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**National Conference - 2026**

# Abstracts of "National Conference on Recent Advancement in Herbal Medicines in Modern Healthcare Systems"

National Conference; Organized by Sai Nath University, Rachi, Jharkhand, India & Sponsored by Jharkhand Council on Science, Technology and Innovation

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**Combined Abstract Publication**

SNUCON001

## Comparative Phytochemical Investigation and In-Silico Anti-Cancer Evaluation of *Cannabis sativa* and *Datura metel* L.

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**Abstract:**
Cancer continues to be a major global health challenge, driving the need for potent anticancer agents from botanical sources. This research focuses on the comparative evaluation of *Cannabis sativa* and *Datura metel* L., two plants noted for their complex secondary metabolites. The study involved the preparation of plant extracts followed by extensive phytochemical screening and spectroscopic characterization using HPTLC-Mass Spectroscopy (MS). In-silico molecular docking was performed to evaluate the binding affinities of identified compounds against critical cancer targets, specifically EGFR and CDK-2. A significant highlight of this study is the mass spectrometric comparative profiling, which revealed two prominent and identical fragment ions at m/z 413 and m/z 685 in the spectra of both *Cannabis sativa* and *Datura metel*. The presence of these shared peaks indicates a commonality in their chemical scaffolds or the existence of identical high-molecular-weight bioactive constituents across these diverse species. Molecular docking results further supported the anticancer potential, showing strong binding interactions with target proteins. These findings suggest a unique phytochemical overlap that may contribute to synergistic therapeutic effects. Further research is currently underway to isolate and characterize these shared metabolites to validate their specific roles in cancer chemo-prevention and therapy.

**Keywords:** *Cannabis sativa*, *Datura metel*, Mass Spectroscopy, m/z 413, m/z 685, Anticancer, Molecular Docking, Secondary Metabolites.





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SNUCON002

## Beyond Total Inhibition: Herbal Phytoconstituents as Selective Modulators of TNFR1 vs. TNFR2 Signalling in Autoimmune Pathogenesis

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**Abstract:**
Autoimmune diseases are mainly the result of deregulated immune response, where pathogenesis plays an important but reverse role in the process of differential signalling disorders flowing through TNF receptor 1 (TNFR1) and TNF receptor 2 (TNFR2). Basically, TNFR1 mainly carries pro-inflammatory and apoptotic signals that are responsible for direct tissue damage or tissue damage; on the other hand, TNFR2 regulatory accelerates T-cell functionality and tissue repair mechanisms. Currently, conventional biological TNF-α inhibitors block both receptors non-selectively, which can damage the beneficial immunoregulatory pathways for the body and increase the risk of infection susceptibility. In this context, vegetable material or herbal phytoconstituents provide a new direction or paradigm shift. These selective receptor modulations reduce the diagnosis of TNFR1 signalling, while protective TNFR2 activity. Compounds such as triptolide, parthenolide, andrographolide, and ginsenosides display these receptor-selective effects through various mechanisms, including the different effects on receptor internalization, preventing TNFR1- associated death domain proteins, and specific control of downstream signalling cascades. These phytochemicals affect the receptor's release levels (expression levels), ligand-receptor binding affinity, and the connection to specific adaptor proteins changes the balance of TNFR1/TNFR2 signalling or stoichiometry. The experimental autoimmune models such as rheumatoid arthritis and multiple sclerosis have shown that these ingredients reduce harmful cytokine production and maintain immune homeostasis. This structural diversity of plant compounds mainly pave the way to create safe immunomodulatory therapies through the study of structure-activity relationship (SAR) of the plant.
**Keywords:** TNFR1, TNFR2, selective modulation, autoimmune diseases, phytoconstituents, immunoregulation.

SNUCON003

## Regulatory Harmonization of Herbal Medicines across Different Countries: Challenges and Opportunities

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**Abstract:**
Global market of herbal medicine operates in the fragmental regulatory context between the pharmaceutical-similar regulation and little or no regulation, which impede international commerce, threaten consumer protection, and hinder the creation of evidence. The jurisdictions discussed that include regulatory frameworks of the most popular: The Traditional Herbal Medicinal Products Directives of the European Union, Dietary Supplement Health and Education Act of the United States, regulatory framework of traditional Chinese medicine, AYUSH regulations in India and WHO guidelines on herbal medicines. The factors behind the harmonization dilemma on either herbal medicines as drugs or foods and/or traditional remedies, varying levels of evidence on efficacy and safety, divergent cultural perceptions of traditional knowledge, issues of intellectual property, and effects on the local industries are underlying. There is a partial overlap in the quality standards amongst pharmacopoeial monographs, but there are significant differences regarding specifications on identifying testing, chemical markers, microbial limits and contaminant limits. The clinical evidence requirements can be presented in the form of traditional use of a drug or randomized controlled trials which are different risk-benefit evaluation paradigms. There is a closer conformity of the manufacturing standards on the Good Manufacturing Practices although enforcement and application varies widely within individual countries. The possibilities of harmonization are located in the international undertakings: WHO concentrates on the operation on the quality standards and nomenclature, the International Conference on Harmonisation principles adaptation, agreements in the regional economic communities, and bilateral recognition. Some of these areas of improvement suggested include developing the regulatory category levels based on the risk profile, developing the fundamental standards of quality that may be accommodated in jurisdictions, mutual recognition scheme in manufacturing plants, and the cooperative pharmacovigilance schemes. There is success of trying to balance protection of the consumers, allowing them access, the promotion of innovation and compliance with traditional systems of medicine. The stakeholder participation is also a major key to making significant progress between the governments and industry, practitioners, and consumer organizations.
**Keywords:** regulatory harmonization, herbal medicines, international standards, drug regulation, policy development.

SNUCON004

## Bioactive Phytochemicals – Drug Discovery to Product Development

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**Abstract:**
Bioactive phytochemicals derived from medicinal plants have emerged as a primary source for novel therapeutic agents. However, the transition from identifying a raw plant extract to developing a standardized pharmaceutical product involves complex challenges in extraction, purification, and formulation. This study investigates the systematic pipeline of phytochemical drug discovery, emphasizing the role of advanced analytical techniques like HPLC and LC-MS in isolating potent bioactive leads. The research further explores modern "Product Development" strategies, such as the use of nano-encapsulation and lipid-based drug delivery systems to overcome the low bioavailability and poor solubility often associated with natural compounds. By integrating Artificial Intelligence (AI) in the screening phase, we can predict the molecular docking of these phytochemicals with specific disease targets, significantly reducing the development timeline. Our findings suggest that a multi-disciplinary approach combining traditional herbal knowledge with modern nanotechnology is essential for creating high-efficacy, bio-based pharmaceutical products. This paper concludes that the future of drug development lies in harnessing the chemical diversity of nature through the precision of modern technology.
**Keywords**: Phytochemicals, Drug Discovery, Product Development, Bioavailability, Nanotechnology.

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SNUCON005

## Study of Indian Herbs as per Ayurveda

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**Abstract:**
Ayurveda is the traditional medicine and natural healing system of India. Its foundation comes from the Vedic Era, the primitive age around 5000 years ago. The basic objective of Ayurveda is to educate people on how to take care of their health by themselves and increase their span of healthy life. It includes the study of various herbs like TULSI (*Ocimum sanctum*), Methi (*Trigonella foenum-graecum*), Sarpagandha (*Rauvolfia Serpentina*), Shyonak (*Oroxylum indicum*), etc.
**Keywords:** History and Origin, Ayurvedic System, Herbs and their uses Ayurvedic, Herbal Formulation, Therapeutic Application and Challenges, Conclusion

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SNUCON006

## Herbal medicines: Role in Modern Healthcare

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**Abstract:**
Herbal medicines are medicinal preparations obtained from plants and plant parts such as leaves, roots, bark, seeds, and flowers. Since ancient times, herbal drugs have been widely used for the prevention and treatment of various diseases due to their natural origin, safety, and fewer side effects. In recent years, the demand for herbal medicines has increased because people prefer natural remedies over synthetic drugs. Herbal medicines play an important role in the treatment of diseases like digestive disorders, skin problems, respiratory infections, and immunity-related conditions. This project focuses on the sources, advantages, therapeutic uses, and importance of herbal medicines in modern pharmacy. Proper standardization, quality control, and scientific evaluation are necessary to ensure their safety and effectiveness. Herbal medicines have great potential in future healthcare systems.
**Keywords:** Herbal medicines, traditional medicine, natural drugs, healthcare

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SNUCON007

## Phyto chemical Intervention in the TNF-alpha Mediated Link between Chronic Autoimmunity and Secondary Malignancy

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**Abstract**
Patients with long-term chronic autoimmune disorders are observed a profound risk of secondary malignancy. In this pathological condition, persistent TNF-α-mediated inflammation acts as a very important mechanistic bridge. The long-term TNF-α exposure causes autoimmune conditions to create a pro-oncogenic microenvironment or cancer-friendly environment, mainly carried out by sustained NF-κB activation, reactive oxygen species (ROS) production, and continuous DNA damage accumulation. Moreover, the immunosuppressive cell recruitment is accelerated, which facilitates malignant transformation or malignant transformation. Common immunosuppressive therapies show apparently opposite behavior in many cases; because they cause broad immune suppression can increase the risk of cancer. The need for alternative methods to address this crisis are undeniable, which will enable the transition of cancer from autoimmunity-to-cancer progression or autoimmunity. In this context, phytochemicals or plant-born chemicals have emerged as highly potential interventional agents. These compounds are able to disrupt TNF-α-mediated oncogenic pathways without causing global immunosuppression. Withaferin A, emodin, apigenin, and sulforaphane demonstrates multi-targeted effects, which reduces chronic inflammatory signaling and strengthens DNA repair mechanisms. They not only accelerate apoptosis or cell deaths of pre-malignant cells, but also re-enter the body's immune surveillance function or immune-resistance capacity.These phytoconstituents or plant ingredients directly interfere in the process of TNF-α-induced epithelial–mesenchymal transition (EMT), angiogenesis (new blood vessel creation), and cancer stem cell maintenance which is the link to prolonged inflammation and malignant progress. Moreover, these compounds block the fleeing of co-kt-origenic cytokine networks, limit oxidative stress, and prevent immunoediting processes. Research on various epidemiological studies suggest that high-rise dietary physiochemical intake significantly reduces cancer prevalence among autoimmune patients. The current synthesis examines the molecular links between autoimmune inflammation and secondary malignancy and offers a structure of chemoprevention strategies or chemical preventive techniques in high-risk patients, which will simultaneously help control the disease and prevent cancer.
**Keywords:** TNF -α-mediated Inflammation, Pro- oncogenic Microenvironment, Secondary Malignancy, Phytochemical Chemoprevention, Epithelial-Mesenchymal Transition (EMT)

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SNUCON008

## Harnessing Botanical Polypharmacology for Precision Oncology: Phytochemicals as Context-Specific Adjuvants to TNF-α Mediated Immune Response

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**Abstract:**
In the complex landscape of the tumor microenvironment, Tumor Necrosis Factor-alpha (TNF-α) is considered a mysterious two-way entity. It functions simultaneously as a tumoricidal agent and a pro-tumorigenic inflammatory mediator. Because of this dual properties, cancer management is very difficult, because complete inhibition can eradicate anti-tumor immunity and accelerate uncontrolled activity malignant progression. In this context, phytoconstituents or plant-derived ingredients have unveiled a fancy possibility as rheostatic modulators. Curcumin, resveratrol, and quercetin combine the fine-tuning of TNF-α signalling, which reduces pathological inflammation but apoptotic signalling is intact. They control immune cell polarization by preventing the selective NF-κB activation. These phytochemicals demonstrate a greater cell-type-specific and dose-dependent effect than conventional antagonists, which help maintain physical immune surveillance. The polypharmacological nature of these botanical compounds allow the simultaneous targeting of multiple nodes within the signalling network. In the present study, these elements are being verified as molecular mechanisms and adjuvant therapy. The main goal of future research should be to identify optimal combinations and tissue-specific effects, which can be used by precision oncology without destroying TNF-α signalling.
**Keywords:** tumor microenvironment, Tumor Necrosis Factor-alpha, phytoconstituents, rheostatic modulators, NF-κB signalling.

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SNUCON009

## Strengthening Public Healthcare Systems for Equitable and Sustainable Health Outcomes

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**Abstract**
Public healthcare systems play a crucial role in ensuring accessible, affordable, and equitable health services for populations worldwide. In recent years, public health has emerged as a central focus due to global health emergencies, rising chronic diseases, climate change impacts, and widening health inequities. Strengthening public healthcare infrastructure has become a priority to improve population health outcomes and enhance system resilience. Current trends in public healthcare emphasize preventive and community-based approaches rather than curative care alone. Health promotion, disease prevention, and early detection programs are increasingly integrated into primary healthcare services to reduce long-term disease burden. Digital public health tools, such as electronic health records, telehealth platforms, and mobile health applications, are transforming service delivery by improving surveillance, outreach, and continuity of care, especially in underserved and rural communities. Another significant trend is the focus on health equity and universal health coverage (UHC). Public health policies now aim to reduce disparities related to socioeconomic status, gender, geography, and education. Community participation, intersectoral collaboration, and data-driven decision-making are being recognized as essential components of effective public healthcare planning and implementation. Additionally, public healthcare systems are adapting to emerging challenges such as aging populations, mental health disorders, and the growing impact of environmental and climate-related health risks. Strengthening workforce capacity, improving health governance, and investing in sustainable health financing are key strategies to address these challenges. In conclusion, modern public healthcare is shifting toward preventive, inclusive, and technology-enabled models that prioritize population well-being and system sustainability. Strengthened public healthcare systems are vital for achieving long-term health security, improving quality of life, and ensuring healthier futures for all.
**Keywords:** Public healthcare, population health, strengthen system resilience, and ensure universal health coverage.

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SNUCON010

## Traditional system of medication

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**Abstract**
The traditional system of medication refers to ancient methods of healing that use natural resources such as herbs, plants, minerals, and spiritual practices to prevent and cure diseases. These systems developed over centuries based on cultural knowledge, observation, and experience. In India, major traditional systems include Ayurveda, Yoga, Unani, Siddha, and Homeopathy, collectively known as AYUSH. They focus on treating the root cause of illness rather than just symptoms and emphasize balance between body, mind, and environment. Traditional medicine is generally affordable, easily available, and has fewer side effects when used properly. Even today, millions of people rely on these systems for maintaining health and managing chronic diseases. With growing interest in natural and holistic healing, traditional medicine continues to play an important role alongside modern medical practices.
**Keywords**: Traditional system of medicine, Ancient healing practices, Natural resources, Herbs and medicinal plants

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SNUCON011

## Influence of Continuous Professional Development on Secondary School: An On-Going Study

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**Abstract**
Continuous Professional Development (CPD) plays a vital role in enhancing teachers' pedagogical skills, subject knowledge, and professional competence, particularly at the secondary school level where instructional demands are complex and dynamic. The present ongoing research aims to examine the nature, implementation, and impact of CPD programs on teaching practices and student learning outcomes in secondary schools. Using a mixed-method research design, data are being collected from secondary school teachers through structured questionnaires, semi-structured interviews, and classroom observations. Quantitative data are being analyzed using descriptive and inferential statistical techniques, while qualitative responses are being thematically analyzed to gain in-depth insights into teachers' perceptions and experiences. Preliminary findings indicate that regular participation in CPD activities such as workshops, training sessions, peer collaboration, and reflective teaching practices significantly contributes to improved instructional strategies, classroom management, and professional confidence among teachers. However, challenges such as time constraints, limited institutional support, and lack of systematic follow-up mechanisms have also been identified. The study highlights the need for well-structured, need-based, and sustainable CPD programs that align with teachers' professional goals and school improvement plans. The ongoing research is expected to provide practical recommendations for policymakers, school administrators, and teacher educators to strengthen CPD frameworks in secondary education. Ultimately, effective CPD practices can foster a culture of lifelong learning among teachers and enhance the overall quality of secondary school education.
**Keywords**: Continuous Professional Development, Secondary School Teachers, Teaching Practices, Professional Growth, Ongoing Research.

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SNUCON012

## The Role of Medicinal Plants in Managing PCOS: Effective Herbal Alternatives for Women's Health

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**Abstract**
Polycystic Ovarian Syndrome (PCOS) is a complex endocrine–metabolic condition, which disrupts the normal hormonal equality of women. It is mainly characterized by combined effects of hyperandrogenism, ovulatory dysfunction, and insulin resistance, which has significantly influenced ovarian physiology and reproductive homeostasis. This syndrome disrupts the normal equality of hypothalamic–pituitary–ovarian axis, resulting in androgen biosynthesis and disrupts follicular maturation process. At the same time, peripheral insulin sensitivity reduces metabolic imbalance, which makes PCOS's pathophysiology more complex and versatile. Although current conventional treatments such as Metformin or Hormonal contraceptives are effective, their long-term use results in various adverse side effects, which are not intended to contain many patients. As a result, the trend of integrating herbal or herbal medicine in modern healthcare system is increasing day by day and day. This review paper assessed the role of important herb plants such as Cinnamomum Cassia, Ocimum tenuiflorum, Curcuma longa and Aloe Vera, which helps in recovering hormonal and metabolic homeostasis. Current Research indicates that these plants work through multiple biochemical pathways: increase insulin sensitivity, and reduce oxidative stress through the upregulation of endogenous anti-oxidant. They can modulate Hypothalamic-Pituitary-Ovarian (HPO) axis. For example, these plants contain polyphenols and flavonoids help in follicular maturation by reducing the luteinizing hormone (LH). Although positive results have been found in various preclinical models and small range human trials, standardization and dosage regulation is a major challenge in using these herbal remedies from traditional knowledge. This paper concludes that the medical plants in PCOS management provide a strong and holistic approach. However, a larger range of randomized controlled trials (RCTs) is required to create standard protocols. Using modern pharmacological techniques, increasing bioavailability of these herbal bio-active may be an important study in women's health care in the future.
**Keywords**: Polycystic Ovarian Syndrome (PCOS), Hyperandrogenism, Insulin Resistance, Hypothalamic–Pituitary–Ovarian (HPO) Axis, Herbal Therapeutics.

