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# DETAILS OF PUBLISHED RESEARCH AND REVIEW ARTICLES


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# Optimizing Rheological Behavior of Pectin Gels: A Response Surface Methodology Approach

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**Abstract**

Pectin, a natural polysaccharide widely used in the food and pharmaceutical industries, forms gels in the presence of sugar and divalent ions such as calcium. Its rheological behavior is strongly influenced by extrinsic factors including pH, calcium chloride, and sugar concentration. This study aimed to optimize the viscosity of pectin gels prepared in aqueous medium, targeting applications in edible films and biodegradable packaging. Gel formulations were prepared with varying calcium chloride concentrations (5-15% w/v), pH levels (4.5-8.0), and sugar concentrations (5-20% w/v). Viscosity was measured using a Brookfield viscometer and analyzed by response surface methodology (RSM). Results showed that pH had the strongest effect, with viscosity increasing from 1734.2 cP at pH 4.5 to a maximum of 2681.2 cP at pH 8.0, reflecting enhanced ionization and cross-linking. Calcium chloride exhibited an optimum at 10% w/v (1097.6 cP), while sugar enhanced viscosity up to 15 g (2747.2 cP) but declined at higher levels due to excessive dehydration. ANOVA confirmed the model's significance ($p < 0.001$), with strong quadratic effects but negligible interactions among factors. Optimal viscosity was obtained under near-neutral pH, 10% w/v calcium chloride, and 15% w/v sugar, highlighting the potential of pectin gels as sustainable biomaterials for food and pharmaceutical applications.

**Keywords:** Pectin, Viscosity, Calcium Chloride, Sugar, Brookfield Viscometer, Rheocalc software.

**Introduction**

Pectin, widely used in the food industry, is valued for its ability to form gels in the presence of sugar and acid,a property essential for producing jams, jellies and marmalades (1). Its rheological behavior is influenced by intrinsic factors such as botanical origin, degree of methylation, distribution of non-methylated galacturonic acid (GalA) residues and degree of acetylation, as well as extrinsic factors including temperature, pH, concentration and the presence of divalent ions (2).

Citrus peels are among the richest sources of pectin, containing approximately 20-30% more than apple peels. In addition to their higher yield, citrus-derived pectin typically exhibits a lighter cream color, whereas pectin obtained from apple peels tends to be darker (3). Other widely utilized commercial sources include sugar beet pulp, mango processing waste and sunflower heads, owing to their high pectin content and availability as agro-industrial byproducts (4). Literature reports indicate that pectin content varies significantly across fruits and vegetables. On a dry matter basis, carrots (6.9-18.6%), orange pulp (12.4-28.0 %) and sugar beet pulp (10.0-30.0%) are particularly rich in pectin, while fresh fruits such as apples (0.5-1.6%), bananas (0.7-1.2%) and peas (0.9-1.4%) contain comparatively lower amounts (5).

In the food sector, one of the major challenges lies in the packaging of food products. To meet the increasing demand for packaged foods, numerous synthetic polymers have been developed and employed due to their cost-effectiveness, flexibility and versatility.

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# PERSONALISING THERAPY: DISSOLUTION MEDIA DESIGN FOR BIOSIMILARS

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## ABSTRACT

The growing availability of biosimilars has significantly broadened therapeutic options while contributing to the reduction of healthcare costs. Despite these advantages, Inter-individual variability in drug response, particularly with complex biologic therapies, remains a critical challenge. Personalised medicine, which relates to treatment strategies based on patient-specific physiological and genetic factors, offers a promising solution to this issue. This review examines the emerging potential of customised dissolution media as a tool for evaluating biosimilar performance in a more patient-centric context. Emphasis is placed on optimising bioavailability and therapeutic outcomes across diverse patient populations. This review focuses on recent advancements, prevailing challenges and future directions for integrating personalised dissolution testing into the development and evaluation of biosimilars.

**KEYWORDS:** Biosimilar, Dissolution media, Bioavailability

## INTRODUCTION:

Biosimilars, referred to by the World Health Organisation (WHO) as "similar biotherapeutic products", are biological medicines that are highly comparable to an already authorised reference biologic in terms of quality, safety and efficacy. Unlike small-molecule drugs, biologics are derived from living cells and typically exhibit complex structural characteristics, making their complete physicochemical characterisation and replication more challenging [1]. Nevertheless, biosimilars offer a more cost-effective alternative to originator biologics, which are often associated with high manufacturing costs and limited accessibility. By reducing financial barriers, biosimilars play a critical role in expanding patient access to advanced biological therapies. They are now increasingly accepted across a wide range of therapeutic areas, including oncology, autoimmune disorders, endocrinology and haematological conditions [2].

Despite their clinical success, biologics often display substantial inter-individual variability in therapeutic outcomes. This variability arises from a range of patient-specific factors, such as genetic polymorphisms, immune system variability, disease heterogeneity, gut microbiota composition, organ function, age, and coexisting medical conditions. These differences can significantly affect drug pharmacokinetics (PK), pharmacodynamics (PD) and immunogenicity. Personalised medicine aims to address this issue by tailoring therapies to the unique biological and physiological characteristics of individual patients [3]. In the realm of biologics, this approach is particularly relevant due to their complex mechanisms of action and potential to elicit immune responses. As the range of biosimilar products expands, so too does the need for predictive and personalised tools to evaluate their performance in diverse patient populations. One such tool is dissolution testing. Traditionally used to assess oral drug release and guide formulation development, dissolution testing serves as a valuable *in vitro* method for predicting *in vivo* drug performance, especially in terms of bioavailability. Dissolution media are carefully designed to simulate the physicochemical conditions a drug encounters within the body, particularly in the gastrointestinal (GI) tract. Factors such as pH, enzyme concentration, viscosity, buffer capacity, and the presence of surfactants are critical in determining how accurately the *in vitro* environment reflects physiological conditions [4]. For small-molecule drugs, a strong *in vitro–in vivo correlation* (IVIVC) has been established, making dissolution testing a widely accepted regulatory tool. However, for biologics and biosimilars, which are typically larger, structurally complex, and more sensitive to environmental changes, traditional dissolution methods often fall short. This limitation becomes especially important as the industry explores novel delivery routes for biologics, such as oral, nasal, and pulmonary administration, where these large molecules must survive and function in a dynamic and sometimes hostile physiological environment [5].

