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3.3.1 Number of research papers published per teacher in the Journals notified on UGC website during the last five years

CALENDER YEAR 2018

S.No.	Title of paper	Name of the author/s	Department	Name of journal	ISSN number
1	Evaluation of Hepatoprotective Activity of *Indigofera barberi* in Rats against Paracetamol Induced Hepatic Injury.	A.Lakshmana Rao	Pharmaceutical chemistry	Advances in investigational Pharmacology and Therapeutic Medicine.	NA
2	Evaluation of Hepatoprotective Activity of *Indigofera barberi* in Rats against Paracetamol Induced Hepatic Injury.	Sk.Aminabee	Pharmacology	Advances in investigational Pharmacology and Therapeutic Medicine.	NA
3	Evaluation of Pharmacognostic, Phytochemical and Physicochemical Standards of *Wedelia Trilobata* Root	D.S.N.B.K.Prasanth	Pharmacognosy	Open Access Journal of Pharmaceutical Research	2574-7797
4	Evaluation of Pharmacognostic, Phytochemical and Physicochemical Standards of *Wedelia Trilobata* Root	A.Lakshmana Rao	Pharmaceutical chemistry	Open Access Journal of Pharmaceutical Research	2574-7797
5	Design and Schematic Evaluation of Dextran Conjugated	A.Lakshmana Rao	Pharmaceutical chemistry	American Journal of Chemistry	2616-5244

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	Dexibuprofen, a Gastrosparing NSAID	A.Lakshmana Rao	Pharmaceutical chemistry	American Journal of Chemistry	2616-5244
6	Formulation and Evaluation of Efavirenz Mucoadhesive Microspheres	G.N.A.Lakshmi	Pharmaceutics	Advance Research in Pharmaceutical s & Biologicals	2250-0774
7	Formulation and Evaluation of Efavirenz Mucoadhesive Microspheres	A.Lakshmana Rao	Pharmaceutical chemistry	Advance Research in Pharmaceutical s & Biologicals	2250-0774
8	Identification of *Helicobacter Pylori* in Dental Plaques	Sk.Aminabee	Pharmacology	Advance Research in Pharmaceutical s & Biologicals	2250-0774
9	Identification of *Helicobacter Pylori* in Dental Plaques	A.Lakshmana Rao	Pharmaceutical chemistry	Advance Research in Pharmaceutical s & Biologicals	2250-0774
10	Formulation and Evaluation of Paracetamol Suspension by using Natural Suspending Agent Extracted from Banana Peels.	M.Sai Vishnu	Pharmaceutics	Internationl Journal of Research in Ayush and Pharmaceutical Sciences	2456-9909
11	Formulation and Evaluation of Paracetamol Suspension by using Natural Suspending Agent Extracted from Banana Peels.	A.Lakshmana Rao	Pharmaceutical chemistry	Internationl Journal of Research in Ayush and Pharmaceutical Sciences	2456-9909
12	Synthesis and Biological Evaluation of Dithiocarbamates of 1-Naphylamine Chalcone	A.Lakshmana Rao	Pharmaceutical chemistry	Journal of Pharmaceutical and Medicinal Chemistry	2455-8346
13	Synthesis of RU-NHC Complex from Caffeine and its Activity against	A.Lakshmana Rao	Pharmaceutical chemistry	European Journal of Pharmaceutical and Medical	2394-3211

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	Malarial Parasites			Research	
14	Evaluation of Antipyretic Activity of Ethanolic Extract of Wedelia Trilobata	A.Lakshmana Rao	Pharmaceutical chemistry	Internationl Journal of Research in Ayush and Pharmaceutical Sciences.	2456-9909
15	Simultaneous Estimation of Canagliflozin and Metformin Hydrochloride in Tablet Dosage Form by UV Spectrophotometry	D.Sharmila	Pharmaceutical Analysis	International Journal of Pharmaceutical Chemistry and Analysis	2394-2797
16	Simultaneous Estimation of Canagliflozin and Metformin Hydrochloride in Tablet Dosage Form by UV Spectrophotometry	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Pharmaceutical Chemistry and Analysis	2394-2797
17	Development and Validation of UV Spectroscopic Methods for Simultaneous Estimation of Ofloxacin and Tinidazole in Pharmaceutical Dosage Form	A.Sai Datri	Pharmaceutical Analysis	Indian Research Journal of Pharmacy and Science	2349-5332
18	Development and Validation of UV Spectroscopic Methods for Simultaneous Estimation of Ofloxacin and Tinidazole in Pharmaceutical Dosage Form	A.Lakshmana Rao	Pharmaceutical chemistry	Indian Research Journal of Pharmacy and Science	2349-5333

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19	Synthesis of Paracetamol Derivatives as Mannich Bases and their Antibacterial Activity	K.Srikanth Kumar	Pharmaceutical chemistry	Journal of Pharmaceutical and Health Sciences	2322-4738
20	Synthesis of Paracetamol Derivatives as Mannich Bases and their Antibacterial Activity	A.Lakshmana Rao	Pharmaceutical chemistry	Journal of Pharmaceutical and Health Sciences	2322-4738
21	Pharmacognostic Study of *Eranthemum nigrum* Stem	D.S.N.B.K.Prasanth	Pharmacognosy	Current Trends in Biomedical Engineering and Biosciences	2572-1151
22	Pharmacognostic Study of *Eranthemum nigrum* Stem	A.Lakshmana Rao	Pharmaceutical chemistry	Current Trends in Biomedical Engineering and Biosciences	2572-1151
23	Thiazolidine-2,4-dione Derivatives Bearing Indole Moiety: Design, Synthesis, Hypoglycaemic Activity and Molecular Docking Studies	K.Srikanth Kumar	Pharmaceutical chemistry	Journal of Applicable Chemistry	2278-1862
24	Thiazolidine-2,4-dione Derivatives Bearing Indole Moiety: Design, Synthesis, Hypoglycaemic Activity and Molecular Docking Studies	A.Lakshmana Rao	Pharmaceutical chemistry	Journal of Applicable Chemistry	2278-1862

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25	Development and Validation of HPLC Method for Determination of Ceritinib in Rabbit Plasma using PDA Detector	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Pharmaceutical Sciences & Research.	2320-5148
26	Design, Synthesis, Biological Evaluation and Molecular Docking Studies of Novel 3-substituted-5-[(indol-3-yl)methylene]-thiazolidine-2,4-dione Derivatives.	K.Srikanth Kumar	Pharmaceutical chemistry	Heliyon.	2405-8440
27	Design, Synthesis, Biological Evaluation and Molecular Docking Studies of Novel 3-substituted-5-[(indol-3-yl)methylene]-thiazolidine-2,4-dione Derivatives.	A.Lakshmana Rao	Pharmaceutical chemistry	Heliyon.	2405-8441
28	Stability indicating RP-HPLC Method for Simultaneous Quantification of Ezetimibe and Glimepiride in Bulk and Pharmaceutical Dosage Form	A.Lakshmana Rao	Pharmaceutical chemistry	Indo American Journal of Pharmaceutical Sciences	2349-7750
29	Pharmacognostic Study of *Passiflora foetida* Stem	D.S.N.B.K.Prasanth	Pharmacognosy	Acta Scientific Medical Sciences.	2582-0931
30	Pharmacognostic Study of *Passiflora foetida* Stem	A.Lakshmana Rao	Pharmaceutical chemistry	Acta Scientific Medical Sciences.	2582-0932

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31	Synthesis and Biological Evaluation of Some Novel Heterocyclic Mannich Bases.	B.Satya Sree	Pharmaceutical chemistry	International Journal of Research in Ayush and Pharmaceutical Sciences	2456-9909
32	Synthesis and Biological Evaluation of Some Novel Heterocyclic Mannich Bases.	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Research in Ayush and Pharmaceutical Sciences	2456-9909
33	HPLC-PDA Analysis of Pazopanib in Rabbit Plasma using Gefitinib as Internal Standard.	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Research in Pharmacy and Chemistry	2231-2781
34	Formulation and Evaluation of Eplerenone Matrix Tablets Using Aloe Vera, Guar Gum and Povidone K30.	P.Bharghava Bhushan	Pharmaceutics	Pharmaceutical Society of Sri Lanka	2449-0113
35	Formulation and Evaluation of Eplerenone Matrix Tablets Using Aloe Vera, Guar Gum and Povidone K30.	A.Lakshmana Rao	Pharmaceutical chemistry	Pharmaceutical Society of Sri Lanka	2449-0113
36	Development and Validation of RP-HPLC Method for Simultaneous Estimation of Paracetamol and Lornoxicam in Bulk and Pharmaceutical Dosage Form	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Research in Ayush and Pharmaceutical Science	2456-9909

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37	Development and Validation of HPTLC Method for the Estimation of Eperisone hydrochloride in Pharmaceutical Formulation.	A.Lakshmana Rao	Pharmaceutical chemistry	Asian Journal of Pharmaceutical Analysis and Medicinal Chemistry	2321-0923
38	Method Development and Validation for Simultaneous Determination of Epalrestat and Pregabalin in Human Plasma by using RP-HPLC	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Research in Pharmacy and Chemistry	2231-2781
39	Method Development and Validation for Simultaneous Estimation of Sitagliptin and Ertugliflozin in Human Plasma by using HPLC	A.Lakshmana Rao	Pharmaceutical chemistry	International Journal of Research in Pharmacy and Chemistry	2249-9504
40	A Novel Method for the Estimation of Budesonide in Human Plasma by using LC-MS-MS	A.Lakshmana Rao	Pharmaceutical chemistry	Der Pharma Chemica	0975-413X
41	Development and Validation of RP-HPLC Method for the Estimation of Ramosetron Hydrochloride in Tablet Dosage Form	A.Lakshmana Rao	Pharmaceutical chemistry	Asian Journal of Pharmaceutical and Health Sciences	2231–234X
42	Validated Stability Indicating RP-HPLC Method for Simultaneous Determination of Cefixime and Acetylcysteine in Pharmaceutical	A.Lakshmana Rao	Pharmaceutical chemistry	Asian Journal of Pharmaceutical and Health Sciences	2231–234X

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	Dosage Form				
43	Validated Stability Indicating RP-HPLC Method for Simultaneous Determination of Cefixime and Acetylcysteine in Pharmaceutical Dosage Form	T.Prasanthi	Pharmaceutical Analysis	Asian Journal of Pharmaceutical and Health Sciences	2231–234X
44	Validated Stability Indicating RP-HPLC Method for Estimation of Antiviral Class of Drugs Sofosbuvir and Velpatasvir in Combination and its Comparision with Reported Methods	A.Lakshmana Rao	Pharmaceutical chemistry	Research Journal of Pharmacy and Technology	0974-3618
45	Method Development and Validation of Stability Indicating RP-HPLC Method for Simultaneous Estimation of Sofosbuvir and Velpatasvir in Tablet Dosage Form	A.Lakshmana Rao	Pharmaceutical chemistry	Pharmaceutical Sciences and Analytical Research Journal	2640-6659
46	Simultaneous Determination of Candesartan and Hydrochlorothiazide in Human Plasma by LC-MS/MS	A. Lakshmana Rao	Pharmaceutical Chemistry	Brazilian Journal of Pharmaceutical Sciences	2175-9790

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KenKyu Advances in Investigational Pharmacology and Therapeutic Medicine 1:1-9 (2018)

Case Report

Evaluation of Hepatoprotective Activity of Indigofera barberi in Rats against Paracetamol Induced Hepatic Injury

A. Lakshmana Rao[1]*, Sk. Aminabee[1], M. Chinna Eswaraiah[2]

[1]Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

[2]Department of Pharmacognosy, Anurag College of Pharmacy, Kodad, Telangana, India.

Received January 08, 2018; **Accepted** January 22, 2018; **Published** January 25, 2018

Abstract

Various fractions obtained from chloroform extract of Indigofera barberi (whole plant) was scrutinized in albino rats for hepatoprotective activity on paracetamol instigated hepatic injury. Into 11 groups rats were divided. 5 animals in each group. By giving paracetamol orally at a dose of 2 gm/kg hepatic injury was acquired. With fraction D, hepatoprotective action is achieved by depletion in various serum marker enzymes like AST (aspartate transaminase), ALT (alanine transaminase). Also diminished the high amount of serum bilirubin and ALP (alkaline phosphotase). The hepatoprotective activity of fraction D was additionally confined by histopathological investigations on paracetamol treated animals. With silymarin (100 mg/kg, orally), as a standard drug the effects acquired were collated. Valuable flavonoids in Fraction D had shown hepatoprotective activity via stability, suppressing oxidative stress and restrictive effect on cellular permeability, through their antioxidant characteristic.

