CRITERIA III

Key Indicator 3.3 - Research Publication and Awards

3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during 2021

Research Publication 2021

PES Modern college of Pharmacy (For Ladies), Moshi, Pune 412105.

RESEARCH PUBLICATION 2021

Year	Sr. No.	Name of Faculty	Title of the Paper	Name of Journal	Year, Vol, Page No, Issue	ISSN No.
2021	1	Dr. Ms. V.S. Tambe, Mr. R.R. Chanshetti	Bioactivity Enhanced Isolated CarpaineFrom Carica Papaya Leaves For Platelet Stimulating Activity	Indian Journal of Pharmaceutical Sciences	2021,84(2), 268-280	0250-474X
2021	2	Dr. Ms. V. S. Tambe	Validated Stability Indicating RP-LC Method For Propylthiouracil with LCMS studies of Forced Degradation Products and Simulataneous Estimation of Its Impurity,	International Journal of Pharmaceutical Sciences and Research	2021, 21(1), 432-442	0975-8232
2021	3	Dr. Prof. S.N. Dhole	Enhanced Pharmacological Efficacy of Berberine Hydrochloride Loaded Lipid Based Pellets For The Treatment Of Metabolic Diseases	Biomedical & Pharmacology Journal	2021, 14(2), 993-1005	2456-2610
2021	4	Dr. Ms. R. L Mhetre, Dr. S.N.Dhole	Formulation And Optimization Of Chlorthalidone Loaded Nano-Particles By Antisolvent Precipitation Using Box-Behnken Design	International Journal Of Pharmaceutical Sciences And Research	2021, 12(1), 260-271.	9074-3278
2021	5	Ms. M. C. Upadhye	A review on viral infections including special magnitude on synthetic and herbal remedies	International Journal Of Modern Pharmaceutical Research	2021, 5(1), 20-23	2319-5878
2021	6	Dr. Ms. R. L Mhetre, Dr. N. S. Kulkarni, Dr. S.N.Dhole	Natural and Modified Excipients in Novel Drug Delivery System: A Review	Research Journal of Pharmaceutical Dosage Forms and Technology.	2021, 13(2), 147-152	0975-4377
2021	7	Dr. Ms. R. L Mhetre, Dr. S.N.Dhole	Patent review on nanosponge: targeted drug delivery system	J. Global trends Pharm. Sci,	2021, 12 (3), 9922 - 9931	2230-7346
2021	8	Ms. M. H. Tapkir	Colocasia Esculenta Starch: Novel Alternative Disintegrant For Pharmaceutical	Indian Drugs	2021, 58 (02), 41-53	0019-462X

			Application			
2021	9	Dr. N. S. Kulkarni, Mr. M.K.Munde, Dr. S.N.Dhole,	A Comprehensive Review on Application of Microwave Irradiation for Preparation of Inclusion Complexes with Cyclodextrins	Research Journal of Pharmacy and Technology.	2021, 14 (02), 1131-1136.	0974-360X
2021	10	Dr. N. S. Kulkarni,	A Review on Applications of Hydroxy Propyl Methyl Cellulose and Natural polymers for the development of modified release drug delivery systems.	Research Journal of Pharmacy and Technology.	2021, 14 (02), 1163-1170.	0974-360X
2021	11	Dr. N. S. Kulkarni, Dr. S.N.Dhole	A Systematic Review on Oral Drug Delivery as a Fast Dissolving Film to Improve Therapeutic Effectiveness.	Research Journal of Pharmacy and Technology	2021,14(03), 1771-1778.	0974-360X
2021	12	Dr. Ms. S. D. More, Dr. S.N.Dhole	A Review On Microparticulate Drug Delivery System	Bull.Env.Pharmacol.Lifesci	2021, 10(3), 163-171	2277-1808
2021	13	Ms. R. S Aher	Development and Characterization of Itraconazole Loaded Emulgel	Turkish Journal of Physiotherapy and Rehabilitation	2021, 33 (3), 38620- 38635	2651-446X
2021	14	Dr. Prof. S.N. Dhole	Niosomes: A Promising Drug Delivery System in Transdermal Drug Delivery (TDDS	Journal of Pharmaceutical Research International	2021, 33(48B), 6-17	2456-9119
2021	15	Dr. Ms. V.S. Tambe	Plant Phyto-Constituents As Antibiotic Adjuvants A Systematic Review And Bibliometric Analysis	Journal Of Pharmaceutical Research International	2021,33(4), 335-351,	2456-9119
2021	16	Prof. Dr. S. N. Dhole, Mr. O.M.Bagade	A Concise Insight on Pulsatile Drug Delivery System: An Outlook Towards Its Development	International Journal of Pharmaceutical sciences and Nanotechnology	2021, 14 (5) 5577-5587	9074-3278
2021	17	Ms. A. S. Gadakh	Ayurveda A Promising Tool For The Eradication Of Covid-19	International Journal Of Pharmaceutical Sciences And Research	2021, 12(6), 3006-3009.	0975-8232
2021	18	Prof. Dr. S. N. Dhole, Mr. O. M. Bagade	An Updated Overview on Mucoadhesive Buccal Drug Delivery System	Research Journal of Pharmacy and technology	2021,14(8), 1495-	0974-360X
2021	19	Mr. H. P. Alhat, Mr. S.V.Joshi	Validated HPTLC Method For Simultaneous Determination Of Lopinavir And Ritonavir	European Journal Of Pharmaceutical And Medical Research	2021, 8(3), 367-374	2394-3211

			In Tablet Dosage			
2021	20	Mr. R. R. Chanshetti	Leaves of Stereospermumsuaveolens DC Exhibit Anti-inflammatory and Anti-arthritic Potential Action in Experimental Animals	Journal of Pharmaceutical Research International	2021, 33(33A) , 164-175	**2456-9119**
2021	21	Dr. Ms. V.S. Tambe	A Review In-Vivo And In-Vitro Testing Models For Antiallergic Formulations	World Journal Of Pharmacy And Pharmaceutical Sciences	2021, 10 (8), 806-821	2278 – 4357
2021	22	Dr. Ms. V.S. Tambe	A Review Role Of Dietary Supplementation In Covid-19 Pandemic	World Journal Of Pharmacy And Pharmaceutical Sciences	2021, 10 (9), 804-827	2278 – 4357
2021	23	Dr. Ms. V.S. Tambe, Dr. Ms. V.S. Vichare	Simultaneous Analysis of Eprosartan and Hydrochlorothiazide In Tablet Formulation By High-Performance Thin Layer Chromatography With Ultraviolet Absorption Densitometry	International Journal Of Pharmaceutical Chemistry And Analysis	2021;8 (3): 123–128	2394-2789
2021	24	Dr. Mr. N.S. Kulkarni, Dr. Ms. M.C. Upadhye, Dr. Prof. S. N. Dhole	Development And Evaluation of Floating Microspheres Of Sumatriptan Succinate Using Ethyl Cellulose And Mucilage Extracted FromVigna Mungo	Journal Of Pharmaceutical Research International	2021, 33(43A), 24-36.	2456-9119
2021	25	Dr. Ms. S.D. More, Dr. Prof. S.N. Dhole	Formulation And Evaluation Of Oral Fast Dissolving Deliveray For Rosuvastin	International Journal of Biology, Pharmacy and Allied Sciences	2021, 10(10): 67-81	2277–4998
2021	26	Dr. Ms. S.D. More	A REVIEW ON BLACK FUNGUS/MUCORMYCOSIS	World journal of pharmacy and pharmaceutical sciences	2021, 10(12), 2106-2121	2278 – 4357
2021	27	Dr. Ms. V. S. Vichare	Development Of Validated RP-HPLC Method For Estimation Of Empagliflozin And Metformin In Combined Formulation	Journal Of Pharmaceutical Research International	2021,33(60A), 1-7	2456-9119
2021	28	Dr. V S. Vichare	Production and Analysis of Lip Balm using Herbal Resources	Journal Of Pharmaceutical Research International	2021,33(59A), 540-546	2456-9119
2021	29	Dr. Ms. P. B. Kothawade	Novel Niacin Receptor Agonists A Promising	Mini Reviews In Medicinal Chemistry	2021;21(17):2481-2496	1389-5575

			Strategy For The Treatment Of Dyslipidemia			
2021	30	Ms. S.A. Koli	Evaluation Of The Effect Of Chrysin In Renal Ischemia Reperfusion Induced Renal Failure In Wistar Rats	International Journal Of Analytical And Experimental Model Analysis	2021, XIII(X),771-799	0886-9367
2021	31	Ms. P.G. Kakade,	Exploration Of Antidiabetic Potential Of Aerial Parts Of Abutilon Indium Linn In Streptozotocin - Nicotinamide Induced Diabetes In Rats	The International Journals Of Analytical And Experimental Model Analysis	2021, XIII(X),405-420	0886-9367
2021	32	Rohini R. Pujari	Exploration of Elephant Foot Yam (Amorphophallus paeoniifolius) Starch: An Alternative Natural Disintegrant for Pharmaceutical Application	Indian Journal of Pharmaceutical Education and Research	2021; 55 (1)Suppl, S209-S219.	2581-5423

Research Paper

Bioactivity Enhanced Isolated Carpaine from *Carica papaya* Leaves for Platelet Stimulating Activity

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***Carica papaya* leaves are used in folklore medicine for the treatment of different types of thrombocytopenia associated with diseases and drugs. There are several scientific studies carried out on humans and animal models to confirm the efficacy of papaya leaves extract for the treatment of thrombocytopenia. In the present study, the alkaloid, carpaine extracted from papaya leaves was found to have platelet stimulating activity. Papaya leaves powder was extracted by microwave with a mixture of methanol: glacial acetic acid: water (180:2:1.6 v/v/v). The extract was treated with suitable solvent to obtain alkaloid fraction. From the total alkaloids, carpaine was further separated by preparative thin layer chromatography, purified and analyzed. Carpaine was complexed with beta-cyclodextrin and mixed with piperine. The complex was administered in thrombocytopenia induced rats. The results showed that bioavailability enhanced carpaine exhibits potent activity of increasing platelet count.**

Key words: Alkaloid, *Carica papaya* leaves, carpaine, platelet stimulating activity, thrombocytopenia

Carica papaya Linn. belonging to family Caricaceae has been used to treat the ailments like malaria, dengue and jaundice. It is used for anti-inflammatory, hypoglycemic, antifertility, abortifacient, hepatoprotective, wound healing, anti-malarial and immunomodulatory activity. Recently, its antihypertensive and antitumor activities have also been established[1]. Its young leaves are rich in flavonoids, alkaloids, phenolic compounds, cynogenetic compounds and carotenoids[2]. Leaves extracts from *Carica papaya* is generally used for patients with dengue fever. There are certain studies carried out to prove the use of *Carica papaya* leaves in thrombocytopenia[3-8]. The extract is available in the form of capsules, tablets and syrup. Although herbal medicines acceptance is increasing in global market, the concern is raised about its inconsistent composition. Hence, it is necessary to assess the activity of isolated phytoconstituents.