In this context, tailoring dissolution media to reflect specific patient conditions such as hypochlorhydria in the elderly, altered enzymatic profiles in pediatric patients, or intestinal inflammation in individuals with Inflammatory Bowel Disease (IBD) becomes essential [6]. Customised dissolution testing that incorporates these variables can offer a more accurate *in vitro* evaluation of biosimilar performance, helping to ensure both therapeutic equivalence and clinical reliability across diverse populations [7].

This review aims to explore the emerging role of personalised dissolution media in the evaluation and development of biosimilars. This study examines how dissolution conditions can be adapted to simulate patient-specific physiological environments, enhance predictive accuracy, and support the broader goals of personalised therapy. This review highlights an important and underexplored intersection between biopharmaceutical science, patient-centric formulation design, and precision medicine.

## DISSOLUTION MEDIA IN DRUG DEVELOPMENT:

### Role of Dissolution Testing in Drug Development:

Dissolution testing is a fundamental tool in pharmaceutical development, used to evaluate how a drug is released from its dosage form into solution under standardised conditions. It plays a crucial role across the formulation, optimisation, quality control, and regulatory approval stages of both oral and parenteral drug products [8].

**a. Oral Formulations:**[9]

- Formulation Optimisation: Helps in selecting excipients, coatings, and release profiles (immediate, delayed, or sustained release).
- Predictive Tool: Correlates *in vitro* release profiles with pharmacokinetic parameters like $C_{max}$ and AUC.
- Regulatory Utility: Assists bioequivalence studies and enables biowaivers for BCS Class I and III drugs.
- Quality Assurance: Ensures batch-to-batch consistency and manufacturing robustness.







## Computational modeling for predicting the drug metabolism: A novel approach for developing new drugs and to predict drug interactions

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**Keywords:** Computational tools, Drug metabolism, Drug discovery, Drug – drug interactions

**Abstract**

Drug metabolism (DM) plays the crucial role in the drug therapy and research as it influences the pharmacokinetics (PK), Pharmacodynamic (PD) of the drug, decides the drug's efficacy and safety and drug interactions (DDIs). An exogenous compound includes the drugs, toxins and other foreign materials undergoes metabolism. The current review represents the computational approaches to predict the drug metabolism in human. This explains the metabolism related aspects for a drug molecule related to the type of enzyme that metabolise, binding sites on the substrate, metabolites formation process and drug-drug interactions. As the usage of multiple drugs containing regimens is increased, the identification and prediction of drug interactions is gaining importance in the personalized medication. The present review also exemplified using a case study by using the propionic derivatives drugs metabolism prediction by using *in silico* software's Bio Transformer 3 and AutoDock vina against enzymes Cytochrome P 450 and transferase enzymes. The binding score obtained for the above molecules and enzymes guiding safer and more effective drug design. Finally, based on the study concluded that every drug had their individual enzyme and metabolism process even though they are structurally similar.

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# ISOLATION AND CHARACTERIZATION OF PROBIOTICS (LACTOBACILLUS) FROM ANDHRA PICKLES (BAPATLA)

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**ABSTRACT**

Fermented foods are recognised as natural reservoirs of beneficial microorganisms, particularly lactic acid bacteria (LAB) with probiotic potential. The present study focused on the isolation and preliminary characterization of *Lactobacillus* species from traditionally prepared Andhra pickles collected in Bapatla, Andhra Pradesh, India. Five homemade pickle samples were analyzed, with fresh curd used as a positive control. Samples were processed using serial dilution and enrichment in de Man, Rogosa, and Sharpe (MRS) broth under anaerobic conditions to promote selective growth of LAB. Preliminary identification was carried out using Gram staining, catalase testing, and carbohydrate fermentation assays. Microscopic examination revealed Gram-positive, rod-shaped, catalase-negative bacteria capable of fermenting glucose with acid production, confirming characteristics typical of *Lactobacillus* spp. Semi-quantitative estimation based on serial dilution turbidity indicated the presence of LAB in all pickle samples, although in lower abundance compared to curd. Pickle samples showed detectable growth up to $10^{-3}$–$10^{-4}$ dilutions,

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# THE ROLE OF ARTIFICIAL INTELLIGENCE IN MODERN PHARMACEUTICAL SCIENCES AND PATIENT ORIENTED HEALTH CARE

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**ABSTRACT**
Artificial Intelligence (AI) is rapidly transforming pharmaceutical sciences and healthcare by introducing data-driven, intelligent approaches across the drug development lifecycle and patient care continuum. From early-stage drug discovery to clinical evaluation, manufacturing, pharmacovigilance, and personalized medicine, AI technologies enable faster decision-making, improved accuracy, and enhanced efficiency. By integrating diverse data sources such as biological datasets, clinical records, real-world evidence, and patient-generated data, AI supports predictive modelling, precision therapeutics, and proactive safety monitoring. Furthermore, patient-centric applications including digital therapeutics, remote monitoring, and virtual health assistants are redefining healthcare delivery by extending care beyond traditional clinical settings. Despite these advancements, ethical concerns, regulatory challenges, data governance issues, and implementation barriers remain critical considerations. This review highlights the evolving role of AI in modern pharmaceutical sciences with a strong emphasis on patient-oriented healthcare, discusses current challenges, and outlines future perspectives toward fully personalized and predictive healthcare models. Responsible and collaborative integration of AI is essential to ensure sustainable innovation, patient safety, and equitable healthcare outcomes.

**KEYWORDS:** Artificial Intelligence; Pharmaceutical Sciences; Drug Discovery; Clinical Trials; Personalized Medicine; Pharmacovigilance; Patient-Centric Healthcare; Digital Therapeutics; Predictive Analytics.