Key words: I. barberi; Paracetamol; Hepatoprotective.

Introduction

Major body organ is the Liver. It executes a vital part in the metabolism of lipids, fats, proteins and carbohydrates. It maintains metabolic equilibrium. It plays vital role in biotransformation, detoxification and elimination of multiple environmental, endogenous and pharmaceutical wastes, biochemical's mandatory for digestion (bile pigments), hormones (angiotensinogen), productivity of many coagulation factors, vitamin A, D, B12 and growth factors. It also safeguards the physique from possible dangerous materials specifically endotoxins that are assimilated by the intestinal tract and virulent

***Corresponding author:** A. Lakshmana Rao Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, Email: dralrao@gmail.com Mobile: 9848779133, Fax: 08674-274441

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***Corresponding author:** A. Lakshmana Rao Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, Email: dralrao@gmail.com Mobile: 9848779133, Fax: 08674-274441

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Open Access Journal of Pharmaceutical Research
ISSN: 2574-7797

Evaluation of Pharmacognostic, Phytochemical and Physicochemical Standards of Wedelia Trilobata (L.) Root

Prasanth DSNBK* and Lakshmana Rao A

Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, India

***Corresponding author:** Prasanth DSNBK, Associate Professor, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, Tel: +917382027437; Email: dsnbkprasanth@gmail.com

Research Article

Volume 2 Issue 1

Received Date: January 11, 2018

Published Date: January 25, 2018

Abstract

Context: Ethnomedicinally, the root of Wedelia trilobata L. (Asteraceae) has long been used in various ailments in traditional system; most importantly it is used against backache, muscle cramp, rheumatism, stubborn wounds, sores, swelling and arthritic pain, fever and malaria. The main problem experienced in the standardization of herbal drugs is lack of proper identi ication of plant source. So there is need to establish quality control parameters by using pharmacognostic and phytochemical evaluation, which ensures the purity, safety and ef icacy of medicinal plant W. trilobata.

Aim: To evaluate pharmacognostic properties including macroscopic, microscopic and physicochemical parameters of the root of W. trilobata.

Methods: Micro and Macroscopic characters of fresh and dried root samples were investigated. Physicochemical parameters were done by utilizing WHO recommended parameters, preliminary phytochemical and luorescent analysis of root sample were performed for identi ication and standardization of root of W. trilobata.

Results: The color, shape, size, odor and surface characteristics were noted from the root and powdered root material of W. trilobata. Light electron microscope images of cross section of root and powdered root revealed that the presence of cork cells, ligni ied spiral vessels, and parenchymatous cells. Phytochemical screening showed the presence of lavonoids, tannins, phenols, saponins, steroids, carbohydrates and glycosides. Physicochemical parameters such as moisture content, ash value, extractive value and luorescent behavior of root powder were determined. These parameters are useful tools to differentiate the powdered drug material.

Conclusion: The present study is helpful to supplement the information with regard to its standardization and identi ication and in carrying out further research in Ayurvedic system of medicine.

Keywords: Pharmacognostic; Microscopical; Wedelia trilobata L; Physicochemical and ligni ied spiral vessels

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Open Access Journal of Pharmaceutical Research
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Evaluation of Pharmacognostic, Phytochemical and Physicochemical Standards of Wedelia Trilobata (L.) Root

Prasanth DSNBK* and Lakshmana Rao A

Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, India

***Corresponding author:** Prasanth DSNBK, Associate Professor, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, Tel: +917382027437; Email: dsnbkprasanth@gmail.com

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Design and Schematic Evaluation of Dextran Conjugated Dexibuprofen, a Gastrosparing NSAID

American Journal of Chemistry
Vol. 3, No. 1, 30-41, 2018

(⚙ Corresponding Author)

Jaya Preethi P[1]
Lakshmana Rao A[2] ⚙
Basaveswara Rao MV[3]

[1]*Department of Pharmaceutical Chemistry, Sree Vidyanikethan College of Pharmacy, Tirupati, India; Department of Pharmaceutical Sciences, Krishna University, Machillipatnam, Andhra Pradesh, India*
Email: javapeesa@gmail.com Tel: 8099454224
[2]*Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, India*
Email: dralrao@gmail.com Tel: 9848779133
[3]*Krishna University, Machillipatnam, Andhra Pradesh, India*
Email: professormandava@gmail.com Tel: 9346234562

ABSTRACT

A novel prodrug approach was undertaken to develop the safe and therapeutically efficacious dexibuprofen to avoid oral NSAIDs induced ulceration. Dexibuprofen was esterified with dextran, using N,N-carbonyldiimidazole in one pot reaction. Synthesized dexibuprofen prodrug was characterized and evaluated by FT-IR and NMR spectroscopy, molecular weight, lipophilicity, partition coefficient, protein binding, degree of substitution, hydrolysis in simulated GI fluids, *in-silico* ADME properties and pharmacological potentials. Structural profile of dexibuprofen prodrug was elucidated by an ester linkage, glucosidic ring anomeric proton, dextran monomer protons and ester carbonyl carbon signals. Prodrug possessed physicochemical features as molecular weight of 83,368.11 g/mol, log P of 5.4 with optimal protein binding of 66% and degree of substitution of 25.3%. It was significantly hydrolyzed in SIF (99.53%) by following first-order kinetics with 85.9 min half-life. *In-silico* ADME properties of prodrug satisfied the Lipinski' rule of five and Jorgensen's rule of three without any CNS activity and cardiac toxicity, thus prodrug was suitable for oral administration. Prodrug has exhibited superior analgesic, anti-inflammatory, antipyretic activities devoid of antigenecity and ulceration in experimental animals. Data of the study were thus evinced that dexibuprofen prodrug is a safer therapeutic moiety in effective management of acute inflammation, pain and fever.

Keywords: *Acyl imidazole, Brewer's yeast, Challenge antigen, Complete freund's adjuvant (CFA), Gastric lesions, Sheep red blood cells (SRBC).*

DOI: 10.20448/812.3.1.30.41
Citation | Jaya Preethi P; Lakshmana Rao A; Basaveswara Rao MV (2018). Design and Schematic Evaluation of Dextran Conjugated Dexibuprofen, a Gastrosparing NSAID. American Journal of Chemistry, 3(1): 30-41.

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Publisher: Online Science Publishing

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ADVANCE RESEARCH IN PHARMACEUTICAL AND BIOLOGICALS
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FORMULATION AND EVALUATION OF EFAVIRENZ MUCOADHESIVE MICROSPHERES

*G. N. A. Lakshmi, G.N.L. Rajitha, A. Lakshmana Rao
Department of Pharmaceutics, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.

Received on 11/01/2018 Revised on 21/01/2018 Accepted on 12/03/2018

ABSTRACT:
Efavirenz falls in the NNRTI class of antiretrovirals, it is an FDA approved drug for clinical use for the treatment of HIV infection, AIDS and AIDS-related conditions either alone or in combination with other antiviral agents. Efavirenz has short half life of about 3 hrs thereby requiring twice daily in large number of patients which leads to patient compliance. The side effects of Efavirenz are dose dependent and a reduction of the total administered dose reduces the severity of the toxicity. Efavirenz is typically administered orally as a capsule and tablet. Dosage forms that are retained in the stomach would increase the absorption, improve drug efficiency and decrease dose requirements. In the present study keeping an objective of dosage forms that are retained in the stomach, mucoadhesive microspheres of Efavirenz were prepared by orifice-gelation method using sodium alginate as coat and carbopol 934, chitosan, and natural mucoadhesive polymers viz., mucilage isolated from Acacia, Guar gum and Karaya gum.

KEY WORDS: Micropsheres, Mucoadhesive dosage forms, Efavirenz, Mucoadhesive microspheres.

***Corresponding author**
G. N. A. Lakshmi
Department of Pharmaceutics
V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.
Email: lakshmigna26@gmail.com , Tel.:+91-95428 94455

INTRODUCTION : Drug delivery systems [DDS] that can precisely control the release rates or target drugs to a specific body site have an enormous impact on the health care system. Microspheres constitute an important part of these particulate DDS by virtue of their small size and efficient carrier characteristics. However, the success of these novel DDS is limited due to their short residence time at the site of absorption. It would, therefore, be advantageous to have means for providing an intimate contact of the DDS with absorbing membranes. Mucoadhesive drug delivery systems are one of the novel drug delivery system, which utilize the property of bioadhesion of polymers that become adhesive on hydration[1]. These drug delivery systems can be used for targeting a drug to a particular region of the body for extended period of time[2]. The attachment could be between an artificial material and biological substrate such as adhesion between a polymer and

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ADVANCE RESEARCH IN PHARMACEUTICAL AND BIOLOGICALS
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FORMULATION AND EVALUATION OF EFAVIRENZ MUCOADHESIVE MICROSPHERES

***G. N. A. Lakshmi, G.N.L. Rajitha, A. Lakshmana Rao**
Department of Pharmaceutics, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.

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ABSTRACT:
Efavirenz falls in the NNRTI class of antiretrovirals, it is an FDA approved drug for clinical use for the treatment of HIV infection, AIDS and AIDS-related conditions either alone or in combination with other antiviral agents. Efavirenz has short half life of about 3 hrs thereby requiring twice daily in large number of patients which leads to patient compliance. The side effects of Efavirenz are dose dependent and a reduction of the total administered dose reduces the severity of the toxicity. Efavirenz is typically administered orally as a capsule and tablet. Dosage forms that are retained in the stomach would increase the absorption, improve drug efficiency and decrease dose requirements. In the present study keeping an objective of dosage forms that are retained in the stomach, mucoadhesive microspheres of Efavirenz were prepared by orifice-gelation method using sodium alginate as coat and carbopol 934, chitosan, and natural mucoadhesive polymers viz., mucilage isolated from Acacia, Guar gum and Karaya gum.

KEY WORDS: Micropsheres, Mucoadhesive dosage forms, Efavirenz, Mucoadhesive microspheres.

***Corresponding author**
G. N. A. Lakshmi
Department of Pharmaceutics
V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.
Email: lakshmigna26@gmail.com , Tel.:+91-95428 94455

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Identification of *Helicobacter Pylori* in Dental Plaques

*Sk. Aminabee A. Bhargavi, A. Rohitha, B. Priya Nandini, K. Venkata Chalam, P. Ganesh, and A. Lakshmana Rao
Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

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ABSTRACT:

Helicobacter pylori (*H. pylori*) were identified in dental plaque, raising the possibility of future gastritis and peptic ulceration. The aim of the present study was the assessment the association of *H. pylori* of dental plaque and stomach in a more homogenous population and also to determine the diagnostic value of dental plaque for gastric infection. *H. pylori* in dental plaque were assessed using three methods, rapid urease test, catalase test and culture method. The significance of the oral hygiene status in these individuals was assessed. Thirty eight patients were positive for *H. pylori* by rapid urease test, twenty nine patients were positive for *H. pylori* by catalase test and twenty three patients were positive for *H. pylori* by culture method out of fifty patients.

Key words: *H. pylori,* Dental plaque, Rapid Urease test, Catalase test, Culture method

*Corresponding author:
Dr. SHAIK AMINABEE*
Associate Professor,
V. V. Institute of Pharmaceutical Sciences,
Gudlavalleru-521356,
Krishna District, A.P., India.
E-mail: aminaammi786@gmail.com
Mobile: 9908037622

INTRODUCTION

Helicobacter pylori (*H. pylori*), a microaerophilic gram negative spiral bacteria, first isolated from a human gastric biopsy specimen in 1983, is well adapted to life in the hostile acidic environment of the stomach[1].

The association between *H. pylori* and the increased risk of duodenal ulceration and antral gastritis has been well established. Hence the importance of preventing reinfection by identifying the potential natural reservoirs of *H. pylori*[2]. The reservoir of *H. pylori* and its mode of transmission are unclear, a fecal-oral, oral-oral, and in developing countries a water borne route of infection have been suggested[3,4]. Studies on gastritis reinfection by *H. pylori* from an oral reservoir has produced conflicting reports as both supragingival and subgingival dental plaque provide an optimal microaerophilic environment required for the survival of *H. pylori*[5].

H. pylori were identified in dental plaque in 1989. Some researchers have hypothesized that dental plaque might be the reservoir for *H. pylori* in those patients with associated
gastritis and ulceration. As techniques have improved, this bacterium has been frequently isolated in dental plaque, with
some reports showing 100% correspondence between *H. pylori* containing dental plaque and patients with *H. pylori* associated gastritis and oral ulceration[6].

