Metric 3.3.2 **Number of research papers published per teacher in the Journals notified on UGC / Scopus list during the year**

YEARWISE DETAILS

Year	2024	2023
Number	19	06

Responses: 25

Digitally Signed
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Location: KASABE DIGRAJ
Date: 28-Dec-2024 14:33:28

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2.	Facile synthesis and surface Characterization of ZnO-Fe3O4 metal Nanoparticles composite using cow urine from the BOS taurus breed and its applications	Dr. Sandip B. Patil	5	**Link**
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Research paper

Anticancer activity of *Lannea coromandelica* on B16F10 melanoma cell line: an *in vitro* and molecular docking approach

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ARTICLE INFO

Keywords:
Anticancer
B16F10 cell line
Lannea coromandelica
Molecular docking
TYRP1

ABSTRACT

Introduction: Phytochemical screening was conducted on various bark extracts of *Lannea coromandelica* to assess their anticancer property against the B16F10 melanoma cell line. The phytoconstituents that were previously identified were utilized in molecular docking studies against the human tyrosinase related protein 1 (TYRP1) as a target receptor in order to provide more evidence for anticancer property.
Methods: Bark powder was extracted by maceration method using distilled water and soxhlet extraction using ethanol. The preliminary phytochemical evaluation and determination of total phenolic and flavonoid content of both extracts were conducted using biochemical assays. The present study investigated the possible anticancer effects of ethanol and aqueous extracts on the B16F10 melanoma cell line using the 3-4,5-dimethylthiazol-2-yl-2,5-diphenyl tetrazolium bromide (MTT) assay and 4,6-diamidino-2-phenylindole (DAPI) labeling techniques. The present study employed molecular docking techniques to assess the binding interactions between phytoconstituents and the TYRP1 protein, utilizing AutoDock Vina module of PyRx 0.8 software.
Results: The phytochemical analysis found flavonoids, steroids, terpenoids, tannins, phenolic compounds, saponins, anthraquinones, cardiac glycosides, and proteins. Ethanolic extract shown preferential cytotoxicity to B16F0 melanoma cell line *in-vitro* (IC_{50} = 9.69 ± 0.68 µg/ml), while aqueous extract exhibited IC_{50} = 75.49 ± 5.95 µg/ml. DAPI staining showed that treated cells had altered nucleus morphology, including apoptotic bodies. According to molecular docking investigations, Quercetin has the highest binding affinity (−9.6 Kcal/mol), followed by Catechin and Myricadiol.
Conclusion: The current investigation has determined that *L. coromandelica* exhibits cytotoxic characteristic, as evidenced by the utilization of computer aided drug design models and *in-vitro* experimentation.

Introduction

Cancer ranks as the second leading cause of mortality globally, and the most frequent malignant condition in people is skin cancer (Chinembiri et al., 2014). According to the origin of the cell and the clinical behavior, different forms of skin cancer have different names (Orthaber et al., 2017). A million or more new instances are reportedly diagnosed each year, and the number is rising. Globally, there were approximately 19.3 million new cases of cancer diagnosed in 2020 where as 19.97 million new cases of cancer diagnosed in 2022. Cancer caused an estimated 10 million deaths worldwide in 2020 whereas in 2022 around 9.7 million deaths worldwide making it one of the leading causes of death globally. Skin cancer is among the most common cancers worldwide. In 2020, there were about 1.4 million new cases of skin cancer reported globally and in 2022, there were about 1.2 million new cases of non-melanoma skin cancer and 0.3 million new cases of melanoma skin cancer. Skin cancer resulted in approximately 66 000 deaths globally in 2020 and approximately 69 416 deaths globally in 2022. Mortality rates can vary significantly depending on factors such as early detection and access to healthcare. According to World Cancer

Abbreviations: MTT, 3–4,5-Dimethylthiazol-2-yl-2,5-diphenyl tetrazolium bromide; DAPI, 4,6- diamidino-2-phenylindole; TYRP1, Tyrosinase related protein 1; PBS, Phosphate buffer saline; IC50, Inhibitory concentration; DMSO, Dimethyl sulfoxide; RCSB, Research collaboratory for structural bioinformatics; PDB, Protein data bank

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RESEARCH

Facile Synthesis and Surface Characterization of ZnO-Fe_3O_4 Metal Nanoparticles Composite Using Cow Urine from the *Bos Taurus* Breed and Its Applications

Narendra Gurumoorti Hiremath[1] · Balasaheb Kokare[2] · Somnath Devidas Bhinge[3] · Sandeep Balwant Patil[4] · Raghunath Mane[1] · Anandrao Kulakarni[5] · Kalyanrao Garadkar[6] · Neeraj Prasad[7] · Sourabh Prasad[8]

Accepted: 6 November 2024

Abstract
The key aim of the proposed research was to investigate a sustainable method for synthesizing zinc oxide nanoparticles, iron oxide nanoparticles, and a zinc-iron nanoparticle composite from the urine of *Bos taurus* cattle, with a focus on evaluating their medicinal properties. The synthesis of these nanoparticles was achieved through environmentally friendly processes. The synthesized nanoparticles underwent comprehensive characterization employing UV/VIS spectroscopy, particle size distribution analysis, FTIR, XRD spectra, SEM, and zeta potential analysis. The FTIR spectra validated the bioreduction of the nanoparticles and composite by revealing distinctive peaks corresponding to Fe^{2+} and Zn^{3+} ions, present in both the individual nanoparticles and the composite. Investigative results indicated that the zinc oxide nanoparticles, iron oxide nanoparticles, and the zinc-iron nanoparticle composite derived from cow urine exhibited irregular morphology, with average sizes measured at approximately 420.7 ± 99.9, 200.7 ± 60.0, and 247.7 ± 27.9 nm, respectively. The cytotoxicity assay results demonstrated that the ZnO-Fe_3O_4NPs composite exhibited a cell inhibition rate of $56.51 \pm 1.0452\%$ at a concentration of 100 µg mL^{-1}, with an IC_{50} value of 30.69. Notably, the ZnO-Fe_3O_4NPs composite demonstrated substantial anti-inflammatory activity with a percentage inhibition of 85.52%. The biologically synthesized zinc oxide nanoparticles, iron oxide nanoparticles, and the zinc-iron nanoparticle composite displayed promising anticancer and anti-inflammatory effects without showing any indications of toxicity. The heightened biological activity observed can be attributed to their unique nanoscale characteristics, including reduced polydispersity and smaller average particle size, which improve responsiveness and interactions with biological entities. Consequently, the nanoparticle composite synthesized via this biogenic technique utilizing cow urine holds considerable potential for various pharmaceutical applications.

Keywords Green synthesis · Cow urine · Zinc oxide nanoparticle · Iron oxide nanoparticle · Zinc-iron nanoparticle composite

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Enhancing Probiotic Efficacy through Progress in Polysaccharide-Based Oral Delivery Systems

Sachin S. Mali[1], Sanjeevani R. Desai[2], Shubhangi B. Sutar[3], Sarang S. Mahamuni[4], Sanket R. Patil[5], Ashwini C. Utage[6]

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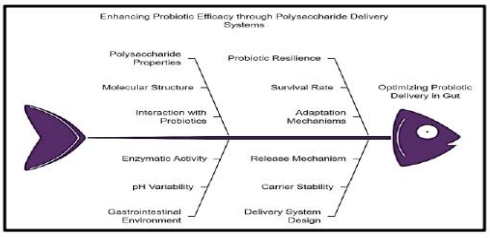
The recent developments in the use of polysaccharide-based oral delivery systems for improvement in the efficacy of probiotics have been organized under discussion within this review. The aspect of using polysaccharide as a carrier for probiotics seems to offer a particularly promising avenue for further stabilization and efficiency at the level of crossing the gastrointestinal tract. This paper covers some applications and current trends, along with future perspectives of using polysaccharide-based delivery systems for probiotics. This review explains and sheds light on how to develop novel strategies that could be used for optimizing probiotic delivery, thereby maximizing the health-promoting effects in the gut environment by discussing potential pros and cons related to the use of polysaccharides as a carrier for probiotics.