## 1. INTRODUCTION[1,2, 3, 20, 25]

The pharmaceutical sciences are undergoing a significant transformation driven by the rapid advancement of Artificial Intelligence (AI). Traditionally, pharmaceutical research and healthcare delivery relied heavily on manual experimentation, linear workflows, and retrospective analysis of limited datasets. However, the growing complexity of diseases, rising development costs, and increasing demand for patient-centred care have exposed the limitations of conventional approaches. AI has emerged as a powerful enabler capable of integrating vast amounts of biological, chemical, and clinical data to generate meaningful insights at unprecedented speed and scale. The convergence of AI with pharmaceutical sciences represents a shift from experience-based decision-making toward data-driven and predictive methodologies. By mimicking aspects of human cognition, AI systems can identify hidden patterns, learn from previous outcomes, and support informed decision-making across the entire drug lifecycle. This integration not only enhances research productivity but also bridges the gap between laboratory innovation and real-world patient needs, ultimately fostering a more responsive and outcome-oriented healthcare ecosystem.

### 1.1 Evolution of Digital Intelligence in Healthcare Systems[2, 11, 12, 14]

The concept of digital intelligence in healthcare has evolved steadily over the past few decades, beginning with basic computerized record-keeping and advancing toward intelligent, autonomous systems. Early digital tools focused on data storage and administrative efficiency, such as electronic health records and hospital information systems. While these technologies improved accessibility to patient data, they offered limited

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# INVESTIGATING THE NEPHROPROTECTIVE POTENTIAL OF OKRA (ABELMOSCHUS ESCULENTUS) AGAINST CISPLATIN-INDUCED NEPHROTOXICITY IN WISTAR ALBINO RATS

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**Keywords:** Abelmoschus esculentus, Liquid chromatography-mass spectrometry, Nephroprotective activity,, Cisplatin, Hydro-alcoholic extract, Antioxidants and Wistar rats.

## ABSTRACT

**Objective:** Plants incorporated in the daily diet are known for their role in disease prevention owing to their diverse biological and pharmacological activities. The present study aimed to investigate the nephroprotective potential of hydro-alcoholic pod extract of *Okra* (*Abelmoschus esculentus*) against cisplatin-induced nephrotoxicity.

**Methods:** The chemical constituents of *Okra* extract were identified through preliminary phytochemical screening and liquid chromatography-mass spectrometry (LC-MS) spectral analysis. A total of 80 compounds were detected, including phytoconstituents with notable antioxidant properties such as alpha-linolenic acid, quercetin, myricitrin, quercetin-3-glucoside-7-xyloside, dioctyl hexanedioate, and protobassic acid. Nephroprotective activity was evaluated in albino Wistar rats at two dose levels (200 and 400 mg/kg b.w.). Nephrotoxicity was induced by a single intraperitoneal injection of cisplatin (6 mg/kg b.w.). The protective effects were assessed by estimating urinary total protein, creatinine clearance, serum creatinine (SC), blood urea nitrogen, lipid peroxidation, and antioxidant status.

**Results:** Nephrotoxicity arose in the group II rats due to cisplatin injections; according to this, SC and urea levels were significantly higher ($p<0.05$) when compared with the normal control group (I). Animals that received the hydroalcoholic extract of pods of *Okra* alone (group-V) exhibited no change in serum and urinary functional parameters. Animals that received the hydroalcoholic extract of pods of *Okra* alone (group-V) exhibited no change in serum and urinary functional parameters. Hence, the hydroalcoholic extract of pods of *Okra* did not show any nephrotoxic effects. Administration of hydroalcoholic extract of pods of *Okra* at 200 mg/kg to cisplatin-injected rats improved of blood urea and SC activity in treatment group III animals, when compared to cisplatin-induced group animals (group-II). It was practically near the normal values related with the normal group animals. On administration of hydroalcoholic extract of pods of *Okra* in treatment groups III and IV animals, a momentous dose-related reduction in the levels of blood parameters was detected when compared to the negative group-II animals.

**Conclusion:** The findings suggest that *Okra* hydro-alcoholic extract possesses strong nephroprotective activity, likely attributable to its antioxidant phytoconstituents. Hence, *Okra* may serve as a promising dietary intervention for mitigating cisplatin-induced nephrotoxicity.

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# MONOCLONAL VS POLYCLONAL ANTIBODIES: PRODUCTION, MECHANISM AND DIAGNOSTIC APPLICATIONS

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**Abstract**
This review summarizes the fundamental concepts, production methods, and clinical/diagnostic utility of polyclonal antibodies (pAbs) and monoclonal antibodies (mAbs). Polyclonal antibodies are produced in animals (e.g., rabbits, chickens, mice, rats, guinea pigs) through a multi-step process including antigen preparation, immunization, and serum collection. Their therapeutic effects stem from diverse pathways, including immunosuppression (e.g., Antithymocyte Globulin - ATG), toxin neutralization (e.g., Tetanus Immune Globulin - TIG), and immunomodulation (e.g., Intravenous Immunoglobulin's - IVIG). Monoclonal antibodies, valued for their high specificity to a single epitope, act via direct (non-effector) mechanisms like receptor blockade and induction of apoptosis, or indirect (effector) mechanisms such as Antibody-Dependent Cellular Cytotoxicity (ADCC) and Complement-Dependent Cytotoxicity (CDC). Both are essential in diagnostics (e.g., ELISA, Western Blotting, IHC), with mAbs preferred for their high specificity and pAbs for their sensitivity and quick, inexpensive production. While mAbs face challenges like high cost and susceptibility to resistance, pAbs struggle with batch-to-batch variability and cross-reactivity.

**IndexTerms: Monoclonal antibodies, Polyclonal antibodies, Antibody production technologies, Immunodiagnostic applications, Therapeutic biologics, Antibody mechanisms of action**

**INTRODUCTION**

The body's ability to maintain balance, known as homeostasis, is supported by the immune system. It protects the body from harmful pathogens and abnormal cell changes. It fights infections and helps the body defend itself against disease. It also plays an important role in repairing damaged tissues, keeping metabolic processes stable, and controlling immune responses. As people age, a process called immunosenescence can affect how well the body maintains balance. The immune system can also be influenced by other body systems, such as the endocrine system, which releases hormones. Keeping this balance is essential for overall health. (1)

The innate immune system includes cells like macrophages and neutrophils, which serve as the first line of defence against many microorganisms, particularly common bacteria. -These immune cells originate from the bone marrow, where they also develop. They travel to different parts of the body, moving through a special network of vessels known as the lymphatic system. Autoimmune diseases can develop when the adaptive immune system mistakenly attacks the body's own antigens. (2)

**ANTIBODY**

The oldest definitions of antibodies state that they are proteins that attach to antigens to perform a specific function. They offer the first line of defense, providing broad protection against potential invaders and allowing time for a specific antibody response to increase in strength. These are known as pre-immune antibodies, which are naturally produced without exposure to exogenous antigens. They are broadly reactive, have low affinity, and are similar to the germline antibodies found in the body (3).