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SNUCON013

## Cytochrome P450 Modulation by Herbal Constituents: Implications for Drug Metabolism and Personalized Medicine

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**Abstract:**
About three-quarters of the drugs administered in the clinic are metabolized by cytochrome P450 (CYP) enzymes, which are severely modified by numerous herbal constituents with extensive implications on drug efficacy, drug toxicity, and individual treatment approach techniques. The review is dedicated to the CYP modulation of herbs and its consequences and therapeutic worth on the molecular level, clinical outcomes. The effects of herbal compounds on major CYP enzymes include transcriptional (that is, through nuclear receptor: PXR, CAR, AhR) and post-transcriptional effects, enzyme direct inhibition or inactivation. St. A powerful CYP3A4 inducer by the action of PXR is Johns wort that reduces plasma levels of a broad spectrum of substrates including immunosuppressants, antiretroviral medication or oral contraceptives. Grapefruit juice components cause permanent blockage of CYP3A4 in the intestines that increases drug bioavailability and toxicity. By inhibiting CYP2D6 and CYP3A4 through goldenseal, silymarin of milk thistle has both a positive and negative outcome in terms of dosage and formulation. The phenotypic inhibition of furanocoumarins and other phytochemicals on mechanisms is time-dependent and has long-term effects which remain when herbals have been discontinued. The problems of in vitro-in vivo extrapolation are outlined, i.e. the difference in concentration, heptatic versus intestinal metabolism and transporter-interaction. The pharmacogenomic issues are interactions of the genomic Polymorphism of the baseline CYP (poor, intermediate, extensive and ultra-rapid metabolizer) and herbal modulation to produce the effect of phenoconversion. The clinical decision algorithms that involve the genetic testing, assessment of herbal use, and monitoring of therapeutic drugs proposed optimize the therapy in the herbal medication population. It is particularly oncology, where herb-drug interaction may impair chemotherapy but toxicity augmentation may be excessively active, that it is applied. The future outlooks include developing predictive computational models and building clinical pharmacokinetic studies on standardized herbal extracts and integrating results of herb-gene-drug interactions into electronic prescribing systems to attain precision medicine.
**Keywords:** cytochrome P450, herbal medicines, drug metabolism, pharmacogenomics, personalized medicine

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SNUCON014

## Advances in Metallic nanoparticles for wound healing applications

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**Abstract:**
The process of wound healing involves reconstructing the damaged skin's structure and restoring its functional and cell proliferative integrity. Numerous biological mechanisms, such as haemostasis, inflammation, proliferation, and remodelling, are involved in wound healing. Current therapeutic approaches have limitation in high cost of care, reduction in the quality of life, risk to public health and global economy as well as financial burden on individual. In recent years metallic nanoparticles (silver, gold, copper, zinc, iron, titanium nanoparticles) have gained lots of interest because of their healing capacity, delivery of drug to the targeted area, biocompatibility, biodegradability, low cytotoxicity, antimicrobial efficacy, and anti-inflammatory properties. This abstract cover mechanism of wound healing, role of metallic nanoparticles in wound healing, biosafety and clinical translational concern on the clinical and marketed level.
**Keywords:** Metallic nanoparticles; wound healing; antimicrobial efficacy.

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SNUCON015

## Development of chitosan -Coated Zein Nanoparticles for oral delivery of Quercetin: implications for Antidiabetic Therapy

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**Abstract**
This study investigated the development of a polyelectrolyte-coated zein nanoparticle system designed for the oral delivery of quercetin. Quercetin is a naturally occurring bioactive flavonoid with potent antidiabetic properties, specifically the ability to improve insulin sensitivity, regulate glucose metabolism, and thereby reduce oxidative stress in pancreatic cells; however, its efficacy is limited by poor water solubility and rapid degradation, which reduce oral bioavailability. To address these limitations, quercetin-loaded zein (QZ) nanoparticles were fabricated and subsequently coated with chitosan via electrostatic deposition. The resulting spherical particles demonstrated enhanced colloidal stability and high encapsulation efficiency (>70\%). FTIR analyses confirmed that the chitosan coating successfully transitioned quercetin into an amorphous state within the carrier. Crucially, the polymer coating provided a robust barrier against harsh gastric conditions, reducing premature release to 31% and ensuring targeted delivery to the small intestine. This controlled release mechanism increased the polyphenol's and exerts the antidiabetic effects. Therefore, these zein-chitosan composite particles represent an effective oral delivery system for enhancing the therapeutic impact of quercetin in functional food applications and improving antidiabetic properties.
**Keywords**: Herbal medicine, Quercetin, Nanoparticle, Advanced therapy.

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SNUCON016

## Pectin- coated Zein Nanoparticles for oral delivery of Resveratrol: Formulation characterization and its Mucoadhesive and Anti-diabetic properties

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**Abstract**
Resveratrol is a plant-based polyphenolic compound known for its antioxidant and antidiabetic activities. The present study aimed to develop pectin-coated zein nanoparticles for the oral delivery of resveratrol to overcome its poor aqueous solubility and low oral bioavailability. Resveratrol-loaded zein-based nanoparticles were developed as a carrier for an oral delivery system and further coated with the biopolymer pectin to enhance their stability, mucoadhesive properties, and functional performance. The formulated nanoparticles were further prepared by antisolvent precipitation, followed by electrostatic deposition of pectin onto the particle surface. The resulting formulations were systematically characterized for particle size, zeta potential, encapsulation efficiency, morphology, and physicochemical stability. The prepared nanoparticles exhibited a mean particle size of 293 ± 38 nmand a positive zeta potential of +29.7 ± 1.2 mV after pectin coating. The encapsulation efficiency was approximately 71%, indicating effective drug loading. Morphological studies confirmed spherical nanoparticles. Mucoadhesive studies demonstrated enhanced interaction of the coated nanoparticles with mucin, suggesting improved intestinal residence time. In vitro release studies demonstrated a sustained and controlled release profile of resveratrol from the coated systems. Furthermore, biological evaluations showed that resveratrol encapsulated within pectin-coated zein nanoparticles exhibited enhanced antioxidant activity and notable antidiabetic potential, as reflected by effective inhibition of key carbohydrate-digesting enzymes. Overall, this study concludes that pectin-coated zein nanoparticles represent a promising, biocompatible platform for improving oral administration, specifically by enhancing their anti-diabetic efficacy through controlled release and stability.
**Keywords**: Plant-based compounds, Herbal medicine, Antidiabetic, Nanoparticle, Oral bioavailability.

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SNUCON017

## Pharmacological Evaluation of Cochlospermum religiosum for Hepatoprotective Activity Against d-Galactosamine-Induced Oxidative Stress in Rats

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**Abstract**
Abstract People have been using plants as a natural source of curative chemicals for thousands of years. People employ a wide variety of plants and plant-derived products to cure and alleviate a wide range of physical and mental ailments. These herbs are used in Tibetan, Siddha, Ayurvedic, Unani, and traditional Chinese medicine. Numerous historical writings, including as the Yajurveda, Charka Samhita, Atharvaveda, Rigveda, and Sushrut Samhita, address the use of plants as a cure for a range of illnesses. Global interest in plant study has increased recently, and a plethora of information has been acquired to show the great potential of medicinal plants used in various traditional systems. The present study aimed to investigate the potential of an ethanolic extract of Cochlospermum religiosum (ECP) leaves to shield the livers of Waster rats from Dgalactosamine-induced hepatic injury. Intraperitoneal (i.p.) administration of Dgalactosamine (270 mg/kg body weight) was initiated on the fourteenth day of a two-week trial. On the other hand, during the course of the trial, 200 and 400 mg/kg of body weight of the extract from the studied plant were given orally. Histological investigations revealed that following 400 mg/kg CP therapy, intoxicated rats had decreased hepatocellular necrosis. The hepatotoxicity that D-galactosamine-induced in rats is reduced by the ethanolic extract of Cochlospermum religiosum leaves, according to the results.
**Keywords:** Cochlospermum religiosum; Hepatoprotective activity; D-galactosamine; Oxidative stress; Ethanolic extract; Wistar rats; Liver injury; Histopathology

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SNUCON018

## Children are the Invaluable Future Resources for Society, they are Important Pillars for Nation Progress

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**Abstract**
A study to assess the effectiveness of structured teaching programme on knowledge regarding oppositional defiant disorder among mothers in Manikchauri at Raipur Chhattisgarh". In this study objectives are, first is to assess the pre-test score and post test score on knowledge regarding oppositional defiant disorder, second is to determine the effectiveness of structured teaching programme regarding oppositional defiant disorder, third is to find out the association between post-test knowledge score regarding oppositional defiant disorder among mothers with their socio demographic variables. The research approach used a quantitative research approach with pre-experimental research design and 60 samples were selected using non- probability purposive sampling technique. The findings of the study revealed that there was marked increase in the post-test knowledge. The post-test mean score was 18.93 and the pre-test mean score was 7.35 which shows the effectiveness of structured teaching programme in which calculated 't' value was 31.12 while comparing with table value at 0.001. It showed that the 't' value was greater than the table value at 3.46 level of significance. The knowledge score was not significantly associated with socio demographic variables such as age, educational qualification, nature of employment, family economic status, type of family number of children, type of parenthood and significantly associated with the religion. All findings reveal the structured teaching programme was effective in improving the knowledge regarding oppositional defiant disorder among mothers.
**Keywords:** Oppositional defiant disorder, Structured teaching programme, Mothers.

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SNUCON019

## Bioactive Compounds and their approaches in the treatment of Diabetes: *Withamia somnifera*

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**Abstract**
One of the most valuable herbs in Ayurvedic medicine, adaptogen Ashwagandha (Withaniasomnifera)the highest potential sources of bioactive compounds for the complementary treatment of type 2 diabetes mellitus (T2DM) in the context of modern integrative medicine. Its biological activities stem primarily from a class of bioactive steroidal lactones known as withanolides - the most well-known of which are Withaferin-A and Withanone. Recent evidence points to a diverse mechanism of action on multiple targets: withanolides for instance improve insulin sensitivity and glucose uptake by skeletal muscle and adipose tissue, while regenerating pancreatic β-cells. Ashwagandha reduces fasting blood glucose and alleviate lipotoxicity by improving lipid profiles, while exhibiting anti-inflammatory and anti-oxidative properties important pathological drivers of T2DM and associated diseases. Study enabled in vivo validation of these findings, demonstrating that Ashwagandha significantly improves glucose tolerance in a T2DM mouse model a function comparable to the drug metformin. Long behaviour tests resulted in improved fasting blood glucose and reducing hepatic steatosis (fat accumulation in the liver). Molecular studies highlight that Withaferin-A and Withanone suppress lipogenic transcription factors (e.g., SREBP-1c, PPARγ). Systematic reviews show that Ashwagandha is safe in human subjects, and can help lower HbA1c, yet there is a surprising lack of clinical trial findings. Overall, this is a promising multi-target botanical approach to T2DM, and further clinical work will help to drive standardization of dosages and formulations.
**Keywords:** Bioactive compounds; Withaniasomnifera; Diabetes.

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SNUCON020

## A Review on Documentation of Ethno-Medicinal Plants Used by Tribal People in Jharkhand

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**Abstract**
Jharkhand have a plenty of diversity of medicinal plant. The traditional medicine is the first health care of aboriginal as well as local people, represents a strong connection related to natural therapeutic recognized by a specific culture. The main objective of present study is to gather knowledge for future study on medicinal plants including on tree, herbs and shrubs species used in traditional remedial in Jharkhand. The data on pharmacological evidence for medicinal plants previously published in journals, textbooks, magazines and internet site are all based on information collection. This review report states that there are 63 species of medicinal plants belonging to 37 families in the Ranchi region. In between 63 medicinal plants reported in Ranchi, maximum 9 plants from Fabaceae family followed by 7 from *Malvaceae* and minimum 1 plant found from each of the families such as *Acanthaceae*, *Mimosoideae*, *Uglyhuridthis* and *Nyctaginaceae* in Ranchi district. The review also reported that this paper documented 58 herbal formulas used to treat 39 different diseases. These recipes contain 80 plants from 50 families from regions such as East Singhbhoom Simdega, Latehar and Gumla in the state, which have large tribal populations. This study suggests that due to overuse, conservation of medicinal plant is necessary.
**Keywords**: Tribals, Jharkhand, Traditional medicine, Herbal formulation

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SNUCON021

## The GLP-1 Revolution: Evaluating the Clinical Paradigm Shift in Metabolic Syndrome and Obesity Management

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**Abstract**
In 2026, the pharmacological management of obesity underwent a significant transformation, largely driven by the introduction of GLP-1 receptor agonists as a primary therapeutic option. Initially approved for the treatment of Type 2 Diabetes, medications such as Semaglutide and Tirzepatide have demonstrated remarkable efficacy in facilitating substantial and sustained weight loss and improving cardiovascular outcomes. This paper offers a comprehensive analysis of the multi-organ benefits associated with GLP-1 therapies, including their effects on neuro-metabolic signalling and systemic inflammation. Beyond weight reduction, this study further investigates the potential of these "blockbuster" drugs in the treatment of non-alcoholic fatty liver disease (NAFLD) and their emerging role in the mitigation of neurodegenerative pathways. Nevertheless, the expedited clinical adoption of these therapies poses significant challenges to contemporary healthcare infrastructure. This research critically explores the socioeconomic implications, encompassing global supply chain disruptions, the proliferation of compounded alternatives, and the ethical considerations surrounding medicalised weight loss in non-clinical populations. Additionally, the study examines the role of pharmacists in fostering long-term patient adherence and addressing the "rebound effect" associated with therapy discontinuation. As healthcare payers evaluate the long-term cost-effectiveness of high-cost biologics, establishing evidence-based protocols for patient selection becomes imperative. The paper concludes that while GLP-1 agonists constitute a cornerstone of 21st-century metabolic medicine, the formulation of integrated policy frameworks is essential to ensure equitable access and the sustainable management of chronic obesity, thereby guaranteeing that innovation translates into enduring public health benefits.

**Keywords:** Metabolic Intervention Strategies, ncretin-Based Therapeutics, Neuro-Metabolic Modulation, Systemic Anti-Inflammatory Effects, Dual-Agonist Efficacy, Hepatic Steatosis Resolution, Neuroprotective Potential, Healthcare Pharmacotherapeutic Adherenceect.

SNUCON022

## The Rise of Virtual Hospitals: Integrating AI-Driven Remote Monitoring into Post-Digital Healthcare Systems

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**Abstract**
In 2026, the global strain on hospital infrastructure has catalysed a transition from traditional inpatient care to fully integrated "Virtual Hospital" models. This paradigm shift harnesses advancements in Artificial Intelligence (AI), wearable biosensors, and high-speed Body Area Networks (BANs) to deliver acute-level care within patients' home environments. This paper examines the operational and clinical efficacy of Virtual Wards in the management of chronic conditions, including congestive heart failure, chronic obstructive pulmonary disease (COPD), and post-surgical recovery. Data indicate that remote patient monitoring (RPM) can reduce hospital readmission rates by up to 50%, thereby significantly optimising resource allocation within tertiary care centres. A central focus of this study is the role of "AI Copilots" in triaging real-time physiological data and predicting clinical deterioration before adverse events occur. This research explores the technical architecture necessary for seamless data integration between home-based devices and hospital-based electronic health records (EHRs). Additionally, the evolving role of the "Virtual Pharmacist" in managing complex medication regimens and ensuring therapeutic safety in a decentralised setting is addressed. Despite promising technological advancements, implementing virtual hospitals faces several critical barriers, including data governance challenges, digital health disparities, and the need for robust cybersecurity protocols to safeguard sensitive patient information. This paper concludes that virtual hospitals represent not merely a supplementary tool but an essential evolution of the healthcare system. They offer a scalable, patient-centred approach to enhancing long-term health outcomes and bolstering the resilience of the global healthcare landscape.

**Keywords:** Decentralized Healthcare Paradigms, Virtual Hospital Integration, Wearable Biosensor Technology, Remote Patient Monitoring (RPM), AI-Driven Clinical Triaging, Predictive Deterioration Analytics, Body Area Networks (BANs). EHR Interoperability Architecture, Decentralized Pharmacy Management, Digital Health Equity, Data Governance and Cybersecurity, Tertiary Care Resource Optimization, Post-Surgical Remote Recovery.

SNUCON023

## Traditional System of Medication

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**Abstract**
Traditional medicine is also called folk or native healing; while its importance has diminished with Western medical advancements, traditional medicines are a repository of knowledge, skills, and practices accumulated over time within an indigenous society (including India), where it exists in various forms such as Ayurveda. As time passes more new diseases and viruses are discovered; thus finding medical solutions through folk medicines becomes harder and less effective as well. Traditional or complementary (or integrative) medicine is not evidence-based in contrast to modern medicine that was developed by trial-and-error from testing ill people for the best treatments. The six traditional systems of medicine found within India include Ayurveda, Siddha, Unani, Homeopathy, Yoga, and Naturopathy. About 70 percent of India's rural population use traditional Ayurvedic medicines. Collectively these systems are called the Indian Systems of Medicine (ISM), which have played an integral role in global healthcare over time, with significant future potential as well. In its theoretical underpinnings, Ayurveda asserts that there are five basic elements within all human bodies: earth, water, fire, air and vacuum; life is a union between body, senses, mind, and soul. The system has a basis in the theory of the five elements (panchabhoot) as well as three humoral theories (Tridosha), which explain natural philosophy behind the physiology based on biological processes that can be classified into Vata, Pitta or Kapha with balance being essential to health because they control all metabolic functions.
**Keywords -** Traditional medicines, Ayurveda, Modern medicines etc.

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SNUCON024

## Clinical Trial Designs for Complex Herbal Interventions: Methodological Challenges and Innovations

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**Abstract:**
Evaluating the efficacy and safety of herbal medicines through clinical trials involves special methodological challenges due to the nature of their complex composition, individualized prescribing practices, and holistic treatment philosophies. Standard randomized controlled trial designs, which have been developed for single, molecule drugs, typically do not sufficiently capture the therapeutic effects of herbal interventions. This review explores innovative trial designs such as pragmatic trials, whole, systems research approaches, comparative effectiveness studies, and adaptive designs that can accommodate the complexity of herbal medicine practice. We outline various measures that can be taken to overcome major obstacles: generating appropriate placebos for herbal preparations, considering formula changes based on individual diagnosis, identifying holistic outcomes beyond just the reduction of a single symptom, and dealing with inter, batch variability of herbal products. Enrichment designs and responder, adaptive randomization help to maximize the efficiency of clinical research in patient populations that are heterogeneous. Real, world evidence studies and registry, based trials serve as an excellent complement to explanatory trials by assessing the effectiveness of treatments in the routine clinical setting. It is essential to have a good quality control and standardization of herbal interventions, training of investigators in traditional diagnostic methods, and picking of outcome measures that are clinically meaningful. Patient, reported outcomes, quality of life instruments, and biomarker panels deliver a comprehensive assessment of efficacy. The regulatory environment related to herbal medicine trials is different in each country, some countries are introducing specific guidelines for herbal medicine trials. The use of pharmacokinetic sampling, pharmacogenomic analysis, and mechanistic substudies further help to understand treatment variability.
**Keywords:** clinical trials, herbal medicine, study design, complex interventions, evidencebased medicine.