Keywords: Polysaccharide-based delivery systems, Probiotic efficacy, Gastrointestinal tract, Innovative strategies, Gut health

Graphical Abstract:



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Enhancing Probiotic Efficacy through Progress in Polysaccharide-Based Oral Delivery Systems

Sachin S. Mali[1], Sanjeevani R. Desai[2], Shubhangi B. Sutar[3], Sarang S. Mahamuni[4], Sanket R. Patil[5], Ashwini C. Utage[6]

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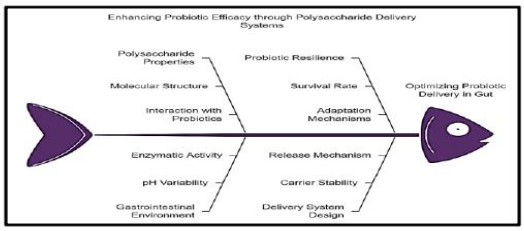
Keywords: Polysaccharide-based delivery systems, Probiotic efficacy, Gastrointestinal tract, Innovative strategies, Gut health

Graphical Abstract:



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Journal of Pharmaceutical Research International

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(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

High-Throughput Insilico Drug Screen against Mpox Targeted Proteins in Comparison with Repurposed Antiviral Drugs against Natural Compounds

Hemanth Kumar Manikyam [a*], Sandeep Balvant Patil [b++], Nazim Hussain [c], R. Edison Eegai Vallal [d], Shikha Sharma [e#] and Abhinandan Ravsaheb Patil [f†]

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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Antifungal Activity of PLGA-Based Voriconazole Nanosuspension for Ophthalmic Application

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[1]RMP'S Bhalchandra College of Pharmacy, Khanapur, Pune

Abstract

The objective of present investigation to characterize PLGA based Voriconazole nanosuspension .PLGA polymer (75:25) were used to prepare Voriconazole loaded nanosuspension by using solvent evaporation technique .The drug polymer interaction and compatibility studies were evaluated by Fourier transformer infrared spectroscopy (FTIR), differential scanning calorimetry (DSC), and X-ray diffraction (XRD), Scanning Electronic Microscopy (SEM) techniques All the formulations of Voriconazole loaded nanosuspension were also evaluated by in vitro drug release profile. To improve their stability the optimized nanosuspension were lyophilized by using mannitol as a cryoprotectant. X-ray diffraction, FTIR and DSC confirmed that the drug was dispersed inside the particles and there is no only interaction between drug and polymer. The. Scanning Electronic Microscopy (SEM) shows nanoparticles are irregular needle shaped particles. Voriconazole was incorporated successfully in nanoparticles of nanosuspension prepared with 1:4 drug polymer ratios by using PLGA (75:25) which provide sustained release profile and follows zero order release kinetic. The Antifungal Assay showed that the maximum zone of inhibition was produced from optimized Voriconazole loaded Nanosuspension (VCZNS4) was compared to other solution and marketed eye drop.

Keywords- VCZNS. PLGA, FTIR, XRD, DSC, SEM

Introduction

Now days various problems are come in front for researcher to work on ophthalmic drug delivery. The conventional dosage form are most convenient and patient compliant route but they have some disadvantage like majority of drug eliminated from the eye due to tear turn over, drug elimination like nasolacrimal drainage, conjuctival uptake due to poor bioavailability, less residence time and results into about less than 5% of drug penetrate into cornea. Delivery of drug to the targeted ocular tissue is restricted by various precorneal dynamic and static ocular barriers. Barriers that pose a challenge to anterior segment drug delivery are static (corneal epithelium, corneal stoma, and blood-aqueous barrier) and dynamic barriers (conjunctival blood flow, lymph flow, and tear drainage) and metabolic barriers To overcome this problems various novel drug delivery system for ophthalmic application such as ocular insert, collagen shield, colloidal or particulate system like Nanoparticle, Nano capsules, noisome, liposome have been developed to prolong the residence time & to improve bioavailability Nanosuspension is a submicron colloidal dispersion of drug particles.

A pharmaceutical nanosuspension is defined as very finely colloid, Biphasic, dispersed, solid drug particles in an aqueous vehicle, size below 1*m, without any matrix material, stabilized by surfactants and polymers, prepared by suitable methods for Drug Delivery applications, through various routes of administration like oral topical, parenteral ,ocular and pulmonary routes. Nanosuspension not only solves the problem of poor solubility and bioavailability but also alter the pharmacokinetic of drug and that improve drug safety and efficacy.

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RESEARCH ARTICLE

Hepatoprotective and Antioxidant Activity of Stem and Leaves Parts of *Cissus woodrowii* (Stapf ex Cooke) Santapau

Pallavi N Patil[1,2*], Ritu M Gilhotra[1], Shweta Sharma[1], Kiran A Wadkar[3]

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ABSTRACT

The contemporary investigation aimed to assess the hepatoprotective potential of *Cissus woodrowii* (Stapf ex Cooke) Santapau against carbon tetrachloride-induced hepatotoxicity. Through evaluating antioxidant levels in liver tissues and blood marker enzymes, it was observed that administration of the plant extract at doses of 200 and 400 mg/kg significantly mitigated liver damage caused by carbon tetrachloride. The study found that carbon tetrachloride-induced reductions in total protein, catalase, glutathione (GSH), and superoxide dismutase (SOD) levels, while increasing levels of alkaline phosphatase, alanine aminotransferase, total bilirubin, lipid peroxidation, and aspartate aminotransferase. However, rats treated with varying doses of the plant extract exhibited restoration towards normal levels of serum marker enzymes and antioxidants, contrasting with those solely exposed to carbon tetrachloride. These findings collectively suggest that *C. woodrowii* (Stapf ex Cooke) Santapau possesses antioxidant properties and exerts a hepato-protective effect against CCl_4-induced liver impairment in rats.

Keywords: *Cissus woodrowii*, Histopathology, Biochemical parameters, Carbon tetrachloride, Lipid peroxidation, Antioxidant.

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Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Natural medicines have garnered a lot of interest from both wealthy and poor nations due to their little and non-existent side effects.[1] Research from the World Health Organization (WHO) indicates that a large segment of the universal population relies on herbal remedies to alleviate or control serious health problems.[2] There are 350 species in the genus *Cissus*, which is part of the Vitaceae family and is used in traditional medicine all over the world to cure a wide range of illnesses.[3,4] This particular plant, *Cissus woodrowii*, is a part of the Vitaceae family and inhabitant of hilly areas of Maharashtra (Pune, Kolhapur). It features tall bushes with huge, broadly orbicular leaves and stems that are either straight or slightly inclined. Lamina 20–30 X 20–25 cm and petioles 15 to 25 cm are the dimensions that are used to identify these leaves; however, it is possible that these measurements pertain to the basal leaves, and our herbarium specimens typically contain the distal leaves, which are typically smaller.[5] Historically, animals have been treated with its roots as an anticancer. To alleviate rheumatic discomfort, the stem paste is applied topically.[6,7] A popular name for Woodrow's grape tree is *C. woodrowii* (Stapf ex Cooke) Santapau.[8] Since all other members of the Vitaceae family are woody lianas, this particular species of *Cissus* stands out taxonomically as a shrub-like plant.[9] The research work on *C. woodrowii* (Stapf ex Cooke) Santapau can proceed with reference of some plants like *C. pallid, C. pteroclada hayata,* likewise of Vitaceae family.