Carpaine (fig. 1) belongs to the class of macrolide analogues. It is one of the major alkaloid of papaya leaves which have been studied for its cardiovascular effects[9,10]. It slows the heart rate in humans and thus reduces blood pressure. It is reported to have anthelmintic action, anti-plasmodial[11] and anticancer activity[1,12,13]. Carpaine is isolated and identified from *Carica papaya* leaves with the content of 0.93 g/kg[14]. The identification of carpaine as active compound for anti-plasmodial activity has been reported. It is also reported to increase platelet count in rats[15]. In this study, an attempt was made to enhance carpaine extraction using microwave and to evaluate the antithrombocytopenic activity of *C. papaya* leaves extract, carpaine and its available marketed formulation.

MATERIALS AND METHODS

Reagents and chemicals:

All solvents (analytical grade) were purchased from Loba Chemie, (India). Dragondraffs reagent and Silica gel $60F_{254}$ plates were procured from Merck (Germany). Marketed tablet formulation containing 1100 mg of *Carica papaya* leaves extract was purchased from local market.

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A VALIDATED STABILITY-INDICATING RP-LC METHOD FOR PROPYLTHIOURACIL WITH LC-MS STUDIES OF FORCED DEGRADATION PRODUCTS AND SIMULTANEOUS ESTIMATION OF ITS IMPURITY

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Keywords:

Propylthiouracil, Thiourea, Impurity, Stability Indicating, LC-MS

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ABSTRACT: A simple, precise, accurate, sensitive and robust stability-indicating HPLC method for simultaneous estimation of propylthiouracil and its impurity thiourea has been proposed. The separation was achieved on a C_{18} column (4.6 mm × 150 mm, particle size 5.0 µm) maintained at 45 °C with a mobile phase composed of water: methanol: acetonitrile (50:35:15 v/v/v) with 0.1% acetic acid and detection wavelength was 241 nm. In statistical analysis, the linear response in the range of 30 - 300 µg/ml for propylthiouracil and 0.3 - 30 µg/ml for thiourea with a correlation coefficient greater than 0.99 was obtained. In forced degradation studies, PTU was found to degrade under basic hydrolysis, oxidative and photo stress while found resistant to acid/neutral hydrolysis and thermal degradation. The probable structures of six major degradants generated under stress conditions were identified by LC-MS studies and the most likely degradation pathway was proposed from mass spectral data. The information presented herein could be very useful for the impurity profiling of drugs as well as can be employed to check the drug product quality during stability studies.

INTRODUCTION: Propylthiouracil (PTU) belongs to anti-thyroid drugs class called thion-amides, commonly used to treat hyperthyroidism, thyrotoxicosis and hyperthyroidism associated with pregnancy. It is a potent inhibitor of thyroid peroxidase enzyme and impairs the oxidation and organic binding of thyroid iodide thus blocks thyroid hormone synthesis [1]. PTU is cited in various Pharmacopoeia to have contaminated by impurity; thiourea (TU). Therefore, it was thought worth determining this impurity to ensure safety, efficacy and quality of the final formulation [2, 3].

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Detailed literature indicated different methods *viz*; HPLC [3], titrimetry [2], potentiometry [2, 3] are available for quantification of PTU in bulk and formulation. Simultaneous estimation methods *viz*; voltammetry [4] and UPLC-MS/MS [5] with other anti-thyroid drugs are also reported in the literature.

Official TLC method to detect impurity; TU is a semi-quantitative method and lacks stability-indicating potential [2]. Two stability-indicating HPLC methods have been reported in the literature; one is applicable to bulk drug [6] and other is to tablet assay [7]. The reported stability-indicating method is applicable for assay but is not applicable to its impurity; TU. These methods do not involve the identification of degradation products and are not suitable for LC-MS studies. Other reported methods include the study of the effect of temperature on stability of extemporaneously

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Enhanced Pharmacological Efficacy of Berberine Hydrochloride Loaded Lipid Based Pellets for the Treatment of Metabolic Diseases

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Numerous researchers in past have reported the diversified therapeutic effects of Berberine hydrochloride (BERH) for the management of metabolic diseases, however due to poor systemic bioavailability these effects are dose dependant and desired effects were reported at high dose levels. The objective of present investigation is to evaluate and establish the enhancement in pharmacological efficacy of the designed BERH formulation at low oral dose level for the treatment of metabolic diseases constituting metabolic syndrome (MS). In the present investigation, BERH formulation in the dose level of (25 and 50mg/kg/day) was evaluated in cafeteria diet (CD) induced MS model in male Wistar rats for 42 days and compared with available marketed preparation in similar dose level using orlistat as reference drug. Among the studied dose level of BERH formulation the 25 mg/kg/day dose was adequate to produce significant reduction in calorie intake ($P < 0.01$), body weight, BMI, ($P<0.001$), organ weight viz. (stomach; $P<0.05$, liver; $P<0.001$, heart; $P<0.01$) and serum biochemical parameters ($P<0.001$). A significant improvement in lipid peroxidation ($P<0.001$), catalase (CAT), reduced glutathione (GSH) and superoxide dismutase (SOD) contents ($P<0.001$) was observed. The histopathological examinations indicated amelioration of liver, heart and pancreas tissues. The current study indicated significant glucose-lowering, hypophagic, anti-obesity, anti-hyperlipidemic and cardio protective activity of the BERH formulation even in much low oral dose level compared to previously reported studies. The observed behavior is attributed due to the enhanced bioavailability of BERH formulation which could be effectively used for metabolic diseases treatment.

Keywords: Berberine Hydrochloride; Bioavailability; Cafeteria Diet; Hyperlipidemic; Metabolic Syndrome; Obesity.

Urbanization, sedentary lifestyles, and changing diets are the characteristic factors of 21st century that leads to the concept of metabolic syndrome (MS). The MS includes clusters of metabolic abnormalities such as obesity, insulin resistance, dyslipidemia and hypertension which are observed together in patients. It is also related with higher possibility of cardiovascular disease and type 2 diabetes mellitus (T2DM) and consequential morbidity and mortality of individuals suffering with MS. Nowadays, MS is the most serious public health concern and clinical challenge which

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FORMULATION AND OPTIMIZATION OF CHLORTHALIDONE LOADED NANO-PARTICLES BY ANTISOLVENT PRECIPITATION USING BOX-BEHNKEN DESIGN

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Keywords:

Chlorthalidone, Nanoparticles, Box-Behnken factorial design, Freeze drying, Solubility

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ABSTRACT: Chlorthalidone is a long-acting diuretic recommended for treatment of oedema associated with congestive heart failure. It is oral active diuretic mainly acting on distal convoluted tubule of nephron. Chlorthalidone is poorly soluble in water at room temperature. Nanoparticles have great potential as a carrier and can improve the solubility of poorly water-soluble drugs like chlorthalidone. The aim of the present study was to formulate and optimize the chlorthalidone nanoparticles using Box-Behnken factorial design approach. Effect of three independent variables (concentration of polymer, amount of surfactant and ultrasonication frequency) on two dependent variables such as particle size and dissolution of the drug was studied. The nanoparticles of chlorthalidone were formulated by anti-solvent precipitation-ultrasonication-freeze drying technology to improve its solubility and dissolution. The samples were characterized using Horiba nanoparticles analyzer, Zeta potential analyzer, Differential Scanning Calorimetry (DSC), Fourier Transform Infrared Spectroscopy (FTIR), Powder X-ray Diffraction (PXRD), and Field Emission Scanning Electron Microscopy (FESEM). The average particle size of 342.5 nm with a Polydispersibility index 0.158 was confirmed by dynamic light scattering. Differential scanning calorimetry and powder X-ray diffraction revealed reduced crystallinity of chlorthalidone. Freeze-dried nanoparticles were observed as spherical shape under field emission scanning electron microscopy. The value of zeta potential was -15.5 mV. *In-vitro* dissolution study by dialysis bag investigated improvement of dissolution rate. The stability of the developed nanoparticle was confirmed by the accelerated stability study of developed nanoparticles. These results showed an increase in the saturation solubility and drug release of chlorthalidone due to particle size reduction and amorphous nature of the drug.

INTRODUCTION: Bioavailability, as well as dissolution of poorly water-soluble drugs, can be improved by the preparation of nanoparticles. Use of novel carriers such as micronization, modifications in excipients, liposomal drug delivery system, and solid dispersion, among others, have shown improved solubility [1].

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Novel carriers have been thoroughly investigated for improving drug solubility. The improvement of solubility was achieved by selecting a carrier system, a proper method of preparation, and optimal drug-carrier ratios.

Moreover, the combination of excipients with other materials can improve the functions of a dosage form [2]. The water solubility of drugs greatly influences pharmacokinetic and pharmacodynamic properties [3]. Biopharmaceutical Classification System (BCS Classification) has been a critical tool for the development of the formulation of various drugs [4]. Based on the solubility and intestinal permeability of the drugs, the BCS categorizes

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A REVIEW ON VIRAL INFECTIONS INCLUDING SPECIAL MAGNITUDE ON SYNTHETIC AND HERBAL REMEDIES

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ABSTRACT

This review describes the viral infection of the interactions between stress proteins and viral components have been described in a large variety of experimental models at different stages of the viral life cycle depending on the type of virus and host cell. viruses get more important perform and functions for humans, plants, animals, and the environment. viral infections cause of death worldwide. in addition to the viruses such as influenza, Ebola, HIV/Aids, Smallpox and Pneumonia, Herpes, Rotavirus and Chicken Pox are responsible for emergent epidemics that threaten global health. This article provides an overview of clinically available antiviral drugs for the primary care physician, with a special focus on pharmacology, clinical uses, and adverse effects, also gives a special emphasis on important herbs used for treating these infections.