Antibodies can be of two types

1 .Monoclonal Antibodies

2. PolyclonalAntibodies

Monoclonal Antibodies are produced through laboratory processes.

They can act as engineered tools that mimic the immune system's ability to attack pathogens. This type of treatment was first discovered in the 18th century by Dr. Edward Jenner, who used fluid from a smallpox pustule to inoculate a person, which helped them develop immunity (4).

Polyclonal Antibodies are naturally produced in a wide range of animal species, such as sheep, goats, rabbits, chickens, ducks, and donkeys.

They offer several benefits as tools for targeting and detecting specific proteins. Their ability to bind to multiple epitopes makes them suitable for a wide variety of applications (5).

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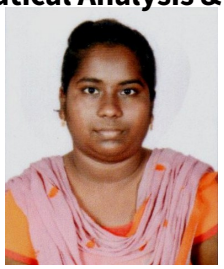

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# RP-HPLC METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF METFORMIN, EMPAGLIFLOZIN AND LINAGLIPTIN IN ITS BULK AND COMBINED TABLET DOSEAGE FORM

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**Article Received on 15/01/2026** **Article Revised on 05/02/2026** **Article Published on 10/02/2026**

**ABSTRACT**
A simple, precise, accurate, and stability-indicating reverse phase high-performance liquid chromatographic (RP-HPLC) method was developed and validated for the simultaneous estimation of Metformin (MET), Empagliflozin (EMP), and Linagliptin (LIN) in bulk drugs and combined tablet dosage forms. Chromatographic separation was achieved using a C18 column with a mobile phase consisting of phosphate buffer and methanol in an optimized ratio, delivered at a suitable flow rate, and detection was carried out using a UV/PDA detector. The method provided well-resolved peaks with satisfactory retention times, good peak symmetry, and acceptable system suitability parameters. The proposed method was validated according to ICH guidelines for parameters including accuracy, precision, linearity, range, specificity, robustness, limit of detection (LOD), and limit of quantification (LOQ). Linearity was observed over the selected concentration ranges for all three drugs with correlation coefficients greater than 0.99. Accuracy studies showed percentage recoveries within acceptable limits, indicating the reliability of the method. Precision studies demonstrated low %RSD values, confirming repeatability and intermediate precision. The method was found to be robust against small deliberate variations in chromatographic conditions. Forced degradation studies under acidic, alkaline, oxidative, thermal, and photolytic conditions confirmed that the method is stability-indicating, as degradation products did not interfere with the analyte peaks. The developed RP-HPLC method is suitable for routine quality control analysis and stability testing of MET, EMP, and LIN in pharmaceutical formulations.

**KEYWORDS:** RP-HPLC, Metformin, Empagliflozin, Linagliptin, Method Validation, Stability-Indicating Method, ICH Guidelines, Pharmaceutical Analysis

## INTRODUCTION

### 1.1 Importance of Analytical Methods

Quality is important in every product or service, but it is vital in medicine as it involves life. Unlike other consumer goods, there can be, and there is no second quality. Therefore, analytical methods, which are a measure of quality of the drugs, play a very comprehensive role in drug development and follow-up activities, to ensure that a drug product meets the established standard, is stable and will continue to meet the purported quality throughout its shelf life.

These methods should be selective and sensitive to monitor the known and unknown impurities, have to be



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# QBD BASED STABILITY INDICATING RP-HPLC METHOD FOR COMBINED ANTIRETROVIRAL TABLETS

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**ABSTRACT**
A tablet containing Dolutegravir, Lamivudine, and Tenofovir disoproxil fumarate is a combined drug of antiretroviral medication used to treat HIV/AIDS. WHO recognised this drug as the first-line treatment for adults. The primary purpose of this study is to develop and validate a simple, accurate, precise, and reproducible reverse-phase high-performance liquid chromatography (RP-HPLC) method for estimating dolutegravir, Lamivudine, and Tenofovir disoproxil fumarate in bulk and tablet dosage forms by optimising chromatographic parameters using a two-level full factorial design. A 2-level full factorial design was utilised to optimise the type of column and percentage of organic phase to maximise the theoretical plates and minimise the retention time of all three drugs. The optimised strength of acetonitrile and 1% ortho phosphoric acid buffer (70:30), flow rate and the volume of injection were found to be 1ml/min and 20 µl, respectively. The retention times were found to be 3.785min, 1.529min and 3.140 min for Dolutegravir, Lamivudine and Tenofovir, respectively. The $R^2$ values for Dolutegravir, Lamivudine and Tenofovir were found to be 0.99985, 0.99994 and 0.99923, respectively. The theoretical plate number and tailing factor for Dolutegravir, Lamivudine and Tenofovir were found to be NLT 2000 and should not be more than 2, respectively. The per cent RSD of peak areas of all measurements was found to be less than 2.0. The QBD approach was found to be an effective technique for optimising chromatographic conditions of the proposed method, which is useful for routine analysis of Dolutegravir, Lamivudine, and Tenofovir disoproxil fumarate in pharmaceutical dosage form.

**KEYWORDS:** RP-HPLC, Dolutegravir, Lamivudine, Tenofovir disoproxil fumarate, QbD, ICH guidelines.

## 1. INTRODUCTION

Antiretroviral therapy (ART)[1] has significantly evolved over the last few decades since the development of the first nucleoside analogues NRTIS[2] (nucleoside reverse transcriptase inhibitors). With the advent of triple therapy, majority of the challenges has been resolved. The latest class of the antiretroviral drugs developed was integrase inhibitors (INI).[3] Dolutegravir[4], (3S,7R)-N-[(2,4-difluorophenyl)methyl]-11-hydroxy-7-methyl-9,12-dioxo-4-oxa-1,8- diazatricyclo[8.4.0.0^{3,8}]tetradeca-10,13-diene-13- carboxamide[5] is an integrase inhibitor. It bocks HIV integrase enzyme by binding to the active site and obstructing the strand transfer step which is important in the HIV replication cycle and leads to the inhibition of viral activity.

