Adedokun B, Chen YF.

Background: A comprehensive summary of evidence about oral health in slum settings that could inform policy directions is lacking.**Objective:** To summarise the latest evidence regarding oral disease burden and their determinants, perceptions, practices, and service utilization in the slums and non-slum urban settings of LMICs.
Design: Systematic review. **Data sources:** Embase and MEDLINE (Ovid); PubMed; Scopus, Web of Science, CRD DARE Database; ELDIS; Essential Health Links; HINARI; African Index Medicus (AIM); and Bioline International, all searched from January 2000 to June 2023 using slum-related terms. **Eligibility criteria:** Empirical studies of all designs were eligible. Studies published in English with full-text available and reporting disease burden, perceptions, behaviours and service utilisation related to oral health of residents of slums or broader settings including slums in low and middle-income countries were included. **Data extraction, quality assessment, synthesis and reporting:** Studies were categorised and data were extracted and charted according to a preliminary conceptual framework refined by emerging findings. The Mixed Methods Assessment Tool (MMAT) was used to appraise the quality of empirical studies. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and (where applicable) the Synthesis Without Meta-analysis (SWiM) guideline were adopted for guiding synthesis and reporting. Results were tabulated and narratively summarised. **Results:** Full-text articles for 56 records were assessed for eligibility and 23 of the articles were included in this review. The majority (13 studies, 57%) were conducted in Asia, and nine studies (39%) in Africa. Six focused on slums (two examined slum and urban non-slum and four examined purely slum settings), two examined general urban settings, eight included both rural and urban areas in their settings, two examined disadvantaged/low socioeconomic, one assessed rural/urban/metropolis/municipal/district, three covered the national population or whole country, and one looked at high versus low socioeconomic regions. The commonest oral diseases reported were dental caries (prevalence: 13% - 76%), and periodontal diseases (prevalence: 23% - 99%). These were higher in slum settings and showed differences across age groups, gender, and socioeconomic classes. Most participants in