KEYWORDS: Ebola, HIV/Aids, Smallpox and Pneumonia.

INTRODUCTION

This review discusses the most common respiratory and gastrointestinal viral pathogens which can be easily transmitted in environments. viral respiratory tract infections in lung transplant recipients may be severe. Most pathogens gain access to the host through surfaces of the body that are exposed to the surrounding environment and rife with resident microorganisms, termed microbiota. Microbiota play an integral role in modulating host health[1]These diseases can be treated by antiviral drugs or vaccines. herbal, dietary, complementary, and natural therapies have been used widely for prevention and treatment of viral infections

VIRUS

A virus is a very tiny germs agent that lives inside the living cells or host cells. Viruses are present in almost every ecosystem on earth. a microorganism is smaller than the bacterium that cannot be grow or reproduce apart from a living cell. Viruses get a bad rap but they also more important perform and functions for humans, plants, animals, and the environment. They are made of genetic material inside of a protein coating and viruses have fatty envelope covering. Viruses need living cells to replicate or reproduce. There are thousands of viruses some more common than others. Viruses are cause the familiar infectious diseases such as the common cold, flu, corona virus and warts. They also cause severe illnesses such as HIV/AIDS, smallpox, and Ebola, Pneumonia, Herpes, Rotavirus and Chicken pox.Tissues were studied by light microscopy, immunohistochemistry to detect viral antigens, in situ hybridization to detect viral RNA, and by viral titration.[2]

Types of viral infection

1. Respiratory Viral Infections, 2.Foodborne Viral Infections, 3.Viralskin Infection, 4.Sexually Transmitted Viral Infections, 5.Other Viral Infection.

1. **Respiratory viral infection:** The most common type of viral infection is the Respiratory Infection. Respiratory infection is affecting the throat, upper airways and lungs, nose. These viruses are the most spread by inhaling droplets containing virus particles.The disease burden from respiratory infection is greater than that of any other cause of disease (232). In 2002, 18% of mortality for children younger than 5 years of age was caused by respiratory infections.[3]
2. **Foodborne viral infection:** Viruses are one of the most common causes of food poisoning. The symptoms of these infections vary depending on the virus involved. Hepatitis-A, Norovirus, Rotavirus. Risk assessment for transmission of emerging viruses through the food chain should include consideration of all means by which food could post a hazard, that is not just consumption.[6]
3. **Viral skin infection:** Viral skin infections can be range from the mild to severe and produce a rash. For example, Molluscum contagiosum, Herpes simplex virus-1 (HSV-1), Varicella-zoster virus (VZV) The infected cell expresses the viral genes, which are able to induce cell growth, proliferation and prevent apoptosis. This review focuses on Epstein-Barr virus, human papilloma virus, hepatitis C virus, hepatitis B virus, human herpes virus 8 and human T-cell leukemia virus, since they have been already established as causative agents of human cancer.Cutaneous viral warts are discrete benign

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REVIEW ARTICLE

Natural and Modified Excipients in Novel Drug Delivery System: A Review

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ABSTRACT:
Modification of existing natural excipients has gain special attention in pharmaceutical industry and excipient technology for development of novel dosage forms with added functionality with the use of single multiple functionality excipient rather than using different excipients. It involves mixing and physical modification of two or more excipient to obtain desired functionality. The current review discusses about the importance of modified excipients modification methods and various examples of co-processed excipients in the market.

KEYWORDS: Natural excipients, co-processed excipients.

INTRODUCTION:

Pharmaceutical Excipients:

An excipient is an innovative substance which is used to convert drug molecule into dosage form which is suitable for patient administration. Excipients are the major part of pharmaceutical dosage form as it is included for various purposes such as stabilization of dosage form for long period of time, for improving physical properties of active ingredient or for increasing the bulk of dosage form containing potent drug[1].

Excipients plays a vital role in the performance and quality of drug delivery system. Excipients maybe used for Enhancing thestability of dosage form i.e. drugs which are light sensitive or sensitive to some environmental conditions (antioxidant and UV absorber) Excipients which are used to modify drug release (disintegrants) For controlling the drug release from dosage form (polymers) For improving bioavailability (solubilizers) Excipients necessary for manufacturing technology (binders, glidants, fillers) Ideal properties of pharmaceutical excipients It should be pharmacologically inactive and compatible with active ingredient. It should be sterile and should not alter the pharmacological action of active ingredient. It should have physical and chemical stability. Be available at relatively lower cost with better quality.

Pharmaceutical Excipients are categorised into four different classes

1. Single entity excipient
2. Physical mixture of different excipients
3. New chemical entity
4. Coprocessed excipients

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PATENT REVIEW ON NANOSPONGE: TARGETED DRUG DELIVERY SYSTEM

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ABSTRACT

Nanosponges are tiny mesh like novel class of hyper cross linked polymer based colloidal structures in which large variety of drug molecules encapsulated within its core. They are having the size of a virus with an average diameter below 1µm.Nanosponges are effective drug carriers which possess higher drug loading capacities compared to other nanocarriers. So they are useful to increase stability, solubility, bioavailability and delayed release of drug also it is helpful in solving toxicity problems of drugs. The nanosponges are able to load both hydrophilic and lipophilic drugs of various categories. Nanosponges are three dimensional network or scaffold with highly porous nature. It can deliver the drugs through various routes like oral, topical, parentral etc. and used as biocatalyst in the delivery of enzymes, proteins, vaccines and antibodies.

INTRODUCTION

Nanosponges are tiny mesh like novel class hyper cross linked polymer based colloidal structures in which large variety of drug molecules encapsulated within its core. They have been a proved spherical colloidal nature, reported to have a very high solubilization capacity for BCS class II (poorly soluble drugs) by their inclusion and noninclusion behavior. They have been recently developed and proposed for drug delivery. It can be solubilize poorly water soluble drugs and provide prolonged release as well as increasing drug bioavailability. Nansponges can load both hydrophilic and hydrophobic drug molecule because of their inner hydrophobic cavities and external hydroplilic branching, there by offering flexibility. They are more like a (3D) three dimensional network or scaffold. The backbone is a long length of polyester which is mixed in solution with small Molecules called cross linkers that act as tiny grappling hooks to fasten different parts of the polymer together. It shows a marked advantage in comparison with the common nanoparticles. They are water soluble but does not breakup chemically in water. They also mix with water and use it as a transport fluid. They are used to mask the unpleasant odour and taste, to convert liquid substances to solids. The chemical linkers enable the nanosponges to bind preferentially to the target site. They are solid in nature and have been found to be safe for oral and invasive routes of administration and so that they could serve as a potential carrier for drug delivery system. The small shape of nanosponges enables the pulmonary and parentral delivery successfully. For oral administration, the complexes may be dispersed in a matrix of excipients, diluents, lubricants and anti-cacking agents suitable

COLOCASIA ESCULENTA STARCH: NOVEL ALTERNATIVE DISINTEGRANT FOR PHARMACEUTICAL APPLICATION

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ABSTRACT

Oral drug delivery system has always been the most prevalent route of administration and continuous efforts are made to improve the drug delivery by this route. Tablets are one of the most extensively used dosage forms and various excipients have been developed for their formulation. The purpose of the current research work was to isolate and study the physicochemical properties of the *Colocasia esculenta* starch and further compare its disintegration ability with maize starch. Starch was isolated from *C. esculenta* corms by aqueous extraction method and possesses characteristics that are typical of starches. It was further evaluated for the presence of other foreign matter and phytoconstituents. Results showed that the isolated sample was free from foreign organic matter and the total ash value was found to be 0.4%. Tablets were prepared by the wet granulation method by varying concentrations in the range of 2.5 to 10% w/w for both the starches. Pre and post-compression parameters were studied and were found to be within the pharmacopoeial limits. Disintegration tests showed that disintegration time decreases with increasing concentration of both the starches. At 10% w/w concentration, disintegration time was found to be lowest, hence it was selected as an optimized formulation Stability studies were performed on F4 batch and it was found to be stable. The determination of disintegration efficiency indicates that *C. esculenta* starch exhibits disintegrating potential.

Keywords: *Colocasia esculenta* starch, Phytochemical tests, disintegration efficiency

INTRODUCTION

The oral drug delivery system is considered as the most recognized route of administration as it has more patient compliance because of simplicity and painless dosage administration. Numerous novel dosage forms are emerging in the market, though conventional dosage forms still maintain an appreciable amount of reputation. Despite overwhelming advantages, oral dosage forms suffering from certain disadvantages such as stability and absorption of the drug in the gastrointestinal tract, difficulty in swallowing of large doses and unpalatable drugs, etc[1]. To achieve better advantages of the oral route of administration it is utmost need to improve the characteristics of conventional dosage form, which can be modified by using various excipients. Excipients play a vital role to ease the handling, modify drug release, enhance stability and bioavailability of drug[2]. Appropriate and rational use of excipients is a critical task of formulators to get safe and efficacious formulation. The development of inert and nontoxic excipient is important and challenging in pharmaceutical research. Many researchers are working on various excipients to enhance the properties of the final formulation. Excipients isolated from natural resources could also present a remarkable potential to be effectively used as a modifier. Moreover, natural excipients exhibit advantages over synthetic excipients, such as being nontoxic, biocompatible, non-polluting, cost-effective and easy local availability[3-10].