Various methods have been used to detect *H. pylori* in dental plaque, suggesting that dental plaque may be responsible for the transmission of the bacteria and

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Research Article

FORMULATION AND EVALUATION OF PARACETAMOL SUSPENSION BY USING NATURAL SUSPENDING AGENT EXTRACTED FROM BANANA PEELS

M. Sai Vishnu*, A. Lakshmana Rao, M. Yamini, M. Rajya Lakshmi, M. Meenakshi Prasanna, N. Uma Mounika

Department of Pharmaceutics, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru- 521 356, Andhra Pradesh.

Keywords: *Musa paradisica,* paracetamol, swelling index, phytochemical testing, sedimentation volume.

ABSTRACT

The present work was aimed to formulate and evaluate a new, cheap and effective natural suspending agent that can be used as an effective alternative for traditional suspending agent. The study procedure involved extraction of suspending agent from the *Musa paradisica* (Banana) fruit peels, determination of swelling index, phytochemical testing, Micromeritic properties of mucilage like Bulk density, Tapped density, Carr's index, Hausner's ratio, Angle of repose, Calibration of paracetamol, preparation of paracetamol suspensions and evaluated for pH determination, determination of sedimentation volume, redispersibility, determination of flow rate, measurement of viscosity, effect of temperature, drug content, particle size determination and *In-vitro* dissolution studies. The study showed that the extraction of suspending agent from banana fruit peels. The swelling index was found to be 40%. The photochemical test showed contains carbohydrates. As the concentration of suspending agent increases therefore viscosity of suspension increases which ultimately reduces the sedimentation of suspension.

INTRODUCTION

Taste is one of the most important parameters governing patient compliance. Undesirable taste is one of several important formulation problems that are encountered with certain drugs. Oral administration of bitter drugs with an acceptable degree of palatability is a key issue for health care providers, especially for paediatric patients. Several oral pharmaceuticals, numerous food and beverage products, and bulking agents have unpleasant, bitter tasting components. So, any pharmaceutical formulation with a pleasing taste would definitely be preferred over a competitor's product and would translate into better compliance and therapeutic value for the patient and more business and profits for the company. The desire of improved palatability in these products has prompted the development of numerous formulations with improved performance and acceptability.[1] Suspending agents also called thickening agents are used to stabilize suspensions are hydrophilic colloid i.e substances that spontaneously from colloidal dispersions with water because of an affinity between the dispersed particles and the dispersion medium.[2] They help in lowering the sedimentation rate of particles in suspension.[3,4]

Rationale of suspending agent selection

Mucilage of *Musa paradisica* can be used as Binding agent, Suspending agent, Thickening agent, Humidifying agent, Disintegrating agent, Gelling agent and Release controlling properties in medicines. In the present study, attempts shall be made to utilize dried powder of banana peel mucilage as suspending agent.

Aim: The present work was aimed to formulate and evaluation of paracetamol suspension by using a new, cheap and effective natural suspending agent from *Musa paradisica* (Banana) fruit peels.

Objective: The main objective of this extraction of suspending agent from a Banana fruit peels.

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Original Article

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Synthesis and Biological Evaluation of Dithiocarbamates of 1-Naphylamine Chalchone

K. Madhavi[1], A. Lakshmana Rao[2], K. Jaya Bharathi[3], J. Subhashini[4], K. Bindu Bhargavi[5], K. Anjaneyulu[6]

[1]Assistant Professor, Dept. of Pharmaceutical Chemistry, [2]Principal & Professor, Dept. of Pharmaceutical Analysis, [3-6]Student, V.V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh 521356, India.

Abstract

The new dithio carbamate derivatives, 2-(naphthalen-8-ylcarbamoyl)-1-(4-hydroxyphenyl) ethyl diethylcarbamodithioate (IIIa) and 2-(naphthalen-8-ylcarbamoyl)-1-(2,4-dichlorophenyl) ethyl diethylcarbamodithioate (IIIa) were synthesized from 1-naphylamine chalchone. The new molecules were characterized by spectral and elemental analysis data. The synthesized analogues were evaluated for anti-mitotic activity by Bengal gram seed germination model showed strong to moderate activities compared with control. Both the molecules showed good inhibition.

Keywords: Dithiocarbamates; 1-Naphthalamine; Antimitotic Activity.

Introduction

Dithiocarbamates, the half amides of dithiocarbonic acids, were discovered as a class of chemical compounds in the history of organo sulphur chemistry. Dithiocarbamates are a common class of organic molecules that form mono and bidentate coordination with transition metals. Transition metal complexes of dithiocarbamate present a wide range of biological activities and are recently applied in the treatment of cancer. Since brassinin (Fig. 1), a phytoalexin first isolated from cabbage had cancer preventive activity,

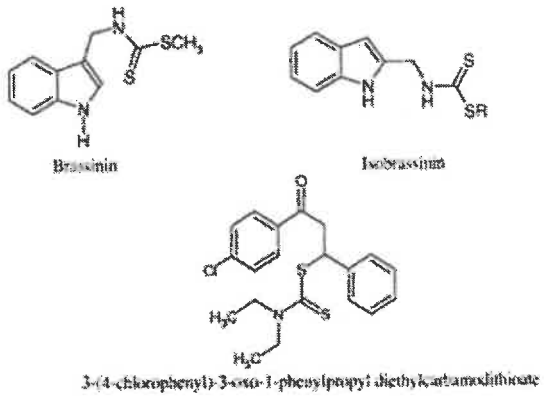

Fig. 1:

structural modification on this compound led to the synthesis of isobrassinin (Fig. 1) and a series of Dithiocarbamates [1], some of these were found to have antitumor activity. On the other side, Chalcones are the bio-genetic precursors of all known flavonoids and isoflavanoids and are abundant in edible plants. They exhibit a broad spectrum of pharmacological activities such as anticancer, anti-inflammatory, anti-malarial, antifungal, anti-lipidemic, antiviral, anti-Leshmanial, anti-ulcer and antioxidant activities. Recently Yong Qian and coworkers reported a series of chalcone derivatives (Fig. 1), with dithiocarbamated moieties which possessed potential anti-proliferative and anti-tubulin properties. Microtubules are among the most important molecular targets for cancer chemo-therapeutic agents. These small molecules bind to the tubulin, interfering with the polymerisation or depolymerisation of micro- tubules and there by inducing cell cycle arrest, resulting in cell death or apoptosis. Based on above information used to

Reprint Request: K. Madhavi, Assistant Professor, Department of Pharmaceutical Chemistry, V.V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh 521356, India.

E-mail: madhavikamma19@gmail.com

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Research Article

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SYNTHESIS OF RU-NHC COMPLEX FROM CAFFINE AND ITS ACTIVITY AGAINST MALARIAL PARASITES

Karumutchu Sitalu[1]*, B. Hari Babu[2] and A. Lakshmana Rao[3]

[1]*Department of Chemistry, Krishna University, Machilipatnam-521001.
[2]Department of Chemistry, Acharya Nagarjuna University, Guntur-522510.
[3]VV Institute of Pharmaceutical Sciences, Gudlavalleru-521356.

***Corresponding Author: Karumutchu Sitalu**

Department of Chemistry, Krishna University, Machilipatnam-521001.

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ABSTRACT

Present day organometallic science is difficult to envision without flexible N-heterocyclic carbene ligands. Because of their remarkable soundness and auxiliary differing qualities these themes are utilized in incalculable coordination buildings in current days. Specifically, transition metal complexes bearing interchangeable and promptly accessible NHCs have been built up as intense homogeneous catalysts. This field concentrates on particular applications and adjustments. Therefore, the present scientific experts can depend on complex engineered apparatus for the functionalization of carbenes, empowering access to polydentate ligand frameworks with or without hemilabile conduct. With regards to this work, different functionalized carbene ligands were utilized to accomplish or examine particular properties of ruthenium complexes. Tetracarbene ligands are generally unbending structures which empower relatively stable mixes because of their chelating coordination mode. Be that as it may, the basic differences of these themes is frequently restricted because of the low adaptability of the ligand forerunners. Using a non-cyclic, open-chain tetraimidazolium salt, we blended Ru (II) edifices whose geometry can be adjusted relying upon the response conditions. Also, these buildings demonstrated articulated movement in the TH of ketones. The present study focuses on the synthesis of Ru-NHC and its impact on malarial parasites.

KEYWORDS: Carbene compounds, methylated caffeine, XRD, malarial parasite.

INTRODUCTION

Ruthenium (III) complexes are all octahedral and low-spin with one pair electron. It can also form extensive series of halide complexes, the aqua-chloro series being probably the best characterized of all its complexes. The Ru(III)/Cl-/H_2O system has received extensive study, especially by ion exchange technique. $K_3[RuF_6]$ can be synthesized from molten salt $RuCl_3/KHF_2$ (Goldberg *et al.*, 1968). The dimeric anion of bromo complexes were reported, for example, $[Ru_2Br_9]_3$- which is composed of a pair of faced-sharing octahedra. Cyano complexes of ruthenium (III) were prepared, the parent $[Ru(CN)_6]^{3-}$ was isolated as the brilliant yellow salt by aerial oxidation of dimethylsulfoxide solution of $[Ru(CN)_6]^{2+}$. Ruthenium (III) is much more amenable in coordination with N-donor ligands than is iron(III), and forms ammines with 3 to 6 NH_3 ligands (the extra ligands making up octahedral coordination are commonly H_2O or halides) as well as complexes with 2,2′-bipyridine and 1,10- phenanthroline (Dwyer *et al.*, 1963).

We are interested in the synthesis of Ruthenium NHC complexes that have the potential to be used as a new class of antibiotics, DNA binders particularly for the treatment of cancer, bacterial infections, malaria, Chagas disease, Spetic shock and also as immunosuppressants. Malaria is a life threatening mosquito-borne infectious disease caused by parasites transmitted to humans through the bite of the Anopheles mosquito and affects approximately 16,00,000 people world wide (Caraballo and Hector, 2014). Infections with infected anophilous mosquitoes cause most of the morbidity and mortality in patients with Malaria (Bousema and Drakeley, 2011).

The global scope of malaria and the spread of drug-resistant *Plasmodium falciparum* make the need for improved therapy undeniable (Guerin et al, 2002). Assessment of both existing drugs and new antimalarials, alone or in combination, requires reliable methods for high-throughput testing. For decades, antimalarial drug effects have been measured in vitro by quantifying parasite uptake of radioactive substrates as a measure of growth and viability in the presence of the test drug (Desjardins et al., 1979; Elabbadi, et al., 1992). Antimalarial drugs are used for the treatment and prevention of malaria infection. Most antimalarial drugs target the erythrocytic stage of malaria infection, which is the phase of infection that causes symptomatic illness. The extent of preerythrocytic (hepatic stage) activity for

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Research Article

EVALUATION OF ANTIPYRETIC ACTIVITY OF ETHANOLIC EXTRACT OF *WEDELIA TRILOBATA*

M.Madhu Babu*, A.Lakshmana Rao, V.Harshitha, V.Madhavi, V.N.S.Lavanya, V.Vineetha, M.Sai Sailaja

Department of pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru- 521 356, Andhra Pradesh.

Keywords: *Wedelia trilobata*, Brewer's yeast, Paracetamol, Digital clinical thermometer.

ABSTRACT

The aim of present study was to investigate antipyretic activity of ethanolic extract of leaves of *Wedelia trilobata* in yeast induced pyrexia in wistar albino rats. In which pyrexia was induced by an intraperitonial injection of 20% brewer's yeast (10 ml/kg b.wt.). The body temperature of rats were measured before the injection of yeast and injected ethanolic extract of leaves of *Wedelia trilobata* (100 mg/kg b.wt.) and (200 mg/kg b.wt.) and followed by treatment with paracetamol (150 mg/kg b.wt.). The body temperature of experimental animals were recorded in the time interval of 0 hr, 1 hr, 2 hr and 3 hr with help of digital clinical thermometer which is placed in rectum in the depth of 2 cm and recorded body temperature values shown that the leaves extract of of *Wedelia trilobata* possess antipyretic activity.

INTRODUCTION

Wedelia trilobata is a mat forming perennial herb with rounded stems. Leaves are fleshy, usually 2 to 4 inches long and 1 to 5 inches wide, with irregularly toothed margins. Flowers are solitary, one inch in diameter and yellow-orange in color. The major components were germacrene D, α-phellandrene, α-pinene, E-caryophyllene, bicycle-germacrene, limonene and α-humulene. The percentage of most of the individual constituents present in *W. trilobata* essential oil changed significantly during the months. The plant has reported various pharmacological activities i.e., antimicrobial, antiproliferation, wound healing, antioxidant, antiinflammatory, *in-vitro* thrombo-lytic, antiproteinase, antifungal, antitumour and leishmanicidal activities[1]. Aerial parts of this plant used in traditional medicine against bronchitis, colds, abdominal pains, dysmenorrheal, fertility enhancer. Antipyreic compounds available in the market still present a wide range of undesired effects, leaving an open door for new and better compounds. Therefore, the present study was made on antipyretic effects on *Wedelia trilobata*.