the studies perceived their oral health status as satisfactory, a belief commoner among younger people, males, those in higher socio-economic classes, and employed. Mouth cleaning was mostly once daily, usually in the mornings. The use of toothpaste and brush was commonest. Other oral hygiene implements included toothpowder, chewing-stick, neem, charcoal, sand, snuff, salt, and the fingers. There was widespread engagement in home remedies for oral disease cure or prevention, while the use of professional dental care facilities was generally low and problem-driven. **Conclusion:** The systematic review identified a sparse body of literature on oral health surveys in slums and other urban settings in LMICs. Available data suggest a high oral disease burden, worse in slums, use of inappropriate mouth cleaning tools, self-care practices for pain relief, and few visits to care facilities.
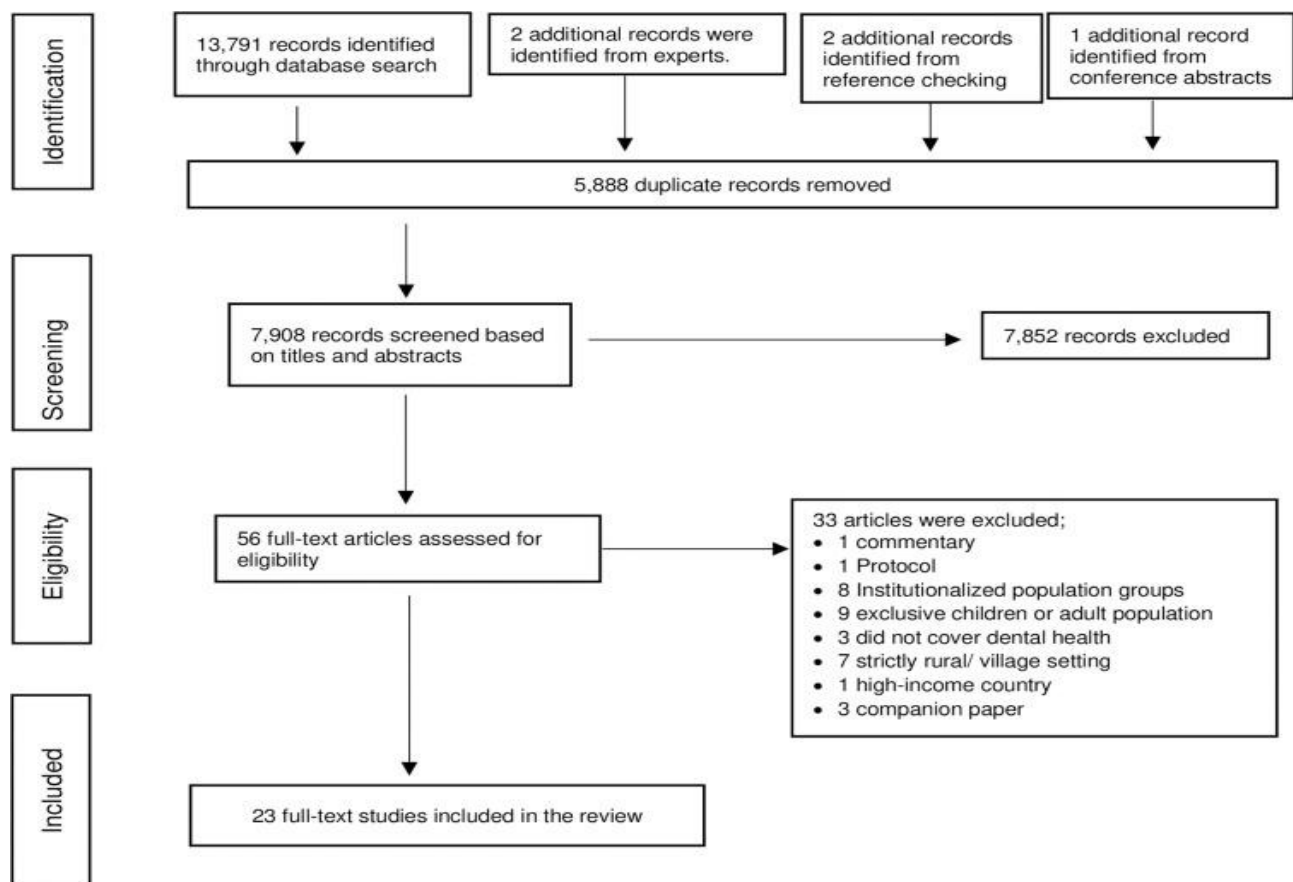
Quantitative analysis of antibacterial efficacy of herbal irrigants against endodontic microflora - A clinical study.

Aims: The study aimed to assess the antimicrobial effectiveness of green tea and neem extract compared to sodium hypochlorite (NaOCl) against various root canal microorganisms. **Materials and methods:** Thirty patients with pulpal necrosis were selected, providing 60 samples before and after irrigation. Groups were assigned as follows: Group A: 3% NaOCl (control), Group B: green tea, and Group C: neem extract.