MATERIALS AND METHODS

Chemicals

Silymarin was purchased from Micro Labs in India, while thiobarbituric acid was acquired from E-Merck in India, and the remaining chemicals were sourced from Sisco Research Laboratory, Mumbai, India.

Collection and Extraction

The hilly region of Kolhapur in India is where the fresh stem and leaves of *C. woodrowii* (Stapf ex Cooke) Santapau were harvested. Pulverized and shade-dried were the stem and leaves. Subsequently, 2.5 L of ethanol (95% v/v) were used as

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Pravin Pawar

Transethosomal Carrier of Curcumin for Improved Topical Delivery: Optimization, In-vitro and Stability Assessment

Authors Raju Rathod, Pravin Pawar

Publication date 2024/6/1

Journal Micro and Nanosystems

Volume 16

Issue 2

Pages 97-111

Publisher Bentham Science Publishers

Description Objective

Currently, there is a clear lack of effective topical treatments for psoriasis. In light of this unaddressed requirement, the work intends to develop, enhance, and assess the effectiveness of a curcumin transethosomal gel for managing psoriasis. This work signifies the delivery of a potential solution to fill the gap in topical psoriasis treatment.

Materials and Methods

Curcumin-loaded transethosomes were prepared using a mechanical dispersion method. An initial study was conducted to determine the ideal concentrations of Lipoid S100 and Isopropyl Myristate (IPM). To refine the ultimate transethosomal formulation, a full factorial design (3^2) was employed, incorporating different levels of Lipoid S100 and IPM. Drug release investigations and pharmacokinetics assessments of curcumin concentrations were performed using a specialized dissolution apparatus and an animal model, respectively.

Results

The ...

Scholar articles Transethosomal Carrier of Curcumin for Improved Topical Delivery: Optimization, In-vitro and Stability Assessment
R Rathod, P Pawar - Micro and Nanosystems, 2024
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Date: 28-Dec-2024 14:33:28

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Reviews

AHEAD OF PRINT

A review on topical ophthalmic drug delivery system: Reference to viscosity enhancer

Pravin Kondiba Pawar[1,2,C], Raju Dubaji Rathod[1,B,D], Satyajeet Ramesh Jagadale[1,B,D]

[1] Department of Pharmaceutics, Dr. Shivajirao Kadam College of Pharmacy, Kasabe Digraj, Sangli, Affiliated to Shivaji University, Kolhapur
[2] Department of Pharmaceutics, Dr. Shivajirao Kadam College of Pharmacy, Kasabe Digraj, Sangli, Affiliated to Shivaji University, Kolhapur

A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation;
D – writing the article; E – critical revision of the article; F – final approval of the article

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Conflict of interest
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Abstract

The eye is the most accessible site for topical drug delivery. Drug's ocular bioavailability is quite low when administered topically as eye drops. Viscosity enhancers are used to increase ocular bioavailability by extending the precorneal residence time of the drug at the ocular site. Cellulose, polyalcohol and polyacrylic acid are examples of hydrophilic viscosity enhancers. The addition of viscosity modifiers increases the amount of time the drug is in contact with the ocular surface. Several polysaccharides have been studied as excipients and viscosity boosters for ocular formulations, including cellulose derivatives such as chitosan (CS), xyloglucan and arabinogalactan (methylcellulose, hydroxyethylcellulose, hydroxypropylmethylcellulose (HPMC), and sodium carboxymethylcellulose). Viscosity-increasing substances reduce the surface tension, extend the corneal contact time, slow the drainage, and improve the bioavailability. Chitosan is a viscosity enhancer that was originally thought to open tight junction barrier cells in the epithelium. Chitosan thickens the medication solution and allows it to penetrate deeper. Alginate is an anionic polymer with carboxyl end groups that has the highest mucoadhesive strength and is used to improve penetration. Carboxymethylcellulose (CMC), a polysaccharide with a high molecular weight, is one of the most common viscous polymers used in artificial tears to achieve their longer ocular surface residence period. Hyaluronic acid (HA) is biocompatible and biodegradable in nature, and it is available in ocular sustained-release dose forms. A polymer known as xanthan gum is used to increase viscosity. At 0.2% concentration, carbomer forms a highly viscous gel.

Key words: polysaccharides, mucoadhesive strength, retinal bioavailability, viscosity enhancer

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In vitro anti-cancer activity of *Epipremnum aureum*

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Abstract

In the present study, *in vitro* anti-cancer activity of aerial parts of *Epipremnum aureum* extracts was performed using the MCF-7 breast cancer cell line. Soxhlet method was used with different solvents for extract preparation. The amount of apoptosis in MCF-7 cells was assessed using flow cytometry for each of the extracts. The chloroform and ethanol extracts had a considerable cytotoxic effect with IC_{50} values of 32.9 and 45.8 µg/mL respectively, while the conventional medication 5-fluorouracil produced an IC_{50} value of 19.2 µg/mL. The microscopic examination of the chloroform and ethanol extracts of *E. aureum* revealed the presence of apoptotic bodies, nuclear fragmentation, and tiny nuclei with strong chromatin condensation. These results suggest that chloroform extract of *E. aureum* is more effective against breast cancer.

Introduction

Breast cancer is regarded as the most dangerous form of cancer and is a leading cause of health issues among women globally (Akram et al., 2017). Currently, pharmaceutical medications, radiation therapy, and surgery are utilized in the management of breast cancer but a considerable number of circumstances involving these treatment options have proven unsuccessful because of drug resistance and toxicity.

The current landscape of cancer treatment relies on the utilization of plant-derived anti-cancer medicines (Wu et., 2021). *Krameria appacea* (Al-Oqail, 2021), *Ardisia crispa* (Nordin et al., 2018), *Mallotus phillippensis* (Sakthidhasan et al., 2021) extracts and their secondary metabolites viz. isoflavones, coumestans, lignans, and prenyl flavonoids are widely acknowledged for their anti-cancer and antiproliferative activity.

Epipremnum aureum is a species in the arum family Araceae. It is a common household plant. There is no scientific study showing its anti-cancer effect on any organ. However, another plant of the same family, *E. pinnatum* has anti-cancer property using T-47D mammary carcinoma cells (Lan et al., 2007). Therefore, the primary goal of this work was to examine the anti-cancer effects of the different extracts of *E. aureum* using MCF-7 breast cancer cell line.

Materials and Methods

Chemicals

All ingredients for the current study i.e., acetone, chloro-form, ethanol, ethyl acetate, petroleum ether, dimethyl sulfoxide (DMSO), 3-(4,5-dimethylthiazol-2-yl)2-5-diphenyltetrazolium bromide (MTT) were procured from Sigma Aldrich (India). MCF-7 cancer cell line was purchased from the National Centre for Cell Sciences, Pune.

Collection and authentication of plant

In the Ashta rural area of Sangli District, Maharashtra, India, the plant *E. aureum* was collected. The Botanical Survey of India, Pune, had authenticated and verified

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METHOD DEVELOPMENT, VALIDATION AND FORCED DEGRADATION STUDIES OF IMEGLIMIN HYDROCHLORIDE IN BULK AND DOSAGE FORM.