Fast disintegrating tablets are formulated by the use of conventional tablet excipients such as lubricants, glidants and bulking agents; besides, it contains disintegrants to enhance the disintegration potential. These are more suitable than conventional tablets by being dissolved in less time, hence faster in the bioavailability of drugs. Disintegrants are excipients used either alone or in combination with others to break the intact tablet into smaller particles upon contact with the gastrointestinal fluid that dissolves and ultimately drug absorption takes place quickly. Several substances, mainly of carbohydrate origin have been tried as disintegrants and certain synthetic disintegrants such as Croscarmellose sodium

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REVIEW ARTICLE

A Comprehensive Review on Application of Microwave Irradiation for preparation of Inclusion Complexes with Cyclodextrins

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ABSTRACT:

Solubility of a drug is the rate limiting step for the absorption of drug. The drugs which shows poor solubility in gastrointestinal tract fails to show therapeutic response and results in poor bioavailability. To improve solubility of a drug various carriers are available amongst them cyclodextrin is most popular choice of excipient. Cyclodextrins are a family of cyclic oligomers containing α-(1-4) linked D-glucopyranose units in the chair conformation. The cyclodextrin features a cavity which is hydrophobic and hydrophilic exterior. The most common cyclodextrins have six, seven, and eight glucopyranose units known as α, β and γ- cyclodextrins respectively. The cavity is limited by hydroxyl groups of different chemical character. These dimensions allow the inclusion of several types of guest molecules/ drugs to form inclusion complexes. Because of host guest interaction, there is change in some properties of guest molecule. Various techniques are reported till today for the preparation of inclusion complex of cyclodextrins with drug to improve solubility as kneading, co-precipitation, solvent evaporation, spray drying, freeze drying and microwave irradiation. Microwave irradiation is an electromagnetic irradiation in frequency range of 0.3 to 300 GHz. Microwave irradiation chemistry is based on heating of materials by microwave dielectric heating effects. This phenomenon is material specific. The microwave irradiations have capacity to induce drying, polymeric crosslinkages/drug-polymer interaction and modify the crystal habit without the need for excessive heat, lengthy process and toxic reactants. Extensive literature survey revealed that Microwave irradiation technique has the capacity to improve the solubility of poorly water soluble drugs.

KEYWORDS: Cyclodextrin, Microwave irradiation, solubility, spray drying, lyophilization.

INTRODUCTION:

Microwave irradiation is an electromagnetic irradiation in frequency range of 0.3 to 300 GHz. All microwave ovens eighter domestic type or scientific microwave reactors operate at a particular frequency of 2.45 GHz, which is equivalent to a wavelength of 12.24 cm. It avoids interference with cellular phone frequencies and telecommunication. The energy of a microwave photon in frequency region of 0.0016 eV is lower as compared to the energy of Brownian motion and is also lacking physical strength to break chemical bonds. It is clear that microwaves cannot induce chemical reactions. Microwave irradiation is actually an electromagnetic irradiation in the frequency range of 0.3 to 300 GHz.

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REVIEW ARTICLE

A Review on Applications of Hydroxy Propyl Methyl Cellulose and Natural polymers for the development of modified release drug delivery systems

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ABSTRACT:

This review summarizes applications of Hydroxy Propyl Methyl Cellulose along with Natural polymers for the development of modified release drug delivery systems. The HPMC was available in variety of grades which show different applications in drug delivery. The various grades of HPMC utilized for the variety of action e.g. Coating agent, Adhesion promoter, Targeted release of drug etc. The modified release drug delivery system one of the highly researched field in pharmacy. Even though it is researched and various modified release formulations available in market. The developing more safer approach for drug release is still area of research, which contain easier routes, safer excipients, highly specific target selective materials. Natural polymer show very less side effects as well as it achieves the desired release of drug, so they are the choice of majority of formulations. e.g. Guar gum, Chitosan and Xanthan gum used in various drug delivery systems. Guar gum Cefapodoxime proxetil floating tablet prepared Guar gum, Xanthan gum ophthalmic preparation. Chitosan used in waste water treatment and various biomedical fields like tissue engineering, buccal drug delivery, anticancer treatment etc. Pollulan nanocrystals were studied for the anticancer drug delivery. The review solely based on HPMC-Natural polymer application in Modified release of drug. The various grades of HPMC utilized for the variety of action.

KEYWORDS: HPMC, Natural polymer, Chitosan, Guar gum, Xanthan gum etc.

INTRODUCTION:

The oral solid unit dosage form, it is the most preferred route for administration of dosage form due to its patient compliance, ease of administration, optimal amount of drug is delivered, But still it need to be improved a lot (controlling the release, drug delivery at desired site, shielding of drug from biological fluid of body, avoiding the multiple dosing are some of the aspects expected to improve)[1,2], To meet that various modifications are made in conventional drug delivery system which is known as modified drug delivery system or modified release drug delivery system. A modified release drug delivery addresses, delayed release, extended release, and oral drug delivery system as well as system which are changed in order to achieve modified release effect.

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Definition by USP - A modified-release dosage form is defined "as one for which the drug release characteristics of time course and/or location are chosen to accomplish therapeutic objectives which are not obtainable by conventional dosage forms. A modified release drug delivery address both[3].

Following must be considered for modified release dosage form:

- Small dose
- Short half-life (Long half-life drugs already have the desired kinetics)
- Wide Therapeutic Window
- Absorbed through the GI
- Modest to rapid absorption
- Highly stable in the GI

Advantages:[3,4]

1. Reduce dosing frequency
2. Improve patient compliance

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REVIEW ARTICLE

A Systematic Review on Oral Drug Delivery as a Fast Dissolving Film to Improve Therapeutic Effectiveness

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ABSTRACT:
Oral routes are mainly preferred route to administer and to deliver drug. Most common oral dosage forms are capsule and tablet. In some cases, the solid oral dosage form may become difficult in swallowing e.g. sudden episode of allergic reaction, motion sickness, coughing, unavailability of water, fear of choking and in different age group of patient and patients who suffer from dysphagia. The administration of pediatric and geriatric population is the advantages of oral film technology where the difficulty in swallowing and larger oral dosage forms is eliminated. It is an interchange platform for molecules that undergo first pass metabolism. To overcome these problems, drug delivery systems of fast dissolving has been developed. Fast dissolving oral delivery systems are solid dosage forms, which dissolve or disintegrate within 1 min when placed in the mouth without chewing or water. The drug are formulated by Oral dissolving films incorporating with selected oral cavity absorption enhancers oral dissolving film carriers are specially designed. Oral films are formulated by using polymers, plasticizers, saliva stimulating agents, colours, flavors and sweeteners. Different methods are reported in literature as solvent casting method, hot melt extrusion method, rolling method and solid dispersion method for the preparation of film. The objective is to target local, for rapid onset of action, to avoid first pass metabolism and to mask bitter taste of drugs. Overall it leads to patient compliance with improved therapeutic success.

KEYWORDS: Fast dissolving film, solvent casting, first pass metabolism.

INTRODUCTION:

The administration of therapeutic agents is perfect route for oral route because the ease of administration and low cost of therapy lead to high levels of patient compliance. Oral dosage forms are more popular than other dosage forms because of ease of administration, accurate dosage, self- medication, pain avoidance, patient compliance, etc. sterile conditions is not require for solid oral delivery systems, therefore, manufacture is less expensive. for oral delivery system has Several novel technologies recently become available to address the pharmacokinetic and physicochemical characteristics of drugs, while improving patient compliance.[1]

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The most popular oral solid dosage forms are capsules and tablet. Tablets are widely accepted because of the convenience in terms of compactness, self-administration, and ease in manufacturing. Children, geriatric patients and many other persons including disabled patient often have trouble in swallowing tablet or capsules, furthermore, dosing is an issue, as most medications are available in doses that are significantly too large for the paediatric population and cannot easily and reproducibly be divided into smaller doses[1-5].

Oral route is most preferred route by manufacturer and medical practitioners due to highest acceptability by patients. All dosage forms are available about 60% of oral solid dosage form long onset time, lower bioavailability, and dysphagia patients turned the manufacturer to the parenteral and liquid orals. The liquid orals (emulsion, syrup, suspension, etc.) has the problem of correct dosing mainly and parenteral are painful drug delivery, which may affect the patient noncompliance. Fast dissolving drug delivery systems

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REVIEW ARTICLE **OPEN ACCESS**

A Review on Microparticulate Drug Delivery System

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ABSTRACT

Microparticles are important part of drug delivery system because of their micron size and carrier properties. Microparticulate drug delivery system delivers the drug in the form of microparticles. The objective of this review is to study different features of microparticulate drug delivery system including its types, release mechanism, preparation methods. This review discusses the various aspects like types of microparticles, carriers used in microparticles preparation, release mechanism of drug advantages, disadvantages, and applications, techniques of preparation and evaluation of microparticles. Microparticulate drug delivery system have many advantages in comparison of conventional dosage form such as improved bioavailability and efficacy, controlled drug release, improved patient compliance and reduced toxicity. Microparticulate drug delivery system became an area of interest for many drugs to provide controlled and sustained drug release.

Key words: Microparticles, polymers, entrapment efficiency, controlled release, sustained release.

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INTRODUCTION

Microparticulate drug delivery system provides the controlled and sustained delivery of drug for extended period of time. Microparticles can be outlined as "the particles having diameter in the 1-1000µm size range." In 1974, Kramer had suggested the microspheres of albumin as a new drug delivery system. Later, the role of microsphere as sustained drug release vehicle was proposed by Java Krishna and Catha in 1997 [1]. Microparticulate drug delivery system is suitable for solids, liquids as well as for gases. Microparticles formed can be administered directly at the site of action or by various routes such as intramuscular, pulmonary, ocular, intraperitoneal, intra-organ, nasal, etc.

Microparticulate drug delivery system is useful for the delivery of vaccines, proteins andnucleic acid. Microparticles provide the protection tothe drug from the environment [2].

Over the last few years, biodegradable polymeric microparticles coated with hydrophilic polymer (E.g. PEG) are used potentially as it have long time circulating ability, target specific delivery and also able to deliver proteins, genes and peptides.[3]

Microparticles are majorly of two types:

1) **Matrix type** - Microspheres are matrix type of microparticles. In microspheres, the drug is dispersed homogeneously. They may be either dissolved or suspended. [4] Microspheres follow first order of drug release.(3)
2) **Reservoir type** – Microcapsules are reservoir type of microparticles. They are heterogeneous system in which core material is surrounded by membrane shell to form a reservoir.(5) Microcapsule follows zero order of drug release. Microcapsules are further classified as Mono coated and Poly coated microcapsules [3].