Samples were collected before and after irrigation in two phases. Samples were collected maintaining a strict sterile condition and stored in buffer solution at -80°C for bacterial-load measurement through real-time Polymerase chain reaction (PCR). Statistical analysis included within-group comparisons using Wilcoxon's test and the paired t-test and inter-group comparisons using the Kruskal-Wallis test with post hoc Dunn's test and one-way analysis of variance with post hoc Tukey's honestly significant difference test ($P \leq 0.05$). **Results:** While no irrigant achieved complete bacterial eradication, all solutions exhibited significant antimicrobial activity postirrigation. NaOCl yielded the most effective results, with green tea nearly comparable, and neem extract demonstrating the lowest efficacy. **Conclusions:** Herbal irrigants, particularly green tea, can serve as effective alternatives to chemical solutions. However, neem extract proved less effective than both green tea and NaOCl, indicating its inferiority in root canal disinfection.
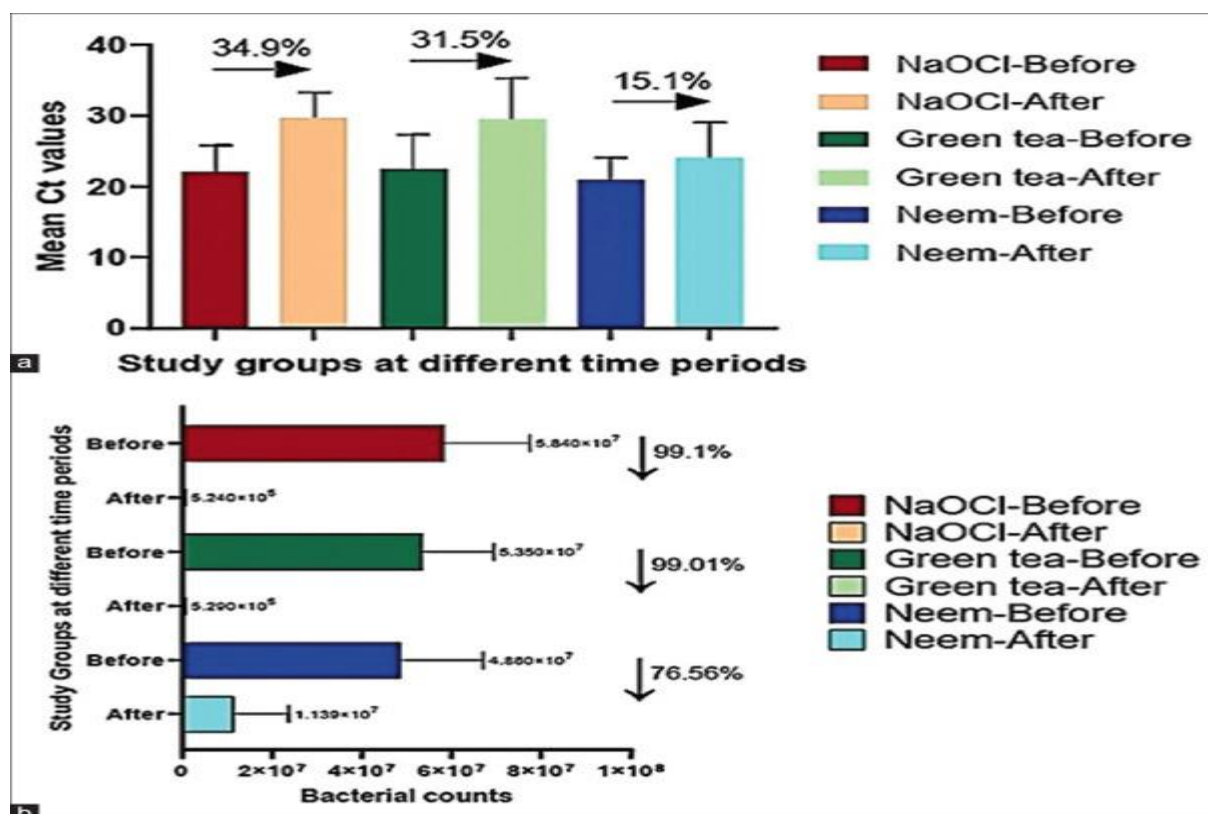
[Antiplasmodial evidence, host mitochondrial biology and possible mechanisms of action of a composite extract of Azadiractha **indica** and Curcuma longa in Plasmodium berghei-infected mice.](#)
Olanlokun JO, Odedeyi A, Oderinde SO, Owolabi BA, Koorbanally NA, Olorunsogo OO.J Parasit Dis. 2024 Dec;48(4):872-890. doi: 10.1007/s12639-024-01714-x. PMID: 39493471

Azadirachta indica A. Juss (Meliaceae) (AI) and *Curcuma longa* L. (Zingiberaceae) (CL) are used for malaria treatment but their anti-glycolytic and host mitochondrial effects have not been studied. The AI stem-bark and CL rhizomes were extracted with methanol. Methanol extract of CL (Turmeric) was partitioned to yield methanol fraction (MF). Swiss mice infected with *Plasmodium berghei* (NK 65 strain) were treated with 200 and 400 mg/kg of AI and turmeric for seven days. Turmeric and MF (200 and 400 mg/kg) were combined with 400 mg/kg AI to treat mice infected with *Plasmodium berghei* (ANKA strain) for four days. Drug and infected controls mice were treated with artemether lumefantrine