Miss Shahista L. Mujawar[1], Dr. Sarika P. Patil[1]*, Miss Sayali R. Bhosale[1], Mr. Nitesh P. Vhasukale[1], Miss Deeplaxmi S. Masal[1], Dr. Kiran A. Wadkar[2]

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A COMPUTATIONAL APPROACH TO THE STRUCTURAL POTENTIAL FOR OXADIAZOLE DERIVATIVES

Miss Tejshree B. Khade*, Miss Dhanashree A. Ghatage, Mr. Vivekanand E. Teli, Mr. Yashvant S. Kadam, Dr. Anuja A. Masule, Dr. Ajit V. Dale
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ABSTRACT

Docking is widely recognized as extensively populated techniques in structure-based drug discovery due to potential to anticipate the ligand binding framework to their respective targets with high accuracy. Establishing the capability to bind to and exhibit affinity for a specific target, such as bioactive peptides or a particular receptor, presents compelling indication of the linking conformal template and underscores the need to conduct additional research. Ambition- Research carried out to assess drugs which are used in treatment of cancer. Methods: To carry out in-silico molecular docking, The software tools BIOVIA DS VISUALIZER, AUTO-DOCK VINA, MOLSOFT, MOLINSPIRATION, PYMOL, and SWISS ADME were employed in the programs.

KEYWORDS: 1,3,4 Oxadiazole, Anticancer, RCSB, AutoDock.

1. INTRODUCTION:

Cancer is a deadly and complicated disease characterised by unchecked cell proliferation. Tumours can be classified as benign or malignant. Benign tumours stay inside their boundaries and do not invade or spread [1]. Cancer is considered deadliest disorder, with a lethality percentage higher than that of both cardiac and viral disorders. One of the primary treatments for cancer is chemotherapy, but it has many drawbacks, including low selectivity and sensitivity, major side effects that might happen accidentally, and the potential for drug resistance to emerge [2].

Due to their beneficial biological and pharmacological properties, heterocyclic compounds have become more and more well-known in recent times. The goal of drug development is to create novel medications with the strongest anticancer efficacy and the fewest negative effects. Changing the molecular structure of medicine and then synthesising its derivative molecules is one method of drug design [3]. Docking is one of these techniques that is frequently hired into development of tumour medications [4].

Oxadiazoles, heterocyclic compounds, feature a five-membered ring composed of two nitrogen and one oxygen atom, originating from furan through the replacement of two carbon atoms with nitrogen atoms akin to pyridine. These compounds possess numerous attributes that render them valuable across a wide range of fields [5].

1,3,4-oxadiazole is now a crucial building block in the creation of innovative medications. A comprehensive examination of literature underscores that even minor changes in structure can lead to significant effects on activity, whether qualitative or quantitative. This suggests that a variety of novel compound derived from 1,3,4-oxadiazole may be synthesised, with the goal of achieving higher activity at lower toxicity [6].

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A COMPUTATIONAL APPROACH TO THE STRUCTURAL POTENTIAL FOR OXADIAZOLE DERIVATIVES

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ABSTRACT

Docking is widely recognized as extensively populated techniques in structure-based drug discovery due to potential to anticipate the ligand binding framework to their respective targets with high accuracy. Establishing the capability to bind to and exhibit affinity for a specific target, such as bioactive peptides or a particular receptor, presents compelling indication of the linking conformal template and underscores the need to conduct additional research. Ambition- Research carried out to assess drugs which are used in treatment of cancer. Methods: To carry out in-silico molecular docking, The software tools BIOVIA DS VISUALIZER, AUTO-DOCK VINA, MOLSOFT, MOLINSPIRATION, PYMOL, and SWISS ADME were employed in the programs.

KEYWORDS: 1,3,4 Oxadiazole, Anticancer, RCSB, AutoDock.

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Original Article

BIO Integration

Comparative Study of Spray-Drying and Freeze-Drying Techniques for Increasing Fenofibrate's Solubility and Dissolution Rate

Aarti P. Nikam[1,*], Pawan D. Meshram[2], Archana V. Vanjari[3] and Saurabh V. Mundada[4]

Abstract

Background: Fenofibrate (FF) is a BCS class II compound whose poor solubility poses challenges in drug delivery and bioavailability. Solid self-micro emulsifying drug delivery systems (S-SMEDDS) have emerged as a promising solution to address these issues. These systems are aimed at enhancing the solubility and dissolution rates of poorly soluble drugs, such as FF, by formulating them into solid dosage forms.

Methods: FF solubility was investigated in various oils, surfactants, and co-surfactants to identify the most suitable components for formulating S-SMEDDS. The preparation of S-SMEDDS was carefully evaluated according to parameters including drug content, morphological characteristics, and structural features. Two methods, freeze-drying, and spray-drying, were compared for their efficacy in producing S-SMEDDS. Additionally, in vitro dissolution studies were conducted to assess the dissolution rates of FF-loaded S-SMEDDS tablets compared with conventional tablets.

Results: Among the oils tested, oleic oil achieved the highest FF solubility, whereas Tween 80 and Transcutol HP were identified as the optimal surfactant and co-surfactant, respectively. The preparation method significantly influenced the properties of S-SMEDDS. Freeze-drying outperformed the other methods by enhancing dissolution rates, primarily through increased surface area. Moreover, the solid-state characteristics of S-SMEDDS were dependent on the polymer concentration and processing method. In vitro dissolution studies demonstrated that FF-loaded S-SMEDDS tablets exhibited faster drug release than conventional tablets, owing to the inclusion of the super disintegrating agent CCS and the S-SMEDDS component. Freeze-drying was superior to spray-drying in enhancing dissolution, albeit with potentially higher production costs.

Conclusions: The study highlights the potential of S-SMEDDS to overcome the solubility and bioavailability challenges associated with FF. Freeze-drying emerged as the preferred method for producing S-SMEDDS, because of its superior dissolution enhancement capabilities, despite potentially higher production costs, whereas spray-dried S-SMEDDS offers economic and environmental benefits, but may achieve lower dissolution rates. Overall, our findings underscore the importance of formulation strategy in enhancing the efficacy of poorly soluble drugs such as FF.

Keywords

BCS-II, fenofibrate, freeze drying, spray drying.

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Introduction

Advancements in biochemical understanding, combinatorial chemistry, and high-throughput selection have led to the development of NCE with poor water solubility, thus posing challenges in oral drug delivery [1–3]. Using amorphous drug forms increases dissolution rates, thereby overcoming solubility limitations [4–6]. However, amorphous systems are inherently unstable because of their elevated free energy, thus substantially hindering their inclusion in commercially available drug products [7, 8].