EXPERIMENTAL METHODOLOGY

Identification & collection of plant material

The whole plant of *Wedelia trilobata* was collected from Gudlavalleru. These plants were identified and authenticated by Department of Botany, Hindu College, Machilipatnam. The plants were sorted, cleaned and air dried at room temperature for one week. Then it was ground to powder. Powdered sample was collected and stored in air and water proof containers protected from direct sunlight and heat until used for extraction.

Preparation of plant material

The powdered material of *Wedelia trilobata* was extracted with maceration for 3 days with distilled water followed by simple distillation. The extracts were concentrated to dryness till free from the solvents.

Qualitative Phytochemical screening

The following tests were carried out on standardized herbal extract to detect the presence of various phytoconstitutents like saponins, tannins, flavonoids, alkaloids, steroids, carbohydrates, proteins and phenols by different methods.

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Simultaneous estimation of canagliflozin and metformin hydrochloride in tablet dosage form by UV spectrophotometry

D. Sharmila[1,*], J. Chandini[2], K. Vasantha Lakshmi[3], Ch. Hari Balaji[4], A. Lakshmana Rao[5]

[1]Associate Professor, [2-4]UG Student, [5]Principal, Dept. of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India

***Corresponding Author:**
Email: sharmiladonepudi@gmail.com

Abstract
The combination of Canagliflozin and Metformin was available as fixed dose tablets for the treatment of type 2 diabetes. The present method aims to develop a simple, precise and accurate spectrophotometric method for simultaneous determination of Canagliflozin and Metformin in commercial formulation. The method utilizes Vierordt's equation based on the measurement at two wavelengths 290nm (λmax of Canagliflozin) and 236nm (λmax of Metformin). The method exhibited linear range of 2.5 to 15µg/ml and 5 to 17.5µg/ml for Canagliflozin and Metformin, respectively, with a correlation coefficient of 0.999. The LOD and LOQ for Canagliflozin were found to be 0.43 and 1.31 respectively. For Metformin the LOD and LOQ were found to be 0.49 and 1.49 respectively. The recovery of Canagliflozin and Metformin were found to be 99.43 and 98.82 respectively. The results were validated statistically as per ICH guidelines and were found to be satisfactory. To conclude, the developed UV spectrophotometric method is more economical for analysis of Canagliflozin and Metformin in both bulk and pharmaceutical dosage form for routine analysis.

Keywords: Canagliflozin, Metformin, Vierordt's equation, UV-Spectrophotometry, ICH guidelines.

Introduction
The combination of Canagliflozin and Metformin is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type-2 diabetes. The Canagliflozin and Metformin formulation is available in four dose strengths (50/500 mg, 50/1000 mg, 150/500 mg, 150/1000 mg) and should be taken twice daily with food.[1] Canagliflozin (Fig. 1a) is chemically (1S)-1, 5-anhydro-1-[3-[[5-(4-fluorophenyl)-2-thienyl]methyl]-4-methylphenyl]-D-glucitol and belongs to the class of SGLT2 inhibitors. It is used in the treatment of type-2 diabetes.[2] Canagliflozin inhibits the reabsorption of glucose from kidneys and lowers the renal glucose threshold by inhibiting sodium-glucose transport protein (SGLT2).[3-4] By blocking SGLT2, Canagliflozin decreases reabsorption of filtered glucose and reduces the renal threshold for glucose (RT_G), thereby elevating the urinary glucose excretion (UGE) and reducing raised plasma glucose in patients with type-2 diabetes.[5] Canagliflozin can be used as monotherapy or multi therapy in the treatment of type-2 diabetes.[6-9]

Metformin (Fig. 1b) a biguanide antihyperglycemic agent used for treating type-2 diabetes. It acts by decreasing hepatic glucose production and glucose absorption, and it enhances insulin mediated glucose uptake. Metformin is recommended as first line therapy for patients with type-2 diabetes. Patients, from whom Metformin monotherapy is not sufficient to achieve glycemic goals, it is referred to use in combination with other class of antidiabetic drugs.[10]

The literature survey revealed that few analytical methods were reported for estimation of the drugs individually and in combination using, UV,[11-13] HPLC,[14-16] HPTLC[17] and LC-MS.[18] In the present study an attempt was made for simultaneous estimation of Canagliflozin and Metformin in pharmaceutical dosage form by UV spectrophomerty. The method can be applied for routine quality control analysis.

Materials and Method
Reagents and Chemicals: The pure sample of Canagliflozin and Metformin was procured from Selleckchem LLC supplied by Pro lab marketing, India. The commercial formulations (Invokamet tablets containing 150mg of Canagliflozin and 500mg of Metformin) were procured from the local market. Methanol (AR grade) was purchased Merck Chemical Division, Mumbai, India and was used as diluent. Fresh purified distilled water was used throughout the experiment.

Instrumentation: Shimadzu UV1800 Double Beam UV-Visible Spectrophotometer, using software UV Probe (version 2.42) was used for spectral studies. Shimadzu BL220H Digital Weighing Balance having sensitivity of 0.001g was used for weighing the materials.

Method Development
Standard solution preparation: About 100mg of Canagliflozin and 100mg of Metformin was accurately weighed and transferred into a 100mL clean dry volumetric flask containing 70mL of methanol. The solution was sonicated for 5min and the drug was dissolved completely. The volume was made up to the mark with a further quantity of the methanol to get a stock concentration of 1mg/mL Canagliflozin and Metformin. From the above prepared stock solution

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Simultaneous estimation of canagliflozin and metformin hydrochloride in tablet dosage form by UV spectrophotometry

D. Sharmila[1,*], J. Chandini[2], K. Vasantha Lakshmi[3], Ch. Hari Balaji[4], A. Lakshmana Rao[5]

[1]Associate Professor, [2-4]UG Student, [5]Principal, Dept. of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India

***Corresponding Author:**
Email: sharmiladonepudi@gmail.com

Abstract
The combination of Canagliflozin and Metformin was available as fixed dose tablets for the treatment of type 2 diabetes. The present method aims to develop a simple, precise and accurate spectrophotometric method for simultaneous determination of Canagliflozin and Metformin in commercial formulation. The method utilizes Vierordt's equation based on the measurement at two wavelengths 290nm (λmax of Canagliflozin) and 236nm (λmax of Metformin). The method exhibited linear range of 2.5 to 15µg/ml and 5 to 17.5µg/ml for Canagliflozin and Metformin, respectively, with a correlation coefficient of 0.999. The LOD and LOQ for Canagliflozin were found to be 0.43 and 1.31 respectively. For Metformin the LOD and LOQ were found to be 0.49 and 1.49 respectively. The recovery of Canagliflozin and Metformin were found to be 99.43 and 98.82 respectively. The results were validated statistically as per ICH guidelines and were found to be satisfactory. To conclude, the developed UV spectrophotometric method is more economical for analysis of Canagliflozin and Metformin in both bulk and pharmaceutical dosage form for routine analysis.

Keywords: Canagliflozin, Metformin, Vierordt's equation, UV-Spectrophotometry, ICH guidelines.

Introduction
The combination of Canagliflozin and Metformin is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type-2 diabetes. The Canagliflozin and Metformin formulation is available in four dose strengths (50/500 mg, 50/1000 mg, 150/500 mg, 150/1000 mg) and should be taken twice daily with food.[1] Canagliflozin (Fig. 1a) is chemically (1S)-1, 5-anhydro-1-[3-[[5-(4-fluorophenyl)-2-thienyl]methyl]-4-methylphenyl]-D-glucitol and belongs to the class of SGLT2 inhibitors. It is used in the treatment of type-2 diabetes.[2] Canagliflozin inhibits the reabsorption of glucose from kidneys and lowers the renal glucose threshold by inhibiting sodium-glucose transport protein (SGLT2).[3-4] By blocking SGLT2, Canagliflozin decreases reabsorption of filtered glucose and reduces the renal threshold for glucose (RT_G), thereby elevating the urinary glucose excretion (UGE) and reducing raised plasma glucose in patients with type-2 diabetes.[5] Canagliflozin can be used as monotherapy or multi therapy in the treatment of type-2 diabetes.[6-9]

Metformin (Fig. 1b) a biguanide antihyperglycemic agent used for treating type-2 diabetes. It acts by decreasing hepatic glucose production and glucose absorption, and it enhances insulin mediated glucose uptake. Metformin is recommended as first line therapy for patients with type-2 diabetes. Patients, from whom Metformin monotherapy is not sufficient to achieve glycemic goals, it is referred to use in combination with other class of antidiabetic drugs.[10]

The literature survey revealed that few analytical methods were reported for estimation of the drugs individually and in combination using, UV,[11-13] HPLC,[14-16] HPTLC[17] and LC-MS.[18] In the present study an attempt was made for simultaneous estimation of Canagliflozin and Metformin in pharmaceutical dosage form by UV spectrophomerty. The method can be applied for routine quality control analysis.

Materials and Method
Reagents and Chemicals: The pure sample of Canagliflozin and Metformin was procured from Selleckchem LLC supplied by Pro lab marketing, India. The commercial formulations (Invokamet tablets containing 150mg of Canagliflozin and 500mg of Metformin) were procured from the local market. Methanol (AR grade) was purchased Merck Chemical Division, Mumbai, India and was used as diluent. Fresh purified distilled water was used throughout the experiment.

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ORIGINAL RESEARCH

DEVELOPMENT AND VALIDATION OF UV SPECTROSCOPIC METHODS FOR SIMULTANEOUS ESTIMATION OF OFLOXACIN AND TINIDAZOLE IN PHARMACEUTICAL DOSAGE FORM

*Sai Datri A, Lakshmana Rao A, Raja Sainadh S, Geethika S, Bhavani Devi S, Vatsavi Sai T
Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.

Submitted on: 22.04.18; Revised on: 15.05.18; Accepted on: 24.06.18

ABSTRACT: A sensitive and validated UV method have been developed for the simultaneous estimation of Ofloxacin (OFL) and Tinidazole (TNZ) in bulk and pharmaceutical dosage form, without prior separation, by three different techniques (Simultaneous equation, Absorbance ratio method and Dual wavelength method). The work was carried out on Shimadzu electron UV1800 double beam UV-Visible spectrophotometer. The absorption spectra of reference and test solutions were carried out in 1 cm matched quartz cell over the range of 200-400 nm. The first method is the application of simultaneous equation, where the linearity ranges for Ofloxacin and Tinidazole were 2-10 µg/ml and 5-15 µg/ml respectively. The second method is the dual wavelength method, where the linearity ranges for Ofloxacin and Tinidazole were 2-10 µg/ml and 5-15 µg/ml respectively. The third method is the determination of ratio of absorbance at 294.6 nm, the maximum absorption of Tinidazole and isobestic wavelength 285.6 nm, the linearity ranges for Ofloxacin and Tinidazole were 2-10 µg/ml and 5-15 µg/ml respectively. The results of the analysis have been validated statistically and by recovery studies. The proposed procedures are rapid, simple, require no preliminary separation steps and can be used for routine analysis of both drugs in quality control laboratories.

KEYWORDS: Ofloxacin, Tinidazole, UV spectroscopy and Validation.

Corresponding Author: Ms. Sai Datri Arige
Phone No: +91-8500542419
E-Mail: sai.dhatri_arige@yahoo.co.in

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Journal of Pharmaceutical and Health Sciences 2018;6(2), 169-176.

Original Article

JPHS

SYNTHESIS OF PARACETAMOL DERIVATIVES AS MANNICH BASES AND THEIR ANTIBACTERIAL ACTIVITY

K. Srikanth Kumar*, A. Lakshmana Rao, M. Bhagya Sri, M. Pravallika, M. Kalyani, K. Seetha Ramudu

Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru-521356, Andhra Pradesh, India.