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SNUCON025

## Impact of Electronic Media on Traditional Play and Well-Being of Children Bilaspur Urban and Rural Schools: A Comparative Study

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**Abstract:**
Children's play is a fundamental aspect of healthy physical, psychological, and social development. Traditional play activities have long contributed to children's overall well-being by promoting physical fitness, creativity, emotional stability, and social interaction. However, the rapid growth and widespread availability of electronic media such as smartphones, tablets, computers, television, and video games have significantly transformed children's lifestyles. Excessive engagement with electronic media has been associated with reduced participation in traditional play activities, decreased physical activity, and various adverse effects on children's well-being. The present study aimed to assess the impact of electronic media on traditional play and well-being of children studying in urban and rural schools of Bilaspur and to compare the patterns between the two groups. A quantitative comparative research design was adopted. The sample consisted of 500 school-going children, including 250 from urban schools and 250 from rural schools, selected through a multistage sampling technique. Data were collected using a structured demographic questionnaire, a tool to assess electronic media usage, a checklist for traditional play activities, and a standardized well-being scale. Ethical clearance was obtained, and informed consent was taken from school authorities, parents, and children prior to data collection.The findings revealed that children with poor vision predominantly belonged to the minimal positive impact category (16.0%), while fewer children showed moderate (6.0%) and optimum positive impact (2.0%) of electronic media. The calculated chi-square value ($\chi^2 = 28.64$) was greater than the table value (9.49) at the 0.05 level of significance, indicating a statistically significant association between vision status and the impact of electronic media. The study concluded that excessive electronic media usage positively affects traditional play and well-being, with vision status playing a significant influencing role.
**Keywords:** Electronic media, Traditional play, Well-being, School-going children, Urban and rural schools, Vision status.

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SNUCON026

## Role of Indian Knowledge System in preventive and personalized medicine from Culinary Traditions to Preventive Care: Indian Spices in Everyday

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**Abstract:**
The Indian Knowledge System (IKS) represents a great and holistic framework for human health, distinguishing itself by prioritizing preventive care, systemic equilibrium, and the integration of conscious daily lifestyle practices. Central to this comprehensive approach is the strategic utilization of Indian spices, which are revered not simply as culinary flavour enhancers, but as essential pharmaceutical agents capable of health maintenance and disease prevention. Deeply rooted in traditional systems such as Ayurveda, the therapeutic application of these spices is highly complex; it is governed by a nuanced understanding of an individual's unique constitution, their digestive capacity, and the shifting environmental dynamics of seasonal changes. This personalized methodology stands in contrast to standardized, one-size-fits-all dietary recommendations often found in modern approaches.Common household spices specifically turmeric, ginger, cumin, coriander, black pepper, garlic, Asafoetida, Fenugreek, Carom seeds, Fennel seeds, Nutmeg, Cardamom, cayenne pepper, mustard seeds, cinnamon, and clove are examined in this study for their potent bioactive profiles. Contemporary research increasingly validates their roles as powerful digestive aids, anti-inflammatories, and antioxidants. The systematic inclusion of these functional ingredients in daily nutrition serves to optimize metabolic balance, fortify the immune system against pathogens, and significantly mitigate the rising global burden of lifestyle-related disorders such as hypertension and metabolic syndrome. This study aims to bridge the historical gap between these classical IKS principles and modern scientific validation. By correlating indigenous culinary wisdom with evidence-based health perspectives, this paper highlights how Indian spices offer a sustainable, culturally grounded, and cost-effective strategy for public health. Ultimately, this work reinforces the critical necessity of reviving traditional dietary practices as a cornerstone of modern preventive health models and comprehensive well-being.
**Keywords:** IKS (Indian Knowledge System**),** Culinary traditions, Ayurveda, Pathogens.

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SNUCON027

## Antimicrobial Effects of Berberis aristata and Its Influence on Modern Herbal Medicine

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**Abstract**
*Berberis aristata* (Indian barberry) has been widely used in traditional medicine, and recent research has underscored its significant antimicrobial potential. The primary bioactive compound, berberine, demonstrates broad-spectrum activity against bacteria, fungi, and protozoa. Mechanistic studies reveal that berberine disrupts microbial cell walls, inhibits nucleic acid synthesis, and interferes with quorum sensing, thereby reducing the pathogenic virulence of these organisms. These properties highlight *B. aristata* as a promising candidate in combating antimicrobial resistance, a major global health challenge. In modern healthcare, standardized extracts of *B. aristata* are increasingly incorporated into herbal formulations for gastrointestinal, dermatological, and oral health applications. Advances in phytopharmaceutical technology, including nano formulations and synergistic blends, have improved its bioavailability and therapeutic efficacy. Emerging evidence also suggests its potential as an adjunct to conventional antibiotics, offering complementary strategies to enhance treatment outcomes and reduce resistance development. This paper reviews recent findings on the antimicrobial effects of *Berberis aristata* and explores its translational relevance in contemporary herbal medicine. While its therapeutic promise is evident, challenges remain in ensuring quality control, regulatory harmonization, and clinical validation. Addressing these gaps is essential for its safe and sustainable integration into healthcare systems. By bridging traditional knowledge with modern scientific approaches, *Berberis aristata* exemplifies how herbal medicine can contribute to innovative, holistic, and patient-centered solutions in global healthcare.
**Keywords**: *Berberis aristata*; berberine; antimicrobial resistance; herbal medicine; phytopharmaceuticals; modern healthcare.

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SNUCON028

## The Neuroprotective and Anxiolytic Profile of β-Caryophyllene: A Mechanistic Review of Cannabinoid type 2 receptor Mediated Up regulation of Endogenous Antioxidants (GSH/SOD) and GABAergic Signalling

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**Abstract:**
β-Caryophyllene (BCP) is a very important dietary sesquiterpene that is found in abundant amounts of *Ocimum tenuiflorum* (Rama Tulsi) and other herbal plants. In the context of Modern Neuroscience, it has emerged as a promising phytocannabinoid. Its main function or mechanism of action is mainly based on neuroprotection and anxiety management. BCP mainly displays selective agonism towards Cannabinoid type 2 (CB2) receptors, which helps to defense anxiety by reducing inflammation of the central nervous system. BCP's lipophilicity is highly developed compared to other classical cannabinoids, which helps to penetrate Blood - Brain Barrier (BBB) easily without any psychoactivity; for this particularity it is called "dietary cannabinoid." This mechanistic review discusses the dual-pathway neuroprotective effects of BCP, mainly in the brain's hippocampus and prefrontal cortex regions. First, CB2 receptor activity triggers directly Nrf2 translocation, resulting in the up regulation of internal antioxidant enzymes such as Glutathione (GSH) and Superoxide Dismutase (SOD). This process helps prevent oxidative stress-induced neuronal damage caused by chronic stress. Secondly, BCP maintains GABAergic and serotonergic neuronal integrity in the brain. It mainly displays anxiolytic-like behavior by modulating GABA*A* and 5-HT1A receptor signaling. Comparative analysis with Benzodiazepines shows that the side-effect profile of BCP is much safer; it is able to provide effective anxiolytic efficacy without any sedation, cognitive impairment or dependence liability. Although the therapeutic potential in the animal model proved, human neuropsychiatric application is still limited due to lack of adequate clinical trials. This review analyzes the neuroprotective mechanism of BCP and highlights its importance as a novel natural alternative in anxiety disorder management, as well as emphasis on the need for clinical investigation in the future.
**Keywords:** Beta-Caryophyllene (BCP), CB2 Receptor Agonist, Neuroprotection, Blood-Brain Barrier (BBB), Oxidative Stress (GSH/SOD), Anxiolytic Efficacy.

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SNUCON029

# Adulteration and Substitution in Herbal Medicines: Analytical Techniques for Quality Assurance

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**Abstract:**
However, adulteration and substitution are significant factors of quality and safety in the global marketplace of herbal medicine and are necessitated by economic conditions, lack of the species, and morphological similarities between botanicals. The following types of adulteration are listed in this review; intentional additions of synthetic drugs or prohibited substances, substitution of synthetically related and therapeutically inferior or poisonous species, dilution with inactive fillers and processing contamination. Identification of processed herbs has been of primary concern particularly with sensitive herbal materials when morphological identification is not feasible. The old methods of using organoleptic and microscopic methods also though helpful have been found to be limited in the identification of complex adulteration. The modern means of analysis have potent solutions: DNA barcoding with ITS2, matK and rbcL genetic markers are possible to determine the species on a species level even in highly processed products and metabarcoding techniques can determine more than a single species in a complex formula. HPTLC involving the fingerprint analysis is a low cost technique of chemical profiling. The non-destructive analysis is fast and it can be done using powerful spectroscopic methods, including near-infrared (NIR), mid-infrared (MIR), and Raman spectroscopy with chemometrics analysis. Hyphenated procedures, HPLC-MS, GC-MS and UHPLC-QTOF-MS, provide a wide range of chemical property and identities of those undeclared synthetic adulterants such as sildenafil, sibutramine and corticosteroids. Novel technologies like nuclear magnetic resonance (NMR) metabolomics, which are used to analyze stable isotopes and handheld devices to test in the field are taken into consideration. It implies quality management systems where orthogonal methods of analysis are diverse, standardization of reference material and supply chain transparency through the aid of blockchain technology. Regulatory measures, proper manufacture of goods, international cooperation in an agency like WHO and INTERPOL are all prerequisite to overcome this prevalent state and protection of health of consumers.
**Keywords:** adulteration, herbal authentication, DNA barcoding, analytical chemistry, quality assurance.

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SNUCON030

# Effect of Dry heat treatment on the physicochemical, rheological properties of starch-anionic gummixture

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**Abstract**
The present study investigates effect of dry heating at 110°C for different heating times (2, 4 and 6 hrs) on potato starch combined with an ionic gum. Dry heating enhanced the water and oil binding capacity while decreasing its solubility and swelling power of the mixture. X-ray diffraction showed that the B-type crystallinity of the mixture remained unaltered, but their relative crystallinity decreased. Furthermore, FESEM showed surface cracking caused by heat treatment, whereas the cracks decreased after the sample was heated for 6hrs with the gum. Amylose leaching and a reduction in intergranular spacing induced by dry heating led to agglomeration of starch granules. The viscosity of dry heated anionic gum-starch mixture samples exhibited pseudoplastic shear-thinning behaviour which suggests that dry heat treatment with anionic gum improves the granule rigidity of starch. Additionally, it showed that the storage modulus of starch-gum mixture has significantly improved by dry heat treatment for 6 hrs. The present study provides the fundamental information to promote the starch-gum application further making it suitable to be used as a food thickener, stabilizer, binder, and texture enhancer.
**Keyword:** Potato starch, Anionic gum, Dry heating, Physicochemical properties, Rheology.

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SNUCON031

## Effect of Different Combinations of C16 Fatty Acid and C18 Fatty Acid on Olive Oil-Based Oleo Gel

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**Abstract**
Increasing awareness of the negative health impacts associated with conventional fat-rich foods has driven interest in healthier lipid alternatives, such as oleo gels, which function as innovative oil-structuring systems in functional food applications. In this study, olive oil–based oleo gels were developed using blends of ricinolein acid (RA) and palmitic acid (PA) at different ratios to examine the combined influence of these fatty acids on oleo gel structure and functionality. The various properties of oleo gels were evaluated through oil binding capacity, hardness, rheological behaviour, texture analysis and structural characteristics were further investigated using (XRD), (FTIR). Microscopic analysis revealed that the incorporation of palmitic acid significantly altered the oleo gel microstructure by promoting the formation of elongated, needle-shaped crystals that contributed to a dense and interconnected network. XRD and FTIR results indicated that the PA-rich oleogum displayed broader and weaker diffraction peaks, suggesting reduced crystallinity, which was consistent with the observed microstructural features. The shift in the carbonyl stretching band confirmed the presence of hydrogen bonding interactions between ricinolein and palmitic acids. Oxidative stability studies demonstrated that oleo gels prepared with intermediate RA–PA ratios exhibited lower peroxide values during storage, indicating enhanced resistance to lipid oxidation. Overall, the findings demonstrate that Oleo gelation effectively stabilizes oil by immobilizing it within a structured matrix, highlighting its potential application in commercial food systems to improve oil stability, product quality, and shelf life.
**Keywords**: Ricinolein acid, Palmitic acid, Oleo gel, Olive oil, Microstructure.

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SNUCON032

## Formulation and Evaluation of a Herbal Face Wash from Pomegranate (*Punica granatum*) Peel Waste

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**Abstract:**
The present study aimed to formulate and evaluate a herbal face wash using waste pomegranate (*Punica granatum*) peel, promoting sustainable utilization of agro-waste. Dried pomegranate peel was subjected to morphological, physicochemical, and phytochemical evaluation prior to formulation. The peel showed a reddish-brown color, rough texture, and astringent nature. Preliminary studies revealed a water extractive value of 21.12%, total ash value of 9.3%, moisture content of 34.57%, and loss on drying of 4.5%, all within standard limits. The aqueous extract exhibited a pH of 6.59, suitable for topical use. Phytochemical screening confirmed the presence of alkaloids, carbohydrates, saponin glycosides, and tannins. Two formulations (F1 and F2) were evaluated for pH, washability, spreadability, foam stability, and stability. Formulation F1 showed better washability and acceptable foam stability. Both formulations were stable and comparable to a marketed product. The study demonstrates the potential of pomegranate peel waste for developing an effective and eco-friendly herbal face wash.
**Keywords:** Pomegranate peel, Herbal face wash, Agro-waste utilization, Phytochemical screening, Cosmetic formulation, Sustainability.

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SNUCON033

## In vitro - In vivo Evaluation of Hybrid Polymeric Nanofiber based scaffolds.

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**Abstract:**
Diabetic wounds are characterized by prolonged inflammation, oxidative stress, impaired angiogenesis, and delayed tissue regeneration, necessitating advanced biomaterial-based wound dressings. In the present study, hybrid polymeric nanofiber scaffolds were developed and evaluated *in vitro* and *in vivo* for diabetic wound healing applications. The nanofibers were fabricated using Amaranthus seed starch, silk protein, and tannic acid via the electrospinning technique. Amaranthus seed starch provided a biodegradable, hydrophilic polysaccharide matrix with excellent swelling and moisture-retention capacity, while silk protein imparted structural integrity, mechanical strength, and enhanced cell adhesion. Tannic acid was employed as a natural crosslinking and bioactive agent, contributing antioxidant and antimicrobial properties. The physicochemical and morphological characteristics of the nanofibers were assessed using FTIR, FESEM, AFM, and contact angle analysis. *In vitro* evaluations, including swelling behaviour, water vapor transmission rate, antioxidant activity, hemocompatibility, and antimicrobial studies, demonstrated that the hybrid nanofibers possess favourable wound-healing attributes and excellent biocompatibility. The scaffolds exhibited high free-radical scavenging activity and effective inhibition of pathogenic microorganisms, essential for managing chronic diabetic wounds. *In vivo* wound-healing efficacy was investigated using a diabetic rat model. The nanofiber-treated wounds showed significantly accelerated wound closure, enhanced granulation tissue formation, improved collagen deposition, and reduced inflammatory response compared to control groups. Histopathological analysis further confirmed improved re-epithelialization and neovascularization. Overall, the developed Amaranthus seed starch–silk protein–tannic acid hybrid nanofiber scaffold demonstrates significant potential as an effective, eco-friendly, and biocompatible wound dressing for diabetic wound management.
**Keywords:** Diabetic wound healing; Electro spun nanofibers; Amaranthus seed starch; Silk protein; Tannic acid; Hybrid polymeric scaffold; In vitro–in vivo evaluation; Wound dressing.

SNUCON034

## Integration of Pharmacogenomic Decision Support Tools in Community Pharmacy Practice: A Systematic Review of Implementation Strategies, Barriers, and Patient Outcomes

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**Abstract:**
The integration of pharmacogenomics into community pharmacy practice represents a significant advancement in personalized medicine, yet its implementation remains challenging. This systematic review examines the current landscape of pharmacogenomic decision support tools in community pharmacy settings, analyzing implementation strategies, barriers, and their impact on patient outcomes. We conducted a comprehensive search across major databases including PubMed, Scopus, and Embase from 2015 to 2024, identifying 47 eligible studies that met our inclusion criteria. The analysis revealed that successful implementation of pharmacogenomic decision support tools is heavily dependent on three key factors: technological infrastructure, pharmacist training, and workflow integration. Studies demonstrated that pharmacies utilizing integrated decision support systems reported a 45% improvement in identifying potential drug-gene interactions and a 38% increase in therapeutic modifications based on genetic profiles. However, significant barriers persist, including high initial implementation costs (reported by 78% of studies), limited insurance coverage for testing, and varying levels of physician acceptance. Patient outcomes analysis showed promising results, with a 32% reduction in adverse drug reactions and a 28% improvement in medication adherence when pharmacogenomic-guided therapy was implemented. Notably, community pharmacies that successfully integrated these tools reported increased patient satisfaction scores (mean improvement of 4.2 on a 5-point scale) and better therapeutic outcomes, particularly in cardiovascular and psychiatric medication management. The review also highlights emerging implementation models, including hub-and-spoke systems and collaborative practice agreements, which have shown promise in overcoming resource limitations in smaller community pharmacies. Despite these advances, standardization of pharmacogenomic data interpretation and clinical decision support alerts remains a critical need. This review provides a comprehensive framework for community pharmacies considering pharmacogenomic service implementation and identifies areas requiring further research and development.
**Keywords:** Pharmacogenomic Implementation, Community Pharmacy Services, Clinical Decision Support Systems, Medication Therapy Management, Personalized Medicine Integration.

SNUCON035

## Toxicological Assessment of Traditional Herbal Medicines: Modern Methodologies and Safety Biomarkers

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**Abstract:**
To perform a thorough toxicological evaluation of traditional herbal medicines, to address the challenges of botanical products, a set of classical paradigms of toxicity testing will be required in conjunction with the new concept of methodology. The review is an overview of the existing strategies of toxicological assessment that comprise acute, subacute, subchronic and chronic toxicity testing as per the OECD principles, and special assessment of genotoxicity, reproductive toxicity and carcinogenicity. The alternative-testing methods are discussed, like the in vitro cell-based tests, the organoid and three-dimensional cultures, and the computational toxicology (QSAR, read-across) methods to minimize the use of animals but maintain the predictivity. Omics methods (genomics, transcriptomics, proteomics, and metabolomics) allow the uncovering of how toxic are the pathways and new safety biomarkers that are specific to the exposure to herbal medicine. Especially, the focus is on the organ, specific biomarkers of toxicity: liver injury (alanine aminotransferase, alanine aspartatase, miR, 122, HMGB1), kidney injury (NGAL, clusterin, KIM, 1), heart damage (cardiac troponins, natriuretic peptides). The article describes the issues that are peculiar to herbal medicine toxicology, including chemical complexity, multiple constituent interactivities, variability in raw material, and traditional preparation which can affect toxicity profiles. Quality control and phytochemical characterization Standardization of test material is identified as a mark of a reproducible toxicology. New approaches are proposed to be elaborated to incorporate adverse outcome pathways (AOPs), physiologically based pharmacokinetic (PBPK) modeling, and systems biology integrations in the overall assessment of safety. It provides several recommendations on how toxicology threshold and acceptable values of daily intake and risk-based safety margins that apply to specific herbal medicines should be established.
**Keywords:** toxicological assessment, herbal medicines, safety biomarkers, alternative methods, systems toxicology.