(10 mg/kg) and distilled water (10 mL/kg), respectively. Serum lactate dehydrogenase (LDH) and aldolase activities were determined. Liver mitochondria were obtained for mitochondrial permeability transition (mPT) pore opening and F_oF_1 ATPase assays. The curcumin content of turmeric was determined using HPLC while LD_{50} of Turmeric and AI was also determined. The AI, and its combination with turmeric decreased parasite load and increased chemosuppression in both sensitive and resistant studies while MF and its combinations with AI induced mPT pore opening. In the resistant experiment, AI + Turmeric 400 mg/kg decreased F_oF_1 ATPase, LDH and aldolase activities against the infected control. The LD_{50} values of both extracts were above 2000 mg/kg while the MF had the highest curcumin content. Antiplasmodial mechanisms of action of AI, CL and their combinations involve anti-glycolytic effects. Their composite formulations are more potent in malaria treatment.

[Exploring plant-based dengue therapeutics: from laboratory to clinic.](#)

Dengue virus (DENV) is a mosquito-borne virus that causes dengue fever, a significant public health concern in many tropical and subtropical regions. Dengue is endemic in more than 100 countries, primarily in tropical and subtropical regions of the world. Each year, up to 400 million people get infected with dengue. Approximately 100 million people get sick from infection, and 40,000 die from severe dengue. Unfortunately, dengue vaccine development is also marred with various complicating factors, as the forefront candidate vaccine performed unsatisfactorily. Moreover, the only licensed vaccine (Dengvaxia) for children 9 through 16 years of age is available in just a few countries. The treatment difficulties are compounded by the absence of an effective antiviral agent. Exploring plant-based therapeutics for dengue from the laboratory to clinical application involves a multi-stage process, encompassing various scientific disciplines. Individual investigators have screened a wide range of plant extracts or compounds for potential antiviral activity against DENV. In vitro studies help identify candidates that exhibit inhibitory effects on viral replication. Some of the most promising medicinal plants showing in vitro activity against DENV include Andrographis paniculate, Acorus calamus, and Cladogynos orientalis. Further laboratory studies, both in vitro and in animal models (in vivo), elucidate the mechanisms of action by which the identified compounds exert antiviral effects. Medicinal plants such as Carica papaya, Cissampelos pareira, and Ipomea batata exhibited potent platelet-enhancing activities while Azadirachta indica and Curcuma longa showed promising effects in both in vitro and in vivo studies. Based on positive preclinical results, researchers design clinical trials. This involves careful planning of trial phases, patient recruitment criteria, ethical considerations, and endpoints. The most important medicinal plants showing efficacy and safety in clinical trials include Carica papaya and Cissampelos pareira. This review suggests that several promising medicinal plants exist that have the potential to be turned into clinical drugs to treat dengue infection. However, in addition to developing synthetic and plant-based therapies against dengue infection, vector management strategies should be made robust, emphasizing the need to focus on reducing disease incidence.

Navigating psoriasis: From immune mechanisms to natural healing approaches.

Psoriasis is a multifunctional autoimmune skin disease with inflammatory and vascular changes. Recent developments show potential for herbal therapies and novel drug delivery systems. A chronic inflammatory skin illness, psoriasis affects 2-5 % of the world's population. It usually manifests itself among individuals of various ages. Redness, swelling, and itching are the hallmarks of psoriasis. Activation of T cells, release of cytokines, abnormal keratinocyte proliferation, altered local vascular structure, neutrophil activation, and inflammation all contribute to psoriasis. The epidermis, dermis, and hypodermis are the skin's surface membranes that are damage by psoriasis. Common therapies include topical, systemic, phototherapy, herbal, and natural agents. There are several subtypes of psoriasis, such as psoriasis arthritis, guttate psoriasis, nail psoriasis, and plaque psoriasis. Natural remedies for psoriasis include neem, turmeric, aloe Vera, turmeric, ginger, and tea tree oil, which have antibacterial and anti-inflammatory qualities. This review will provide details on the use of herbs for management in psoriasis.