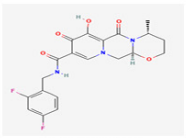

**Fig. 1: Dolutegavir.**

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# Ameliorative Effect of Lagenaria siceraria on Cisplatin-Induced Kidney Injury in Wistar Rats

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DOI: https://doi.org/10.22376/ijlpr.v15i4.2014

Keywords: Lagenaria siceraria, Nephroprotective activity, Cisplatin, Hydro-alcoholic extract

ABSTRACT

The objective of the present study was conducted to investigate the nephroprotective activity of hydroalcoholic extract of *Lagenaria siceraria* against cisplatin-induced nephrotoxicity in Albino Wistar rats. Cisplatin (6mg/kg.bw.t, i.p.) used as nephrotoxicant. The oral administration of hydroalcoholic extract at two different doses (200mg/kg.bw.t and 400mg/kgb.w.t) of *Lagenaria siceraria* were used to examine the Nephroprotection using Urinary and serum biomarkers, as well as renal oxidative stress biomarkers, histological and immunohistological studies. Enhanced levels of Urinary, serum biomarkers, total protein and lipid peroxidation and decreased urinary creatinine and anti-oxidant enzymes observed after cisplatin induction. Treatment with Hydroalcoholic extract alters the Cisplatin induced nephrotoxic effects. Histopathological studies and immunohistochemical observations provided evidence consistent with the biochemical findings. Thus, the current study reveals the advantageous use of *Lagenaria siceraria* in renal toxicity.



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*Original Research Article*

# *Rhizophora apiculata* extracts improved memory function through inhibition of acetylcholinesterase and oxidative stress in scopolamine-induced memory deficits in rats

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***Keywords:***
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*Antioxidant*
*Scopolamine*
*Memory enhancement*
*Anticholinesterase*
*Neuroprotection*

## Abstract

**Objective:** This study aims to investigate the neuroprotective, memory enhancement effects and phytochemical profile of *Rhizophora apiculata.*

**Materials and Methods:** Ethanolic and aqueous extracts of *R. apiculata* leaves were prepared and screened for their antioxidant potential. *In vitro* studies were performed to assess the neuroprotective effects of *R. apiculata* extracts against scopolamine-induced neurotoxicity in SH-SY5Y cells. Further, *in vivo*, memory-enhancing effects of the extracts were evaluated in a scopolamine-induced amnesia model in rats by measuring brain acetylcholinesterase (AChE) levels, lipid peroxidation, and glutathione (GSH) activity. Furthermore, phytochemicals were identified through HR-LCMS analysis, and their binding interactions with the target protein AChE were investigated through *in silico* studies.

**Results:** Treatment with ethanolic (100 µg/ml) and aqueous extracts (100 µg/ml) significantly reduced oxidative stress up to 89.386±2.37% in DPPH assay and 84.167±5.80% ABTS assays, respectively. The extracts (100 µg/ml) notably increased the viability (97.49%) of SH-SY5Y neuroblastoma cells against scopolamine-induced neurotoxicity. *In vivo*, studies revealed that both extracts improved memory function in scopolamine-induced amnesia by inhibiting the AChE activity and enhancing brain GSH levels while reducing lipid peroxidation. HR-LCMS analysis identified 54 distinct phytochemicals, with several compounds showing promising binding affinities like olitorin (-11.5 kcal) and gambiriin A3 (-10.7 kcal) for AChE in *in-silico* studies.

**Conclusion:** Based on the findings of this study, *R. apiculata* leaves may be considered a promising source of neuroprotective compounds, with potential therapeutic applications for various neurological diseases.

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(Research Article)

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# Development of synbiotic powder preparation from reduced starch and fermented soyabean to improve gut health

Sudheer Chowdary Bodepudi *, Venu Babu Chennupati, Sushma Ch, Poornachandra Rao. K and Sukanya Manam

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## Abstract

Synbiotics are combination of both prebiotics and probiotics containing product mainly involved in the improving of gut health. These are emerging high demand nutraceuticals commercially around the world which was expecting of gaining 1.5 billion USD during the year 2023. Various countries like North America, UK, Germany, France, China and India are focused on this product development. Synbiotics plays a major role in the prevention of various gut related disorders like irritable bowel syndrome, gastro esophageal reflux disease, lactose intolerance etc. Our study was aimed to prepare the synbiotic by using soya bean and reduced starch from the rhizome of banana. Firstly, the soyabean paste was prepared by through cleaning of soyabeans then it was soaked, boiled and thrashed into paste. Add barley to this paste and mix well. Then the mixture was left for fermentation by using the Bacillus subtilis in a clean dry porcelain container for about 3 months. After the through fermentation the product was dried and powdered along with addition of reduced starch isolated from the rhizome of banana. After the formulation the product was evaluated for stability, growth rate of beneficiary bacteria, and reduction activity against pathogenic bacteria like E. coli. The results shows that the stability of the product was satisfactory. The colony forming units of bacteria was increased and the product shows the inhibition of pathogenic bacteria. Now a days because of adultrated food, antibiotic therapy gut health was disturbing synbiotics are major hope in future nutraceuticals commercially plays vital role in gut health maintenance.

**Keywords:** Synbiotics; Nutraceuticals; Gut Health; Reduced Starch; Fermented Soya

## 1. Introduction

In the earlier days humans are consumed healthy fermented foods and beverages which helps in the improvement of beneficiary bacteria in the intestine. Gradually as the many numbers of changes occurred in the dietary aspects leads to decrease in reduction of gut bacteria. Due to this condition debiosis occurs which will lead to various GIT disorders like indigestion, abdominal discomfort, flatulence.[1] Prolonged imbalance of gut bacteria leads to many numbers of pathological conditions like constipation, neurological disturbances, immunity related problems, increased blood glucose levels etc. [2] To overcome this condition synbiotics are only approach to improve the gut health. Synbiotics are combination of the prebiotic and probiotics components which shows the beneficiary effects on both growth and maintenance of beneficiary bacteria. Various fermented products used since from the ages like yogurt, cheese, kimchi, miso products are having this synbiotic activity because of fermentation due to good bacteria.[3] Now a days various products like carbonated beverages, irregular dietary aspects, excessive usage of antibiotics and intake of low fiber foods leads to decrease in the gut bacteria. As per the recent statistics synbiotic products research and usage was increased around worldwide.[4] Many countries like east America, Japan, china and india are drastically used these synbiotics from the past few years. Commercialization of synbiotics is come into existence and it was commercialized now a days. Even in the geriatrics, neonates also these prebiotics are prescribed during the usage of antibiotics which