Abstract

A variety of Paracetamol derivatives as mannich bases were prepared through mannich reaction by reacting Paracetamol as compound containing active hydrogen, substituted benzaldehyde, morpholine as secondary amine compound and small amount of conc. HCl as catalyst. A simplistic one-pot method under mild conditions has been developed for the synthesis of all the compounds and they were characterized by physically (Rf values, Melting point, Molecular weight, Molecular formula) and by spectral data (IR and 1H-NMR spectral analysis). Antibacterial activity was carried out by using cup plate method. All the newly synthesized compounds were screened for antibacterial activity against gram positive and gram negative microorganisms i.e. Staphylococcus aureus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa in comparison with standard drug Streptomycin. However the antibacterial activity of the synthesized compounds against the tested organisms was found to possess good to moderate activity. The 1H-NMR spectra chemical shifts in δ, ppm were recorded on Bruker NMR 400 MHZ using spectrophotometer using DMSO-d6 as solvent. The IR spectra of the synthesized compounds were recorded on Bruker FT-IR spectrophotometer with KBr pellets. The progress of the reaction and purity of the compounds was checked by TLC on pre-coated silica gel G plates by using n-hexane:ethyl acetate (9:1) v/v as a mobile phase and visualized in UV cabinet. A facile one-pot method under mild conditions has been developed for the synthesis of the title compounds. All the compounds were evaluated for their antibacterial activity against gram +ve and gram -ve micro-organisms by cup plate method. 3-(4-chlorophenyl)-3-(morpholine-4-yl)-N-(4-hydroxyphenyl) propanamide 4a gives high % yield. The antibacterial screening results states that compound 4b shown significant activity against S. aureus, 4a and 4b compounds shown significant activity against B. subtilis, compound 4b shown significant activity against E. coli and compound 4f shown significant activity against P. aeruginosa.

Keywords: Paracetamol, Substituted benzaldehydes, Morpholine, Mannich reaction, In vitro antibacterial activity

**Corresponding author*: K. Srikanth Kumar, Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru-521356, Andhra Pradesh, India.
Tel: +9494682732
Email address: karumanchi002@gmail.com

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Curr Trends Biomedical Eng & Biosci

Pharmacognostic Study of *Eranthemum nigrum* Stem

DSNBK Prasanth* and A Lakshmana Rao

Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, India

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***Corresponding author:** DSNBK Prasanth, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Seshadri Rao Knowledge Village, Gudlavalleru, India, Email: dsnbkprasanth@gmail.com

Abstract

Objective: To analyze the pharmacognostic characteristics and physiochemical parameters of the stem of *Eranthemum nigrum* [*E. nigrum*].

Methods: Microscopic characters and powder analysis had been carried out with the help of a microscope. The physiochemical properties such as loss on drying, total ash value, acid insoluble ash value, water soluble ash value, extractive values and fluorescence of *E. nigrum* had been performed.

Results: The color, shape, size, odor, and surface characteristics were reported from the stem and powdered stem material of *E. nigrum*. Light microscope images of cross section and powdered stem revealed the presence of Phloem fibers, Lignified Xylem Vessels, Lignified xylem fibers and Parenchyma cells. Phytochemical testing confirmed the presence of steroids, alkaloids, tannins, saponins, carbohydrates, glycosides, amino acids and proteins.. Physicochemical parameters such as moisture content, ash value, extractive value and fluorescent behavior of stem powder have also been established.

Conclusion: The current research would be useful in order to supplement the information regarding standardization, identity and in performing additional explorations in Ayurvedic system of medicine.

Keywords: Pharmacognostic; *Eranthemum nigrum*; Lignified xylem vessels; Phloem fibers; Phytochemical; Physicochemical analysis

Introduction

Medicinal plants are usually playing a significant part in traditional medicines intended for therapy of various health issues. However a crucial hurdle, which has impeded the promotion in the usage of alternative medications in the developed countries, is lack of evidence of documentation and absence of stringent quality control measures. Additionally, there is a dependence on the data of all study meted out on traditional medicines by way of documentation. Keeping this issue, it is now quite necessary to generate assurance about the standardization of the plant as well as its parts to be used like a medication. During the process of standardization, we are able to take advantage of various techniques and methodology to achieve our goal in a phase wise approach e.g. pharmacognostic and phytochemical studies. These techniques and methods are helpful in recognition and standardization of the plant material. Appropriate characterization and quality assurance of starting material is a crucial step to ensure reproducible quality of herbal medicine to assist people in order to justify its safety and effectiveness. Because of this reason, we have executed pharmacognostic studies of *Eranthemum nigrum* belongs to family Acanthaceae [1]. This sort of research is not going to help in authentication but additionally ensures reproducibility of herbal goods in promoting [2].

In the present study, we have been focusing our exploration on one of the commonly available plant in India i.e., *Eranthemum nigrum*, belongs to family Acanthaceae. The family Acanthaceae consists of almost 4000 species of exotic plants. Various species of Genus *Eranthemum* being utilized traditionally for extensive kinds of ethno medicinal purposes. The genus *Eranthemum*, with around 138 species, some of the important species include *E. austrosinensis, E. burmanicum, E. capense, E. ciliatum, E. erythrochilum, E. griffithii, E. macrophyllum, E. macrostachyus, E. obovatum, E. pulchellum, E. purpurascens, E. roseum, E. strictum, E. tapingense, E. tubiflorum* and *E. watti*. The *Eranthemum nigrum* [Acanthaceae] is native to Pacific Islands. The shrub attains height a height of 1.5-1.8m. The upper surface of leaves is blackish purple and the lower surface purplish with dark veins. The flowers are in terminal erect spikes, white and

spotted rose at the base [3]. Plants are adapted to partial shade. The leaves are elliptical, glossy or dull with smooth margins and acute tips [4,5]. All parts of this plant are widely used as a folklore medicine for the treatment of various ailments by the Indian traditional healer. Ethno medicinally, the genus *Eranthemum* has been documented various pharmacological activities including antipyretic [6], antidiabetic [7], antiulcer [8], antimicrobial [9],

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(International Peer Reviewed Journal)

Thiazolidine-2,4-dione Derivatives Bearing Indole Moiety: Design, Synthesis, Hypoglycaemic activity and Molecular Docking Studies

K. Srikanth Kumar[1,2], A. Lakshmana Rao[2]* and M.V. Basaveswara Rao[3]

1. Faculty of Pharmaceutical Sciences, Krishna University, Machilipatnam-521002, A.P., **INDIA**
2. Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru-521356, A.P., **INDIA**
3. Department of Chemistry, Krishna University, Machilipatnam-521002, A.P., **INDIA**

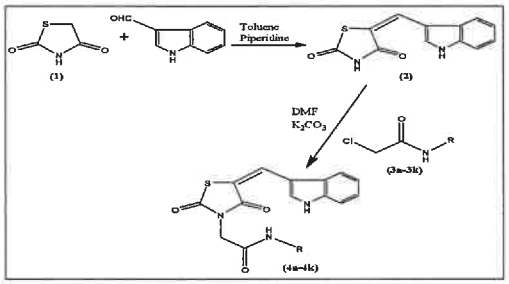
Email: dralrao@gmail.com

Accepted on 16th September, 2018

ABSTRACT

A series of novel thiazolidine-2,4-dione derivatives having N-aryl acetamide appendage at 3rd position and indolyl methylene appendage at 5th position was synthesized by using appropriate procedures. The synthesized compounds were characterized physically, FT-IR, ^{1}H-NMR, ^{13}C-NMR and mass spectral analysis. The newly synthesized compounds were evaluated for their hypoglycemic activity by means of tail tipping method in Alloxan induced Wister albino rats of both sexes. Compounds 4a and 4b showed promising hypoglycaemic activity in both acute studies as well as in chronic study when compared with the standard drug Rosiglitazone. Molecular docking studies were carried out using AutoDock software and revealed that compounds 4a and 4b exhibit significant binding interaction with PPARγ receptor compared with the standard ligand Rosiglitazone.

Graphical Abstract



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INTRODUCTION

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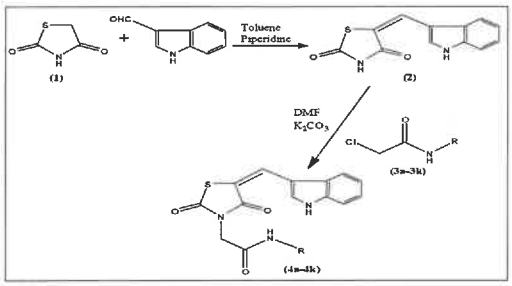

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DEVELOPMENT AND VALIDATION OF HPLC METHOD FOR DETERMINATION OF CERITINIB IN RABBIT PLASMA USING PDA DETECTOR

M. S. V. Sakuntala [*1], M. William Carey [2] and A. Lakshmana Rao [3]

Department of Pharmacy [1], JNTUK, Kakinada - 533003, Andhra Pradesh, India.
Department of Pharmacy [2], Government Polytechnic, Visakhapatnam - 531116, Andhra Pradesh, India.
V. V. Institute of Pharmaceutical Sciences [3], Gudlavalleru - 521356, Andhra Pradesh, India.

Keywords:

Ceritinib, Dasatinib, Rabbit plasma, HPLC

Correspondence to Author:
M. S. V. Sakuntala

Research Scholar,
School of Pharmaceutical Sciences,
JNTUK, Kakinada - 533003
Andhra Pradesh, India.

E-mail: m.sakuntala1@gmail.com

ABSTRACT: A rapid, sensitive and reproducible HPLC method was developed and validated for the quantification of Ceritinib in rabbit plasma using PDA detector at wave length 264 nm. The method was developed using Dasatinib as internal standard (IS). Ceritinib is a selective and potent inhibitor of anaplastic lymphoma kinase (ALK) indicated in the treatment of non-small cell lung cancer (NSCLC). The Ceritinib and Dasatinib were separated as symmetrical peaks on an analytical column ODS (250 × 4.6 mm, 5 µm) column using a mixture of 75% phosphate buffer (pH 3.6) and 25% acetonitrile as mobile phase with a flow rate of 1.0 ml/min. The total chromatographic run time is 10.0 min with retention times for Ceritinib and Dasatinib at 7.630 min and 2.771 min respectively, no interferences from the endogenous plasma peaks is observed. The method is validated and linear calibration curves were obtained across a range of 0.002 - 0.2 µg/ml for Ceritinib with a correlation coefficient of 0.999. The coefficients of variation for intra-day and inter-day assays were less than 10%. The intra-batch and inter-batch precision (% CV) across five levels (LLOQ, LQC, MQC, HQC, and ULOQ) is less than 11.15. The method was validated as per the USFDA guidelines and the results were within the acceptance criteria for selectivity, sensitivity, linearity, precision, accuracy, recovery stability of solution and stability of solution in plasma.

INTRODUCTION: Ceritinib **Fig. 1** is used for the treatment of adults with anaplastic lymphoma kinase (ALK)-positive metastatic non-small cell lung cancer [1] (NSCLC). Chemically Ceritinib is N-{2- [(5-chloro-2- {[5-methyl-4- (piperidin-4-yl)- 2-(propan- 2- loxy) phenyl] amino} pyrimidin- 4-yl) amino] phenyl} propane- 2- sulfonamide.

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Ceritinib exerts its therapeutic effect by inhibiting auto-phosphorylation of ALK, ALK-mediated phosphorylation of the downstream signaling protein STAT3, and proliferation of ALK-dependent cancer cells [2].

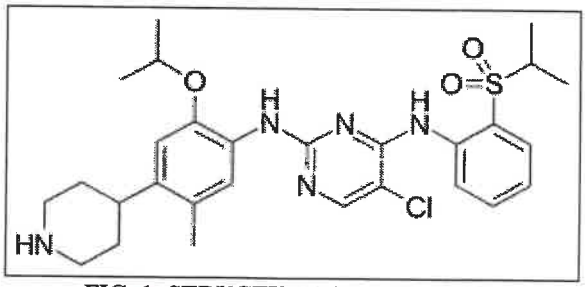

FIG. 1: STRUCTURE OF CERITINIB

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Design, synthesis, biological evaluation and molecular docking studies of novel 3-substituted-5-[(indol-3-yl) methylene]-thiazolidine-2,4-dione derivatives

K. Srikanth Kumar [a], **A. Lakshmana Rao** [a,*], **M. V. Basaveswara Rao** [b]

[a] *Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru 521356, Andhra Pradesh, India*

[b] *Department of Chemistry, Krishna University, Machilipatnam 521002, Andhra Pradesh, India*

* Corresponding author.

E-mail address: dralrao@gmail.com (A. Lakshmana Rao).

Abstract

Various thiazolidine-2,4-dione derivatives **3a-l** possessing indole moiety were designed, synthesized using appropriate conventional heating as well as microwave irradiation methods. All the synthesized compounds were characterized physically and spectrally. The compounds were evaluated for *in vitro* antibacterial activity, *in vitro* antioxidant activity and *in vivo* hypoglycemic activity in relation to the standard drugs. Most of the new compounds exhibited moderate activity and some showed considerable activity. Molecular docking studies were carried out using AutoDock software and revealed that compound **3b** has significant binding interaction with PPARγ receptor compared with the standard ligand Rosiglitazone.