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SNUCON036

## Natural Polymer Based Composite System for Localized Wound Healing

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**Abstract**
Biomaterials that can provide antibacterial protection, moisture balance, and prolonged therapeutic administration are necessary for localised wound healing. In order to improve wound care, a grafted copolymer composite system based on Natural Plant Gum like Neem gum, Catechu Gum, was created in this work and electrospinning into nanofibrous mats. Graft copolymerisation was used to chemically alter jamun gum, which was chosen for its inherent antioxidant qualities, film-forming capacity, and biocompatibility, in order to enhance its mechanical strength and functional performance. Based on intrinsic viscosity, rheological properties, and grafting efficiency percentage, the grafted polymer was optimised. Successful grafting, partial crystallinity, and improved thermal stability of the composite were verified by physicochemical and analytical characterisations (FTIR, XRD, OCA, and TGA). Studies on swelling and biodegradation showed pH-responsive behaviour appropriate for situations with chronic wounds. Studies on drug loading and controlled release showed a non-Fickian diffusion mechanism and sustained therapeutic release over a 24-hour period. Common wound pathogens were effectively inhibited by antibacterial tests. Overall, the Jamun gum–based grafted copolymer complex system using electrospinning presents a promising, biocompatible material for localized wound healing, offering structural stability, controlled drug release, and antimicrobial potential. Further in vivo and clinical trials are needed to confirm its efficacy and acceptability in real-world use.
**Keywords:** Natural graft copolymer, electrospinning, wound healing, nanofibers, controlled drug release, biocompatibility.

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SNUCON037

## Circular Economy Principles in Herbal Medicine Industry: Waste Valorisation and Sustainability

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**Abstract:**
Herbal medicine business creates a lot of biomass wastes in the process of growing, extracting and processing, which poses a challenge to the environment as well as creating untapped economic potentials. By applying the principles of a circular economy, this paradigm can be changed by redefining waste streams as assets rather than wastes, which will increase sustainability and economic feasibility. The reviewed paper looks at novel approaches to valorize waste in the herbal medicine value chain, starting with agricultural residues, all the way to post-extraction biomass. Waste discharged in the agriculture sector such as stems, leaves and roots that are not used in pharmaceutical manufacturing have remaining bioactive compounds, lignocellulosic substances and nutrients that can be cascadably utilized. The remains of extraction that are traditionally disposed after processing contain important amounts of polyphenols, dietary fibers, and other value-added compounds that can be obtained under sequential extraction regimes, enzymatic treatments, or supercritical fluid technologies. Applications Valorization is used to produce dietary supplements, cosmetics, natural colorants, biofertilizers, biopesticides, animal feed additives, biodegradable packaging, anaerobic digestion or pyrolysis to produce bioenergy. The industrial symbiosis models promote the exchange of resources across sectors with the herbal medicine waste being the feedstock of the complementary industries. Organic waste is recycled into nutrient-containing amendments to soil through composting and vermicomposting, enabling agricultural nutrient cycles to be closed. The reduction of environmental burden and the better use of resources through waste valorization is demonstrated with the life cycle assessment and techno-economic analyses. Nevertheless, technological scalability of the implementation, quality standardisation of the products obtained by using waste, regulatory frameworks, and economic viability are some of the barriers to implementation. The future directions are based on concepts of biorefinery, which combines several valorization routes, digital waste management, policy-based incentives to promote a cyclic economy, and corporate partnerships that encourage the ecological nature of the industry in terms of herbal products.
**Keywords:** circular economy, waste valorization, herbal medicine industry, biorefinery, sustainability.

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SNUCON038

## Multi-Omics Integration (Genomics, Proteomics, Metabolomics) in Herbal Medicine Research

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**Abstract:**
Herbal medicines are multicomponent and highly complex in chemicals, so analytical methods that are simple, single platforms would not be sufficient to elucidate the nature of these compound products. Multi-omics integration is the use of genomics, transcriptomics, proteomics, and metabolomics to give a comprehensive understanding of the complexity of encompassing the entire molecular processes of therapeutic effects in medicinal plants. This article offers approaches to the creation, processing, and combining different omics analysis to clarify biosynthetic reactions, determine pharmacologically active elements and comprehend pharmacodynamic reactions. We study the fields of genome sequencing and gene expression profiling in order to describe what medicinal plants are able to do by way of biosynthesis and how they react to environmental conditions and the effect of these on secondary metabolite synthesis. Protein targets, signalling cascades, and post-translational modifications that take place in response to herbal treatments are revealed by proteomics methods. The patterns of absorption, distribution, metabolism and excretion of phytochemical constituents are mapped out using metabolomics and pharmacokinetics studies. Animal models such as computational tools such as network analysis, pathway enrichment, machines learning algorithms help to incorporate data and generate hypothesis. Its uses in quality checking, authentication and standardization of herbal products are presented. Multi-omics research has been able to identify combination synergies of compounds, to understand the how of traditional formulations and can find biomarkers to use as personalized herbal medicine. Such issues as data heterogeneity, statistical complexity, problems of reproducibility, and necessity of specific bioinformatics knowledge are the challenges. Current trends include single-cell omics, spatial transcriptome and combining with clinical phenotypic data to achieve herbal medicine at a precision level.
**Keywords:** multi-omics, metabolomics, genomics, proteomics, systems biology

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SNUCON039

## Blockchain Technology for Authentication and Traceability in the Herbal Medicine Supply Chain

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**Abstract:**
The market of global herbal medicine suffers serious issues of adulteration, counterfeiting, and lack of transparency in the supply chain which is reducing quality of products and endangering patients' safety. The revolutionary solution of blockchain is to provide herbal products with the immutable, transparent, and decentralized tracking systems throughout cultivation to the consumer. This paper will discuss blockchain applications that establish digital ledgers that are immutable and document all transactions and transformations along the supply chain of herbal medicine. Smart contracts facilitate quality certification and Good Agricultural Practices checks, as well as calculate authenticity at every supply chain point in an automated way. We analyze pilot projects that prove the ability of blockchain to track medicinal plant species field of certified farms through processing plants, manufacturers, distributors, and retail pharmacies where full provenance visibility is provided. Internet of Things (IoT) sensors are integrated to monitor the storage conditions (temperature, humidity, light exposure) in real time and automatically record the data in blockchain and ensure that post-hoc manipulations cannot be made. Quick Response (QR) code systems are connected to blockchain databases that enable consumers to identify the authenticity of a product and track the entire supply chain history through apps on their smartphone devices. The examples of Traditional Chinese Medicine and Ayurvedic product supply chains provide case studies of the successful use of distributed ledger technologies in the fight against fake goods and their origin in a recall. Technical factors such as consensus mechanism, scalability problem, interoperability standards and energy use of blockchain networks are considered. There are regulatory implications, privacy issues of data, implementation, and barriers to adoption by stakeholders. This technology will promise to reinstate the confidence of the consumer to the safeguard of intellectual property and hold accountability within the intricate global herbal medicine supply chain.
**Keywords:** blockchain, supply chain, traceability, authentication, quality assurance

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SNUCON040

## Quality Control and Standardization Protocols for Herbal Medicines: Bridging Traditional Practices with Pharmaceutical Standards

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**Abstract:**
Strong standardization procedures are highly vital to safeguard and safeguard the quality of herbal medicine which is not incompatible with traditional practices and protocols of modern pharmaceutical standards. This paper has described different quality control techniques of raw material authentication/phytochemical standardization, high-performance liquid chromatography (HPLC), and gas chromatography-mass spectrometry (GC-MS) are critical in determining the correct quantification and adulterants. Molecular authentication methods are applied as a supplement to standard organoleptic assessment. Properly controlled Good Manufacturing Practices (GMP) is suggested to regulate the phytochemical content of the material that has been planted. In addition, comparative accounts of the International Guidelines, which are denoted by the World Health Organization (WHO) and the European Medicines Agency (EMA). Multi-component standardization methods are more indicative of the herbal formular holistic nature as opposed to single market compound. The new technology such as the use of block chain-based quality tracking system to ensure rapid quality and transparency. Lastly, seasonal variations and shortage of reference standards have been suggested to be implemented using a consistent quality assurance program.
**Keywords:** quality control, standardization, HPLC, authentication, Good Manufacturing Practices.

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SNUCON041

## Development And Validation of Methotrexate Drug by Using Uv Spectrophotometry Method

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**Abstract:**
A cost-effective, straightforward, accurate, and exact stability indicator for UV. The greatest λmax at 303 nm is observed in the spectrophotometric approach developed for the determination of methotrexate. The linear response, exhibiting a strong association value ($r^2$ = 0.9987), demonstrated the applicability of the method following Beer-Lambert's law is applicable in the concentration range of 2–10 µg/mL, with recovery results that are nearly 100% and minimal standard deviation values. The ICH Q1A (R2) criteria were followed in the validation of the suggested spectrophotometric approach. This method can thus be applied to risk-free routine chores.
**Keywords:** Methotrexate, UV SPECTROSCOPY, beer lambert's law.

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SNUCON042

## Gut Microbiome Modulation by Herbal Medicines: Prebiotic Effects and Therapeutic Implications

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**Abstract:**
Mounting evidence shows that the therapeutic effect of most herbal medicines is mediated by the alteration of the composition and metabolic activity of the gut microbiome. The present review analyses Bidirectional interrelation between herbal medicines and intestinal microbiota (prebiotic efficacy and bioactivation of phytochemicals microbiome dependent). Mechanisms through which herbal polysaccharides, polyphenols, alkaloid, and other components stimulate the proliferation of beneficial bacteria like Bifidobacterium, Lactobacillus and Akkerman Sia and inhibit the growth of pathogenic organisms are analysed. Biotic reaction of herbal substances in microbes can produce derivatives with improved bioavailability and biological action when in comparison with parent materials. More sophisticated sequencing techniques, metagenomics, and metabolomics have identified changes in the microbiomes in relation to herbal interventions in metabolic diseases, inflammatory bowel disease and neuropsychiatric diseases. Some of the major mechanisms by which herbal medicines have systemic effects include the gut-brain axis, gut-liver axis and the microbiome-immune crosstalk. Individual sensitivity to herb-based treatment is partly attributed to inter-individual change in microbial composition. We address the growth of symbiotic in which herbal prebiotics and probiotics are jointly utilized to achieve the targeted application in a therapeutic manner. Among these, there are difficulties in establishing causality, standardizing the protocols of microbiome analysis and addressing confounding factors of diet and lifestyle. The directions of future research would be precision medicine methods based on personal microbiome analysis and the development of herbal formulations that would be optimally adapted to positive microbiome changes.
**Keywords:** gut microbiome, herbal medicine, prebiotics, microbiome modulation, phytochemical biotransformation.

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SNUCON043

## 3D Printing Technologies for Customized Herbal Medicine Dosage Forms

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**Abstract:**
The three-dimensional printing technology is transforming the practice of pharmaceutical manufacturing, where personalized herbal medicine dosage forms can be produced on demand and in the correct dosage to meet individual patient needs. This novel solution will overcome the drawbacks of traditional production that results in denser formulations that cannot be used in precision medicine. We critically examine 3D printing strategies that can be used to herbal pharmaceuticals, such as fused deposition modeling, inkjet, selective laser sintering, and binder jetting, with respect to their applicability in various phytochemical attributes and dosage form considerations. Other important factors are thermal stability of heat-reactive phytochemicals during heat extrusion, solubility properties of ink formulations, and mechanical properties of printed constructions. The ability to customize drugs allows accurate customization of dosing according to pharmacogenomic profiles, age-specific needs, disease conditions, and polypharmacy factors, which are especially useful with pediatric and geriatric patients. Multimaterial printing makes it possible to produce complex geometries with immediate-release and sustained-release compartments, which can be used to formulate sophisticated pharmacokinetic profiles and herbal-conventional drug product combinations. We provide case studies of successful 3D-printed tablets with embedded standardized herbal extracts with controlledrelease properties, chewable formulations with better palatability to children, and customized polypills with a combination of various herbs. Special quality control approaches that are unique to 3D-printed pharmaceuticals, such as content uniformity testing, dissolution testing, and mechanical strength testing, are mentioned. The regulatory routes of individualized 3Dprinted drugs, such as point-of-care pharmacy manufacturing in hospitals, are discussed. Among the challenges include the scarcity of material to be used in printing pharmaceuticals, scalability issues, validation, and high start-up costs. The technology has the potential to make personalized herbal therapies democratic.
**Keywords:** 3D printing, personalized medicine, dosage forms, pharmaceutical technology, additive manufacturing.

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SNUCON044

## Digital Health Technologies and Mobile Applications for Herbal Medicine Consultation and Monitoring

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**Abstract:**
Digital health tools and smartphone apps are gradually reshaping the use of herbal medicines through increased accessibility, easier treatment monitoring, and the provision of evidence, based guidance to both practitioners and patients. This paper gives an overview of how digital innovations have influenced various aspects of herbal medicine including telemedicine services offering remote herbal consultations, symptom checker apps powered by artificial intelligence, plant recognition apps and herbal medicine databases integrated with electronic health records. Patients can benefit from mobile applications that not only recommend personalized herbal treatments but also provide dosage calculation, medication reminder, and symptom tracking functionalities that allow patients to assess the effectiveness of the treatment and any side effects rigorously. We scrutinize the options of top, rated apps such as a photographic herb identification feature which uses image recognition algorithms, an herb, drug interaction checker capable of screening patient medication lists, and constitution assessment tools that are based on traditional diagnostic methods. Clinical decision support (CDS) tools can provide clinicians with evidence, based abstracts, alerts on contraindications and treatment protocol recommendations that have been extracted from guidelines of clinical practice and systematic reviews. Additionally, wearable devices and IoMT gadgets collect continuous real, time data on physiological parameters and thus can enable health practitioners to track the correlation between herbal therapies and objective health parameters such as heart rate variability, sleep quality, and levels of physical activity. The use of blockchain technology in healthcare platforms guarantees data security, patient privacy, and secure sharing of electronic health information across healthcare providers. Some of the challenges faced in the field include determining the clinical accuracy of automated suggestions, resolving the issues of liability, and finding ways to bridge the digital divide.
**Keywords:** Digital health, mobile applications, telemedicine, health monitoring, clinical decision support

SNUCON045

## Synthetic Biology and Biosynthetic Pathway Engineering for Sustainable Production of Rare Phytochemicals

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**Abstract:**
Rare phytochemicals that have strong therapeutic potential are frequently found in low concentration in their natural plant sources, which restricts their clinical use and business feasibility. The engineered biosynthetic pathways in conjunction with synthetic biology methods are applicable as an alternative to extracting and chemically constructing plants. This paper examines the reconstitution of entire biosynthetic pathways in microbial chassis organisms including Escherichia coli, Saccharomyces cerevisiae and Yarrowialipolytica in heterologous production of valuable phytochemicals. We consider such strategies as codon optimization, enzyme screening, metabolic flux balancing, and cofactor regeneration systems to increase productivity. The fact that recent breakthroughs have been made in generating taxol precursors, cannabinoids, opioid alkaloids and complex terpenoids illustrates that this strategy is possible. Pathway optimization is boosted by the usage of computer-aided design software, machine learning, and by high-throughput screening. Complementary platforms The Cell-free biosynthesis systems: Cell-free biosynthesis can be used as a complement to plant cell suspension cultures to produce individual classes of compounds. Economic studies show that there is competitive cost of production against agricultural sourcing of different compounds. There is a discussion on regulatory issues, intellectual property systems and quality control guidelines of biosynthetically produced phytochemicals. This bio-manufacturing paradigm shift works around the supply chain weaknesses, the environmental sustainability issue, and is able to make new derivatives with better pharmacological characteristics.
**Keywords:** synthetic biology, biosynthetic pathways, phytochemicals, metabolic engineering, heterologous expression

SNUCON046

## Phytopharmaceutical Development: Translating Traditional Formulations into Evidence-Based Medicines

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**Abstract:**
Switching the old method of herbal preparation to the standardized phytopharmaceutical products demands stringent scientific justification, quality control measures, and legislative adherence and maintenance of therapeutic effect. This rigorous review discusses the multidisciplinary approach of phytopharmaceutical development in terms of ethnopharmacological records up to preclinical research studies to clinical confirmation and market approval. Our strategies to botanical authentication, chemical fingerprinting, and active markers or marker compounds that provide batch-to-batch consistency are analysed. The pharmaceutical formulation development focuses on the bioavailability issues with the introduction of new delivery systems such as nanoparticles, liposomes, phytosomes, and sustained-release matrices. The preclinical safety testing uses acute, subchronic, chronic toxicity tests, genotoxicity testing, as well as reproductive toxicology according to the international standards. Pharmacodynamics and Pharmacokinetic studies explain the absorption, distribution and metabolism, excretion and doseresponse. Clinical development occurs after undergoing the phase trials that prove safety, efficacy and superiority or noninferiority to the current therapies. Various jurisdictions have various regulatory pathways, including traditional-use registration of Europe Medicine Agency, the botanical drug guidance of FDA, and other national herbal product regulation models. Real life safety and efficacy data are evidenced by post-marketing surveillance and pharmacovigilance systems, and comparative effectiveness research. Examples of successful ones have been Veregen 2 registration (sinecatechins), Fulyzaq (crofelemer), and countless varieties of standardized extracts accepted in the European region. Some of the challenges are intellectual protection, high development cost and cultural acceptance. Evidence-based medicines that are available to the world populations are formed by the combination of traditional knowledge and modern pharmaceutical sciences.
**Keywords:** phytopharmaceuticals, drug development, standardization, regulatory approval, evidence-based medicine

SNUCON047

## Artificial Intelligence and Machine Learning Applications in Herbal Drug Discovery and Formulation Optimization

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**Abstract:**
Based on a hybrid linguistic paradigm, the combination of Artificial Intelligence (AI) and machine learning (ML) is a paradigm shift in herbal drug discovery. This immense amalgamation of the old botanical science, and the newest algorithms in the contemporary world of science has quickened the marking procedure of bioactive substances. The structure activity relations, predictions, have shown unparalleled success of deep learning models, particularly convolutional and recurrent neural networks models, in the task of predictions, enabling the possibility of conducting virtual screening of large phytochemical libraries. Through algorithms, natural language processing (NLP) has been obtained to extract data on historical ethnobotanical databases, which assists in the screening of candidates of therapeutic formulations in a traditional formulation. In addition, machine learning algorithms are capable of analysing the mathematical relationship between the pharmacological activities and chemical fingerprints that already exists. The Quantitative structure-activity relations (QSAR) models are developed with the help of AI that is particularly efficient in the calculation of therapeutic properties of lead compounds. These computational methods have minimized time and costs instead of the Traditional method, which is the Trial and error. Certain issues concerning the liquid data quality and model interpretability, nevertheless, AI and herbal medicine have opened up a new horizon that revealed the potential of vegetable resources in therapy. Scientific rigor and reproducibility have been enhanced to a distinct level by this process of scientific evolution.
**Keywords:** Artificial intelligence, machine learning, drug discovery, phytochemicals, formulation optimization

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SNUCON048

## Nanotechnology & Physics of Enhanced Bioavailability: Bridging Ayurvedic Wisdom and Modern Phyto-therapeutics

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**Abstract:**
The global resurgence of herbal medicine is currently limited by the poor pharmacokinetic profiles of bioactive phytoconstituents-most notably their low aqueous solubility and rapid first-pass metabolism. This research explores the synergy between the Indian Knowledge System (IKS) and modern phyto-nanotechnology to overcome these barriers. By applying principles of condensed matter physics and surface chemistry, we analyze how the reduction of herbal extracts to the nanoscale (1–100 nm) drastically alters their bio-interaction. The study investigates the physics of the Noyes-Whitney equation, which describes the relationship between particle surface area and dissolution rate: $dC/dt = DA(Cs - C)/h$ where $dC/dt$ represents the dissolution rate, D the diffusion coefficient, A the surface area, and Cs the saturation solubility. Our findings demonstrate that by utilizing lipid-based nanocarriers and green-synthesized gold nanoparticles, we can exponentially increase the effective surface area (A), thereby enhancing the bioavailability of poorly soluble Indian herbs such as Curcuma longa (Curcumin) and Withania somnifera (Ashwagandha). Furthermore, we draw parallels between modern nano-formulations and traditional Ayurvedic Bhasmas, providing a scientific basis for their enhanced cellular permeability. The paper also addresses the critical "bench-to-bedside" transition, focusing on phytochemical screening, quality control standards for regulatory compliance (FDA/AYUSH), and the emerging landscape of patents and copyrights in herbal intellectual property. This research concludes that integrating nanotechnology into the traditional system of medication is not merely an upgrade, but a necessary evolution for delivering personalized and preventive medicine in the modern healthcare era.
**Keywords:** Phyto-nanotechnology, Ayurvedic Bhasmas, Bioavailability Physics, Lipid-based Nanocarriers, Indian Knowledge System (IKS), Regulatory Compliance.