Lipid-based drug carriers play a major role in increasing drug molecule solubility, dissolution, and bioavailability within the gastrointestinal tract. SMEDDS formulations use bile salt as well as lipolytic agents to create a solubilized phase, thus aiding in drug release during digestion. After dilution in the aqueous environment, the formulation transitions to small oil-in-water micro-emulsions, thereby enhancing drug delivery [9]. The mechanical churning that naturally occurs in the stomach and intestines during digestion leads to emulsion formation. Beyond enhancing solubilization, the inclusion of fat in these

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Original Article

Evaluation of the cytotoxic activity of leaf extracts of *Mimosa rubicaulis* (Lam.) against cancer (HepG2) and normal (L929) cells through induction of apoptosis

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Abstract

Investigation of the *in-vitro* anti-cancer and apoptosis activity of various extracts of *M. rubicaulis* (Lam.) against cancer cell lines (HepG2 and L929) is important. The HepG2 and L929 Cell lines were exposed to increasing concentrations of various extracts of leaves of *M. rubicaulis* (Lam.) ranging from 640 to 20 µg/ml for 24 hours. MTT assay was used to determine cytotoxicity. All extracts of leaves of *M. rubicaulis* (Lam.) treated with cancer cell lines HepG2 and normal cell line L929 in response to increasing concentration, cell viability decreased significantly. Additionally, the most affected cells were HepG2 cells, followed by L929. The study found that when exposed to ethanolic extract, the cancer cell lines (HepG2) showed the highest expression, while the normal cell lines (L929) showed the lowest. Based on the experimental data, we discovered that *M. rubicaulis* (Lam.) has a cytotoxic effect on cancer cell lines. In contrast, no cytotoxic effect was observed at the highest dose on normal cells. The ethanolic extract had potent anti-cancer activities against HepG2 cells *via* induction of Apoptosis by Flow Cytometry. According to the findings ethanolic extract has a high cytotoxicity against HepG2 cells, with an IC_{50} of 93.69 µg/ml. Apoptosis processes such as alterations in cell shape, chromatin condensation, membrane swelling, and the production of apoptotic bodies were seen in ethanolic extract treated HepG2 cells. The ethanolic extract treated HepG2 cells variations in light scattering reveal the general characteristics of cell death due to apoptosis. These outcomes show how effective ethanolic extract of *M. rubicaulis* (Lam.) to exert apoptosis, particularly in late stage apoptosis in HepG2 cell lines. Hence, further investigation is required to study the phytoconstituents in ethanolic extract of *M. rubicaulis* (Lam.) responsible for cytotoxic activity.

Keywords: Cytotoxicity, *M. rubicaulis* (Lam.), Anti-cancer potential, Apoptosis, HepG2, L929, MTT assay, IC_{50}.

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1. Introduction

Aggressive cancers are the second most significant cause of death among people [1]. Hepatocellular carcinoma/(HCC) is one of the riskiest types of cancer, with a bad prognosis,

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RESEARCH ARTICLE

Evaluation of Antiulcer Activity for Selective and Functional Millet using Pylorus Ligation Induced Ulcer in Rat

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ABSTRACT

Although millet has long been thought to have gastroprotective properties, much research does not assess its efficacy as a treatment for stomach ulcers. Currently, medication therapy is the primary clinical treatment for stomach ulcers. Antacids, cytoprotective medicines, proton pump inhibitors (PPI), H2 histamine receptor antagonists have many side effect and poor patient compliance. Hence, inexpensive, easily accessible, and with less negative effects, millets are an excellent and traditional source in the treatment of a variety of diseases like ulcers. In the present research, pearl millet, finger millet and sorghum millet formulation is used and toxicity and antiulcer activity are determined on wistar rats grouped in six different groups consisting of control, disease, standard, millet formulation, glycerin (gly.) vehicles and millet along with glycerin vehicle. After the test item was administered once at a solitary dosage of 2000 mg/kg, none of the treatment group animals showed several clinical indications of toxicity or mortality. In antiulcer activity, ulcer scoring was found to be less in group treated with millet and glycerin than in the diseased group and standard group and %inhibition was also increased in groups treated with millet with glycerine. Total acidity and pepsin estimation was done and these values for the millet group with glycerine were found within limit compared to disease control. The millet and glycerine treatment significantly inhibited lesions associated with stomach ulcers.

Keywords: Peptic ulcer, Millets, Pylorus ligation, *In-vivo* study, Antiulcer activity.

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Conflict of interest: None

INTRODUCTION

One digestive system illness that has a high recurrence rate is gastric ulcers. Between 5 and 10% of people will experience stomach ulcers in their lives, and between 0.1 and 0.3% will experience them annually.[1] The pathological signs include bleeding, erosion, ulcers, and damage to the stomach mucosa. Patients frequently complain of dull discomfort, nausea, vomiting, and regurgitation of acid and epigastric pain.[2] Acute consequences from the disease's long-term progression, such as gastrointestinal bleeding and stomach perforation, can have a major negative impact on patients' health. The pathophysiology of gastric ulcers involves hypersecretion of stomach acid, alcohol misuse, infection of *Helicobacter pylori* infection, smoking and prolonged administration of Non-steroidal anti-inflammatory drugs (NSAIDs). Other significant causes include the dysregulation of ATP-sensitive K+ (KATP) channels and endogenous protective substances like growth hormones, prostaglandins, nitric oxide and mucus.[3]

Currently, medication therapy is the primary clinical treatment for stomach ulcers. Antacids, cytoprotective medicines, PPI, H2 histamine receptor antagonists, and antibacterial medication combinations are among the available treatments for active gastric ulcers. These medications, however, come with a number of negative consequences, such as inadequate healing of ulcers and ulcer returning, which place a significant financial strain on individuals and public health infrastructures.[4-6] Investigating safe and efficient gastro-protective drugs made from natural resources is therefore crucial. There are already a number of edible options that can help treat stomach ulcers[7-9] For ulcer disease, there are a number of pharmacological therapy options, but their use is restricted because of low compliance and frequent side effects. Because of this, every possible substitute for this treatment was looked for and pursued. And finally, natural phytochemicals extracted from plants are inexpensive, easily accessible, and have less negative effects, making them excellent traditional medicines for the treatment of ulcer disease.[10-12]

Asia and Africa are two regions where millets are frequently farmed and is the grain that is most commonly consumed in China. A significant portion of human nutrition comes from millets, whose output has been rising over the past few decades to keep up with the growing global population's

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In-Vitro Evaluation of Antiulcer Activity of Selective and Functional Millet

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KEYWORDS
Millets; In-vitro study; Acid neutralizing capacity; Peptic ulcer; Anti-ulcer activity.

ABSTRACT:

Introduction: Peptic ulcer disease (PUD) is a gastric condition which occurs because of an imbalance between defensive and harsh factors, like gastric mucus, secretion of bicarbonate, prostaglandins, and intrinsic resistance of mucosal cell components. There are several medication treatment options available for PUD, but their use is limited due to poor compliance and frequent side effects. Due to this reason, alternative for this treatment was religiously searched and continued and finally found natural phytochemical isolated from plants which possess less side effects, ease of accessibility and affordability and hence considered to be a great traditional medicines in the treatment of PUD

Objective: To design, develop and formulate functional millet formulation and evaluate physicochemical characterization, phytochemical screening and in-vitro study of the prepared powder product for the antiulcer activities.

Method: In present research study, sorghum, finger millet, pearl millet and sesame seeds were used. Millet formulation was used as the novel source of drugs for the antiulcer medications. Its in-vitro H+, K+-ATPase inhibition and Acid neutralizing capacity was analyzed on enzyme extract obtained from fresh goat stomach against standard drug omeprazole and Al(OH)3+Mg(OH)2 respectively

Result: At a concentration of 1000 µg/ml of millet sample and omeprazole found 56.75 % and 84.48 % of inhibition respectively. The millet sample at concentration 2000 mg/ ml was observed to neutralize acid as compared to standard.

Conclusion: From the results that the millet formulation represents a novel drug source for antiulcer treatments. Nevertheless, a comprehensive *in-vivo* study on the pharmacological assessment and Future research will be done to determine the underlying mechanism of action that accounts for its antiulcer efficaciousness.