Keyword: Pharmaceutical chemistry

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Pharmaceutical Sciences
Seshadri Rao Knowledge Village
GUDLAVALLERU - 521 356

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[a] *Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru 521356, Andhra Pradesh, India*

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STABILITY INDICATING RP-HPLC METHOD FOR SIMULTANEOUS QUANTIFICATION OF EZETIMIBE AND GLIMEPIRIDE IN BULK AND PHARMACEUTICAL DOSAGE FORM

M. Mukkanti Eswarudu[1]*, A. Lakshmana Rao[2], K. Vijay [3]

[1]Department of Pharmaceutical Analysis, Vignan Pharmacy College, Vadlamudi, Guntur-522213 and Ph. D Research Scholar, Department of Pharmacy, JNTUK, Kakinada, India.

[2] Principal, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru- 521356, A.P., India.

[3]Assistant Professor, University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Guntur- 522510, A.P., India.

Abstract:

A simple, specific, accurate, and precise reverse phase high performance liquid chromatographic (RP-HPLC) method and Stability indicating tests was developed and validated for the simultaneous quantification of Ezetimibe and Glimepiride in Bulk drugs and Pharmaceutical dosage form. The quantification is carried out using Kromosil C18 (150 ×4.6mm, 5µ) column with mobile phase consisted of a mixture of Acetonitrile and Potassium dihydrogen ortho phosphate buffer in the ratio of 65:35 (v/v) delivered at a flow rate of 1.0 ml / min and effluents were monitored at 228 nm.The retention times of Ezetimibe and Glimepiride were found to be 2.789 min and 3.282 min respectively. The linearity for Ezetimibe and Glimepiride were in the range of 25-150 µg/ml and 2.5-15 µg/ml with correlation co-efficient of 0.999 for both drugs. The mean % recoveries of Ezetimibe and Glimepiride were found to be 98.41 to 100.78 % and 98.39 to 100.80 % respectively. The proposed method was validated as per ICH guidelines and it was found to be accurate, precise and robust, and it was applied to the estimation of Ezetimibe and Glimepiride in combined tablet dosage form. Forced degradation studies indicated the suitability of the method for stability studies.

Keywords: *Ezetimibe, Glimepiride, RP-HPLC, Validation and ICH Guidelines.*

***Corresponding Author:**
M. Mukkanti Eswarudu,
Assistant professor,
Department of Pharmaceutical Analysis,
Vignan Pharmacy College, Vadlamudi, Guntur- 522213 and
Ph. D Research Scholar, Department of Pharmacy,
JNTUK, Kakinada, India.
***Mobile:** +91 95538 08484, **Email:** eswarmunnangi@gmail.com*

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ACTA SCIENTIFIC MEDICAL SCIENCES

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Research Article

Pharmacognostic Study of *Passiflora foetida* Stem

DSNBK Prasanth[1]*, A Lakshmana Rao[2], J Sai Sowmya[3] and G Ooha Deepika[3]

[1]*Associate Professor, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India*

[2]*Professor and Principal, Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India*

[3]*Student, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India*

***Corresponding Author:** DSNBK Prasanth, Associate Professor, Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

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Abstract

Introduction: Ethnomedicinally, the stem of *Passiflora foetida* (Passifloraceae) is certainly utilized in numerous illnesses in traditional system; most significantly it is utilized against nausea, swelling, renal or bladder and feminine complications, dermatitis, measles, ulcers, injuries, itchiness and urinary burning. The primary hurdle accomplished in the standardization of natural drugs is deficit of correct recognition of herb source. Therefore, there exists an ought to set up quality control guidelines by making use of pharmacognostic and phytochemical analysis, which will assure the purity, safety, and efficiency of therapeutic herb *P. foetida.*

Aim: To judge pharmacognostic properties involves macroscopic, microscopic and physicochemical variables of the stem of *P. foetida.*

Methods: Micro and Organoleptic characteristics of fresh and dried stem samples had been examined. Physicochemical variables had been done by using WHO suggested variables, preliminary phytochemical and fluorescence evaluation of stem sample had been performed for identity and standardization of stem of *P. foetida.*

Results: The organoleptic characteristics were noted from the stem and powdered stem material of *P. foetida.* Light electron microscope pictures of cross portion of stem and powdered stem revealed that the existence of multicellular, uniseriate covering trichomes, epidermis, cortex, vascular bundles, lignified sclerenchyma and pith. Phytochemical testing revealed the existence of flavonoids, tannins, phenols, saponins, carbohydrates, proteins and glycosides. Physicochemical variables including moisture content, ash value, extractive value and fluorescent behaviour of stem powder had been established. These types of variables are helpful tools which will distinguish the powdered drug materials.

Conclusion: The current research is useful to supplement the data regarding its standardization and identity and in performing additional exploration in Ayurvedic system of medication.

Keywords: Pharmacognostic; Microscopical; *Passiflora foetida*; Physicochemical and Lignified Spiral Vessels

Introduction

The process of standardization is attained by pharmacognostic studies which usually help in authentication and recognition of herb. Appropriate quality and recognition poise of the raw materials are essential in herbal remedies to make sure their quality, safety, and effectiveness. Pharmacognosy might be a reliable and simple unit, by that utter details of the crude medication is acquired [1]. *Passiflora foetida* belonging to the Passifloraceae family the varieties are indigenous to exotic northern South America and Western Indies. It has become naturalized in several exotic areas across the globe and it is considered a pantropical weed around the globe [2-5]. It is utilized by Indians as traditionally in the treat-

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Research Article

SYNTHESIS AND BIOLOGICAL EVALUATION OF SOME NOVEL HETEROCYCLIC MANNICH BASES

Satya Sree B[1]*, Lakshmana Rao A[2], Lakshmi Sindhu A[3], Alekya P[3], Pavani B[3], Asha A[3]

*[1]Associate Professor, [2]Professor and Principal, [3]Student, Department of Pharmaceutical Chemistry, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, A.P., India.

Keywords: Acetanilide, Substituted benzaldehyde, Morpholine, Methyl amine.

ABSTRACT

Various novel heterocyclic mannich bases were prepared by using Mannich reaction. Acetanilide was treated with substituted benzaldehyde and morpholine / methyl amine to give corresponding titled compounds in good yields. The synthesized compounds were characterized by physical properties and spectral studies (IR, 1H-NMR) and tested for antimicrobial activity against Escherichia coli, Bacillus subtilis by using cup plate method with reference to the standard Streptomycin. All the titled compounds show good antimicrobial activity.

INTRODUCTION

The literature studies enlighten the fact that Mannich bases are very reactive and recognized to possess potent diverse activities[1] like anti-inflammatory, anticancer, antifilarial, anti-bacterial[2], antifungal[3], anticonvulsant[4], anthelmintic, antitubercular, analgesic, anti-HIV[5], antimalarial, antipsychotic, antiviral activities and so forth. In addition, several minor biological activities of Mannich bases, such as their ability to regulate blood pressure or inhibit platelet aggregation, their antiparasitic and anti-ulcer effects, as well as their use as agents for the treatment of mental disorders

Therefore, it seems promising to synthesize some novel heterocyclic mannich bases using compounds like acetanilide, substituted benzaldehyde and morpholine / methyl amine. Novel heterocyclic mannich bases possess numerous activities. As part of ongoing studies in developing new anti–microbials, we are reporting the synthesis of a novel novel heterocyclic mannich bases with interesting anti-microbial activity.

MATERIALS AND METHODS

Materials and reagents were purchased from commercial suppliers (Merck grade) and they were used without purification. Melting points were determined by using electrical melting point apparatus and are uncorrected. The progress of the reaction was monitored by TLC using Silica Gel G (Merck). IR spectra were recorded in KBr discs on a Bruker analyzer. ^{1}H-NMR spectra were recorded on a Bruker (400 MHz) spectrometer (chemical shifts in ppm) in DMSO using TMS as internal standard.

Experimental work: Scheme shown in Fig. 1.

General procedure for synthesis of novel heterocyclic mannich bases [6,7]:

A mixture of acetanilide (1.35 g), benzaldehyde (1.06 g) and morpholine (0.87 g) were taken in RBF and refluxed for 1 hour at a temperature of 60-70°C. The progress of the reaction was checked by TLC. After completion of reaction, cool the solution and add cold water. The obtained precipitate was filtered and dried.

Various novel heterocyclic mannich bases synthesized from the above procedure are:

- ✓ 3-Morpholino-N-3-diphenyl propanamide (1a)
- ✓ 3-(4-hydroxy phenyl)-3-morpholino-N-phenyl propanamide (1b)
- ✓ 3-(4-chloro phenyl)-3-morpholino-N-phenyl propanamide (1c)
- ✓ 3-(4-flouro phenyl)-3-(methyl amino)-N-phenyl propanamide (1d)
- ✓ 3-(3,4,5-trimethoxy phenyl)-3-(methyl amino)-N-phenyl propanamide (1e)

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Therefore, it seems promising to synthesize some novel heterocyclic mannich bases using compounds like acetanilide, substituted benzaldehyde and morpholine / methyl amine. Novel heterocyclic mannich bases possess numerous activities. As part of ongoing studies in developing new anti-microbials, we are reporting the synthesis of a novel novel heterocyclic mannich bases with interesting anti-microbial activity.

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Research Article

HPLC–PDA ANALYSIS OF PAZOPANIB IN RABBIT PLASMA USING GEFITINIB AS INTERNAL STANDARD

MSV. Sakuntala[1*], A. Lakshmana Rao[2] and M. William Carey[3]

[1]Department of Pharmacy, Jawaharlal Nehru Technological University Kakinada, Kakinada, Andhra Pradesh, India.
[2]Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.
[3]Department of Pharmacy, Government Polytechnic, Visakhapatnam, Andhra Pradesh, India.

ABSTRACT

In the present investigation, a rapid, specific and sensitive isocratic HPLC method coupled with photodiode array detection (PDA) has been described for the assay of pazopanib in rabbit plasma using gefitinib as an internal standard. The pazopanib and internal standard gefitinib were extracted from rabbit plasma in a single step using acetonitrile. The analysis of pazopanib was performed on Hypersil ODS C18 (250 mm × 4.0 mm I.D., 5.0 µm particle size) column with a mobile phase, 0.01 M potassium dihydrogen orthophosphate (pH 3.6):acetonitrile (75:25, *v/v*) and UV detection set at 264 nm. The developed method was validated by evaluating system suitability, selectivity, sensitivity, linearity, precision, accuracy, ruggedness and stability in conformity with the guidelines of the United States Food and Drug Administration (FDA). The results of validation parameters were found to be within the acceptance limits. Hence, the developed and validated method can be utilized for the routine determination of pazopanib in plasma samples of rabbit.

Keywords: Pazopanib, Gefitinib, Plasma, HPLC and Analysis.

INTRODUCTION

Pazopanib (Fig. 1) is chemically described as 5-({4-[(2, 3-dimethyl-2*H*-indazol-6-yl) (methyl) amino] pyrimidin-2-yl} amino)-2-methylbenzene-1-sulfonamide. Pazopanib was approved by FDA for treating patients with advanced renal cell carcinoma and soft tissue sarcoma (who already received chemotherapy)[1,2]. Pazopanib exhibits antiangiogenic and antitumour effects through inhibiting multiple receptor tyrokinases[3,4]. Pazopanib is a potent and selective second-generation multi targeted tyrosine kinase inhibitor. Pazopanib inhibits key proteins responsible for tumor growth and angiogenesis such as vascular endothelial growth factor receptor -1, -2, -3, platelet-derived growth factor receptor -α, -β, cytokine receptor, fibroblast growth factor receptor -1, -3, interleukin-2 receptor inducible T-cell kinase, transmembrane glycoprotein receptor tyrosine kinase and leukocyte-specific protein tyrosine kinase.

Few analytical methods have been reported for the quantification of pazopanib. Chaitanya et al[5] and Susena et al[6] reported spectrophotometric methods for the assay of pazopanib in bulk and in tablet formulations. UPLC-MS/MS methods were proposed by Paludetto et al[7] and Qiu et al[8]. Paludetto et al[7] method was applied for the simultaneous quantification of pazopanib and its metabolites in plasma of patients treated with pazopanib. Qiu et al[8] method was applied to investigate the pharmacokinetics of pazopanib in rat plasma. Mukul et al[9] determined pazopanib in mouse plasma and brain tissue homogenate using LC-MS/MS. Verheijen et al[10] quantified pazopanib in a dried blood sample by LC-MS/MS.

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Research Article

Formulation and Evaluation of Eplerenone Matrix Tablets using Aloe Vera, Guar Gum and Povidone K-30.