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SNUCON049

## Traditional Systems of Medicine

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**Abstract:**
Traditional systems of medicine represent organized, knowledge-based healthcare practices that have evolved over centuries within different cultural and geographical contexts. These systems emphasize a holistic approach to health, focusing on the balance between body, mind, and environment rather than merely treating diseases. This research paper provides a comprehensive study of major traditional systems of medicine, including Ayurveda, Traditional Chinese Medicine (TCM), Unani, Siddha, and Indigenous/Folk medicine. It examines their historical development, philosophical foundations, diagnostic techniques, therapeutic modalities, and medicinal resources. The paper further explores the relevance of traditional medicine in the modern world, including its contribution to drug discovery, preventive healthcare, and integrative medicine. Scientific validation, regulatory challenges, safety concerns, and global acceptance are critically analysed. The study concludes that traditional systems of medicine continue to play a vital role in global healthcare and, when supported by scientific research and appropriate regulation, can significantly complement modern medical systems.
**Keywords**: Traditional systems of medicine, Ayurveda, Unani, Siddha, Traditional Chinese Medicine, herbal medicine, holistic healthcare

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SNUCON050

## Climate Change and the Sustainable Development of Herbal Medicine Systems

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**Abstract:**
Climate change poses significant challenges to the sustainable development of herbal medicine systems worldwide. Variations in temperature, altered precipitation patterns, the increasing frequency of extreme weather events, and shifting ecosystems significantly influence the growth, distribution, quality, and availability of medicinal plants. Several herbal species exhibit high sensitivity to climatic variations; consequently, such changes may lead to reduced plant biomass, modifications in phytochemical composition, and potential threats to the survival of rare and endemic species. Additionally, overharvesting, habitat degradation, and reductions in biodiversity aggravated by climate change further compromise the long-term viability of traditional herbal resources. The sustainable development of herbal medicine requires integrated strategies that address both environmental and socio-economic factors. The conservation of medicinal plant biodiversity requires both in situ and ex situ approaches, climate-resilient cultivation methodologies, and sustainable harvesting protocols. The cultivation of medicinal plants through agroecological practices can mitigate pressure on wild populations while simultaneously enhancing the livelihoods of rural and indigenous communities. Moreover, documenting traditional knowledge, coupled with integrating modern scientific research, can facilitate adaptive management and stimulate innovation in herbal medicine production.
**Keywords:** Climate change, Herbal medicine, Medicinal plants, Biodiversity conservation, Sustainable development, Phytochemical composition, Agroecological practices, Traditional knowledge.

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SNUCON051

## Recent Trends in Medicated Textile

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**Abstract:**
A significant advance in the field of smart and functional fabrics, medicated textiles combine the fields of nanotechnology, pharmacology, and textile engineering. The purpose of these textiles is to administer medicinal substances, such as painkillers, antibacterial agents, and anti-inflammatory drugs, directly to the skin or wound site. There are several ways to incorporate active pharmaceutical ingredients (APIs) over textile substrates, such as coating, embedding drug-loaded nanofibers, and microencapsulation. Medicated textiles can be used for everything from wound dressings and post-operative textiles to regular clothes that provide skin-care properties. In both preventive and therapeutic medicine, medicated textiles are expected to become increasingly important as the need for non-invasive, patient-focused healthcare solutions increases. The efficiency and wearability of the textile are given particular attention, along with the latest developments in the development of different nanogenerators, supercapacitors, and photoelectronic devices on fabric. Additionally covered are prospective clean-up strategies as well as the potential nanotoxicity linked to treated textiles because of these nanoparticles' propensity to leak into the environment. Lastly, a forecast of future developments in the incorporation of intelligent nano-devices into textile textiles is given. A recently developed kind of smart textiles known as "medicated textiles" combines traditional textile materials with pharmaceutical functionality to provide therapeutic benefits directly to the human body. Through techniques including microencapsulation, coating, electrospinning, or embedding inside nanofibers, active pharmaceutical ingredients (APIs) are incorporated into fibres to create these textiles. The drugs are delivered precisely and continuously when they come into touch with the skin or are exposed to body heat or moisture. In medical applications, medicated textiles are being utilised more and more for purposes like dermatological therapy, transdermal drug administration, wound healing, and infection prevention. They are also becoming more well-liked in the fields of cosmetics and wellness.
**Keywords:** Medicated textiles; Smart textiles; Nanotechnology; Drug delivery systems; Active pharmaceutical ingredients (APIs); Microencapsulation; Nanofibers; Wound healing; Transdermal drug delivery; Functional fabrics

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SNUCON052

## Herbal Medicines as a Bridge Between Ayurveda and Modern Healthcare Systems

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**Abstract:**
Herbal medicines have gained renewed global attention due to their therapeutic potential, cultural acceptance, and role in preventive healthcare. Ayurveda, one of the oldest traditional medical systems of India, provides a rich repository of medicinal plants and formulations that have been used for centuries. In recent years, scientific advancements have enabled the systematic evaluation of these herbal medicines through modern pharmacological, phytochemical, and clinical approaches. This has strengthened the integration of traditional Ayurvedic knowledge with contemporary healthcare systems. The present paper explores how herbal medicines act as a bridge between Ayurveda and evidence-based modern medicine. Emphasis is placed on recent advancements in standardization, quality control, safety evaluation, and validation of herbal drugs using modern analytical techniques. The role of phytochemical screening, bioavailability enhancement, and regulatory mechanisms in ensuring the efficacy and safety of herbal formulations is also highlighted. Additionally, the study discusses the significance of herbal medicines in disease prevention, health promotion, and management of chronic illnesses, contributing to an integrated and holistic healthcare approach. The integration of traditional knowledge with modern scientific validation not only enhances the global acceptance of herbal medicines but also supports sustainable drug development and personalized healthcare. The paper concludes that strengthening collaboration between traditional medicine and modern healthcare systems can improve healthcare outcomes while preserving India's rich medicinal heritage.
**Keywords:** Herbal Medicine, Ayurveda, Modern Healthcare, Traditional Knowledge, Standardization, Integration.

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SNUCON053

## The Impact of Artificial Intelligence on Modern Healthcare System

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**Abstract:**
Healthcare clinical and administrative procedures are being transformed by artificial intelligence (AI), which is increasing accessibility, accuracy, and efficiency. Medical imaging analysis, personalized treatment plans, and predictive diagnostics are all made possible by technologies like robotic process automation, machine learning, and natural language processing. These innovations improve diagnostic accuracy, enable early illness diagnosis, and boost patient outcomes. AI also reduces operating expenses for healthcare organizations by streamlining administrative processes like billing, patient data management, and appointment scheduling. Despite these benefits, there are still issues with algorithmic bias, data privacy, and decision-making openness. The changing responsibilities of healthcare professionals and the ethical issues around accountability for judgments made by AI must be addressed. In order to ensure that AI aids clinicians while protecting patient welfare, the future of AI in healthcare will depend on striking a balance between ethical norms and technological advancement. Realizing AI's full potential in healthcare will require on-going study and cooperation between engineers, medical professionals, and legislators.
**Keywords:** Artificial Intelligence, Health Care, Predictive Diagnostics, Machine Learning, Medical Imaging, Administrative Efficiency, Data Privacy, Ethical Consideration.

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SNUCON055

## CRISPR and Genetic Engineering Approaches to Enhance Therapeutic Compounds in Medicinal Plants

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**Abstract:**
The use of CRISPR-Cas9 and cutting-edge technologies in genetic engineering has transformed the boost in the production of therapeutic compounds in medical plants. Conventional breeding techniques are lengthy and may not be adequate in maximising the production of secondary metabolites. This review will look at the recent developments in genome editing approaches to biosynthetic pathway genes, transcription factors, and regulatory elements to enhance the production and variety of pharmacologically active compounds. We report effective case studies such as the enhancement of the levels of artemisinin in the Artemisia annua, higher vincristine production in Catharanthus roseus, and higher levels of ginsenoside in Panax species. The combination of multi-gene editing, base editing and prime editing technologies make it possible to make accurate changes without inserting alien DNA. Moreover, CRISPR-based inactivation of alternative metabolic routes inhibits carbon flow in the metabolism and diverts it to therapeutic targets. Issues such as off-target effects, regulators, societal acceptability, and scalability are highly assessed. Synthetic biology and the CRISPR technology have converged upon an unprecedented opportunity to establish medicinal plants as biofactories to produce high-value pharmaceuticals in a sustainable manner. Future efforts involve multiplexed modification of complex pathways in engineered cells and to develop tissue-specific expression systems in order to reduce pleiotropic impacts on plant fitness.
**Keywords:** CRISPR-Cas9, medicinal plants, secondary metabolites, biosynthetic pathways, genome editing

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SNUCON056

## Network Pharmacology Approaches to Deciphering Multi- Target Mechanisms of Herbal Formulations

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**Abstract:**
The mechanism of action of the traditional herbal formulations is multi-component, multi- target, multi-pathway which poses a challenge to the traditional paradigm of pharmacology in terms of single targeted interventions. Network pharmacology is a combination of these principles: systems biology, bioinformatics and polypharmacology based on the systematic study of the interaction of herbal constituents with the biological systems. This review summarizes approaches to the development of the compound-target-pathway-disease networks that can demonstrate the synergies of herbal medicines. We summarize computational methods such as target prediction methods, molecular docking, protein-protein interaction networks and the enrichment of pathway. Phytochemical structures, known targets, and disease associations are in database resources that are vital to evaluate. Case studies provide the example of the successful use of network pharmacology in decoding the classical formulations of Xiaoyao San which is used in depression, Gegen Qinlian Decoction which is used in diabetes, and Qingfei Paidu Decoction which is used in COVID-19. Topological analysis defines major active compounds and hub targets as important nodes and coordinated control of physiology processes as functional modules. Mechanistic insights are enhanced by integration with experimental validation using in vitro assays, animal models and clinical studies. The problems are the lack of complete databases, accuracy of predictions, and disconnect between the results of computations and clinical translation. New methods that add microbiome-interaction to gut targeting, dynamics, and patient-specific networks have been developed. Network pharmacology expedites rational formulation development, identification of quality markers and repositioning of existing medicines in the management of modern ailments.
**Keywords:** network pharmacology, herbal formulations, multi-target mechanisms, systems biology, bioinformatics

SNUCON057

## Nano-encapsulation of Phyto-extracts (Berberry & Silymarin): A Novel Approach for Improving Bioavailability and Efficacy of Phyto-therapeutics in the Treatment of Type 2 Diabetic Patients

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**Abstract:** Type 2 diabetes mellitus is characterized by insulin resistance, hyperglycaemia, and associated complications such as cardiovascular diseases, nephropathy, retinopathy, and neuropathy. Metabolic syndrome is an emerging global epidemic with no cure and increasing risk factors among all age groups. Herbal drugs have been traditionally used in treating type 2 diabetes mellitus and have shown efficacy in lowering blood glucose levels and triglyceride content in plasma. Some of the most effective herbal drugs are Berberine from Berberis spp and Silymarin from Silybum marianum. Both of them exhibit anti-hyperglycaemic activity and lipid-lowering action, but their therapeutic applications are limited by their poor aqueous solubility, short half-life, and low bioavailability when administered orally. This article reviews the evolution of phytomedicines into phyo-nanomedicine. It discusses how nano-formulation can overcome the aforementioned shortcomings of herbal medicine and how innovative drug-delivery systems can be used to improve the bioavailability of herbal medicine. Various types of nano-carriers (e.g., liposome, SNEDDS, etc.) have been studied extensively for improving the bioavailability and delivery efficiency of herbal medicine. Research data suggest that these carriers can protect the bioactive molecules of herbs from the digestive system's degradative process, ensure targeted delivery at desired sites, and prolong the circulation time of the active components of herbal medicine. Nano-encapsulated Berberine was reported to show a 10-fold higher bioavailability than the un-encapsulated Berberine. The high bioavailability of nano-encapsulated Berberine was attributed to the activation of AMPK pathway, resulting in enhanced insulin sensitivity.The article further discusses the synergistic effect of the combination of piperine (a natural bio-enhancer) along with other herbal medicine to inhibit efflux transporters (such as P-gp). The article suggests that the combination of traditional pharmacology and modern material sciences will lead to a novel class of phyto-based therapeutics for treating patients with type 2 diabetes mellitus either as monotherapy or as adjuvant therapy.
**Keywords:** Type 2 diabetes mellitus, insulin resistance, hyperglycaemia, metabolic syndrome, diabetic complications, herbal drugs, phytomedicine, phyto-nanomedicine, and berberine.

SNUCON058

## Peppermint Menthol Nanoemulsions for Manometry-Guided IBS Therapy

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**Abstract:** Mentha piperita oil which contains a high concentration of menthol has traditionally been utilized in treating gastrointestinal spasms and discomforts. The recent studies have led to peppermint menthol nanoemulsions to control irritable bowel syndrome (IBS). Nanoemulsions increase menthol solubility and bioavailability resulting into low dose, reduced adverse effects. Clinical trials have shown the high levels of stimulations in the abdominal pain, bloating and stool pattern of patients who use the peppermint menthol nanoemulsions, having abdominal problems of IBS. The objective findings of a decrease in spasm and better bowel functioning are given to anorectal manometric and other motility studies. It will be integrated with gut-brain axis applications so patients can be monitored on their symptoms and triggers and hence have the opportunity to customize their diet and lifestyle. In the case of other gastro intestinal medicine interactions, pharma surveillance systems observe interaction potentiality. The future involves combination of probiotics and antispasmodic drugs to have synergistic effects. Using peppermint menthol nanoemulsions in managing IBS can provide an alternative to conventional methods that offer natural remedies to patients.
**Keywords:** Peppermint, menthol, IBS, nanoemulsions, manometry, antispasmodics

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SNUCON059

## Quercetin Lipid Nanoparticles in AI-Driven Precision Oncology

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**Abstract:** Quercetin, a flavonoid that is rich in onions, apples and other vegetable sources has been shown to have good anticancer activity in preclinical and early clinical clinical studies. Recent progress in the field of nanotechnology methods has facilitated the entrapment of quercetin into lipid nanoparticles, and has enhanced its solubility, stability and targeted action to tumors greatly. The carriers based on lipids have the advantages of increased cellular activities and extended blood circulation that contribute to higher tumor tissue accumulation and reduced off target effect. Quercetin as nanoparticles have been found to produce significant drops in tumor volume and metastatic load in animal models of breast, colon, and lung cancer and are usually as effective as or more efficacious than traditional chemotherapeutic agents using lower dosages. Genomic and transcriptomic data are investigated with the help of artificial intelligence algorithms that can recognize a patient who is most likely to be helped by quercetin-based therapy and arrange a personalized treatment plan. As a result of AI-controlled dosing models, administration time is optimized, and interactions between drugs are predicted, in turn, increasing the safety and efficacy. A series of clinical trials are being actualized to obtain the quercetin nanoparticles in conjugation with the usual chemotherapy and immunotherapy, and early outcomes show higher response rates and less toxicity. Using quercetin lipid nanoparticles as a component of precision oncology models will help the latest healthcare systems embrace the benefits of natural compound use and use the latest technology to achieve improved cancer results.
**Keywords:** Quercetin, lipid nanoparticles, oncology, precision medicine, tumor regression, AI dosing

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SNUCON060

## Shilajit Liposomes Enhancing Mitochondrial Function in Chronic Fatigue Clinics

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**Abstract:** Shilajit, a mineral-enriched herbs, have become effective mitochondrial modulator of chronic fatigue and other forms of related ailment. Recent clinical trials have proved the effects of fulvic acid-enriched Shilajit on ATP production and mitochondrial membrane potential which result in severe fatigue scores and improved exercise capacity. The content of fulvic acid is matched by standardization through ICP-MS and liposomal encapsulation enhances bioavailability and maintains plasma levels of up to 12-24 hours. Intravenous or sublingual liposomal preparations are used with lifestyle counseling in specialized fatigue clinics, and patient-reported outcomes indicate the 20-25 percentage improvement in energy indices in 8-10 weeks. The objective recovery and autonomic balance feedback is presented by wearable activity trackers and heart-rate variability monitors. Mitochondrial-related gene pharmacogenomic profiling assists in determining the best dosage and reduced adverse events. Combined with electronic health records, it would be possible to track fatigue patterns and comorbidities over time. The future study is aiming at the combination of Shilajit and other mitochondrial cofactors CoQ10 and Vitamins in nano-co-formulations. These integrative approaches can make Shilajit a key element of evidence-based patient-centered fatigue management in the contemporary healthcare systems.
**Keywords:** Shilajit, fulvic acid, mitochondria, chronic fatigue, liposomes, ATP

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SNUCON061

## Nonencapsulated Ashwagandha for Personalized Stress Management in Telemedicine

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**Abstract:**
In the contemporary healthcare, herbal medicines form the center of interest, as they blend traditional knowledge and the latest technology. This review points out improved standardization of Ashwagandha (Withania somnifera) application by applying the high-performance liquid chromatography (HPLC) and LC-MS/MS which determines the withanolids accurately to 95 per cent purity in GMP laboratories. In 2023, Phytotherapy Research had meta/reduce studies (n=1200) where cortisol decreases and HAM-A changes 2328% and 8 weeks of improvements showed better results with side effects under 5 vs synthetic anxiolytics. Liposomes Nanoencapsulation can enhance bioavailability 12-fold and oral formulations can be realized by use of low doses. It can be integrated into telemedicine apps, such as AYUSH-supported applications, so that the patients can observe the symptoms in real time through validated scales (PSS-10) and salivary cortisol biosensors, connected to the wearables. CYP3A4 polymorphic screening Pharmacogenomic screening maximizes the dosage, which is 40 times less variable. Issues relating to adulteration of supply chains are improved through the use of blockchain traceability between farms and pharmacies. The adoption of the hospital is facilitated by regulatory frameworks in the CDSCO and WHO of India. The interactions between the herbals and SSRIs are clinical synergies that improve the mood disorder results, which place herbals in the value-based care settings. The next step in research is AI predictive analytics to prevent relapse based on Ashwagandha, which is integrated into the framework of holistic and patient-centered health care in the context of increased mental health costs.
**Keywords:** Ashwagandha, nanoencapsulation, pharmacogenomics, telemedicine, cortisol reduction, standardization.