1. Introduction

Peptic ulcer disease (PUD) is gastric condition which occurs because of an imbalance between defensive and harsh factors, like gastric mucus, bicarbonate secretion, prostaglandins, and intrinsic resistance of mucosal cell components [1]. Peptic ulcers typically occur when aggressive elements overcome defensive ones [2]. The reason behind this include Helicobacter pylori, hyper secretion of pepsin, non-steroidal anti-inflammatory medicines, and occasionally idiopathic. [3,4]. The use of tobacco, mental strain, fast emptying of the stomach, and Zollinger-Ellisson syndrome, which is characterized by excessive and uncontrollably high acid production, all contribute to the development of ulcers [5]. The main pathways involved in the pathophysiology of these illnesses Blood flow, mucus secretion, the formation of hydrochloric acid (HCl),

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RESEARCH ARTICLE

Development and Optimization of Nateglinide Loaded Polymeric Sustained Release Microspheres

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ABSTRACT
This research study aims to develop and characterize of polymeric sustained release microspheres of Nateglinide (NTG), anti-diabetic drug known for its shorter half-life, which leads to poor bioavailability and frequent dosing. NTG polymeric microsphere developed by Emulsion-Solvent Diffusion-Evaporation method. Ethyl cellulose was used as rate retarding material. The polymeric microsphere were characterised for % yield, encapsulation efficiency, drug release, FTIR, and SEM. The developed NTG polymeric microspheres were smooth and spherical with porous nature and showed entrapment efficiency in range of 59.43% - 88.47 % with highest percent yield of 98.75%. FTIR spectra showed drug excipient compatibility while optimized formulation F5 showed complete drug release up to 24 hrs. These results indicate that NTG microspheres offer a safe and effective drug delivery system with prolonged release, which can enhance bioavailability, improve patient compliance, and reduce dosing frequency.
Keywords: Nateglinide, Sustained drug delivery, Shorter Half-life, Polymeric Microspheres.
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Conflict of interest: None

INTRODUCTION

The oral route is considered as effective ways to deliver medications. However, because it is restricted to particular areas of the gastrointestinal tract, it is linked to a comparatively short systemic half-life and limited absorption.[1] Frequent dosage regimen is required to maintain therapeutic efficacy due to these pharmacokinetic constraints. The effectiveness of drug therapy is primarily defined by the ability to attain and sustain the desired concentration of the drug in the bloodstream or target tissues.[2, 3] These setbacks of conventional drug delivery system demand the need for Novel drug delivery including nanoparticles, microspheres, liposomes etc. Novel drug delivery systems (NDDS) offer significant advantages over traditional systems by providing controlled, sustained, and targeted drug release. These systems maintain therapeutic drug levels over extended periods, improving efficacy and reducing side effects therefore suitable for drugs with shorter half-life.[4] NDDS reduce the frequency of administration, enhancing patient compliance, especially for chronic conditions. Advanced formulation considerations including nanoparticles, liposomes, and hydrogels enable precise control over drug release, optimizing both pharmacokinetics and pharmacodynamics. By addressing the limitations of conventional dosage forms, NDDS improve treatment outcomes and offer more effective, patient-friendly therapies.[5,6] Microspheres typically ranges from 1 µm to 1000 µm are a promising approach in sustaining the release of drugs with short half-lives. These spherical micro particles, typically made from biodegradable polymers, encapsulate the drug and control its release through diffusion or degradation of the polymer matrix. For drugs with a short half-life, microspheres can significantly prolong the drug's bioavailability in the bloodstream, reducing the need for frequent dosing and enhancing patient compliance. By providing a controlled, steady release, microspheres help maintain a consistent drug concentration, improving therapeutic efficacy and minimizing side effects. This is especially beneficial for drugs that require precise dosing, such as those used in chronic diseases or critical care. Additionally, microspheres can be engineered for targeted delivery to specific tissues or organs, further optimizing the therapeutic outcome. Overall, microspheres offer a versatile and effective strategy for enhancing the pharmacokinetics of short half-life drugs. Nateglinide, an oral hypoglycemic agent for type 2 diabetes, has very short half-life of 1.5 hours, necessitating frequent dosing to maintain effective blood glucose control. Starlix (Nateglinide) is available in 60 mg and 120 mg oral tablets, to be taken 1 hr–30 minutes before meals. The recommended dose of NTG is 120 mg three times a day, either alone or with Metformin or a Thiazolidinedione. Frequent dosing is necessary to achieve effective glucose control and provide patient relief. This can be challenging for patients, leading to suboptimal adherence and fluctuating glucose levels. Formulating Nateglinide as a sustained-release (SR) microsphere formulation offers several advantages.[11] By encapsulating

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Future Journal of Pharmaceutical Sciences

RESEARCH Open Access

Efficient in vitro oxaliplatin delivery with functionalized single-walled carbon nanotube for enhanced colon cancer treatment

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Abstract

Background Site-specific transport of medicinal products to malignant cells and tissues is an intriguing area since it has an ability to safeguard healthy cells. Selective upregulation of folate receptors on colon cancer cells is usual. Consequently, folate receptors have become one of extensively studied target moieties for targeting the delivery of chemotherapeutics. Hence, the study aimed to anchor folic acid, chitosan and oxaliplatin to the functionalized nanotube (FA-CHI-FSWCNT-OXA) for targeting folate receptors on colon cancer cells. The purification process of single-walled carbon nanotubes (SWCNTs) involved the use of an ultrasonic-assisted acid digestion method. The developed complex was evaluated using FTIR, DSC, SEM, XRD and in vitro dissolution studies. SRB and MTT assays were used to assess in vitro cytotoxicity of oxaliplatin and FA-CHI-FSWCNT-OXA) against HT29 and COLO320DM cell lines. Further, progression of apoptosis in cells was investigated using flow cytometry.

Results The FTIR results corroborated drug attachment over carbon nanotube (CNT), whereas the TEM results validated the nanosizing (1–300 nm) of the developed system. Drug entrapment in CNT was found to be 93.43 ± 1.65%, and in vitro drug release was found to be 94.73 ± 0.90% after 24 h. The complex reduced viability of 92.35 ± 0.942% cells than oxaliplatin's 66.58 ± 0.38% inhibition, revealed by MTT assay. In the SRB assay, the developed system showed 91.22 ± 0.90% inhibition, whereas oxaliplatin showed 76.69 ± 0.52% inhibition against HT29 cells.

Conclusions Conclusively, the developed system exhibited better cytotoxicity effects as compared with plain oxaliplatin. Our findings are suggestive of the potential development of CNT-anchored antineoplastic agents for target-specific delivery.

Keywords Carbon nanotube, Oxaliplatin, Colon cancer, Cytotoxicity, Apoptosis

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Background

Reportedly cancer is among the leading causes of death in the USA and even in most of the developed countries. Nearly 25% of deaths occur only due to cancer, which stands next to cardiovascular diseases. Among the internal malignancies, colonic cancer and cancer of the rectum are considered to be more frequent [1]. A large number of cases are reported for colorectal carcinoma (CRC), which has been demonstrated to be the third most common type of internal malignancy worldwide [2, 3]. CRC is classified into five stages based on

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RESEARCH ARTICLE

Pharmacokinetic assessment of Natural Anticancer Berberine Chloride in presence and absence of some Herbal Bioenhancers in rabbit model

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ABSTRACT:
The present study investigated the influence of pretreatment of herbal bioenhancers quercetin, curcumin and piperine, separately on pharmacokinetic profile of berberine chloride (BBC) in rabbit model. Initially, ex-vivo permeability studies were conducted to optimize the batches of drug and bioenhancer combinations, wherein, the optimized batches were subjected for in-vivo pharmacokinetic studies in rabbits via single oral dose. All experimental procedures on animals were conducted according to the CPCSEA guidelines. The collection of blood samples were done at predetermined time intervals appropriately processed and analyzed by HPLC method. The data were processed using software and pharmacokinetic parameters (AUC, C_{max}, T_{max}, K_{el}) of BBC were obtained. The results showed that piperine exhibited strongest bioenhancing effect on BBC absorption as compared to quercetin and curcumin. The C_{max} of BBC was increased by 626.53%, 401.86% and 168.60% for piperine, quercetin and curcumin optimized batches, respectively, with notable reduction in T_{max} as compared to BBC (Control). These bioenhancers showed outstanding enhancement in the pharmacokinetic profile of BBC. BBC has been reported to be P-glycoprotein (P-gp) substrate, exhibiting extremely poor bioavailability, which could be successfully overcome by pre-treatment with bioenhancers, attributed to bioenhancer mediated inhibition of the P-gp efflux pump and drug metabolizing enzymes. This improvement in bioavailability and other pharmacokinetic parameters of BBC in presence of bioenhancers would be expected to reduce dose, dosing frequency and toxicity of BBC, thereby contributing improved patient compliance. Thus, it could be concluded that, pre-treatment of herbal bioenhancers could be an effective approach to improve pharmacokinetics of drug like molecules.