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Development and Characterization of Itraconazole Loaded Emulgel

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ABSTRACT:

Background: Itraconazole is an anti-fungal agent, practically insoluble in water and dilute acids, slightly soluble in ethanol (95%) and freely soluble in dichloromethane. Itraconazole shows low solubility across the physiological pH range result in incomplete absorption from the gastrointestinal tract and thus shows low in vivo bioavailability (55%). Emulgel of Itraconazole improve the solubility thereby its bioavailability.

Methods: In the present study emulgel was prepared by using Carbopol 934 to prepare gel , liquid paraffin was used as oil phase.Itraconazole first dissolved in dichloromethane and later added in aqueous phase. Both the oily and aqueous phases were separately heated to 70-80^0 C, then the oily phase was added to the aqueous phase with continuous stirring until room temperature to form emulsion. The obtained emulsion and gel base was incorporated with each other in 1:1 ratio with gentle stirring to obtain the emulgel

Result: All developed formulations of Itraconazole(F1-F6) were evaluated for the physiochemical parameters such as percentage yield, drug content, pH, viscosity, Spreadability, Extrudability. Viscosity studies of various formulations revealed that formulation F4 was good to compare to others. Formulation F4 shows good Rheological properties. Formulation F4 shows maximum drug release i.e. 96.09% at the end of 270 min.

Conclusion: Itraconazole showed enhance the bioavailability. Carbopol-934 significantly affects drug release and rheological properties of the gels. Formulation F4 is sufficient enough to treat the skin infections and can be further developed for scale-up

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Niosomes: A Promising Drug Delivery System in Transdermal Drug Delivery (TDDS)

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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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Review Article

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ABSTRACT

Infectious disease treatment and immunisation have undergone a transformative change in recent years. With the advancement of biotechnology and genetic engineering, a large number of disease-specific biological have been created, as well as a focus on delivering these biological effectively. Niosomes are vesicular Nano carriers that are gaining popularity as a potential transdermal drug delivery system due to properties like enhanced drug penetration, a local depot for sustained drug release, and a rate-limiting membrane for modulating systemic absorption of drugs through the skin. Niosomes are non-ionic surfactant-based vesicles that are biodegradable, relatively nontoxic, more stable, and less expensive than liposomes. This analysis gives a high-level overview of niosomes, including their chemical composition, structure, benefits, and applications, as well as some general observations on niosomes as percutaneous permeation enhancers.

Keywords: Niosomes; drug delivery system; transdermal drug delivery.

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Plant Phyto-constituents as Antibiotic Adjuvants: A Systematic Review and Bibliometric Analysis

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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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Review Article

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ABSTRACT

The advent of antibiotics in the 19th century has significantly reduced the morbidity and mortality of infectious diseases. However, irrational use of antibiotics in humans as well as in animals has driven the 21st century to the rapid emergence of MultiDrug Resistance Bacteria (MRB). Moreover, the dissemination of COVID-19 pandemic has paved the way for MRB, typically due to increased use of antibiotics to avoid secondary infections.

The fast pace progression of bacterial resistance for the antibiotics and their combinations is making the management of MRB infections tough and increasing the cost of the treatment as well. However, use of Efflux Pump Inhibitors (EPI) as adjuvant for antibiotics has shown a ray of hope by retaining the susceptibility of the antibiotics and thereby reducing the burden of immediate requirement of new antibiotics for MRB. Accordingly, the present paper is aimed to scrutinize the predominant literature depicting the plant Phyto-constituents as an EPI and adjuvant for antibiotics in the management of MRB infections.

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A Concise Insight on Pulsatile Drug Delivery System: An Outlook towards its Development

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ABSTRACT

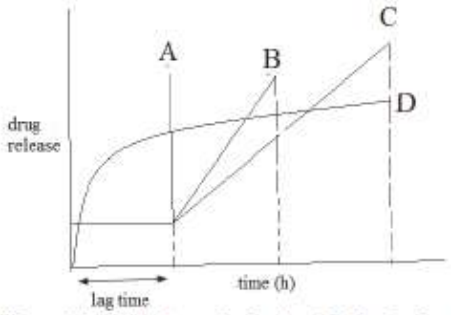
In pharmaceutical science, the pulsatile drug delivery system gains more attraction because of their number of benefits over the other dosage forms. In these systems, the drug is released at right time at the right site of action, and in the right amount, it is the most beneficial and important characteristic of the PDDS system due to that the patient compliance is increased, and the drug release is after a well-defined lag time. Moreover, this system is designed according to the circadian rhythm of the body. Because the disease has a predictable cyclic rhythm, such as Arthritis, diabetes mellitus, asthma, peptic ulcer, hypertension, cardiovascular disease the PDDS is more effective than other dosage forms.This system is a more time-specific and site-specific drug delivery system. In this system the drug is released as a pulse. The mechanism of PDDS is first diffusion then erosion and then osmosis. For the drug having a high first-pass effect and having a high risk of toxicity and side effects, these systems can be very useful. And to reduce dosing frequency and improve patient compliance this system is very helpful. There are various methods present like, single-unit systems and multiple-unit systems – which included capsular system, pulsatile delivery by osmosis, pulsatile delivery by erosion of membrane, delivery by rupture of membrane, etc.

KEYWORDS: Pulsatile drug delivery system; Chronopharmacology; Techniques; Circadian rhythm; Pulsatile release; Polymers.

Introduction

Traditionally the drug release pattern is generally immediate or extended type, but these drug release pattern have some disadvantages, so that now a day's vast amount of research will be focused on constant drug release pattern. The pulsatile drug delivery system will be on of that type in that system the release of drug will be constant for long time period. The pulsatile drug delivery system is a site and time specific drug delivery system thus it provide increasing patient compliance. Pulsatile system is defined as it is a rapid and transient release of certain amount of molecules within a short time period immediately after a predetermined time of period, that period called a lag time. The lag time will be essential for that drug which are degrade under gastric acid medium (e.g., peptide drugs) and produce irritation in gastric mucosa or induce nausea and vomiting. The drug having first pass metabolism result the reducing bioavailability (Reddy et al., 2009; Arora et al., 2006).

In the Fig.1 show that the drug release profile of pulsatile drug delivery system.



Where, Asigmoidal release after lag time (B) delayed release after lag time (C) sustained release after lag time (D) extended release without lag time.

Fig. 1. Drug release profile of pulsatile drug delivery system.

Chronopharmacotherapy

It is branch of pharmaceutics for design and evaluate drug delivery system. As early as the fourth century BC, Alexander the Great's scribe Androsthenes noted that the leaves of certain trees opened during the day and

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AYURVEDA A PROMISING TOOL FOR THE ERADICATION OF COVID-19

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Keywords:

Ayurveda, Herbal drugs, Covid-19, Treatment, Supportive

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ABSTRACT: The COVID-19 pandemic has created a global health crisis posing an unprecedented public health emergency. The number of deaths and people being infected is increasing daily throughout the globe. This situation is much more severe due to possible devastating situations because of several social and economic factors. Effective management to address this infection is still evolving, and attempts are being made to integrate traditional interventions along with standard of care. Ayurveda and yoga can be proved excellent results in cure of Covid-19. It has also been accepted by ICMR in its latest guidelines; they have showcase importance of Ayurveda and yoga in treatment of covid-19. In view of this, an attempt is made to conglomerate a few important herbs whose chemical constituents must be tested for their anti-viral potential against Covid-19 infection. Many of the ayurvedic herbal preparation proved its worth as an immune booster in treatment of Covid-19.

INTRODUCTION: The year 2020 had been impacted by the emergence of the dreadful disease known as COVID-19, which is started to spread in the world since 30th January 2020. It had found its origin in Wuhan city of China. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the causative agent for the COVID-19. [1] In India, its route starts with the first migrant come from Wuhan city of China was a medical student who was first identified patient of COVID-19. The government of India introduces to lockdown in the country from 17th March 2020. After that rapid increase in COVID-19 patients had been observed. Ministry of information and Broadcasting in July 2020 had declared that the mortality rate in India due to COVID-19 is lowest as compared to the rest of the world at 2.41%. ICMR apex body in India controlling medical research and related activities had suggested some ayurvedic practices and medicines which can be helpful in controlling the COVID-19 situation in India. India has near about 30 vaccines in the various stages of development and is expected in the first quarter of the year 2021. [2, 3]

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The emergence of COVID-19 had created a greater impact on the economy of every country, which marked negative growth first in decades. The government of India had taken various measures to rebound economic growth with ease in lockdown. The motto of atmanirbhar Bharat Abhiyan had a tremendous boost to Indian industries especially those of in the pharmaceutical sectors and health-related industries. It has been observed as a marked increase in production of hospital beds, ventilators and PPE kits. India is the second major producer of PPE kits in world. The self-sufficiency objectives had created this impact on industrial growth opens the doors of new opportunities for everyone [4-9].

In India, the spread of the corona virus had been observed through peoples who had travel history to the affected countries in March. Then some peoples had also been attended the various functions that

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REVIEW ARTICLE

An Updated Overview on Mucoadhesive Buccal Drug Delivery System

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ABSTRACT:

Among the various routes of drug delivery, the oral route is an attractive site for the delivery of drugs. The main advantages of these formulations are: drug targeting, sustained release, increased permanence time in the buccal mucosa, increased bioavailability, and decreased potential adverse effects and maintains constant blood levels for extended period of time. The buccal cavity was found to be the most suitable and easily accessible site for the delivery of therapeutic agents for both local and systemic delivery. Buccal mucosa has a tremendous availability, which leads to direct access to systemic circulation through the internal jugular vein bypasses the drug from hepatic first pass metabolism. The main disadvantage of this route is Limited absorption area- the total surface area of the membranes of the oral cavity available for drug absorption is 170 cm^2 of which ~50 cm^2 represents non-keratinized tissues, including buccal membrane, the barrier function of the skin changes from one site to the other and from one person to other person with age and large dose of drug are difficult to be administered. Melt granulation is emerging technique and this technique used to increase the dissolution rate of poorly water-soluble drugs. Tablet molding technique: Tablets produced by the molding technique are easier to scale up for industrial manufacture than lyophilisation technique. Hot melt extrusion of film method: Hot melt extrusion has been used for the manufacture of controlled release matrix tablets, pellets and granules, as well as oral disintegrating films.