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SNUCON062

## Milk Thistle Silymarin Liposomes Protecting TB Hepatotoxicity in DOTS

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**Abstract:** Milk thistle (Silybum marianum) is an herb which has silymarin which is a flavonoid system of which it has strong hepatoprotective and antioxidant effect. The latest research has tested silymarin liposomes in hepatotoxicity prevention in anti-tuberculosis (TB) drug usage in patients receiving directly observed treatment, short course treatment (DOTS). Clinical studies have demonstrated that silymarin liposomes are very effective in lowering the heightened levels of liver enzymes and discourage interruptions in treatment by hepatotoxicity effects. Liposomal formulations are either intravenous or oral preparations, and introduce high bioavailability and persistent release, which results in lifelong protection during treatment. Incorporation of TB control programs will enable routine conduct of liver functionality tests as well as corrective actions in case unhealthy events. Silymarin content has to be standardized to guarantee a uniform efficacy and safety. The research would be conducted to assess silymarin liposomes in HIV-TB co-infection and in other liver ailments caused by drugs in the future. Healthcare systems can enhance morbidity and improve the outcome of treatments through the use of milk thistle silymarin liposomes in the treatment of TB.
**Keywords:** Milk thistle, silymarin, hepatotoxicity, liposomes, TB, DOTS.

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SNUCON063

## Curcumin Liposomes: Revolutionizing Osteoarthritis Therapy in Precision Medicine

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**Abstract:**
An example of herbal incorporation to the contemporary orthopedics is curcumin of turmeric (Curcuma longa). Low solubility hindered activity until liposomal and solid lipid nanoparticle (SLN) preparations were developed that showed 1520 times more intensity in plasma than 2024 Journal of Controlled Release research papers. Phase II RCTs (n=450) exemplified 42% -pain decrease in 12 weeks, was not inferior to ibuprofen and had better GI adverse effects. They combine in the healthcare systems with wearable accelerators that measure mobility and inflammation of the joints through multiplex cytokine assays. The scaled production of AYUSH and US FDA GRAS status. As a Pharmacokinetic poroscopy, PBPK software assumes dosing in patients with obesity, which has 30% non-response. The telemedicine clinic clinical guidelines incorporate curcumin patches with remote adherence physiotherapy applications. Sustainability through CO2 -extracted rhizomes lowers environmental implication. Lyophilized kits eliminate limitations such as the stability. Such development cuts NSAID addiction by a quarter in chronic care. Future directions are the CRISPR-($)-enriched turmeric cultivars with increased curcumins and combination trials with stem cell therapies, which will make herbals firm in the regenerative healthcare framework in musculoskeletal conditions.
**Keywords:** Curcumin, liposomes, osteoarthritis, precision medicine, bioavailability, WOMAC.

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SNUCON064

## Ginger Oleoresin Microneedles for Chemotherapy-Induced Nausea Control

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**Abstract:**
Ginger (Zingiber officinale) has been used to reduce vomiting and nausea especially in pregnancy and in motion sickness. The most recent studies have involved the use of ginger oleoresin as a concentrated extract of gingerols and shogaols as a mode of chemotherapy-induced nausea and vomiting (CINV) management. Ginger oleoresin nanostructured microneedle patches offer an effective transdermal delivery system, which does not go through the gastrointestinal system, but instead, achieves stable releases of active compounds. Cancer patients undergoing chemotherapy have also shown clinical trials that ginger oleoresin microneedles are effective in reducing the occurrence and severity of acute and delayed nausea which is sometimes as effective as traditional antiemetics but with minimal side effects. The microneedles are simple to use and take off making them convenient to use at home under remote care. Coupled with supportive care protocols, the oncology nurses can keep track of the symptoms of the patient and adapt the adjunctive therapies when needed. Combination patches with other antiemetic agents are going to be developed as an in addition to the current condition. Ginger oleoresin microneedles are a better way of managing CINV and improve the quality of life of cancer patients receiving chemotherapy due to their provision of a natural and patient-friendly option.
**Keywords:** Ginger, oleoresin, microneedles, nausea, chemotherapy, supportive care.

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SNUCON065

## Aloe Vera Polysaccharide Hydrogels for Smart Burn Wound Regeneration

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**Abstract:** Aloe vera (Aloe barbadensis) is a plant that has been utilized over a long period to heal wounds and to ease inflammation. The recent extension of biomaterials has resulted in coming up with Aloe vera polysaccharide polymer-based hydrogels to heal burn wounds. Designed to offer an environment that promotes epithelialization, alleviate pain, and scar reducing, these hydrogels protect pain and offer a moist environment. Aloe vera hydrogels have been demonstrated to hasten healing of wounds, and to yield better cosmetic effects as compared to the traditional dressing. The new smart wound dressings have IoT sensors to measure temperature, moisture, and pH and provide warnings to clinicians of infection or slow healing. Remote follow-up and intervention is possible through incorporation with electronic health records. There is standardization of polysaccharide content which guarantees consistency in efficacy and safety. The future directions involve the integration of Aloe vera hydrogels with antimicrobial agents and growth factors towards better regenerative results. Modern healthcare systems can utilize the potential of polysaccharide hydrogel of Aloe vera to promote faster wound healing with reduced morbidity and less harm by utilizing this in the burn care sector.
**Keywords:** Aloe vera, polysaccharides, burns, hydrogels, wound regeneration, IoT sensors.

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SNUCON066

## Supercritical Ginseng Extracts for AI-Optimized Alzheimer's Adjunct Therapy

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**Abstract:** Ginsenosides found in Panax ginseng promote cognitive health by green extraction with supercritical CO2 with a 92 purity and quite high Rb1/Rg1 optimum ratio to protect the brain. In a 2025 RCT in Nutrients (n=320 elderly), MMSE increased and amyloid-beta decreased by 14% and 24 weeks and interaction risk was less than 2% through PK research. Segmenting by APOE genotyping and EEG wearables AI used in the framework of modern healthcare to boost adherence 35%. Hippocampal volume in the former MCI with fMRI protocols place ginseng in their hospital protocols. Korean/Indian biotech farms provide sustainability, which guarantees the ethical sourcing. Enteric coatings help deal with challenges such as hydrolysis of ginsenosides. Traditional Medicine Strategy WHO promises the utilization of evidence. The cost-effectiveness analysis demonstrates that there are 40% savings in comparison with monotherapy. Virtual reality cognitive training is beneficial with integration. The future prospects include nanoparticle-brain targeting and multi-omics to enable subtype-specific efficacy to make ginseng a workhorse in the healthcare of the aging populations.
**Keywords:** Ginseng, ginsenosides, Alzheimer's, AI dosing, supercritical extraction, neuroprotection.

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SNUCON067

## Echinacea Alkylamides as Vaccine Adjuvants in Public Health Programs

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**Abstract:**
Echinacea (Echinacea purpurea) has alkylamides which activate the immune system and improve the antibody production. Recent research has examined the potential of using Echinacea alkylamides as vaccine adjuvant to stimulate immunity to different vaccines, including influenza and COVID -19. Clinical trials have indicated Echinacea-adjuvated vaccines are superior to unadjusted vaccines in the generation of increased antibody levels and extended immunity. Echinacea-based adjuvants can be integrated into the mass vaccination programs in terms of the public health measures, especially where the resources are not sufficient to supply the population with the vaccines. Stability in immunostimulatory effects and safety: The content of the alkyl amides is usually standardized. There is pharmacovigilance which looks at the possibility of adverse reactions and interactions with other immunomodulatory agents. Future studies are expected to streamline the dosage schedules and consider the activity of Echinacea adjuvants when using in concomitant with alternative vaccines. Management of infectious diseases by incorporation of Echinacea alkylamides into vaccination schemes can be employed by the modern health care systems to optimize the protection of the population on a large scale.
**Keywords:** Echinacea, alkylamides, vaccine adjuvants, immunity, public health, antibodies.

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SNUCON068

## Good Agricultural and Collection Practices (GACP) for Medicinal Plants: Sustainability and Quality Implications

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**Abstract:**
Good Agricultural and Collection Practices (GACP) of medicinal plants constitute the core of quality assurance measures which give a sustainable production of products, environment protection as well as standard chemical composition of botanical raw materials. This is a detailed report on how GACP was conceptualized, the implementation problems and impact it has on quality of products and environmental protection. Some of the basic GACP considerations are: germplasm selection and validation, selection of site basing on the soil condition and soil pollution, sustainable agriculture practices, which minimize the amount of agrochemicals used, organic farming, integrated pest control, proper irrigation and nutrient control, optimum harvesting period basing on the phyto chemical maturity and of post harvest management that prevent degradation and contamination, as well as have documentation systems that allow traceability. Where there are wild-collected species, the sustainable harvesting rules also include the population measurements, population harvest threshold, selective harvesting which preserves the regenerative power, time restriction and geographical protection. The impact of climate change on the chemistry of medicinal plants and geographical distribution requires adaptive management approaches. The consequences of quality are enormous: The compliance to GACP implies the more appropriate chemical consistency with less heavy metals and pesticides, microbial loads, and more optimal concentrations of active components than the unregulated sourcing. Specifically, the impact of GACP on the variability of marker compounds in ginseng, contents of the artemisinin in Artemisia annua and alkaloid distribution in opium poppy are reported in a case study. The sustainability effect is also wider than the conservation of plants and it also helps to preserve the rural livelihoods, conservation of traditional knowledge and conservation of the biodiversity. Some of the work barriers include availability of training and resources by the smallholder farmers, the high cost of certification, lack of enforcement of the regulations in some regions and the market price systems which fail to adequately compensate quality changes. The efficient models of WHO recommendations, European Medicines Agency recommendation and national programs in China and India are reviewed. Government incentive programs, cooperative certification strategy, capacity building strategy, fair trade pricing system rewarding quality premiums and inclusion of GACP requirements in specifications of pharmaceutical supply chain are some of the suggestions.
**Keywords:** Good Agricultural and Collection Practices, medicinal plants, sustainability, quality assurance, phytochemical standardization.

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SNUCON069

## Fenugreek Galactomannans in Postpartum Lactation Support Apps

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**Abstract:**
Galactomannans are water-soluble fibers that are found in the seed of Fenugreek (Trigonella foenum-graecum) which activates milk production in lactating women. It has been clinically demonstrated that the fenugreek galactomannan supplements result in the increase of the breast milk volume and the feeding gain in infants during the early postpartum period. Normal galactomannan gels or capsules are given with the supervision of the lactation consultant checking the volume of milk and infant feeding behaviors. Mobile health programs follow through milk production, infant development and the well being of mothers and give them personalized recommendations and reminders on supplementation and breastfeeding. There are also education materials on proper ways of breast feeding and nutrition provided in these apps so that the mother can make sound judgments. The system of pharmacovigilance is observed to be able to record any adverse effects e.g. gastrointestinal discomposure or allergic responses so that it can be used safely. Combinations with other galactagogue and probiotics to provide greater lactation support is a future development. Digital lactation care can enable healthcare providers to enhance the results of breastfeeding and maternal satisfaction through the incorporation of fenugreek galactomannans.
**Keywords:** Fenugreek, galactomannans, lactation, postpartum, breastfeeding, mobile apps.

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SNUCON070

## The Paradox of Allium sativum: Investigating the Cytotoxic Mechanisms of Allicin in the Human Body

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**Abstract:**
Allicin, a volatile organosulfur compound, is the primary bioactive constituent formed when garlic (Allium sativum) is crushed, which is recognised for its antimicrobial and cardio protective properties. Allicin is a highly reactive redox"-active molecule. When concentrations are high it often reaches excessive supplementation and therefore allicin changes its transition from a therapeutic agent to a potent systemic toxin. The toxicity of allicin mainly determined by its rapid thiol disulfide exchange reactions. This abstract signifies 3 key pathways of allicin induced damage. 1.Oxidative Stress & Glutathione Depletion, 2. Cholinesterase enzyme inhibition, 3. Cytotoxicity & Apoptosis
**Keywords**: allicin, Allium sativum, organosulfur compound, cytotoxicity.

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SNUCON071

## CRISPR genome editing Technology on the treatment of HIV / AIDS

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**Abstract:**
Biotechnology is a branch of science which deals with technique of using live organisms or enzymes from organisms to produce a desired product these products are useful to human need. Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) is still a severe health problem worldwide. According to the statistics from World Health Organization (WHO)about 36.9 million people were living with HIV by the end of 2017, with about 1.8 million newly infected individuals. Interestingly, only 59% of infected patients. In the recent years, the three main nuclease-mediated gene editing tools including transcription activator-like nucleases (TALENs), zinc finger nucleases (ZFNs), and clustered regularly interspaced short palindromic repeat (CRISPR)/CRISPR-associated nuclease 9 (Cas9) have been widely used in HIV-1/AIDS treatment researches AIDS is still a major global health problem. It is caused by HIV infection and induces immune destruction There are two different types of HIV, HIV-1, and HIV-2. They both have many similarities and both can lead to AIDS Compared to HIV-1, HIV-2 has lower transmissibility and is less pathogenic. HIV-1 is recognized as the major cause of AIDS and becomes the main target to prevent and cure AIDS.
**Keywords:** HIV, CRISPR, AIDS, Biotechnology.

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SNUCON072

## Character Association Analysis in a Segregating Population of Brinjal Derived from Bi-Parental Crosses

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**Abstract:**
Brinjal (*Solanum melongena* L.), commonly known as eggplant, is an important solanaceous vegetable crop widely cultivated in tropical and subtropical regions. It is valued for its nutritional richness, culinary versatility, and economic importance. However, improvement in fruit yield remains a major breeding objective due to its complex inheritance and interaction with multiple morphological and reproductive traits. The present investigation was conducted at the Horticultural Research Centre, HNB Garhwal University, Srinagar, Uttarakhand, to elucidate the relationship among yield and its contributing traits and to estimate their direct and indirect effects on marketable fruit yield in brinjal. Segregating progenies derived from bi-parental crosses were evaluated for twenty-three quantitative and qualitative traits related to plant growth, yield, and fruit quality. Correlation analysis revealed a significant and positive association of marketable fruit yield per plant with number of fruits per plant, plant height, and average fruit weight, indicating their crucial role in yield enhancement. Genotypic correlation coefficients were generally higher than phenotypic correlations, suggesting a strong inherent genetic association among the studied traits with comparatively lower environmental influence. Path coefficient analysis was employed to partition correlation coefficients into direct and indirect effects to better understand cause-and-effect relationships among characters. The results demonstrated that average fruit weight exerted the highest positive direct effect on marketable fruit yield, followed by number of fruits per plant and fruit length. Additionally, plant height, fruit set percentage, fruit diameter, number of flowers per cluster, and days to first picking also exhibited substantial positive direct effects on fruit yield, indicating their importance as major yield determinants.
**Keywords:** Bi-Parental, Brinjal, Correlation, Path, Segregating.

SNUCON0073

## Potential Medicinal Plants and Their Traditional Uses Among the Tribal Communities of Jharkhand: A Review

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**Abstract:**
World Health Organization has estimated that 80 per cent of the world's population relies upon the traditional medicinal systems for their primary health care. Out of 17,000 species of higher plants reported in India, 7500 are known to have medicinal importance. Jharkhand accounts for 3.4% of the total forest cover of the country. There are about 32 tribal communities which share 26.30% of the total papulation of Jharkhand. They have their own traditional uses and methods for the preparation of medicines to cure small injuries to various chronic diseases. Since time immemorial, forest has been the main source of medicinal plants but due to overexploitation, tremendous industrialization, globalization and changes in sustenance economy, medicinal plants are at risk of extinction in the different areas of Jharkhand. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several synthetic drugs have led to increased emphasis on the use of medicinal plants for a wide range of human ailments. The present review paper documented 100 potential medicinal plants and highlights their traditional uses among the tribal communities of Jharkhand. The study also deals with 14 rare medicinal plants and need urgent *in situ* conservation and *ex situ* multiplication in general and micro propagation in particular, to fulfill the increasing demand of pharmaceutical industries.
**Keywords:** Medicinal Plants, Traditional Uses, Tribal Communities, Conservation.

SNUCON0074

## Nutraceuticals: A Comprehensive Review of Classification, Functional Roles, Safety, Quality, And Future Perspectives

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Abstract:
Nutraceuticals represent a rapidly expanding domain at the interface of nutrition and pharmaceutical sciences. The term refers to foods or food-derived components that provide health benefits beyond basic nutritional functions, including disease prevention and health promotion. Since the concept was introduced in 1989 by the Foundation for Innovation in Medicine, nutraceuticals have attracted increasing scientific and commercial interest. They include isolated nutrients, dietary supplements, functional foods, herbal products, genetically engineered foods, and fortified processed foods. Growing evidence suggests that nutraceuticals may play a supportive role in managing lifestyle-related disorders such as cardiovascular diseases, diabetes, obesity, osteoporosis, arthritis, cancer, and neurodegenerative conditions. Their widespread use, particularly in developed countries, reflects a shift toward preventive and integrative healthcare approaches. This review provides a comprehensive discussion of nutraceutical classification, potential health benefits, disease-specific applications, safety and quality considerations, and future research directions.
**Keywords:** Phytochemicals, Neutraceuticals, Bioactive compounds, healthcare, Disease

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SNUCON075

## A Study to assess the effectiveness of structured teaching program on knowledge regarding care of a patient on mechanical Ventilation among selected colleges of Ranchi, Jharkhand

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**Abstract:**
Mechanical ventilation is a vital life-support intervention extensively used in intensive care units to support patients with respiratory failure. Nurses play a pivotal role in ensuring safe, effective, and continuous care for patients receiving mechanical ventilation, which demands sound theoretical knowledge and clinical competence. However, undergraduate nursing students often demonstrate inadequate understanding of ventilator functions, indications, modes, complications, and essential nursing responsibilities. Limited clinical exposure and insufficient preparedness may result in errors related to patient assessment, monitoring, and emergency management of ventilated patients. The present study was conducted to evaluate the effectiveness of a structured teaching program on knowledge regarding the care of patients on mechanical ventilation among B.Sc. Nursing third-semester students at a selected nursing college in Ranchi, Jharkhand. The structured teaching program was systematically designed and included comprehensive modules on types of ventilators, modes of mechanical ventilation, ventilator settings and monitoring parameters, prevention of ventilator-associated complications, infection control measures, and immediate nursing interventions in response to ventilator alarms. A pre-experimental one-group pre-test and post-test research design was adopted to assess the difference in knowledge levels before and after the educational intervention. Knowledge assessment was carried out using a structured questionnaire. The results revealed a marked improvement in post-test knowledge scores compared to pre-test scores, indicating the effectiveness of the structured teaching program. The findings of the study conclude that structured teaching programs significantly enhance nursing students' knowledge and preparedness in caring for patients on mechanical ventilation. Incorporating such educational interventions into undergraduate nursing curricula can strengthen clinical competence, reduce errors, and ultimately contribute to improved patient outcomes in critical care settings.
**Keywords:** Mechanical Ventilation, Nursing Education, Structured Teaching Program, Clinical Competence, Ventilator Care, Critical Care Nursing.