KEYWORDS: Berberine Chloride, Quercetine, Curcumin, Piperine, *in-vivo* pharmacokinetic profile.

INTRODUCTION:

Berberine chloride (BBC) is herbal isoquinoline alkaloid with manifold promising therapeutic activities and has been widely utilised in Ayurveda and traditional Chinese medicine for decades. Due to cost effectiveness, minimal toxic impact and innumerable therapeutic actions, recently it has gained remarkable curiosity and tremendous attention.

In spite of its significant activities, its oral use has been severely curtailed as it shows extremely low and variable plasma concentrations in humans with an absolute oral bioavailability of less than 1%. In clinical emergencies, it takes a massive dose (up to 1.5g/day) that could cause adverse gastrointestinal consequences[1].

The key factors for poor membrane permeability and subsequently poor bioavailability of drug are the prevalence of cytochrome P450 enzymes in the gut/ liver which are accountable for presystemic drug metabolism, impaired absorption, predominant tissue distribution, drug excretion into the lumen, bile or urine

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REVIEW ARTICLE

SULFOXIDES AND SULFONES: REVIEW

Satwashila S. Kadam[a]*, Niranjan S. Mahajan[b], Pankaj A. Jadhav[c] and Shashikant C. Dhawale[d]

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ABSTRACT

It has been established that sulfoxide with sulfones have distinct pharmacological effects. Commodity compounds like sulfoxide and sulfones find widespread use in many chemical disciplines. This is why organic chemists find the synthesis of sulfoxide and sulfones so interesting. In the process of oxidation, sulphides can transform into sulfoxides or sulfones. Comprehensive oxidation to the sulfones is significantly simpler than mild oxidation to the sulfoxide, but both can be achieved by the use of highly selective technologies.

Keywords: Oxidation, hydrogen peroxide, halogen derivatives, Green oxidation, electrochemical and photochemical oxidation

INTRODUCTION

Well over past 10 years, the study of organic sulfoxides has grown in the field of chemistry. This is because organic sulfoxides are used as building blocks to make many chemically as well as physiologically active compounds. Oxidation of sulphides, the major straight forward synthetic pathway to the latter, is the transition of sulfoxides to sulfone (Fig.1)[1], which can be accomplished with a variety of reagents and oxidative processes. While many of these are useful, several of them lead to the over-oxidation of the related sulfones. Therefore, avoiding the formation of unwanted byproducts of oxidation requires carefully controlling the reaction's response setting, like time, the ratio of oxidants, and temperature. Unfortunately, this is frequently challenging to do, and there is still a large emphasis placed on the research and development of specific oxidants for this transition[2-6].

Oxidation using hydrogen peroxide (H_2O_2)

Hydrogen peroxide's high oxygen content, low price and reliability in storage and operation make it a desirable oxidant for environmentally conscious businesses and households[7]. Since just water is a byproduct, it has a negligible impact on the environment. Hydrogen peroxide (H_2O_2) is additional easily available than new oxidizing agents like peracids and hydroperoxides[8].

Hydrogen peroxide (H_2O_2) is the most well known oxidizer of aromatic and aliphatic sulphides to the appropriate sulfoxides with a high yield[9]. When combined with a variety of catalysts and solvents and applied in neutral, acidic, or alkaline environments, it can produce a wide range of products.

The synthesis of sulfones from sulphide was examined when acoustic cavitations were present. The oxidant used was 30 percent hydrogen peroxide[10]. Sulfones yields were increased by a factor of five to six under optimal sonication compared to the more traditional method using mechanical agitation alone[11]. Fig. 1 is a schematic depiction of the sulfoxide and sulfone synthesis in presence of hydrogen peroxide.

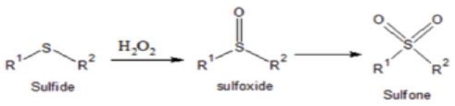

Fig. 1: Synthesis of sulfoxide and sulfone[10]

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ORIGINAL ARTICLE

Development and Evaluation of *In Situ* Gel Formation for Treatment of Mouth Ulcer

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ABSTRACT

Objectives: Mouth ulcers are one of the most prevalent conditions that can be caused by a range of circumstances. Many formulations, such as solutions, suspensions, and ointments are available commercially. However, because there is no long-term effect, no medication can be regarded as totally effective for treating mouth ulcers. The use of bioadhesive methods can boost the therapy efficacy. Because it is easier to administer than prepared gel formulations, the phenomenon of the sol-to-gel conversion can be beneficial. The major goal of this study was to develop and test *in situ* gels for treating mouth ulcers using choline salicylate and borax as model medicines.

Materials and Methods: Because a thermosensitive polymer was employed in this formulation, the sol-to-gel change was thermally reversible, and the frequency of administration was reduced by using the mucoadhesive polymer carbopol. Gelation temperature, pH, gel strength, spreadability, *in vitro* mucoadhesion, and *in vitro* drug release were all measured in the formulations.

Results: The experimental section indicated that viscosity of sols and gel strength increased with increasing temperature, *i.e.*, gel can be created at the site of application owing to body temperature. When poloxamer 407 was used at a concentration of 14 to 16 percent *w/v*, the gelling temperature was close to the body temperature (35-38 °C), but when carbopol 934P was added, the gelling temperature was raised. All formulations had pH between 5.5 and 6.8. All formulations had viscosities of less than 1000 cps, allowing for simple administration of the formulation to a mouth ulcer.

Conclusion: As a result, a correctly developed *in situ* gel for oral ulcers can extend the duration spent at the application site and minimize the frequency of administration. These findings show that the developed technology is a viable alternative to traditional drug delivery systems and can help patients comply.

Key words: *In situ* gel, thermo reversible, mucoadhesive, choline salicylate, mouth ulcer, 2^2 factorial designs

INTRODUCTION

Numerous routes of administration employed so far in new drug delivery systems, localized drug delivery to oral cavity tissues, have been examined for the treatment of periodontal diseases, bacterial and fungal infections, aphthous ulcers, and other disorders.[1] The oral mucosa is the "skin" that covers most of the mouth cavity, besides the teeth. It can be used for multitude of things. Its main purpose is to serve as a deterrence.[2] It protects deeper tissues such as fat, muscle, nerves, and blood vessels from mechanical trauma such as chewing. Oral mucosal disease is the most common disease that affects people. Mouth ulcers are painful round or oval sores that develop in the mouth, usually on the inside of the cheeks or lips.