KEYWORDS: Mucoadhesive, Buccal Drug Delivery, Emerging technology, Direct milling.

INTRODUCTION:

Mucoadhesive tablets are unconventional formulations with a few numbers of products registered by regulatory agencies such as FDA and ANVISA, and available to the population. However, there are a high number of patents and articles using this pharmaceutical form as an alternative to the oral administration. These formulations can be applied in areas with low vascularization, aiming local administration, or with high vascularization, when systemic absorption is desired; in opposition to the oral tablets, whose pharmacological efficacy depends necessarily on the absorption and systemic distribution.

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The main advantages of these formulations are: drug targeting, sustained release, increased permanence time in the buccal mucosa, increased bioavailability, and decreased potential adverse effects. Among the various routes of drug delivery, the oral route is an attractive site for the delivery of drugs. The buccal cavity was found to be the most suitable and easily accessible site for the delivery of therapeutic agents for both local and systemic delivery. Buccal Adhesive drug delivery system extend the residence time of the dosage form at the site of absorption and facilitate an intimate contact of the dosage form with the absorption surface and thus contribute to improved therapeutic performance of the drug. Bioadhesion can be defined as phenomenon of interfacial molecular attractive forces in the midst surfaces of the biological substrate and the natural and synthetic polymers, which allows the polymer to stick to the biological surface for a prolonged period of time. Among the many routes of drug delivery the oral route is perhaps the most preferred by clinicians and patients

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Research Article

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EJPMR

VALIDATED HPTLC METHOD FOR SIMULTANEOUS DETERMINATION OF LOPINAVIR AND RITONAVIR IN TABLET DOSAGE FORM

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ABSTRACT

A high performance thin layer chromatographic method has been developed for the simultaneous determination of lopinavir and ritonavir from tablet dosage form. Separation was performed on aluminum HPTLC plate (20×10cm) precoated with silica gel F_{254} HPTLC plates as stationary phase and the mobile phase consisting of toluene, ethyl acetate, methanol, formic acid (6:4, 4.5:0.5:0.5v/v/v/v) and wavelength of detection 254nm was used. After development, plates were observed under UV light. The detector response was linear in the range of 2µg/spot - 12µg/spot and 2 µg/spot - 6 µg/spot for lopinavir and ritonavir respectively. The developed method was validated as per ICH guidelines. The validated lowest limit of detection was 0.004827 µg /spot and 0.003369 µg /spot whereas lowest limit of quantification was 0.014627 µg /spot and 0.010208µg /spot for lopinavir and ritonavir respectively. The described method has the advantage of being rapid and easy. Hence it can be applied for routine quality control analysis of lopinavir and ritonavir from pharmaceutical preparation and stability studies.

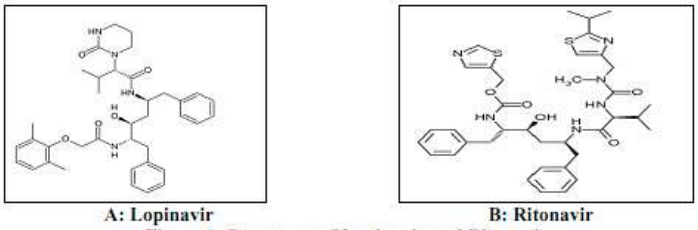
KEYWORDS: Lopinavir, Ritonavir, HPTLC, Validation.

INTRODUCTION

Lopinavir chemically (2S)-N-[(2S,4S,5S)-5-[2-(2,6dimethylphenox acetamido]-4-hydroxy-1,6-iphenylhexan-2-yl]-3-methyl-2-(2-oxo-1,3-diazinan-1-yl)butanamide and its empirical formula is $C_{37}H_{48}N_4O_5$ with a molecular weight of 628.80 (figure 1 A) [1-3]and Ritonavir (5s, 8s, 10s,11s)-10-hydroxy-2-methyl-5-(1-methylethyl)-1-[2-(1-methylethyl) -4-thiazolyl]-3,6-dioxo-8,11-is (phenylmethyl)-2,4,7,12-etraazatridecan-13-oic acid 5-thiazolyl methyl ester of molecular formula $C_{37}H_{48}N_6O_5S_2$ and its molecular weight is 720.95(figure 1 B).[1-3] These are antiretroviral drugs from protease inhibitor class. The drugs have been proved to be effective in anti-HIV treatment.

Ritonavir is the most potent protease inhibitor in its ability to inhibit CYP-450 and efflux pump-P-glycoprotein as a result the potential for severe drug interaction is quite great because of strong CYP-450 inhibiting effect of ritonavir. The drug has found value when used in fixed dosage form combination with other PIs to block their metabolism and acts as a booster for these drugs. In these cases ritonavir is used in a sub therapeutic dose but boosts the effectiveness of co administered drug.[4-7]

Literature survey of lopinavir and ritonavir either single or in combination with ritonavir revealed several methods based on HPLC and spectrophotometric methods in pharmaceutical formulation ,however there are few HPTLC method for simultaneous determination. The proposed method was validated as per ICH guideline.



A: Lopinavir **B: Ritonavir**

Figure 1: Structures of Lopinavir and Ritonavir.

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Leaves of *Stereospermum suaveolens DC* Exhibit Anti-inflammatory and Anti-arthritic Potential Action in Experimental Animals

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Authors' contributions

This work was carried out in collaboration between both authors. Author RRC submitted work is part of Ph.D. research activity. Author DDB has guided and supervised the research work. Both authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aim: The experimental investigation of current research work was to identify traditional rich claim of *Stereospermum suaveolens DC* leaves for anti-inflammatory and anti-arthritic potential action in animals.
Study design: Ethyl acetate fraction of *Stereospermum suaveolens* DC (Bignoniaceae) methanolic extract of leaves evaluated at 125mg/kg, 250mg/kg and 500mg/kg (p.o.) doses for anti-inflammatory and anti-arthritic activity.
Methodology: Ethyl acetate fraction of *Stereospermum suaveolens* DC (Bignoniaceae) methanolic extract of leaves was evaluated for phytochemical investigation for total flavonoid content using UV spectroscopy and TLC study. Carrageenan induced rat paw edema (Acute method) and Freund's complete adjuvant (FCA) induced chronic arthritis in wistar rats were used as an animal models to claim *Stereospermum suaveolens* DC leaves for anti-inflammatory and anti-arthritic potential. The rat paw volume and percentage inhibition of the paw edema were evaluated for anti-inflammatory activity. The assessments of arthritis in rats were measured by haematological values and radiological examinations.
Result: Ethyl acetate fraction of *Stereospermum suaveolens* DC (Bignoniaceae) methanolic extract

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A REVIEW: IN-VIVO AND IN-VITRO TESTING MODELS FOR ANTIALLERGIC FORMULATIONS

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ABSTRACT

The allergic diseases are increasing on this globe over the years. There are four types of allergies like, type-1 (anaphylactic reactions), type-2 (cytotoxic reaction), type 3 (immunocomplex reactions), and type-4 (cell-mediated reactions). Hypersensitivity is among the common form of allergy. In this review, we have discussed *in-vivo* and *in-vitro* models for testing allergy like BALB/c, CH3/HeJ, C57BL/Mice, BN Rat, Zebrafish, Guinea Pig, Dog, Monkey, Cat, Pig, Sheep, Mast Cell, Human basophile, and RBL-2H3 etc. Dog are mostly used for human allergy testing as it is more related and shows common allergies same as humans. Mast cell play significant job in allergic study and RBL-2H3 cells play chief role in feed allergy. These models help in the development of new drug or novel therapy. The objective of this study is to develop allergy model and to analyse allergies throughout species and focus on how these allergies are equivalent in people.

KEYWORDS: *In-vivo* and *In-vitro* models, IgE, allergy screening, antiallergics.

INTRODUCTION

Animals are very contributed for understanding of allergy. Allergic conditions such as dermatitis, rhinitis, inflammation, sinusitis, inflammation to bronchi, and feed sensitivity represents common source of person ailment. Atopic dermatitis it is a congenital disease transmitted in all age group, and results from close connection between genetical organs. Rhinitis (AR) is a direct-type allergic response in allergic person afterward subjection to aerial irritants. The connection of antigen with particular IgE which is connected to nose mast

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A REVIEW: ROLE OF DIETARY SUPPLEMENTATION IN COVID-19 PANDEMIC

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ABSTRACT

COVID-19 is a novel coronavirus disease. It is an upper respiratory tract virus which can cause infection to the people with all age groups. Dietary supplements show gradually increasing mark in all over the globe as an immunity booster. Dietary supplements may include nutraceuticals as well as micronutrients. Nutraceuticals is the term of combining words "Nutrition" and "Pharmaceuticals". These are defined as the type of food or food extracts that shows a good and beneficial impact on the health of human body. The micronutrients are the chemical substances which are essential for the growth and health of living organisms in small amounts. Micronutrients shows a crucial role in the immune system and accordingly have a beneficial impact on the coronavirus disease outcome. The low levels of micronutrients such as vitamins, minerals, etc. are being correlated with the adverse clinical outcomes during any type of viral infections.

KEYWORDS: COVID-19, SARS-CoV-2, Dietary Supplements, Vitamins, Minerals, Proteins.