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SNUCON076

## Post-Harvest Factors Affecting Phytochemical Stability in Medicinal Plants

**Anusree Anand[1*], Bhagyashree Singh[1] Buts Kumar Gourav[1], Nishi Prakash Tiwari[1], Dharmendra Kumar Ram[1], Neha Rani[1], Preeti Kumari[1]**

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**Abstract:**

Phytochemicals are the primary determinants of the pharmacological efficacy of medicinal plants; however, their stability is profoundly influenced by post-harvest operations. This study critically evaluates key post-harvest factors governing phytochemical stability in medicinal plants, with particular emphasis on harvest maturity, post-harvest handling, drying kinetics, storage environment, and packaging systems. Major classes of phytoconstituents, including alkaloids, phenolics, flavonoids, terpenoids, glycosides, and essential oils, are highly susceptible to degradation mediated by enzymatic oxidation, thermal stress, photodegradation, hydrolysis, and volatilization. Delays between harvesting and processing enhance the activity of endogenous enzymes such as polyphenol oxidase and peroxidase, accelerating oxidative degradation of phenolic compounds. Drying parameters, particularly temperature, air velocity, and drying duration, significantly affect mass transfer rates and thermal stability of phytochemicals, with excessive thermal load resulting in structural modification and loss of bioactivity. Storage conditions, including temperature, relative humidity, oxygen availability, and light exposure, further regulate phytochemical stability during storage through oxidative and moisture-induced pathways. The selection of appropriate packaging materials with low oxygen and moisture permeability is critical for minimizing post-drying degradation. Emerging post-harvest technologies such as controlled atmosphere storage, vacuum packaging, and low-temperature drying techniques have demonstrated improved phytochemical retention and extended shelf life.

**Keywords:** Phytochemical stability, Post-harvest management, Medicinal plants, Storage environment, Oxidative degradation, Packaging systems

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SNUCON077

## Integrating Agricultural Biotechnology and Plant Genetics for Standardized and Sustainable Herbal Medicines

**Nishi Prakash Tiwari[1], Dharmendra Kumar Ram[1], Neha Rani[1], Buts Kumar Gourav[1], Anusree Anand[1], Preeti Kumari[1], Bhagyashree Singh[1]**

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**Abstract:**

Herbal medicines are increasingly gaining global recognition in modern healthcare systems due to their natural origin and therapeutic potential. However, the lack of standardization, variation in phytochemical composition, and sustainability concerns remain major challenges in the effective utilization of medicinal plants. Agricultural biotechnology and plant genetics provide advanced scientific tools to address these limitations by improving the quality, consistency, and sustainable production of herbal medicines. Plant genetics plays a crucial role in identifying elite genotypes with enhanced medicinal properties and stable phytochemical profiles. Genetic characterization and marker-assisted selection enable the development of uniform planting materials with superior therapeutic value. Agricultural biotechnology further strengthens this process through tissue culture, micropropagation, and DNA fingerprinting techniques, ensuring genetic purity, disease-free propagation, and authentication of medicinal plant species. The integration of biotechnological approaches with traditional herbal practices facilitates standardization by maintaining consistent levels of bioactive compounds, improving safety, and ensuring regulatory compliance. Moreover, biotechnological interventions promote sustainable cultivation practices by reducing dependence on wild plant populations and conserving medicinal plant biodiversity. This integrated "farm to pharmacy" approach bridges agriculture, biotechnology, and healthcare systems, enhancing the reliability and global acceptance of herbal medicines. The study highlights the importance of combining agricultural biotechnology and plant genetics as a scientific foundation for developing standardized, safe, and sustainable herbal medicines. Such integration not only strengthens traditional medicine systems but also contributes to sustainable agriculture and modern healthcare development.

***Keywords:*** Agricultural Biotechnology, Plant Genetics, Herbal Medicines, Standardization, Sustainability, Medicinal Plants.

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SNUCON078

## Optimization of protocol for in vitro regeneration in Tinospora cordifolia (Giloy)

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**Abstract:**
Tinospora cordifolia (Willd.) Hook. F. and Thoms. (Giloy) belongs to family Menispermaceae and is mostly found in tropical Indian subcontinent especially India, Sri Lanka and Bangladesh. It is an important medicinal plant species and considered as a rich source of alkaloids and terpenes which is used as a rejuvenating drug. The extract of the mature stem is useful in curing skin diseases and dry barks have anti-spasmodic, anti-pyretic, anti-allergic, anti-inflammatory and anti-leprotic properties. *Tinospora cordifolia* suffers from poor seed set and poor germination in its natural habitat. Stem cuttings, though useful for propagation, are dependent upon weather conditions for proper growth. In the present investigation a viable *in vitro* regeneration protocol for mass multiplication of *Tinospora cordifolia* was standardized. An efficient regeneration protocol was developed for *T. cordifolia* using nodal and shoot tip in explants. Eight different phytohormonal combinations that is MS media supplemented with BAP and $AdSO_4$ at different concentrations and combinations was used. The best result was observed in 3 mg/l BAP and 100 mg/l $AdSO_4$ for bud breaking and less response was observed in other media combinations.
**Keywords:** Giloy, micropropagation, tissue culture, in-vitro regeneration, medicinal plant, MS media.

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SNUCON079

## Anti-inflammatory and Anticancer Potential of Novel Thieno[2,3-*d*]pyrimidines by Inhibiting Cyclooxygenase 2 (COX-2) Enzyme

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**Abstract:**
The principal hallmarks of cancer include uncontrolled cell proliferation, immune cell escape, resistance to apoptosis, angiogenesis, and invasion and metastasis to neighboring tissues. According to the WHO, more than 200 types of cancer have been reported so far, with no common successful therapy. Interestingly, recent studies have revealed that the cyclooxygenase-2 (COX-2) enzyme is overexpressed not only in various inflammatory conditions but also in many solid tumors, including colorectal, hepatic, pancreatic, breast, ovarian, cervical, and lung cancers. COX-2 facilitates in immune evasion and resistance to cancer immunotherapy by impairing the function of dendritic cells (DCs), natural killer (NK) cells, T cells, and type-1 immune responses. Both non-selective NSAIDs and selective COX-2 inhibitors have been shown to induce apoptosis and suppress tumor cell proliferation, invasiveness, and angiogenesis. Notably, the FDA has approved celecoxib (COX-2-selective inhibitor) as an adjuvant therapy for the management of colorectal adenomas in patients with familial adenomatous polyposis (FAP). However, many COX-2-selective inhibitors have been withdrawn from the market due to their cardiotoxicity. Therefore, extensive research efforts are currently directed toward the discovery of novel scaffolds for COX-2-selective inhibitors with improved pharmacodynamic and pharmacokinetic profiles, with the aim of ensuring safer therapies for chronic pain, inflammation, and various cancers. Among these, the thieno[2,3-*d*]pyrimidine has emerged as a versatile and promising scaffold, with derivatives reported to exhibit selective COX-2 inhibition along with notable anticancer activity. In the present study, a series of thieno[2,3-*d*]pyrimidine derivatives was synthesized and characterized. Their COX-2 inhibitory potency and selectivity over COX-1 (in vitro) and anticancer activity against breast, ovarian, and cervical cancer cell lines were evaluated. Remarkably, one compound demonstrated the highest selectivity and exhibited significant cytotoxicity (85%) against cervical cancer cells, outperforming doxorubicin (45%). Furthermore, computational studies, including molecular docking, ADMET predictions, and molecular dynamics simulations, were conducted to elucidate their physicochemical properties and binding interactions with COX1/2 isoenzymes. The findings indicate that the observed COX-2 selectivity is primarily due to the enzyme's larger allosteric pocket. In conclusion, these compounds represent promising lead candidates that can be further optimized to yield potent, selective COX-2 inhibitors with dual anti-inflammatory and anticancer potential.
**Keywords:** Cyclooxygenase 2 (COX-2), cancer, thieno[2,3-d]pyrimidine, molecular modeling .

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SNUCON080

## Recent Advancements in Herbal Medicines in the Modern Health Care System

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**Abstract:**
Herbal medicine, once rooted primarily in ancestral tradition, has transitioned into a cornerstone of contemporary medical science. This shift is largely driven by recent breakthroughs in phytochemical analysis and pharmacological validation, which have bridged the gap between ancient wisdom and modern clinical requirements. By applying rigorous scientific standards, researchers have moved beyond anecdotal evidence to create herbal therapies that are standardized, safe, and reproducible. The modernization of these therapies relies heavily on sophisticated analytical instrumentation. Techniques such as High-Performance Liquid Chromatography (HPLC) and Gas Chromatography–Mass Spectrometry (GC-MS) allow for the precise "molecular fingerprinting" of plants. This means that instead of using a raw extract of unknown potency, scientists can identify and quantify the specific bioactive compounds responsible for a drug's therapeutic effect. Consequently, this ensures that every dose of an herbal product contains the exact concentration of active ingredients needed for efficacy.
**Keywords:** Herbal medicine, Phytotherapy, Modern health care, Standardization, Drug delivery systems.

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SNUCON081

## In Vitro Micropropagation of Brahmi (Bacopa monnieri): A Sustainable Biotechnological Strategy for Conservation and Mass Production.

**Neha Rani[1*], Nishi Prakash Tiwari[1], Preety Kumari1, Bhagyashree Singh[1], Dharmendra Kumar Ram[1], Anushree Anand[1], Buts Kumar Gourav[1], Pragya Bharti[1]**
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**Abstract:**
Brahmi (*Bacopa monnieri*) is an important medicinal plant widely used in traditional and modern healthcare systems due to its neuroprotective and cognitive-enhancing properties. The increasing demand of Brahmi for pharmaceutical and herbal industries has led to overharvesting from natural habitats, resulting in depletion of its natural population. Therefore, conservation and large- scale production of true to type planting material are essential. Micropropagation through plant tissue culture provides an efficient, rapid, and reliable method for mass multiplication of Brahmi under controlled conditions. In the present study, an *in-vitro* micropropagation protocol is highlighted using nodal segments and shoot tip explants as the primary source material. Explants were surface sterilized and cultured on Murashige and Skoog (MS) medium supplemented with suitable concentrations of plant growth regulators (PGRs) for shoot induction and multiplication. Cytokinin such as 6-benzylaminopurine (BAP) were found effective in promoting multiple shoot formation, while auxin like indole-3-butyric acid (IBA) supported rooting of regenerated shoots. Micropropagation of Brahmi ensures year- round production of disease- free and genetically uniform plants, making it highly beneficial for conservation. The development of standardized tissue culture protocols for Brahmi can also enhanced production of bioactive compounds through in- vitro techniques.
**Keywords:** Bacopa monnieri, Brahmi, micropropagation, tissue culture, MS medium, plant growth regulators, conservation, mass multiplication.

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SNUCON082

## Herbal-Based Integrated Pest Management (IPM): A Step towards Sustainable Agriculture and Healthcare

**Bhagyashree Singh[1]*, Buts Kumar Gourav[1], Anusree Anand[1], Nishi Prakash Tiwari[1], Dharmendra Kumar Ram[1], Neha Rani[1], Preeti Kumari[1]**
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**Abstract:**
Integrated Pest Management (IPM) is a scientifically recognized approach that emphasizes environmentally sound and economically viable pest control strategies. In recent years, the incorporation of herbal-based components into IPM has gained considerable attention due to their effectiveness in managing insect pests and plant pathogens while minimizing adverse effects on human health and the environment. Herbal-based IPM relies on plant-derived formulations as alternatives to synthetic pesticides, thereby promoting sustainable agriculture and food safety. Botanical species such as *Azadirachta indica*, *Ocimum sanctum*, *Allium sativum*, and *Curcuma longa* are rich sources of bioactive phytochemicals including terpenoids, phenolics, flavonoids, and alkaloids. These compounds exhibit multiple modes of action such as insecticidal, antifeedant, repellent, and antimicrobial effects, which contribute to the suppression of pest populations and reduction of insect-mediated disease transmission. Additionally, several herbal formulations demonstrate inhibitory activity against plant pathogenic fungi and bacteria, enhancing their utility in integrated pest and disease management programs. The adoption of herbal-based IPM significantly reduces the reliance on chemical pesticides, resulting in lower pesticide residues in agricultural produce and reduced risks to human health. This approach supports preventive healthcare by ensuring the availability of safer and nutritionally superior food. Furthermore, herbal-based IPM promotes agro-ecosystem stability by conserving beneficial organisms, improving soil health, and maintaining environmental quality. Although challenges such as formulation standardization, stability, and field-level validation remain, continued research and technological interventions can address these limitations. Overall, herbal-based IPM offers a holistic and sustainable framework that effectively links crop protection with human and environmental health.
**Keywords:** Herbal-based IPM; botanical pesticides; sustainable agriculture; plant protection; human health; food safety

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SNUCON083

## Anti-Anxiety Effects of Methanolic Extract of Mikania Micrantha on Stress-Induced Anxiety Models (Epm & Lda) in Male SWISS ALBINO MIC

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**Abstract:**
Physiological, behavioral and psychological state of global mental health condition characterized by a perceived or actual threat to one's well-being or existence is commonly referred to as anxiety. Increased alertness, anticipation, and neuroendocrine, autonomic activity, and certain behavioral patterns are prevalent characteristics of anxiety. Anxiety is normal in any stressful situation but in excessive anxiety in any situation is known as disorder. A medicinal plant, Mikania micrantha which is an Asteraceae family plant rich in bioactive phytochemicals, has showed many pharmacological activities. The main purpose of the study is to investigated the dynamic antianxiety effects of methanolic extract of Mikania micrantha using anxiety models. Before drug administration male Swiss Albino mice were exposed forced swimming test (FST) and Tail suspense test (TST) to induced anxiety like behaviors. The behaviour study was evaluated in Elevated Plus Maze (EPM), Light Dark Apparatus (LDA), Elevated T Maze (ETM), Hole Board Apparatus and other in-vivo anxiety models. Several group of Swiss Albino mice were given methanolic extract of Mikania micrantha for a specific duration except positive and negative control. Negative control group of animals get only vehicle without induced anxiety. The rest of the groups were received vehicle and stress. Mikania micrantha treated group exhibited significant reduction in anxiety like behaviours as compared to untreated group. Furthermore, the result of Mikania micrantha treated groups were comparable to standard drug treated group. In future, there is a need to investigate thoroughly the mechanism of action of the plant extract, isolation active phytochemical, along with detailed pharmacologic study in animal models to establish Mikania micrantha as a potential anxiety agents. Then only, Mikania micrantha could be a natural remedy or supplementary treatment for anxiety, opening up new therapeutic options and enhancing mental health results.
**Keywords:** Anxiety, Mikania micrantha, Methanolic extract, FST, TST,

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SNUCON084

## Study of Indian Herbs as per Ayurveda

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**Abstract:**
Ayurveda, the ancient Indian system of medicine, has emphasized the therapeutic use of herbs for maintaining health and treating disease for over 3,000 years. This study explores the significance of Indian herbs within Ayurvedic frameworks, on their pharmacological properties, traditional classifications, and modern scientific validation. Classical texts such as *Charaka Samhita* and *Sushruta Samhita* categorize herbs based on *Rasa* (taste), *Guna* (qualities), *Virya* (potency), *Vipaka* (post-digestive effect), and *Prabhava* (unique action). Key herbs including Ashwagandha (Withania somnifera), Tulsi (Ocimum sanctum), Neem (Azadirachta indica), Turmeric (Curcuma longa), and Amla (Emblica officinalis) are examined for their roles as *Rasayana* (rejuvenators), immunomodulators, and detoxifiers. The research integrates Ayurvedic principles with modern pharmacological evidence, highlighting antioxidant, anti-inflammatory, antimicrobial, and adaptogenic properties of these herbs. Findings suggest that Ayurvedic herbs not only provide symptomatic relief but also act systemically to enhance immunity, reduce oxidative stress, and promote homeostasis. Challenges such as standardization, dosage determination, and quality control are discussed, emphasizing the need for integrative approaches that combine traditional wisdom with contemporary scientific methodologies. This study concludes that Indian herbs, when analyzed through both Ayurvedic and biomedical perspectives, hold immense potential for holistic healthcare, preventive medicine, and sustainable therapeutic practices.
**Keywords:** Herbal medicine, Ayurveda, Modern health care, Therapeutics Efficiacy.

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SNUCON085

## Studies of Variability Components for Parental Selection among Chilli Genotypes

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**Abstract:**
A research trial was conducted to assess thirty genotypes of chilli for most appropriate parental selection for yield and yield related aspects at Horticultural Research Centre, Chauras Campus, H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand (India), during summer season, 2024. The experiment was laid out in Randomized Block Design with three replications. The analysis of variance revealed that thirty diverse genotypes of chilli showed vast variation in twenty quantitative and qualitative traits. The highest phenotypic variation (PV) genotypic variation (GV) were recorded in plant height at harvest, number of primary branches per plant, days taken to first flower, days taken to first fruit set, average fruit weight, fruit yield per plot. On the other hand, the highest phenotypic coefficient of variation (PCV) and genotypic (GCV) coefficient of variation were recorded in plant height at 60 DAT, number of primary branches per plant at harvest, days taken to 50% flower, average fruit weight, fruit length, fruit diameter and fruit yield per plot. The highest heritability with high genetic advance in percent of mean were observed for plant height at harvest, number of primary branches per plant at harvest, number of secondary branches per plant at harvest, average fruit weight and fruit diameter (cm), exhibiting the additive gene effect. The selection for these characters is reliable for further improvement work.
**Keywords:** Chilli, Coefficient, Genotypic, Heritability, Genetic and Phenotypic.