Bharghava Bhushan Rao P[1]*, Lakshmana Rao A[1], Ravi Kumar K[2], Sowmya K[3], Kameswara Rao S[4]

[1,3]V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

[2]Hindu College of Pharmacy, Guntur, Andhra Pradesh, India.

[4]Nirmala College of Pharmacy, Mangalagiri, Andhra Pradesh, India.

*Corresponding author: drbharghav84@gmail.com

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Abstract

Purpose: In the existing work different sustained release matrix tablets of eplerenone were prepared with dried mucilage of *Aloe vera,* guar gum and povidone K30 by using different binder: tablet weight ratios viz. 1:20, 2:20, 3:20, 4:20 and 5:20. **Method**: During this process *Aloe vera* leaves are procured, extracted, dried and characterized to obtain *Aloe vera* mucilage powder. Pre-formulation studies were performed and studied for the functional groups and also compatibility studies were conducted. The formulations that were prepared using *Aloe vera* were named as EPA, for Guar gum as EPG, for Povidone K30 as EPP and finally combination of *Aloe vera* and Povidone K30 was named as EPAP. **Results**: From the graphs, kinetic evaluation was done and observed that the drug release is governed by diffusion mechanism and this is confirmed by r values. The regression coefficient values, clearly indicates that the drug release is governed by zero order and almost all formulations showing Fickian release. Among all the formulations that were prepared EPAP-5 is selected as best. The best formulation is compared with the marketed formulation. **Conclusion**: *Aloe vera* gel dried powder is a suitable matrix agent in formulating sustained release tablets of eplerenone. It may be useful in similar preparations of other drugs.

Key words: *Eplerenone, Matrix tablets, Aloe vera, Guar gum, Povidone K-30.*

Introduction

Among the entire delivery systems oral route is highly preferred because of its high comfort zone that cannot be produced by other routes. In order to release the drug at specific location different types of polymers are used and they also help to show prolonged action. Many advanced technologies are available and these are making the delivery systems more suitable and advantageous when compared to the past. Controlled release oral drug delivery system is one among the advanced technologies that is most widely preferred. (1)

Eplerenone is a steroidal anti mineralcorticoid of the spirolactone group that is used as an adjunct in the management of chronic heart failure. The recommended starting dose of eplerenone for the treatment of essential hypertension is 50 mg once daily titrated to a maximum of 50 mg twice daily.

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Revised: 5 June 2018; Accepted: 22 June 2018

Abstract

Purpose: In the existing work different sustained release matrix tablets of eplerenone were prepared with dried mucilage of *Aloe vera,* guar gum and povidone K30 by using different binder: tablet weight ratios viz. 1:20, 2:20, 3:20, 4:20 and 5:20. **Method**: During this process *Aloe vera* leaves are procured, extracted, dried and characterized to obtain *Aloe vera* mucilage powder. Pre-formulation studies were performed and studied for the functional groups and also compatibility studies were conducted. The formulations that were prepared using *Aloe vera* were named as EPA, for Guar gum as EPG, for Povidone K30 as EPP and finally combination of *Aloe vera* and Povidone K30 was named as EPAP. **Results**: From the graphs, kinetic evaluation was done and observed that the drug release is governed by diffusion mechanism and this is confirmed by r values. The regression coefficient values, clearly indicates that the drug release is governed by zero order and almost all formulations showing Fickian release. Among all the formulations that were prepared EPAP-5 is selected as best. The best formulation is compared with the marketed formulation. **Conclusion**: *Aloe vera* gel dried powder is a suitable matrix agent in formulating sustained release tablets of eplerenone. It may be useful in similar preparations of other drugs.

Key words: *Eplerenone, Matrix tablets, Aloe vera, Guar gum, Povidone K-30.*

Introduction

Among the entire delivery systems oral route is highly preferred because of its high comfort zone that cannot be produced by other routes. In order to release the drug at specific location different types of polymers are used and they also help to show prolonged action. Many advanced technologies are available and these are making the delivery systems more suitable and advantageous when compared to the past. Controlled release oral drug delivery system is one among the advanced technologies that is most widely preferred. (1)

Eplerenone is a steroidal anti mineralcorticoid of the spirolactone group that is used as an adjunct in the management of chronic heart failure. The recommended starting dose of eplerenone for the treatment of essential hypertension is 50 mg once daily titrated to a maximum of 50 mg twice daily.

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Research Article

DEVELOPMENT AND VALIDATION OF RP-HPLC METHOD FOR SIMULTANEOUS ESTIMATION OF PARACETAMOL AND LORNOXICAM IN BULK AND PHARMACEUTICAL DOSAGE FORM

A. Lakshmana Rao[1]*, T. Raja[1], B. Madhu Harika[2]

*[1]Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

[2]Department of Pharmaceutical Chemistry, Vikas Institute of Pharmaceutical Sciences, Rajahmundry, Andhra Pradesh, India.

Keywords:
Paracetamol, Lornoxicam, Estimation, HPLC.

ABSTRACT

A simple, rapid, accurate and precise isocratic reversed phase high performance liquid chromatographic method has been developed and validated for simultaneous estimation of Paracetamol and Lornoxicam in tablet dosage form. The chromatographic separation was carried out on Zorbax C18 column (150 mm x 4.6 mm I.D., 5 µm particle size) with a mixture of 20 mM ammonium acetate pH 3.2 buffer and acetonitrile in the ratio of 60:40 v/v as a mobile phase at a flow rate of 1.0 mL/min. UV detection was performed at 265 nm. The retention times were 2.74 minutes and 5.36 minutes for Paracetamol and Lornoxicam respectively. Calibration plots were linear (r^2=0.999 for both Paracetamol and Lornoxicam respectively) over the concentration range of 6.25-250 µg/mL for Paracetamol and 0.1-4 µg/mL for Lornoxicam. The method was validated for linearity, precision, accuracy, ruggedness and robustness. The proposed method was successfully used for simultaneous estimation of Paracetamol and Lornoxicam in tablet dosage form. Validation studies revealed that the proposed method is specific, rapid, reliable and reproducible. The high % recovery and low % RSD confirms the suitability of the proposed method for routine quality control analysis of Paracetamol and Lornoxicam in bulk and tablet dosage form.

INTRODUCTION

Paracetamol (Fig. 1) is a non-selective COX inhibitor and has weak activity on prostaglandin synthetase in the inflamated peripheral tissues [1]. Paracetamol is used to treat many conditions such as headache, muscle ache, arthritis, backache, toothache, cold and fever. Chemically it is N-acetyl-p-amino phenol [2].

Lornoxicam (Fig. 2) is a potent analgesic with excellent anti inflammatory properties in a range of painful and inflammatory conditions, including postoperative pain and rheumatoid arthritis [3]. Chemically it is 6-chloro-4-hydroxy-2-methyl-N-2-pyridinyl-2*H*-thieno[2,3-e]-1,2-thiazine-3-carboxamide1,1-ioxide [4].

Literature survey reveals that few analytical methods using spectrophotometry [5-7], HPLC [8-10] and HPTLC [11-13] have been reported for the simultaneous determination of Paracetamol and Lornoxicam in combined dosage forms. Therefore, an attempt has been made to develop a novel, rapid, accurate and precise RP-HPLC method for simultaneous estimation of Paracetamol and Lornoxicam in tablet dosage form and validated in accordance with ICH guidelines [14].

MATERIALS AND METHODS

Instrumentation

To develop a high performance liquid chromatographic method for simultaneous estimation of Paracetamol and Lornoxicam using Waters 2695 HPLC system on a Zorbax C-18 (150 mm × 4.6 mm I.D., 5 µm particle size) column was used. The instrument is equipped with pump-515,

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DEVELOPMENT AND VALIDATION OF HPTLC METHOD FOR THE ESTIMATION OF EPERISONE HYDROCHLORIDE IN PHARMACEUTICAL FORMULATION

A. Lakshmana Rao*[1] and T. Raja[1]

[1*]Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

ABSTRACT

A simple, precise, accurate and rapid high performance thin layer chromatographic method has been developed and validated for the estimation of Eperisone hydrochloride in bulk and pharmaceutical dosage form. The stationary phase used was silica gel precoated aluminum plate $60F_{254}$ plates. The mobile phase used was a mixture of ethyl acetate: methanol: toluene (4:3:3, v/v/v). The detection of spots was carried out at 272 nm. The method was validated in terms of specificity, accuracy, linearity, precision and accuracy. The calibration curve was found to be linear between 100-700 ng/band. The proposed method can be successfully used to determine the drug Eperisone hydrochloride in bulk and pharmaceutical formulation.

KEYWORDS

Eperisone, HPTLC, Validation and Precision.

Author for Correspondence:

Lakshmana Rao A,

Department of Pharmaceutical Analysis,

V. V. Institute of Pharmaceutical Sciences,

Gudlavalleru, Andhra Pradesh, India.

Email: dralrao@gmail.com

INTRODUCTION

Eperisone hydrochloride acts by relaxing both skeletal muscles and vascular smooth muscles and demonstrates a variety of effects such as reduction of myotonia, improvement of circulation and suppression of the pain reflex[1]. Chemically it is 4-ethyl-2-methyl-piperdino prophenone hydro-chloride. The chemical structure of Eperisone hydrochloride was shown in Figure No.1. Eperisone hydrochloride also facilitates voluntary movement of the upper and lower extremities without reducing muscle power, it is therefore useful during the initial stage of rehabilitation and as a supporting drug during subsequent rehabilitative therapy[2-4].

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Research Article

METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS DETERMINATION OF EPALRESTAT AND PREGABALIN IN HUMAN PLASMA BY USING RP-HPLC

Prem Kumar Bichala[1*], Lakshmana Rao Atmakuri[2] and Vijay Kotra[3]

[1*]School of Pharmaceutical Sciences, Jawaharlal Nehru Technological University, Kakinada, Andhra Pradesh, India.

[2]V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

[3]University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India.

ABSTRACT

A simple, rapid, sensitive, precise and accurate high-performance liquid chromatography method was developed for simultaneous determination of Epalrestat and Pregabalinin human plasma using Glipizide as an internal standard (ISTD). The analytes were extracted from 500 µL aliquots of a human plasma sample by direct protein precipitation technique using acetonitrile. Evaluation of content of the drugs was done by employing a mixture of acetonitrile and 0.1% orthophosphoric acid (OPA) buffer in the ratio of 45:55 v/v as the mobile phase with a flow rate of 1 mL/min and injection volume of 10µL. Chromatographic separation was accomplished using Symmetry C18 150 X 4.6mm, 5µm analytical column and the effluents were monitored at 220 nm with a photodiode array (PDA) detector. The total run time was 8 min with a retention time of Epalrestat, PregabalinandGlipizide was 3.828, 4.699, and 2.463 min respectively. Linearity was established at a concentration range of 0.250-5.00 µg/mL for Epalrestat and 0.160-3.25 µg/mL for Pregabalin. The method was validated as per the US-FDA guidelines and the results were within the acceptance criteria and proposed method was successfully applied for the simultaneous determination of Epalrestat and Pregabalinin human plasma.

Keywords: Epalrestat, Pregabalin, Protein Precipitation, Human Plasma, RP-HPLC.

INTRODUCTION

Epalrestat is an aldose reductase inhibitor. It is chemically designated as 2-[(5Z)-5-[(*E*)-2-methyl-3-phenylprop-2-enylidene]-4-oxo-2-sulfanylidene-1,3-thiazolidin-3-yl] acetic acid. The chemical Formula of Epalrestat $C_{15}H_{13}NO_3S_2$. Aldose reductase reduces glucose to sorbitol. Epalrestat restrained high glucose-intervened neutrophils. Endothelial cell grip and articulation of endothelial bond particles not just through the hindrance of a PKC-subordinate pathway, yet additionally through expanded endothelial NO generation.

Epalrestat is a carboxylic corrosive subsidiary and a non-competitive and reversible utilized for the treatment of which is a standout amongst the most widely recognized long haul intricacies in patients with. It lessens the aggregation of intracellular sorbitol which is accepted to be the reason for diabetic neuropathy, retinopathy and, nephropathy. Artificially, Epalrestat is strange in that it is a medication that contains a gathering. Epalrestat is the main ARI economically accessible. It is effortlessly assimilated into the neural tissue and hinders the compound with the least symptoms.[1]

INTERNATIONAL JOURNAL OF PHARMACEUTICAL, CHEMICAL AND BIOLOGICAL SCIENCES

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Research Article

METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF SITAGLIPTIN AND ERTUGLIFLOZIN IN HUMAN PLASMA BY USING HPLC

Prem Kumar Bichala[1*], Lakshmana Rao Atmakuri[2] and Vijay Kotra[3]

[1]School of Pharmaceutical Sciences, Jawaharlal Nehru Technological University, Kakinada, Andhra Pradesh, India.