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PDF

Original Article

## Antidiabetic and antioxidant activities of synthetic 2-styrylchromones

Madhava Rao Vallabhaneni * | Srinivasa Rao Nathani | Lakshmi Kondraganti | Hanumatha Rao Addanki | Sudheer Chowdary Bodempudi

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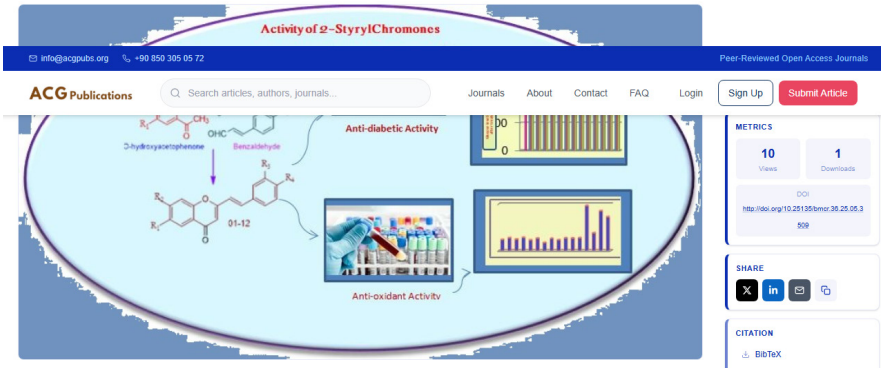
**Keywords:** 2-styrylchromones | antidiabetic Activity | antioxidant Activity | streptozotocin induced diabetic | glibenclamide | superoxide radical scavenging

### Abstract




2-Styrylchromones are very potent bioactive substances showing innumerable activities like antioxidant, antidiabetic, antiviral, antiinflammatory, anticancer, anti-microbial etc. All these activities are due to their core structure (benz-γ-pyrone) containing styryl group at 2nd position. Substituents especially hydroxyl groups are responsible for anti-diabetic and antioxidant activities. 2-Styrylchromones with a greater number of –OH substituents showed high activity than the remaining compounds. Compounds 5, 6, 7 and 9 having significant activity where the nature and position of substituents play a vital role. The synthetic compound with –OH groups at 4', 6 and 7 positions competed with standard drugs in respective activities.

### Supporting Information

Supporting Information

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# Impact of Fenugreek Oil on Sitagliptin's Pharmacokinetic and Pharmacodynamic Profile: A Computational Docking Study to Correlate Blood Glucose Level

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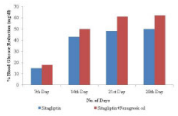

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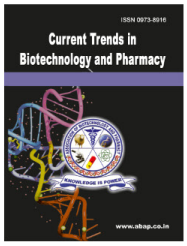
**Keywords:** Sitagliptin, Fenugreek Oil, Pglycoprotein, Linoleic Acid, Linolenic Acid, Oleic Acid

## ABSTRACT

Sitagliptin, a DPP-4 inhibitor, performs by blocking the enzyme dipeptidyl peptidase-4 (DPP-4), which usually degrades incretin hormones that regulate blood glucose level. By inhibiting DPP-4, Sitagliptin enhances incretin levels, promoting insulin release and reducing liver glucose production. This study aimed to investigate the pharmacokinetic and pharmacodynamic interaction in between Sitagliptin, and fenugreek oil. The pharmacokinetic interactions were investigated with molecular docking studies and the results revealed that the absorption of Sitagliptin may be more in presence of fenugreek oil due to high binding energy of linoleic acid, linolenic acid and oleic acid present in fenugreek oil with PGlycoprotein (P-gp). The albumin binding capacity is less from the fatty acids of fenugreek oil compared to Sitagliptin. The metabolism of Sitagliptin caused by CYP3A4 is less in presence of fenugreek oil as the docking score is more with the components of fenugreek oil. This molecular docking study predicts an improvement of oral bioavailability of Sitagliptin in presence of fenugreek oil due to increased absorption and reduced metabolism. Pharmacodynamic studies were carried out by observing the blood glucose level in Streptozotacin induced diabetic rats. Higher percentage reduction in blood glucose was observed from the group treated with Sitagliptin and fenugreek oil compared to test group treated with Sitagliptin. Thus molecular docking studies are correlated with in-vivo experimental blood glucose data.





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# Preformulation Analysis of Millet-Derived Starches: A Comparative Study

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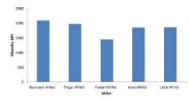

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**DOI:** https://doi.org/10.5530/ctbp.2025.2s.3

**Keywords:** Barnyard Millet, Finger Millet, Foxtail Millet, Kodo Millet, Little Millet, Starch

## ABSTRACT

Starch is a widely utilized excipient in the pharmaceutical industry, playing essential role as a multi functional adjuvant. While starches from rice, wheat, maize, corn and potato have traditionally been used, there is growing interest in alternative raw materials driven by sustainability and the demand for nutrient-rich options. Millets, small-seeded grains known for their high nutritional value and wide cultivation, present a promising alternative to conventional starch sources. This study aimed to isolate and evaluate starches from barnyard millet, finger millet, foxtail millet, kodo millet and little millet. The isolated starches were characterized for different parameters. The results revealed that the starch isolated from barnyard millet exhibited favorable rheological properties, indicating its suitability as an effective excipient. Granules were prepared using starch paste from the different millet species, and their micrometric properties were evaluated. Tablets were then formulated with these granules and subjected to various quality control tests. The results confirmed that barnyard millet starch demonstrated favorable rheological properties and served as an excellent binder, making it a promising alternative for pharmaceutical applications.