INTRODUCTION

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2/COVID 19), a novel coronavirus, is a worldwide pandemic, as declared by the World Health Organization. It is a viral infection that affects respiratory tract, in the peoples of all ages.[22,36] The Coronavirus Disease - 19 i.e. COVID-19 is a highly infectious disease and caused due to Corona virus. This COVID-19 is also known as one of the life-threatening pandemics. The rapid spread of this deadly virus at the unbelievable rate has shocked the world and create the challenge to

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Original Research Article

Simultaneous analysis of eprosartan and hydrochlorothiazide in tablet formulation by High- Performance thin layer chromatography with ultraviolet absorption densitometry

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ABSTRACT

A new, simple, accurate, and precise high-performance thin-layer chromatographic method has been established for simultaneous analysis of Eprosartan and Hydrochlorothiazide from a tablet formulation. Standard and sample solutions of Eprosartan and Hydrochlorothiazide were applied to precoated 250 µm layer of silica gel G 60 F_{254} and the plates were developed with Chloroform: Acetonitrile: Glacial Acetic Acid (7:3:1,v/v/v) as mobile phase. Detection and evaluation of densitograms was performed densitometrically at 254 nm. The linear range was 200-700 ng/band with the retention factors of Eprosartan and Hydrochlorothiazide were 0.26± 0.02 and 0.44±0.02, respectively. The method was validated and successfully used for analysis of the drugs in tablets.

1. Introduction

Eprosartan (EPS), (E)-3-[2-butyl-1-[(4 carboxyphenyl)methyl]-1H-imidazol-5-yl]-2-[(2 thienyl)methyl]propenoic acid (Figure 1)[A], is a highly selective, non-peptide angiotensin-II antagonist. It has been shown to inhibit angiotensin-II induced vasoconstriction and to reduce systolic and diastolic blood pressure.[1] Hydrochlorothiazide (HYT), 6-chloro-3,4-dihydro-2H-1,2,4-benzothiadiazine-7-sulphonamide-1,1-dioxide (Figure 1)[B] is a diuretic drug.[2] The rationale behind use of this drug combination is that in treatment of hypertension in patients whose blood pressure is not adequately controlled by monotherapy. Oral administration of EPS with HYT has been found to be more effective than use of either drug alone.[3]

Other work dealing with analysis of EPS and other drugs in pharmaceuticals and biological samples includes use of LC–MS–MS,[4] capillary zone electrophoresis,[5] and micellar electrokinetic capillary chromatography.[6] Analysis of EPS in biological samples by HPLC–UV[7] and a chemometric method for optimization of solid-phase extraction HPLC–UV[8] of EPS in plasma have also been reported. There are several reports of the analysis of HYT

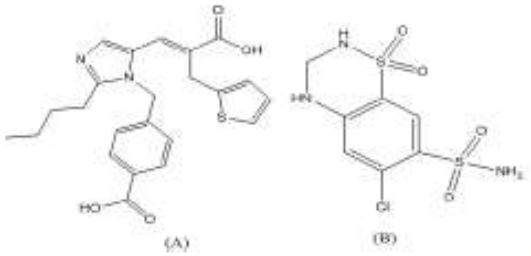

Fig. 1: The structures of (A) Eprosartan and (B) Hydrochlorthiazide

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Development and Evaluation of Floating Microspheres of Sumatriptan Succinate using Ethyl Cellulose and Mucilage Extracted from *Vigna Mungo*

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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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ABSTRACT

Aim: The present investigation is to formulate and evaluate gastroretentive floating microspheres for sumatriptan succinate. Gastric retention is widely used approach to retain dosage form in stomach and to enhance absorption of drugs.
Methods: The gastroretentive floating microspheres was prepared by two different techniques as solvent evaporation and W/O/W multiple emulsion technique. Ethyl cellulose, HPMC K4M polymer and mucilage extracted from *Vigna Mungo* in various proportions were used for formulation of microspheres. Combination of ethyl acetate and acetone in different proportion was used as organic phase and the microspheres were characterized for particle size, shape, morphology, percentage yield, entrapment efficiency, drug loading, *In-Vitro* Floating/Buoyancy study, In-vitro Floating/Buoyancy study and release kinetics.
Results: The average particle size of all batches was found in the range 100 to 210 µm and the entrapment efficiency of all formulations was found in the range of 17.46 % to 59.28 %.Total

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FORMULATION AND EVALUATION OF ORAL FAST DISSOLVING DELIVERY FOR ROSUVASTATIN

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ABSTRACT

In the present work, oral thin films of Rosuvastatin were designed with a view to enhance patient compliance by solvent casting method. In the solvent casting method, ludiflash (1,2,3,4 and 5% w/w), crospovidone (1,2,3,4 and 5% w/w) as super disintegrants were used in different concentrations with Gelatin, Poly vinyl alcohol as a film forming base for the formulation of oral disintegrating thin films of Rosuvastatin by solvent casting method. The prepared formulations of films were evaluated for film thickness measurement, folding endurance study, in-vitro disintegration time, in-vitro drug release pattern (in pH 6.8 phosphate buffer). Drug content, and drug-polymers interaction study (IR spectroscopy). Among all formulations, the formulation (F5) prepared by 5% ludiflash show good drug release (98.34%).

Keywords: Ludiflash, crospovidone; Rosuvastatin; oral disintegrating thin films

1. INTRODUCTION

Among the different routes of administration, the oral route of administration continues to be most preferred route due to various advantages including ease of administration, avoidance of pain, versatility and most importantly patient compliance. Taking the biological and physiological aspects of absorption and metabolism, not many drugs can be delivered successfully through the oral route because of the first pass effect of the drug which in turn affects the membrane permeability, absorption and bioavailability [1]. One such relatively new dosage form is

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A REVIEW ON BLACK FUNGUS/MUCORMYCOSIS

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• ABSTRACT

Mucormycosis is a fungal infection that usually appears due to the presence of fungi or environmental factors that contribute to the prolonged use of antibiotics and intensive care. It is caused by the use of immunosuppressive steroids and the patient's history of diabetes. Mucor mycosis is a rare illness characterized by high mobility rate and body surface internal effects. It is usually treated with various medications.

• INTRODUCTION

Mucormycosis is a fatal fungal infection that usually leads to a poor quality of life. It is treated with various surgical procedures and toxic chemicals even with the best treatment, mucormycosis still has a mortality rate of around 50% to 100%. This condition can be fatal even for individuals with a history of mild illness.

Angioinvasive infections are usually triggered by hematologic malignancies and/or stem cell transplantation in immunocompromised hosts. High-risk patients include those with diabetes and poorly controlled hyperglycemia. The fungi that cause mucormycosis are known as the Rhizopus, Mucor, and Cunninghamella. They can infect individuals with compromised immune systems and cause various types of injuries and illnesses. In the US, there has been a significant rise in the number of patients with mucormycosis, which is a fungal infection that can infect human hematopoietic stem cell transplant recipients. Cases of mucormycosis have increased significantly in France over the past decade. A study conducted in India, COVID19 disease could cause a yearly prevalence of around 200,000 cases. Output Rephrased/Re-written Text affecting various parts of body and it get spread rapidly the covid patients and also the covid worriers like doctors, nurses and ward boys are becoming plagued by this uncommon fungus at higher rate than ever present.

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Development of Validated RP-HPLC Method for Estimation of Empagliflozin and Metformin in Combined Formulation

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

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ABSTRACT

Aim: The aim of the present study include development of validated RP-HPLC method for estimation of Empagliflozin and Metformin in combined dosage form by using LC-MS compatible volatile mobile phase.

Methodology: Appropriate separation of drugs was achieved using C18 column as a stationary phase and Acetonitrile: Water (50: 50, v/v) at a flow rate 1mL/min as mobile phase. Detection was done at 230 nm.

Results: The R_t of Metformin and Empagliflozin was found to be 2.20 ± 0.02 min and 3.64 ± 0.02 min respectively. When the marketed formulation was analyzed by the developed method, the % drug contents were found to be 98.57 ± 1.28 and 99.86 ± 1.02 %w /w for Empagliflozin and Metformin, respectively. The method was found to be linear in a range of 11.25 – 56.25 µg/mL for Empagliflozin and 85 – 425 µg/mL for Metformin. Detection limit and quantitation limit were found to be 0.30 and 0.92 µg/mL for Empagliflozin and 1.12 and 3.36 µg/mL for Metformin, respectively. The accuracy and precision results were found to be near 100 % w/w for both the drugs. The method was also found to be robust and specific.

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Production and Analysis of Lip Balm using Herbal Resources

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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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ABSTRACT

Lip care products are an integral part of a day-to-day lifestyle. These impart the colour and protect the lips from the external environment. The major function of lip balm is to protect and moisturize the lips. A variety of lip care products are available in the market. The main concern with this product is that these contain synthetic colourant and flavouring agents that may have adverse effects such as darkening of lips. Besides, these may contain heavy metals that adversely affect various body organs. The current research work deals with preparation lip balm by using maximum possible natural ingredients and evaluation of the formulation. Various natural ingredients used were beetroot extract, Cocoa powder, Almond oil and Vitamin E. The physicochemical properties such as colour, odour, consistency, spreadability, melting point, pH and stability were studied. It was found that the formulation possesses red colour due to the addition of beetroot pigments, it had a typical flavour of cocoa powder, uniform in consistency and good spreadability. The melting point and pH of formulation were found to be 58-60°C ± 0.62 and 6.9 ± 0.25 respectively. The stability study indicated that formulation is stable at room temperature and refrigeration temperature. It can be concluded that lip balm formulation was successfully prepared by using these natural additives and better alternatives to synthetic excipients.

Keywords: Lip balm; natural ingredients; beetroot; cocoa powder; almond oil.

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REVIEW ARTICLE

Novel Niacin Receptor Agonists: A Promising Strategy for the Treatment of Dyslipidemia

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Abstract: ***Background***: Hyperlipidemia is characterized by high level of cholesterol and triglycerides in blood. Various classes of drugs like statins, fibrates, niacin *etc.* are used for treatment of hyperlipidaemia.

Objective: Niacin, which is one of the beneficial anti-hyperlipidemic agents, helps decreasing LDL cholesterol by 20 to 40% and causes increase of HDL cholesterol by 20 to 35%. However cutaneous flushing, loss of glucose tolerance, liver toxicity are the reported side effects of niacin therapy responsible for decreased patient compliance. Very recently, the G protein coupled receptor (GPCR); GPR109A located on the adipocytes has been identified as the receptor for activation of niacin.