Mouth ulcers are also called recurrent aphthous stomatitis (RAS), aphthae, aphthosis, and canker sores. The word aphthous is derived from the Greek word "aphtha", which signifies the ulcer. Despite the redundancy, these oral sores are still referred to as aphthous ulcers in medical literature.[3] RAS has an etiology that is either unknown or unclear.[4] Idiopathic RAS, rather than being a singular entity, may be the presentation of several illnesses with quite distinct etiologies. Nutritional deficiencies such as iron and vitamins, especially B12 and C, poor dental hygiene, infections, stress, indigestion,

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RESEARCH ARTICLE

Exploring the Antioxidant Potential of *Cissus woodrowii* (Stapf Ex Cooke) Santapau: A Study on Leaves and Stem

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ABSTRACT

Cancer, diabetes mellitus, cardiovascular disease, neurodegenerative illness, inflammatory disease, and many other pathologies have a common denominator: oxidative stress. The situation arises from the overproduction or ineffective quenching of free oxygen and nitrogen species within the cell. Antioxidant activity, nutritional value and traditionally roots were made into a powder and applied to cut wounds where pus had formed, ethnobotanical/traditional use is as an antitumor in Maharashtra. Owing to its ethnomedicinal importance, proper identification with pharmacognostic and phytochemical details and evaluation is vital for drug development and to prevent adulteration highlights and their role in laying down standardization. The present paper discusses phytochemical and antioxidant study of *Cissus woodrowii* (Stapf ex Cooke) Santapau. The both extract showed occurrence of glycosides, phenolic compounds, alkaloids, flavonoids also tannin and aqueous and ethanol extract of stem and leaves showed good antioxidant properties by DPPH assay.

Keywords: *Cissus woodrowii* (Stapf ex Cooke), Pharmacognostic, Phytochemical, Antitumor, Antioxidant.

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INTRODUCTION

In addition to being produced endogenously during the body's regular aerobic metabolic activities, nitrogen and free oxygen species are also found in the environment (exogenous).[1,2] Free radicals can also be produced by exposure to exogenous factors including smoking, ionizing radiation and medications. In contrast, free radicals are produced endogenously by mechanisms like the mitochondrial electron transfer chain as well as by various diseases.[3] There is an intricate antioxidant defense mechanism in the body that includes both enzymatic and non-enzymatic pathways that ensure health by keeping pro-oxidants and antioxidants in a state of dynamic balance.[1] Three enzymes catalase, glutathione peroxidase, and superoxide dismutase comprise the enzymatic antioxidants. Antioxidants that are not enzymes are also used by the body; examples include uric acid, bilirubin, and lactoferrin. However, oxidative stress is linked to many diseases, and this damage is caused in part by the accumulating free radicals when the body's endogenous antioxidant mechanisms are overworked.[4]

To combat oxidative stress, scientists have conventionally used synthetic antioxidants. There are reports of negative side effects from using these synthetic antioxidant molecules.[5] Examples include the carcinogenic and hepatotoxic effects of butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA). Synthetic antioxidants are underutilized because they are difficult to obtain, expensive, and easily damaged.[3] Current work is necessary to identify replacement antioxidants that are more secure, conveniently accessible, and potent.[6] Medicinal herbs have a higher likelihood of offering effective, safer, less expensive, and more simply reachable remedies for oxidative stress-related ailments than current conventional and complementary approaches.[7] Plants' antioxidant qualities have been shown to protect the body from disease, with studies showing that their eating reduces chances of cancer, cardio disease, dementia, high blood pressure, and stroke.[8]

Polyphenols and three B vitamins (C, A, and E) are the main classes of phytoconstituents responsible for plants' antioxidant activity. The hydroxylated versions of benzoic acid and cinnamic acid found in plants are called phenolic compounds. They can fight cancer and free radicals.[3] To name a few, there are tannins, anthocyanidins, coumarins, flavonoids, and phenols. The defense systems of plants against

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Synthesis of Novel Methylsulfonylacrylimidamide *via* Click Chemistry Approach, Computational Analysis and α-Glucosidase Inhibition Activity

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A series of Novel Methylsulfonylacrylimidamide analogs (**4a**–**4h**) were designed, synthesized, and screened for their α-glucosidase inhibitory activity. The results indicated that some of the synthesized derivatives displayed inhibitory activities against α-glucosidase with IC_{50} values ranging from 10.35 ± 0.15 to 60.39 ± 1.77 μM when compared to standard drug acarbose (IC_{50} 832.22 ± 2.00 μM). Among the synthesized derivatives, compounds **4f** and **4h** with a Di cyclohexyl and dioctyl substitution in the acrylimidamide displayed the most significant inhibitory activity with the IC_{50} value of 14.54 ± 0.19 μM and 10.35 ± 0.15 μM. The inhibitory action of compounds **4f** and **4h** against α-glucosidase was studied by enzyme kinetic and molecular docking. *In vitro*, cytotoxicity showed that **4f** and **4h** exhibited low cytotoxicity against human cell lines. The ADME study suggested that most compounds will likely be orally active as they obeyed Lipinski's rule of five. Our studies showed that these derivatives could be considered a new class of α-glucosidase inhibitors.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease that affects millions of people worldwide. According to the latest data from the International Diabetes Federation (IDF) in 2021, diabetes continues to be a major global health concern, with an estimated 537 million adults aged 20–79 years old living with diabetes worldwide.[1] The prevalence of diabetes is expected to increase to 643 million by 2045, driven by population growth, aging, urbanization, and unhealthy lifestyle habits. Type 2 diabetes mellitus (T2DM) is the most common form of diabetes, accounting for around 90% of all cases. The burden of diabetes is particularly high in low- and middle-income countries, where access to healthcare and diabetes management is often limited. In addition to its impact on health, diabetes also poses a significant economic burden, with estimated global healthcare expenditures related to diabetes reaching USD 727 billion in 2019.[2] The disease is characterized by hyperglycaemia, hyperlipidaemia, glucosuria, negative nitrogen balance, and sometimes ketonemia.[3] Diabetes mellitus can lead to serious complications such as nephropathy, retinopathy, and neuropathy.[4] Therefore, the development of new and effective treatments for diabetes is of utmost importance to improve patient outcomes and reduce the societal impact of the disease. In this study, we aim to contribute to this effort by designing and evaluating a novel class of α-glucosidase inhibitors as potential therapeutics for T2DM. α-glucosidase is the final enzyme for the digestion of carbohydrates in the brush border of small intestine mucosa. The digestion process of enzyme involves hydrolysis of glycosidic linkages of polysaccharides to monosaccharides like glucose, which is mainly responsible for causing hyperglycaemia in diabetic disease.[5] Therefore, α-glucosidase inhibitors play a critical role as therapeutic drugs for treating type 2 diabetes mellitus by maintaining blood glucose levels to a normal or near-normal range.[6,7] Currently, clinically used α-glucosidase inhibitors such as miglitol, acarbose, and voglibose have some limitations, such as flatulence, abdominal discomfort, and loose stools.[8] These side effects occur because only a small fraction of the dose is absorbed due to fermentation of unabsorbed carbohydrates. As a result, the acceptability of α-glucosidase inhibitors is poor due to these uncomfortable symptoms.[9] Therefore, the design and development of molecules that are more specific, target-oriented, potent, and have minimal side effects for the treatment of type 2 diabetes mellitus is essential. One promising approach to the development of such molecules is via click chemistry, which is primarily known for the synthesis of triazoles via azide (aryl/alkyl), alkynes coupling cycloaddition reaction catalyzed by copper. The triazoles have a wide range of applications, from material science to drug discovery. A novel feature of triazole as N_2 releasing was disclosed soon after its

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