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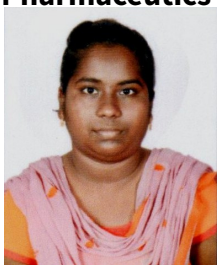

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## Phytochemical and antimicrobial screening of *Crinum asiaticum* extract of herbal hand wash tablets

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**DOI:** https://www.doi.org/10.22271/phyto.2025.v14.i6d.15664

**Abstract**
This study evaluates the phytochemical composition and antimicrobial activity of *Crinum asiaticum* leaf extract for developing herbal hand wash tablets. Ethanolic extraction followed by qualitative screening confirmed the presence of alkaloids, flavonoids, tannins, phenols, glycosides, and saponins. The extract was tested against *E. coli*, *Bacillus subtilis*, and *Aspergillus niger* using the agar well diffusion method, showing clear, concentration-dependent zones of inhibition. A herbal hand wash tablet was formulated using the extract and assessed for pH, appearance, foamability, viscosity, and skin irritation, all of which met acceptable standards. The formulation displayed strong antimicrobial action comparable to marketed products. Overall, *Crinum asiaticum* extract demonstrates promising potential as a natural and effective antimicrobial ingredient for herbal hand wash tablets.

**Keywords:** *Crinum asiaticum*, Phytochemical screening, Herbal hand wash, Antimicrobial activity, Ethanolic extract, Zone of inhibition

**Introduction**
The Crinum genus in the Amaryllidaceae family comprises 180 species, distributed across Asia, Australia, Africa, and America, with significant alkaloid content. *Crinum asiaticum* Linn., found in tropical regions worldwide, is traditionally used to treat pain, inflammation, wounds, swellings, and as an antidote in Southeast Asian medicine [1]. In Thai medicine, its leaf is used to treat inflammatory joints and support postpartum care [2]. Traditional Thai medicine uses *Crinum asiaticum* hot leaf compresses for musculoskeletal discomfort [3]. The leaf extract contains alkaloids, phenolics, terpenoids, and aldehydes [4], showing anti-inflammatory and pain-relieving effects [5]. Lycorine is its major active compound with anti-inflammatory properties [6]. The Crinum L. genus comprises 130 flowering species in the Amaryllidaceae family [7], growing in tropical climates across continents [8]. These species contain 118 distinct alkaloids [9] with various pharmacological effects, including weight loss, sedation, and antinociceptive activities [10]. *Crinum asiaticum* is a perennial bulbous herb growing up to 2m tall [11], known as poison bulb for its emetic properties [12] and spider lily [13]. It has medicinal and ornamental value [14]. *Crinum asiaticum* (Amaryllidaceae) possesses anticancer, immune-stimulating, analgesic, antiviral, antimalarial, and antimicrobial properties. The study aimed to prepare and examine alcoholic leaf extracts for phytoconstituents. The plant was collected from Bapatla college of pharmacy, Andhra Pradesh, India and authenticated by Dr. D. Raja kumari. Botany, The Bapatla College of Arts & Science, Bapatla district, Andhra Pradesh.


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# PREPARATION AND EVALUATION OF DEPILATORY CREAM CONTAINING PONNATHRAM POWDER

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## Abstract

This study focuses on formulating and evaluating a depilatory cream prepared using Ponnathram (Hartala) powder, a traditional yellow mineral historically used in South Indian practices for hair-removal purposes. Because the raw mineral contains arsenic compounds, it was first subjected to the Shodhana detoxification process, involving cleaning, boiling in herbal media, repeated heating, and quality checks to obtain purified Ponnathram suitable for topical use. The cream was prepared by incorporating the purified powder into a base composed of methyl cellulose, glycerin, talc, and water, resulting in a uniform paste.The formulation was assessed for its organoleptic properties, pH, homogeneity, spreadability, and viscosity. The prepared cream exhibited a bright yellow appearance, smooth texture, and it was free from lumps or grittiness. The pH was strongly alkaline, consistent with the mechanism of chemical depilatories that weaken the keratin structure of hair. The spreadability and viscosity values indicated that the cream could be easily applied and maintain a suitable consistency.The study provides preliminary information on the physical characteristics of a Ponnathram-based depilatory cream offering a basis for further investigation into its performance and safety.

**Index terms: Ponnathram powder, Hartala(orpiment), depilatory cream, arsenic trisulphide, Traditional yellow mineral, Hair removal cream, shodhana, topical formulation, keratin breakdown, alkaline depilatory, herbal detoxification, cosmetic evaluation, spredability.**

## I. Introduction

Depilatory creams are often used in research labs to remove hair before surgery, imaging, or other procedures. These creams, basically chemical hair-removal products, are designed to dissolve hair right at the skin's surface. They work by breaking the sulfur bonds in keratin, the protein that makes up hair, which reacts easily to strong alkaline and reducing agents. People have been using depilatories for centuries to get rid of unwanted hair. While many women today prefer shaving,

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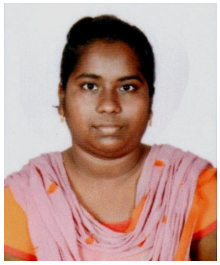

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# PREPARATION AND EVALUATION OF HERBAL TOOTHPASTE OF ACHYRANTHES ASPERA

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**Abstract**
The study examines a novel herbal toothpaste composed of Achyranthes aspera, recognized for its multiple medicinal benefits. The formulation utilizes A. aspera bioactive compounds as an organic solution for dental care. These compounds possess antimicrobial properties that combat gingivitis, act as anti-inflammatory agents to minimize plaque, and reduce gum discomfort. The toothpaste incorporates these properties to tighten gums, reduce plaque, and freshen breath while safeguarding individuals with sensitive oral tissue. Laboratory studies confirm the efficacy of A. aspera extract against oral pathogens, establishing its value as a natural oral treatment. The product offers a safe, toxic-free, and environmentally friendly alternative to conventional toothpaste, supporting overall oral health and general well-being.

**Index Terms**
Herbal toothpaste, Achyranthes aspera, antimicrobial activity, gingivitis, plaque, natural formulation.

**I. Introduction**
Dentifrices, commonly known as toothpaste, serve to clean teeth and maintain both teeth and gum health. Toothpaste removes dental plaque and food particles, prevents unpleasant odors, and contains active fluoride that aids in preventing dental diseases. Gingivitis, a widespread oral infection, is primarily caused by dental plaque. Mechanical oral care has limitations; hence, incorporating effective dental drugs like chlorhexidine and triclosan into toothpaste formulations enhances plaque management. The use of herbal toothpaste dates back to ancient India and China (300-500 BC). Approximately 80% of the global population relies on plant-based remedies, with over 35,000 plant species documented for their medicinal properties, including antibacterial, antiviral, antifungal, and anticancer effects.