Method: *In-vitro* studies have demonstrated that GPR109A receptor having high affinity for niacin. The present review attempts to provide a systematic presentation of the various chemical classes of compounds that have been reported as novel niacin receptor agonists including pyrazole-3-carboxylic acids, urea derivatives, anthranilic acids, biaryl anthranilides, tetrahydro anthranilic acid, xanthines, barbituric acid, bicyclic pyrazole carboxylic acids, pyrido pyrimidinones, pyrazolyl propionyl cyclohexenamides, pyrazole acids *etc.*

Results: As the design of GPR109A receptor agonists offers a promising solution for treatment of dyslipidemia, this review will be beneficial for medicinal and drug discovery chemists to expediate the process of discovery of new class of anti-hyperlipidemic agent with favorable lipid lowering profile with increase in HDL levels.

Conclusion: This review explains novel GPR109A receptor agonists for the treatment of dyslipidemia.

Keywords: Antihyperlipidemic drugs, cutaneous flushing, dyslipidaemia, Niacin receptor agonists, G-protein coupled receptor (GPCR), HDL.

1. INTRODUCTION

1.1. Background

Cardiovascular diseases (CVD) are the leading causes of mortality in the world, in both developed as well as in developing countries [1]. According to WHO global database, CAD (Coronary Artery Disease) is the leading cause of death in India, responsible for 28% of mortality [2]. Across the globe, the highest rate of CAD is observed among South Asians [3]. The rate of cardiovascular diseases in the urban Indian population is between 6.5-13.2% and between 1.6-7.4% in the rural population. However, due to changing life styles, presently, this rate is growing rapidly in rural areas [4]. The average age of onset of CVD in Indians is much lower than in other populations around the world [5]. A large variation of the occurrence of hypercholesterolemia is reported between countries, as well as within countries, and between different areas and population groups [6].

The atherosclerosis of large along with medium sized arteries is mainly responsible for cardiovascular diseases. One of the most important contributing factors is dyslipidaemia. [7-9] Dyslipidaemia or hyperlipidemia, which is characterized by the elevated level of lipids in the blood, including triglycerides, fatty acids, fats, cholesterol, phospholipids and cholesterol esters are mainly responsible for the development of atherosclerosis related conditions such as coronary heart disease (CHD), peripheral vascular disease and ischemic cerebrovascular disease [10].

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Title

EVALUATION OF THE EFFECT OF CHRYSIN IN RENAL ISCHEMIA REPERFUSION INDUCED RENAL FAILURE IN WISTAR RATS

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Abstract

Renal ischemia is a principal source of acute renal failure (ARF) and results in high rates of morbidity and fatality. Renal ischemia reperfusion is a multifaceted disorder concerning diverse mechanisms characteristically renal vasoconstriction, insidious tubular injury, and glomerular damage. Moreover, ischemia reperfusion injury entails assorted proceedings, including hammering of energy, deformation of the ionic haemostasis, generation of impulsive oxygen species, and cell demise.

In the present study, the effect of Chrysin of its activity on renal ischemia reperfusion, has been evaluated. The animals were (180-230g) divided into 6 groups and 8 animal in each group after that administered with 10,20 and 40 mg/kg dose of chrysin administered to the rat by orally, for 28^{th} days on 29^{th} day the animals were anaesthetised by using Sodium thiopentone (35 mg/kg i.p) and were subjected to ischemia reperfusion injury. The animals were kept in metabolic cages for 24 hours on 30^{th} day on that basis parameter were evaluated and the animal were sacrificed and their kidneys were isolated for histopathology and antioxidant parameters.

At the end of the study we found out that the decreased in water intake and Sodium level, decrease in urine output, Creatinine,Urea BUN,Pottasium level. when the test groups (10mg/kg, 20mg/kg, 40mg/kg) were compared with Ischemia reperfusion group and normal vehicle control group. GSH and SOD level in increased and MDA level decreased in rats when the test groups (10mg/kg, 20mg/kg, 40mg/kg) were compared with Ischemia reperfusion group.

Keywords- Ischemia Reperfusion,Haemostasis,Acute renal Failure,Hepatoprotective

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Exploration of Antidiabetic potential of aerial parts of *Abutilon indicum* Linn in streptozotocin- nicotinamide induced diabetes in rats

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Abstract
Present study was carried out to investigate Antidiabetic activity of ethyl acetate fraction of aerial parts of *Abutilon indicum* L. (EAAI) in streptozotocin induced early diabetic nephropathy in rats, to focus on its possible mode of action and identification of possible phytoconstituents responsible for the proposed activity. Experimental diabetes was induced in Wistar rats by single intraperitonial injection of streptozotocin (65 mg/kg). Animals were divided in six groups (n=6) and treated with variable doses of EAAI for 4 weeks. Fasting blood glucose was measured at 0, 7th, 14th, 21st, 28th day of the study. At the end of 4 weeks, oral glucose tolerance test (OGTT), lipid profile, glycosylated haemoglobin, was determined. Antioxidant enzymes of liver were evaluated. Pancreas of experimental animals was examined to determine structural changes. Further, EAAI was also analysed for its phytochemical composition using various qualitative and quantitative methods.
Daily oral administration of EAAI for 28 days to diabetic rats produced significant decrease in fasting blood glucose, lipid profile, and liver enzymes. Where as significant improvement in glycosylated haemoglobin, oxidative stress parameters of liver has been observed in EAAI treated diabetic rats. Histopathology of pancreas tissue showed structural improvement.
The results of our study demonstrate Antidiabetic potential of aerial parts of *Abutilon indicum* L. justifying its use in the indigenous system of medicine.

Keywords: Streptozotocin, *Abutilon indicum*, Hyperglycaemia, Oxidative stress, Antioxidants, Quercetin

1. INTRODUCTION

Diabetes mellitus (DM) is an endocrine disorder marked by abnormalities in lipid, carbohydrates, and protein metabolism and it is characterized by hyperglycaemia and glycosuria. Decreased insulin secretion or absence of insulin in blood is mainly responsible for diabetes mellitus. Increased blood sugar it does not only cause hyperglycaemia but result in numerous complications which are grouped as acute, sub acute, or chronic; these include but are not limited to retinopathy, neuropathy, nephropathy, cardiovascular disorders, hypoglycaemia, diabetic ketoacidosis, hyperosmolar nonketotic syndrome, polydipsia, frequent urination, lack of vigour, ocular impairment, weight loss, and excessive eating (Fatai , 2016). The prevalence of type 2 diabetes mellitus (T2DM) is approaching epidemic proportions, and diabetes mellitus (DM) affects people of all ages. There has been a dramatic increase in the prevalence of DM over the past 30 years; while previously, far fewer adults (and rarely children) were affected by this condition, mostly because obesity and physical inactivity were not as pervasive (Nissa, 2012). Current research is focused on the development of newer drug leads from phytoconstituents of medicinal plants which have been used in traditional practices, so as to get more potential and effective agents with lesser side effects than existing hypoglycaemic agents.
Abutilon indicum (Linn.) sweet (Malvaceae) commonly called 'Country Mallow' is a perennial plant up to 3 m in height. *Abutilon indicum* abundantly found as a weed thought out the tropical parts of India (Reyad, 2015). The plant is used in the traditional system of medicine for hypoglycemic, hepatoprotective, antimicrobial, male contraceptive, antidiarrheal activities, astringent, antibacterial, anthelmintic, carminative and diuretic. It is used locally for colds, high fever, mumps, tuberculosis, bronchitis, diabetes, carbuncle, haemorrhoids, hernia, diarrhoea and various types of

Original Article

Exploration of Elephant Foot Yam (*Amorphophallus paeoniifolius*) Starch: An Alternative Natural Disintegrant for Pharmaceutical Application

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ABSTRACT

Aim and Objectives: The aim of the current study is to isolate the starch from elephant foot yam (*Amorphophallus paeonifolius*) and investigate its potential as a disintegrant in tablet formulation as compare to standard corn starch. The objective of the study is to explore the applications of natural resources and develop an alternative to commercially available starches. **Materials and Methods:** Starch was isolated by a simple method, evaluated for phytochemical and physico-chemical properties. Tablets were prepared by wet granulation by varying concentrations of elephant foot yam or corn starch in the range of 2.5%, 5%, 7.5% and 10%. Further granules were evaluated for flow properties and tablets were evaluated for post-compression parameters. **Results:** It was found that the pH of the isolated starch sample was found to be neutral; it exhibited good swelling capacity and fair flow properties. P-XRD pattern showed a C-type diffraction pattern, SEM studies indicated that starch granules had a smooth surface. Granules possessed good flow properties and tablets complied with standard limits of weight variation. Hardness and friability were found in the range of 4.11-4.69 kg/cm^2 and 0.11-0.50% respectively. The wetting time was found in the range of 7 to 35 sec for elephant foot yam starch and 16-49 sec for corn starch. Disintegration time for elephant foot yam starch was found to be 28 to 84 sec and for corn starch, it was 40 to 90 sec. **Conclusion:** Formulations containing elephant foot yam starch showed a similar dissolution profile as that of corn starch. Stability studies were performed on F4 batch and it was found stable for three months.

Key words: Elephant foot yam, Corn starch, Disintegrant, Fast Disintegrating tablet, Disintegration time, Wetting time.

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INTRODUCTION

Excipients are a critical and integral part of pharmaceutical dosage forms and are used for various purposes along with active ingredients.[1] Excipients play a vital role to ease the manufacturing process of various dosage forms, modify physical properties of dosage form, improve patient compliance by imparting color and flavor, acts as a carrier for insoluble drug, modify the release pattern in case of fast disintegrating and prolong release dosage forms, improve stability and bioavailability of drug etc.[2] Stable and efficacious product can be obtained by addition of appropriately stable and compatible excipients in precise quantities in the formulation. Excipients range from simple to complex substances that can be challenging to characterize. Inappropriate use of excipient might lead to mild to severe toxic effects. It is a critical task of a formulator to select appropriate excipients to develop an efficacious and stable dosage form as per the requirements. Hence the development of the excipients is one of the key research areas in pharmaceuticals.

Starch is an immortal excipient!!! It is the major storage polysaccharide of higher plants found in the form of discrete granules.

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