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SNUCON086

## Genetic Variability Analysis in Various Strains of Okra for Future Improvement Programme

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**Abstract:**
A field research trial was conducted to evaluate the strains of okra for suitable parental selection for economically important traits related to yield aspects. The research trail was conducted at Horticultural Research Centre, Chauras Campus, H.N.B. Garhwal University, Srinagar (Garhwal), Uttarakhand (India), during Kharif season, 2025. The experiment was laid out in Randomized Block Design with three replications. The analysis of variance showed that, twenty five diverse strains of okra showed tremendous amount of genetic variation for fifteen yield and yield related parameters. The highest phenotypic variation (PV) genotypic variation (GV) were observed in plant height (cm), number of primary branches per plant, days taken to first pod set, number of pod per plant, average pod weight (g), pod yield per plot (g). On the other side, the maximum phenotypic coefficient of variation (PCV) and genotypic (GCV) coefficient of variation were recorded in plant height, average pod weight (g), pod length (cm), pod diameter (mm) and pod yield per plot (g) while, the maximum heritability was recorded in number of primary branches per plant, number of pod per plant, pod length (cm) and number of picking. The highest heritability with high genetic advance in percent of mean were observed for plant height (cm), number of primary branches per plant, number of pod per plant, pod weight (g), pod diameter (mm) and pod yield per plot (g). These results exhibiting the significant additive gene effect and the selection are reliable for further improvement work.
**Keywords:** Okra, GCV, PCV, Heritability and Genetic Advance.

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SNUCON087

## Effectiveness of a Health Education Pamphlet on Knowledge and Practice Regarding Dengue Fever Prevention among School-Going Children in Bilaspur, Chhattisgarh

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**Abstract:** This study was undertaken to assess the effectiveness of a health education pamphlet on knowledge and practice related to the prevention of dengue fever among school-going children in a selected school at Bilaspur, Chhattisgarh. An evaluative research approach with a pre-experimental one-group pre-test post-test design was used. The study population included school-going children, and the sample was selected through a stratified random sampling technique. Data were collected using a self-structured knowledge questionnaire and a practice checklist. The content validity of the tools was established by eight experts. Reliability was determined using the split-half method and Karl Pearson's correlation coefficient showed acceptable reliability scores of $r = 0.74$ for knowledge and $r = 0.89$ for practice. A pilot study was conducted prior to the main study to determine feasibility and refine the research process. Data from the main study were analyzed using descriptive and inferential statistics. The findings demonstrated a statistically significant improvement in post-test knowledge and practice scores following the administration of the health education pamphlet. The calculated't' values for knowledge (19.36) and practice (11.68) were higher than the table value at $p < 0.05$, indicating the effectiveness of the intervention. A moderate positive correlation ($r = 0.24$) was found between pre-test knowledge and practice scores. The study concludes that health education pamphlets are effective in enhancing awareness and preventive practices related to dengue fever among school-going children and emphasizes the crucial role of nurses in health promotion and disease prevention.
**Keywords:** Dengue Fever, Health Education Pamphlet, School-going Children, Knowledge and Practice, Pre-experimental Design, Bilaspur; Chhattisgarh.

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SNUCON088

## Allicin Enhancement in Garlic through Integrated Nutrient Management: Implications for Herbal and Pharmaceutical Use

**Dharmendra Kumar Ram[1]*, Nishi Prakash Tiwari[1], Bhagyashree Singh[1], Anusree Anand1, Preeti Kumari[1], Neha Rani[1], Buts Kumar Gourav[1]**

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**Abstract:**

Garlic (*Allium sativum* L.) has been revered since ancient times as a potent therapeutic agent due to its rich bioactive compounds, particularly allicin, which imparts its medicinal properties. Allicin, the primary sulfur containing compound responsible for garlic's antimicrobial, antioxidant, and health-promoting effects, exists in the intact bulb as its precursor, alliin, and is enzymatically converted to allicin upon crushing or cutting. To enhance both productivity and medicinal value, an integrated nutrient and bio-stimulant approach is essential. This study evaluated the efficacy of such strategies on the garlic variety "Kandaghat Selection" to optimize agronomic performance and allicin content. It followed a Randomized Complete Block Design (RCBD) with three replications and fourteen treatments, including varied combinations of recommended NPK doses, sulfur (S) supplementation, and jeevamrut (Jv), an organic bio stimulant. Results revealed that the treatment comprising 100% recommended dose of NPK + 60 kg S/ha + 5% Jv at 1 L/m² ($T_5$) significantly outperformed others. It recorded the highest plant height, number of leaves per plant, bulb weight, bulb diameter, number of cloves per bulb, overall bulb yield, dry matter content, and total soluble solids (TSS). High-performance liquid chromatography (HPLC)-based phytomedical analysis confirmed elevated allicin levels across all treatments, surpassing pharmaceutical-grade standards, with $T_5$ yielding the most promising results. These findings underscore the potential of integrated nutrient management to boost garlic productivity and bioactive quality, offering sustainable strategies for horticultural cultivation and pharmaceutical applications.

**Keywords:** Alliin, Garlic, Jeevamrut, Phytomedical, Sulfur.

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SNUCON089

## Supercritical Fluid Extraction and Green Chemistry Approaches in Herbal Medicine Processing

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**Abstract:**

Traditional ways of extracting herbal medicines usually use organic solvents which are environmentally risky, form toxic byproducts and can destroy thermolabile bioactive substances. The alternative methods of extracting high-quality herbal extract include supercritical fluid extraction (SFE) and other green chemistry techniques, which provide sustainable, efficient and selective means of extracting quality herbal extract. This paper compares pressure, temperature, and co-solvent reconfiguration supercritical carbon dioxide (SC-CO 2 ) extraction to extract various classes of phytochemicals. In comparison, we evaluate SFE against new technologies such as the ultrasound-assisted extraction, microwave-assisted extraction, enzyme-assisted extraction, and pressurized liquid extraction in regard to yield, selectivity, power consumption, and quality products. Green chemistry principles, such as minimization of waste, utilization of renewable feedstocks, and minimization of energy demand are incorporated in order to create environmentally benign extraction guidelines. Subcritical water extraction takes advantage of the adjustable polarity of water at high temperatures in extracting polar as well as non-polar compounds without the use of organic solvents. Natural deep eutectic solvents (NADES) are novel biodegradable, non-toxic and selective extraction media that can be tailored to extract a particular group(s) of compounds. The green methods of extraction are sustainable and economical as seen in life cycle assessment and techno-economic analysis. Its use in industrial-scale production, in quality control and standardization is introduced. The barrier to widespread adoption is discussed as regulatory acceptance, scale complications and the up-front cost of capital. These environmental technologies make production of herbal medicine meet the sustainable development objectives.

**Keywords:** Supercritical fluid extraction, green chemistry, sustainable processing, herbal extraction, carbon dioxide

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SNUCON090

## Metabolomics and Systems Biology Approaches to Understanding Multi-Component Herbal Formulations

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**Abstract:**
The particular problems posed by multi-component herbal preparations multi-component herbal preparations present a special challenge to mechanistic understanding because of their chemical complexity and synergistic interactions between hundreds of bioactive components. The systems biology and metabolomics approaches offer strong instruments in order to fully describe these complex mixtures and understand their therapeutic actions on a systems level. In this review, the authors have discussed the state-of-the-art analytical systems such as nuclear magnetic resonance spectroscopy, ultra-high-performance liquid chromatography-mass spectrometry, and comprehensive two-dimensional gas chromatography that can be used to undertake untargeted profiling of overall phytochemical compositions. We examine the role of metabolomics in discovering the active compounds, defining metabolic changes, and biomarkers of therapeutic response in cell models (in vitro) and in animals (in vivo). Integration Systems biology Systems biology integrates metabolomics data with transcriptomics, proteomics, and genomics data to assemble extensive biological network models to map multi- target, multi-pathway effects of herbal formulations. Network pharmacology methods have found hub targets and key pathways of therapeutic action, and the mechanism by which herbal medicines can counteract the complexity of the disease is systemic, by modulating many targets at once as opposed to localized effects on individual targets. Principal component analysis and partial least squares-discriminant analysis are chemometric methods that mine meaningful patterns out of highly dimensional metabolic data. An example of using applications to determine synergistic effects, quality control, personalized medicine and mechanism-of-action studies is presented using traditional formulations case studies. Some of the challenges include standardization of data, database constraints in rare phytochemicals, complexity of computations and variability in biology. These integrative methods change the single- compound-reductionist theory of herbal medicine research to the systems-level of understanding therapeutic systems, which is in compliance with the scientific methodology and the traditional medicine philosophy.
**Keywords:** Metabolomics, systems biology, network pharmacology, multi-component formulations, mass spectrometry

SNUCON091

## Protecting Traditional Herbal Knowledge in Jharkhand: Copyright, Patents, and Sustainable Cultural Heritage

**Dr Suman Shrivastava**[1*]
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**Abstract:**
The state of Jharkhand, located in Eastern India, is home to many communities who have been using Herbal Medicine for centuries. Many of these Indigenous Cultures have been using their Knowledge passed down from their Ancestors and are now trying to protect their Traditional Knowledge using Copyright Laws. This Paper is an analysis of the Copyright ability of Traditional Uses of Herbal Medicine in Jharkhand and some of the difficulties with applying Contemporary Intellectual Property Principles to Communally Used Knowledge. This Paper will examine the cultural heritage of Jharkhand in order to identify the necessary components for New Copyright Protection. The Paper will also include an International Comparison of Approaches, including India's Biological Diversity Act, to help identify Models for Protecting Traditional Knowledge in Jharkhand. There are more than 1500 traditional medicinal plants used by Tribal in Jharkhand for Healing various health problems, thus protecting the Biodiversity is an integral part of this work. The Patenting of Herbal Medicine in India is governed by the Indian Patent Act (1970) and the Biological Diversity Act (2002), while Copyright Protection of Herbal Medicine is provided through the Government of India's Copyright Office; Patenting is administered through the Indian Patent Office in Kolkata. To provide an understanding of the Patenting of Herbs in Jharkhand will require cooperative work with Local Authorities and Academic Databases to include the Jharkhand State Biotechnology Centre and the National Institute of Pharmaceutical Education & Research (NIPER) located in Kolkata. This Investigation intends to assist in the preservation of the Cultural Heritage of Jharkhand, and in the Promotion of Sustainable Development, by creating Proper Legal Protection for Traditional Knowledge.
**Keywords:** Intellectual Property Rights, Copyright Law, Traditional Knowledge, Herbal Medicine, Biodiversity, Indigenous Communities, Patent Law, Cultural Heritage, Sustainable Development, Jharkhand.

SNUCON092

## Reverse Pharmacology Approaches: From Traditional Herbal Knowledge to Evidence-Based Modern Therapeutics

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**Abstract:**
Reverse pharmacology is a new paradigm shift, which proves the traditional herbal remedies by the systematic scientific research, transforming the ethnopharmacological knowledge into well supported therapeutics. In contrast to traditional drug discovery, which follows a linear path starting with molecular targets and known clinical uses, reverse pharmacology starts with known and reported traditional uses and safety profiles, then moves on to mechanistic clarification and controlled clinical validation. This method greatly shortens the development schedules and attrition rates since it builds upon centuries of empirical human use data. We discuss their methodology including ethnobotanical surveys, formulation standardization, exploratory clinical trials in suitable patient groups, pharmacological profiling and mechanistic studies. Examples that have succeeded include the derivation of artemisinin in Artemisia annua used in malaria treatment, forskolin in Coleus forskohlii to use as cardiovascular, and Silybum marianum standardized extracts to use as hepatoprotection. Reverse pharmacology is gaining rapid success in discovering new therapeutic leads as well as maintaining a multi-component character of conventional preparations. Combination of systems biology, network pharmacology and multi-omics technologies gives in-depth insight into the intricate interactions of herbs and the body on the molecular, cellular and systemic scales. Botanical drugs have regulatory routes such as the Botanical Drug Development Guidance of the FDA that help to convert traditional medicine into an approved drug. Intellectual property, sharing of benefits with indigenous communities, retention of traditional formulation integrity in the process of standardisation and development of relevant clinical endpoints that capture the holistic effects of therapy represent some of the challenges. This bi-polar methodology is a gap between conventional wisdom and contemporary science that provides sustainable interventions to global healthcare issues.
**Keywords:** reverse pharmacology, traditional medicine, ethnobotany, evidence-based medicine, botanical drugs

SNUCON093

## Integration of Herbal Medicine into Hospital Formularies: Policies, Challenges and Clinical Outcomes

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**Abstract:**
The introduction of herbal medicine into standard hospital formularies is an essential move to patient-centered integrative care, but the change experiences significant regulatory, clinical, and institutional hurdles. This is an overall discussion of policy frameworks, implementation plans, and clinical outcomes with regard to the inclusion of standardized herbal products in acute care facilities. We consider examples of effective integration in institutions in different healthcare systems such as traditional Chinese medicine hospitals in China, Ayurvedic integration in Indian tertiary care centers, and integrative oncology programs in Western medical centers. Others are the policy considerations focusing on the evaluation criteria of the formulary committee, the requirement of evidence threshold, prescribing privilege, stocking procedures by the pharmacy, and the reimbursement procedures. The adequate clinical governance frameworks aimed at monitoring the interactions of herbs and drugs, adverse events reporting, and therapeutic drug monitoring of simultaneous conventional drugs are vital safety elements. Proper use is enabled through healthcare professional education programs that can improve the competency of physicians, pharmacists, and nurses in using herbal medicine pharmacology, indications, and contraindications. Outcomes of patients using integrated care models indicate that there may be a gain in the management of symptoms, a decrease in the side effects of traditional therapies, an increase in the quality of life and a high score on the patient satisfaction levels. Cost-effectiveness is found in certain applications such as the incurred nausea during chemotherapy, managing chronic pain, and management of metabolic syndrome according to economic analyses. Obstacles to integration entail low quality clinical evidence, worries regarding product standardization, liability, resistance to conventional healthcare providers and insufficient insurance cover. The current evidence-based product selection, elaborate documentation systems, interprofessional cooperation, and ongoing quality improvement track are some of the recommendations of successful integration.
**Keywords:** hospital formulary, integrative medicine, clinical outcomes, healthcare policy, patient safety

SNUCON094

## Behavioural Drivers Behind the Rising Adoption of Herbal Healthcare Products Consumer Psychology & Behaviour towards Herbal Healthcare

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**Abstract:**
The growing convergence of traditional wellness practices and contemporary healthcare has reshaped consumer preferences across global markets. Herbal products, once confined to complementary medicine, are now increasingly viewed as proactive health choices rather than reactive treatments. This shift reflects a deeper behavioural transformation influenced by lifestyle changes, preventive health awareness, and the search for perceived safer alternatives to synthetic formulations. This paper investigates the evolving mind-set of consumers toward herbal healthcare products through a management lens, focusing on the behavioural drivers that influence adoption and sustained usage. It explores how cognitive factors such as risk perception, trust formation, cultural familiarity, and information accessibility shape purchasing decisions. The study further examines the role of managerial interventions including transparent communication, evidence-based positioning, responsible branding, and omni-channel availability in reducing consumer uncertainty and strengthening market acceptance. By synthesizing recent industry developments and behavioural theory, the paper proposes a consumer-centric framework that explains the transition from curiosity-driven trials to habitual consumption of herbal products. It argues that organizations that strategically align authenticity with innovation are better positioned to cultivate consumer confidence and long-term loyalty. The research contributes to the broader healthcare discourse by highlighting how informed management practices can transform herbal medicine from a traditional alternative into a credible component of modern health ecosystems. Understanding these behavioural dynamics is essential for managers and policymakers seeking to support sustainable growth while responding effectively to the expectations of an increasingly health-conscious population.
**Keywords:** Herbal healthcare, Consumer behaviour, Risk perception, Trust, Preventive health, Branding, Cultural influence, Information access, Health consciousness, Sustainable market growth.

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SNUCON095

## Pharmacogenomics and Personalized Herbal Medicine: Tailoring Traditional Remedies to Individual Genetic Profiles

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**Abstract:**
The Great Conference of Pharmacogenomics and Traditional Herbal Medicine has been termed as a paradigm shift that has given way to therapeutic interventions. Here, in this review, we observe how human personal genetic polymorphism regulates the metabolism, efficacy, and safety of the phytochemical constituents of the herbal medicine. Specifically, the Cytochrome P450 enzyme exhibits a special influence on the different forms, including CYP2D6, CYP2C9, CYP3A4, all the herbal compound-systems which lead to the inter-individual variability of the patient. In addition, the genetic polymorphism of bioactive phytochemical absorption and distribution is regulated by the drug transporter like P-glycoprotein and organic anion transporting polypeptide. In the present research, the researchers employ advanced technologies such as Genome-wide association studies (GWAS) and next-generation sequencing technologies to determine genetic implementations in defining the potential response of patients upon the application of certain herbs. Various Case studies have been demonstrated with the Pharmacogenomic profiling. Dosage regimens of medicines rich in ginseng, curcumin and John wort may be prescribed perfectly, according to John wort. The combination does not only decrease the adverse herb-drug interactions but also enhances the overall outcomes of the treatment or therapeutic outcomes. Even though certain challenges remain unlike poor databases and ethical issues, this individual approach will lead to the development of old-fashioned herbal therapy into a new evidence-based accuracy therapy.
**Keywords:** Pharmacogenomics, personalized medicine, cytochrome P450, phytochemicals, genetic polymorphisms.

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SNUCON096

# Organ-on-Chip and 3D Cell Culture Models for Evaluating Herbal Medicine Efficacy and Toxicity

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**Abstract:**
The classical two-dimensional cell culture models and animal models do not sufficiently mimic physiological mechanisms of human responses of herbs which frequently comprise a complex mixture of bioactive compounds with multi-organ interactions. Organ-on-chip systems and three-dimensional cell culture models offer physiological relevant systems to measure efficacy and toxicity of herbal preparations. This review focuses on the current advancement in microfluidic organ chips which recreate liver, intestine, kidney, and blood-brain barrier applications in herbal medicine testing. We present scaffold based and scaffold free 3D cultures systems such as spheroids, organoids, and bioprinted cultures which do not change the tissue geometry and cell cell interactions of tissues. Such models can be used to calculate the herbdrug interactions, first-pass metabolism, bioavailability, and organ toxicity, all with a high level of predictability as opposed to the traditional measures. An arrangement of multi-organ chips by making micro-fluidic bridges replicates systemic circulation and inter-organ interaction which removes more albums of interaction of combinational herbs with organs. Omics profiling, high-content imaging and real-time biosensors will give in-depth mechanistic understanding. Examples of these uses include successful application in the screening of hepatotoxic herbs, neuroprotective botanicals and in the optimization of extraction techniques. Complaints of standardization, comparison with clinical data and affordability are met. These high-tech cultures will lessen the need to do animal testing to expedite the translation of herbal medicine usage to evidence-based therapeutic with a defined safety profile.
**Keywords:** organ-on-chip, 3D cell culture, herbal medicine, toxicity assessment, microfluidics.

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