**II. Materials and Methods**

**A. Materials**
Peptone, NaCl, Agar, Methanol, Anhydrous phosphorus pentoxide, Calcium carbonate, SLS, Glycerin, Formaldehyde, Gum tragacanth, Alcohol, Herbal extract, Glycerol, Citric acid, Sodium lauryl sulphate, Peppermint oil, Saccharine, Distilled water; microorganisms: Staphylococcus aureus, Escherichia coli, Bacillus subtilis, Pseudomonas aeruginosa.

**B. Preparation of Plant Material**
The aerial parts of Achyranthes aspera were collected, seeds separated, and shade dried to eliminate moisture. The dried seeds were ground into coarse powder for phytochemical screening.

**C. Successive Solvent Extraction**
Approximately 60g of the powdered seeds were subjected to Soxhlet extraction with methanol for 3 hours. The extract was concentrated and evaporated on a water bath at 50°C to obtain a thick methanolic paste.

**D. Preparation of Herbal Toothpaste by Dry Gum Method**
Abrasive, binding agent, preservative, and sweetener were mixed homogeneously. Humectants and distilled water were gradually added to form a smooth paste. Subsequently, the herbal extract, surfactants, and flavoring agents were incorporated.

**E. Antimicrobial Assay by Well Diffusion Method**
Agar well diffusion method was used to assess antimicrobial activity. Bacterial strains were incubated and inoculated on agar plates. Wells of 6-8 mm diameter were filled with varying concentrations of plant extract. Plates were incubated at 34°C for 24 hours, and zones of inhibition (ZOI) were measured.





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# EXTRACTION OF SERICIN FROM SILK COCOONS:AN UPDATED AND NOVEL OVERVIEW

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Abstract :

Sericin, a natural protein derived from the cocoons of Bombyx mori, has gained significant attention due to its remarkable physicochemical, biological, and functional properties. This review provides an updated overview of sericin extraction techniques, including hydrothermal, enzymatic, alkaline, detergent-based, and autoclave-assisted methods, highlighting their efficiency, environmental impact, and influence on molecular weight distribution. The extraction process from cocoon pretreatment to hot-water extraction and confirmation through protein tests is detailed to provide clarity on laboratory-scale procedures. Sericin's diverse properties such as antioxidant, antimicrobial, moisturizing, wound-healing, anti-inflammatory, and UV-protective activities are discussed alongside its physicochemical characteristics including solubility, molecular weight variability, and structural transitions. Its biocompatibility, biodegradability, film-forming capability, and adhesive nature further support its application in biomedical, cosmetic, and pharmaceutical fields. Overall, the review consolidates current knowledge on sericin extraction and properties, emphasizing its significance as a sustainable and multifunctional biomaterial.

Keywords :

Sericin; Bombyx mori; Silk cocoon; Extraction methods; Hydrothermal extraction; Enzymatic extraction; Autoclave degumming; Physicochemical properties; Biological activities; Antioxidant; Wound healing; Biocompatibility; Biodegradability; Protein analysis.

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# Estimation of Caffeine Content and Adulteration in Different Branded and Unbranded Tea Available in Local Market

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***Authors' contributions***

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

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## ABSTRACT

Green tea comes from the *Camellia sinensis* (L.) Kuntze tea plant, a member of the Theaceae family. In various traditional medicine systems such as Ayurveda, Unani, and homeopathy, it has been widely used for its therapeutic properties, including its astringent, diuretic, stimulant, and cardioprotective effects. Tea, one of the most widely consumed beverages globally, contains a variety of bioactive compounds including caffeine, polyphenols, and minerals, which contribute to its health benefits. With rising concerns over adulteration in widely consumed products like tea and coffee, this study aimed to assess the caffeine content and identify adulterants in different branded and unbranded tea samples from the Udupi district of Karnataka, India. Results revealed that branded teas generally had higher caffeine content and lower levels of adulteration compared to

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# PSORALEA CORYLIFOLIA L. (BAKUCHI): A COMPREHENSIVE REVIEW ON PHARMACOGNOSY, PHYTOCHEMISTRY, PHARMACOLOGY, AND THERAPEUTIC POTENTIAL IN SKIN DISORDERS

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**Abstract:**

*Psoralea corylifolia L. (commonly known as Bakuchi or Babchi) is a well-documented medicinal plant in Ayurveda, Unani, and Chinese medicine, primarily recognized for its therapeutic role in dermatological conditions, including psoriasis, vitiligo, and leprosy. The seeds and other plant parts are rich in furanocoumarins, flavonoids, meroterpenes, and essential oils, which contribute to its diverse pharmacological actions such as antimicrobial, anti-inflammatory, antioxidant, antitumor, and hepatoprotective properties. This review aims to provide an updated and comprehensive understanding of P. corylifolia by discussing its botany, traditional uses, phytochemical composition, extraction methods, pharmacological studies, and clinical applications. It is an annual herb of the genus Psoralea in the family Fabaceae, and its mature fruit can be used medicinally as a precious medicinal herb to tonify muscles and bones. With the deepening of research, its applications to various industries, including food, agriculture, and cosmetics, with products being developed in countries such as Vietnam, India, and Japan. PCL and related products have demonstrated therapeutic effects, such as antiosteoporosis effects, estrogen-like effects, anti-inflammatory properties, neuroprotection, antitumor activity, and vitiligo treatment. The expression mechanisms of these pharmacological effects are closely related to the regulation of the immune system, the inhibition of oxidative stress, and the induction of apoptosis. This paper summarizes the latest research on the ethnobotany, phytochemistry, processing technology, pharmacology, and hepatotoxicity of PCL. Furthermore, bibliometric analysis was used to systematically analyze the research hotspots and trends in PCL, which have never been addressed in previous reviews of PCL. In the future, it will be necessary to focus on the active metabolites of PCL, analyze its targets and signaling pathway network to address potential toxicity and side effects in clinical applications, and further expand the potential application of PCL in medicine.*

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