Niosomal gel improves dermal delivery of **nimbolide**: a promising approach for treatment of psoriasis.

Aim: Psoriasis is a chronic inflammatory skin disorder characterized by the excessive proliferation of keratinocytes, forming thickened skin plaques due to immune-mediated cytokine responses. Delivering drugs through this barrier to target inflamed tissues remains challenging. Nimbolide (NIM), known for its anti-inflammatory and anticancer properties, shows promise in managing psoriasis. However, its efficacy is limited by its inability to penetrate the thickened horny layer of the skin. To overcome this obstacle, we have developed Nim-loaded niosomal (Nio) formulations (NIM Nio) aimed at improving dermal delivery and achieving localized sustained release at psoriasis-affected sites.**Methods:** The formulation characteristics were assessed using Zeta sizer, Transmission Electron Microscopy (TEM), and High-performance liquid chromatography (HPLC). The optimized formulation was evaluated for anti-psoriatic potential compared to Nim alone by using molecular techniques such as Confocal Microscopy, Flow cytometry, enzyme-linked immunosorbent assay (ELISA), and Western blotting.**Results:** NIM Nio showed effective penetration into psoriatic skin, resulting in reductions in keratinocyte hyperproliferation, oxidative stress, splenomegaly, inflammatory cytokines, Psoriasis Area and Severity Index (PASI), and rete ridges compared to NIM alone. **Conclusion:** Our findings underscore the significant anti-proliferative, antioxidant, and anti-inflammatory properties of NIM Nio in psoriasis, demonstrating its potential as a promising therapeutic option for this challenging condition.

Neem seed oil ameliorates diabetic phenotype by suppressing redox imbalance, dyslipidaemia and pro-inflammatory mediators in a rodent model of type 2 diabetes.

The neem plant (*Azadirachta indica*) has popular ethnomedicinal applications. The anti-diabetic potential and mechanism of neem seed oil (NSO) in a rodent model of type 2 diabetes mellitus was evaluated in the present study. Experimentally-induced diabetic animals were administered NSO (200 and 400 mg/kg) or metformin (150 mg/kg) orally for 30 days, with some animals serving as positive and negative controls. NSO significantly ($p < .05$) reversed diabetes-induced impaired glucose metabolism, dyslipidaemia, and oxido-inflammatory imbalances typified by changes in the NADH/NAD+ ratio ($p < .001$) and increases in the mRNA or protein levels of C-reactive protein, 4-hydroxynonenal, and pro-inflammatory cytokines (TNF-α and Il-1β) among others in the hepatic or pancreatic tissues of diabetic animals. The histological evaluation of the pancreatic tissue

corroborated the protective effect of NSO. The findings showed that the antidiabetic effect of NSO proceeded through its hypolipidemic effect and modulation of redox and inflammatory signalling events in the tissues of animals.

Effect of gedunin on cell proliferation and apoptosis in skin melanoma cells A431 via the PI3K/JNK signaling pathway.

Background: Melanoma is an aggressive skin malignancy with rapid metastasis and high morbidity. Gedunin (GN) is a tetranortriterpenoid belonging to the Meliaceae family, described for its anticancer, antiproliferative and apoptotic properties. **Objectives:** In the present study, we investigated the effect of GN on A431 melanoma cell proliferation and

apoptosis. The inflammatory proteins (tumor necrosis factor alpha (TNF-α), nuclear factor kappa-light-chain-enhancer of activated B cells (NF-κB), cycloxygenase 2 (COX-2), inducible nitric oxide synthase (iNOS), and interleukin 6 (IL-6)) apoptosis-related proteins, such as Bax, Bcl-2 and caspase-3, and alterations in the PI3K/JNK and p38 pathways in A431 cells after GN treatment were examined. **Material and methods:** The cytotoxicity assay and cell apoptosis of GN activity on A431 cells were assessed using MTT assay, acridine orange/ethidium bromide (AO/EB), DAPI (4',6-diamidino-2-phenylindole), propidium iodide (PI), enzyme-linked immunosorbent assay (ELISA), reverse transcription polymerase chain reaction (RT-PCR) and western blot analyses. **Results:** The findings demonstrated that GN (10 and 15 µM/mL) inhibits the growth of melanoma cells, triggers apoptosis by enhancing Bax and caspase, and reduces Bcl-2, cyclin-D1, c-myc, and survivin in a concentration-reliant manner. Additionally, GN attenuated the protein expression of inflammatory proteins (TNF-α, NF-κB, COX-2, iNOS, and IL-6) and the cell proliferative PI3K/JNK/p38 signaling pathway. Due to the imbalance in the Bax/Bcl-2 ratio, apoptosis is promoted, and the caspase cascade and Cyt-c are activated. This led us to conclude that GN treatment inhibited Bcl-2, cyclin-D1, c-myc, and survivin activity through the TNF-α/NF-κB and PI3K/JNK/p38 signaling pathways, further preventing the proliferation and stimulation of apoptosis, which contributes to growth arrest in melanoma cells. **Conclusions:** Gedunin has been shown to promote melanoma cell death in vitro, suggesting that it could be used as a future treatment for malignant melanoma. Our findings suggested that GN might be applied as a preventative measure in the management of skin melanoma cells.

[Synthesis of epoxyazadiradione-thiazole hybrid derivatives and evaluation of their cytotoxic activities.](#)

In an attempt to develop natural product-based anticancer agents, a series of novel epoxyazadiradione-thiazole hybrids (**6a-j**) were synthesised and evaluated for their anticancer activity. All the synthesised derivatives were assessed for *in vitro* cytotoxic activity against a panel of human cancer and normal cell lines and the results showed that most of the compounds exhibited significant cytotoxic activity against cancer cells and as well some of the compounds showed less cytotoxicity against normal cells. In particular, compound **4** showed potent cytotoxic activity against tongue cancer cell lines. In consideration of the potent activity, the compound **4** was further assessed for cell cycle analysis and the results showed that the compound arrests the cell cycle progression at the G0/G1 phase in the tongue cancer cell lines. Consequently, the annexin V/PI staining assay demonstrated that compound **4** induced early apoptosis against tongue cancer. Taken together, the results inferred that the epoxyazadiradione is promising anticancer candidate for developing novel anticancer drugs against tongue cancer.

Neem in Veterinary Science

TOXICO-pathological effects of herbal plants have always been a major concern, but little information is provided on the toxico-pathological effects of medicinal plants used against coccidiosis. This study aimed to assess the histopathological effects of Carica papaya seeds (CPS), Azadirachta indica leaves (AIL), and Sarcocephalus latifolius root (SLR) used as coccidiostat in traditional poultry farms with various doses using the chick embryo model. A total of 420 Sasso breeder eggs at ED4 of incubation were inoculated with the extract of these plants following a 3×4 factorial design with 3 plant extracts (CPS, AIL and SLR) and 4 inoculation doses (0, 25, 50 and 100 mg/kg egg-weight). From ED6 to ED19, the weights of the albumen and embryo were recorded, and the weights of ED19 embryo organs such as liver, heart, kidney, and lungs were measured. Additionally, histopathological lesions were examined. The results indicated that the presence of various phytoconstituents such as alkaloids, phenolics, flavonoids, tannins, saponins, coumarins, steroids, and triterpenes with statistically significant free-radical-scavenging ability differed among the plant extracts ($p < 0.0001$). Toxico-pathological examination revealed a dose-dependent slight toxicity ($p < 0.0001$) of the Azadirachta indica leaves extract compared to the other plants. Additionally, the relative organ weight showed kidney hypertrophy ($p = 0.001$) and liver hypertrophy ($p = 0.0001$), as well as dilation of hepatic and cardiac vessels. The conclusion drawn was that chicken embryos are more susceptible to in ovo inoculation with Azadirachta indica leaves compared to Carica papaya seeds and Sarcocephalus latifolius root.