[2]V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

[3]University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India.

ABSTRACT

A simple, rapid, sensitive, precise and accurate high-performance liquid chromatography method was developed for simultaneous estimation of Sitagliptin and Ertugliflozin in human plasma using Dapagliflozin as an internal standard (ISTD). The analytes were extracted from 500 µL aliquots of a human plasma sample by direct protein precipitation technique using acetonitrile. Evaluation of content of the drugs was done by employing a mixture of acetonitrile and 0.1% orthophosphoric acid (OPA) buffer in the ratio of 40:60 v/v as the mobile phase with a flow rate of 1 mL/min and injection volume of 10 µL. Chromatographic separation was accomplished using Inertsil 250 X 4.6 mm, 5 µm analytical column and the effluents were monitored at 220 nm with a photodiode array (PDA) detector. The total run time was 8 min with a retention time of Sitagliptin, Ertugliflozinand,Dapagliflozin 4.548, 5.331, and 3.945 min. respectively. Linearity was established at a concentration range of 0.020-0.750 µg/mL for Sitagliptin and 0.008-0.300 µg/mL for Ertugliflozin. The method was validated as per the US-FDA guidelines and the results were within the acceptance criteria and proposed method was successfully applied for the simultaneous determination of Sitagliptin and Ertugliflozin in human plasma.

Keywords: Sitagliptin, Ertugliflozin, Dapagliflozin, Protein Precipitation, Human Plasma.

INTRODUCTION

Sitagliptin is an oral dipeptidyl peptidase-4 (DPP-4) inhibitor used in conjunction with diet and exercise to improve glycemic control in patients with type 2 diabetes mellitus. It is chemically designated as (3*R*)-3-amino-1-[3-(trifluoromethyl)-6,8-dihydro-5*H*-[1,2,4] triazolo [4,3-a]pyrazin-7-yl]-4-(2,4,5-trifluorophenyl) butan-1-one. The chemical formula of Sitagliptin is $C_{16}H_{15}F_6N_5O$. Sitagliptin inhibits DPP-4 which leads to increased levels of glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropicpolypeptide (GIP), decreased levels of glucagon, and stronger insulin response to glucose.[1,2] The chemical structure of Sitagliptin is shown in Fig. 1.

Ertugliflozin belongs to the class of potent and selective inhibitors of sodium-dependent glucose cotransporters (SGLT). It is chemically designated as(1*S*,2*S*,3*S*,4*R*,5*S*)-5-[4-chloro-3-[(4-ethoxy phenyl)methyl]phenyl]-1-(hydroxymethyl)-6,8-dioxabicyclo[3.2.1]octane-2,3,4-triol. The chemical formula is $C_{22}H_{25}ClO_7$. The administration of Ertugliflozin in combination with Sitagliptin is indicated to improve glycemic control in adult patients with type 2 diabetes

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A Novel Method for the Estimation of Budesonide in Human Plasma by Using LC-MS-MS

Raveendra Babu Gudimitla[1], Lakshmana Rao Atmakuri[2*], Venkateswara Rao Jangala[3]

[1]*Department of Pharmaceutical Analysis, A.K.R.G. College of Pharmacy, Nallajerla, Andhra Pradesh, India*
[2]*Department of Pharmaceutical Analysis, V.V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India*
[3]*Department of Pharmaceutical Analysis, St Pauls College of Pharmacy, Turkayamijal, Hyderabad, Telangana, India*

ABSTRACT

A novel method for the estimation of Budesonide in human plasma by using LC-MS-MS and the analyte is budesonide and internal standard is levenorgestreol were extracted with the tertbutyl methyl ether: n-hexane (70:30, v/v) from human plasma. The chromatographic severance was attained of the peak using Agilent Zorbax Eclipse XDB-C_8, (100 mm × 4.6 mm, 3.5 µm) column with a run time is 2.5 min. Budesonide and levenorgestreol were recorded at the total ion current of their relevant multiple reaction monitoring. The LC-MS-MS system composed an Agilent 1100 infinity combined with an AB Sciex Qtrap® 4000 thermo Finnigan TSQ quantum discovery triple quadruple mass spectrometer. All of the parameters must be validated like selectivity, accuracy, precision, linearity, lower limit of quantification, matrix effect, recovery reached the acceptance criteria under the following of ICH guidelines. Budesonide have checked the various stability studies like short term stability at 25°C, long term stability for 55 days at -70°C, wet extract stability for 54 h, auto sampler stability for 63 h, bench top stability for 14 h and freeze-thaw stability at -60°C. Hence, it can be used for routine drug analysis and bioequivalence studies of budesonide in human plasma samples.

Keywords: Budesonide, Levenorgestreol, Estimation, Human plasma, LC-MS/MS and Validation

INTRODUCTION

Budesonide was a glucocortico steroid and its chemical name is 16,17-(butylidenebis(oxy))-11,21-hydroxy-(11-β,16-α)-pregna-1,4-diene-3,20-dione. Budesonide designated for the asthma, nasal polyposis and Crohn's disease [1] and it was used for long term management of asthma and chronic obstructive pulmonary disease with the help of inhaled corticosteroid therapy [2]. A relevant number of studies for estimation of budesonide have been reported, the methods employed includes UV spectroscopy [3,4] high performance liquid chromatography [5-7] and liquid chromatography-mass spectroscopy [8-10]. Pharmacokinetics and pharmacodynamics of budesonide have been measured in healthy volunteers [11,12] and primary biliary cirrhosis patients [13] However, no studies regarding the estimation of budesonide in human plasma by using Liquid Chromatography-Mass Spectroscopy-Mass Spectroscopy (LC-MS-MS) has published so far. The goal of the present study was estimation of budesonide in human plasma by using LC-MS-MS. Besides, until now, no studies have been reported in scientific literature regarding the data of full bio-analytical validation of estimation of budesonide in human plasma by using LC-MS-MS. This paper reports the simple, sensitive, rapid, precise and accurate method for the estimated of budesonide in human plasma by using LC-MS-MS. Based on the data obtained the LC-MS-MS has been applied for analysis of commercial and bioequivalence studies of budesonide samples.

MATERIALS AND METHODS

Materials

Budesonide (≥ 99%) was purchased from Aarti Industries Limited (Mumbai, India). Levonargestrel (≥ 98%) was purchased from Clearsynth Labs (Mumbai, India). Acetonitrile (≥ 95.8%) and methanol (≥ 98.5%), tert butyl methyl ether (≥ 99.5%), HPLC grade were purchased from J.T. Baker (Philipsbur, USA). Formic acid, analytical grade, n-hexane and water, both HPLC grade, were purchased from Merck Limited (Mumbai, India).

Instrument

The LC-MS-MS system composed an Agilent 1100 infinity combined with an AB Sciex Qtrap® 4000 thermo Finnigan TSQ quantum discovery

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Development and validation of RP-HPLC method for the estimation of Ramosetron hydrochloride in tablet dosage form

A. Lakshmana Rao*, D. Prasanthi, D. Sai Krishna, E. Chinni and E. Sravani

Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

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***Corresponding author:**

Email : dralrao@gmail.com
Phone : +91-9848779133

ABSTRACT

A simple, rapid, sensitive, accurate and precise RP-HPLC method has been developed and validated for the estimation of Ramosetron hydrochloride in bulk and tablet dosage form. The method was carried out using Hypersil ODS C18 (150 x 4.6 mm I.D., 5 m particle size) column and mobile phase comprised of buffer pH 3.2 and acetonitrile in proportion of ratio 50:50 v/v and degassed in ultrasonic water bath. The flow rate was 0.8 mL/min and the detection wavelength was at 310 nm. The linearity was observed in the range of 1-5 µg/mL with a correlation coefficient of 0.999. The retention time of Ramosetron hydrochloride was 2.54 min. The method was validated as per the ICH guidelines for its linearity, precision, accuracy, specificity, limit of detection, limit of quantitation and by performing recovery studies. The percentage recovery of the drug Ramosetron hydrochloride was 99.76 % to 100.33 % from the tablet formulation. The proposed method is suitable for the routine quality control analysis for the estimation of Ramosetron hydrochloride in bulk and tablet dosage form.

INTRODUCTION

Ramosetron hydrochloride (Fig. 1) is a serotonin 5-HT_3 receptor antagonist for the treatment of nausea and vomiting [1]. Chemically Ramosetron hydrochloride is (1-Methyl-1*H*-indol-3-yl) (4,5,6,7-tetrahydro-1 *H*-benzo [d] imidazol-6-yl) methanone hydrochloride. Ramosetron is also indicated for a treatment of diarrhea-predominant irritable bowel syndrome in males. Ramosetron was shown in pharmacological assays to inhibit activities mediated by 5-HT3 receptors, such as emesis caused by cisplatin [2]. A few HPLC methods [3-5] were reported earlier for the estimation of Ramosetron hydrochloride in bulk and pharmaceutical dosage form. In the present study the authors report a rapid, sensitive, accurate and precise HPLC method for the estimation of Ramosetron hydrochloride in bulk drug and in tablet dosage form.

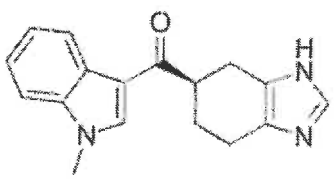

Figure 1: Chemical structure of Ramosetron

MATERIALS AND METHODS

Chromatographic conditions

The analysis of the drug was carried out on a Agilent 1260 Infinity Binary HPLC system equipped with a reverse phase Hypersil ODS C18 (150 x 4.6 mm I.D., 5 m particle size) column, mp, a 20 µL injection loop, rheodyne injector, DAD detector and running on Open Labs EZChrom software.

Chemicals and solvents

The reference sample of Ramosetron hydrochloride (API) was provided as gift sample from Spectrum Pharma Research Solutions, Hyderabad, India. The commercial formulations (IBSET tablets containing 5 mg of Ramosetron hydrochloride) were procured from the local market. Acetonitrile (HPLC grade), ortho phosphoric acid, triethyl amine were purchased from E.Merck (India) Ltd., Mumbai, India. Freshly prepared triple distilled water was used throughout the experiment.

Preparation of buffer

Dissolve 1 mL of ortho phosphoric acid (OPA) in 1000 mL of water. Adjusted the pH to 3.2 by using triethyl amine and the solution is filtered and sonicated for 5 min.

Preparation of mobile phase and diluent

500 ml of the buffer (0.1% OPA) was mixed with 500 ml of

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Validated stability indicating RP-HPLC method for simultaneous determination of Cefixime and Acetylcysteine in pharmaceutical dosage form

A. Lakshmana Rao*, T. Prasanthi , V. Aswini

Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

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Keywords:

Cefixime, Acetylcysteine, HPLC, Validation.

***Corresponding author:**

Email : dralrao@gmail.com
Phone : +91-9848779133

ABSTRACT

A simple stability indicating RP-HPLC method has been developed for the simultaneous determination of Cefixime in combination with Acetylcysteine using ODS C18 column (250 × 4.6 mm, 5 µm) with UV detection at 274 nm. The mobile phase consisting of 0.1% Ortho Phosphoric Acid (OPA) and acetonitrile in a ratio of 58:42, v/v and at a flow rate of 1.0 mL/min. The method was linear over the concentration range for Cefixime 50-375 µg/mL and for Acetylcysteine 75-400 µg/mL. The retention times for Cefixime and Acetylcysteine were found to be 2.018 min and 5.141 min respectively. The average percentage recoveries of active pharmaceutical ingredient (API) Cefixime and Acetylcysteine were found to be in the range of 99.23% and 100.13% respectively. The method was validated and was successfully employed for the routine quantitative analysis of pharmaceutical formulations containing Cefixime and Acetylcysteine in combined tablet dosage form.

INTRODUCTION

Cefixime (Fig. 1), an antibiotic, is a third-generation oral bactericidal cephalosporin. Cefixime is chemically known as (6R,7R)-7-[(2Z)-2-(2-amino-1,3-thiazol-4-yl)-2-[(carboxymethoxy) imino] acetamido]-3-ethenyl-8-oxo-5-thia-1-azabicyclooct-2-ene-2-carboxylic acid [1]. The antibacterial effect of Cefixime results from inhibition of mucopeptide synthesis in the bacterial cell wall. Cefixime is extremely stable in presence of β-lactamase enzymes and some cephalosporins may be susceptible to Cefixime. Cefixime is used in the treatment of uncomplicated urinary tract infections caused by *Escherichia coli* and *Proteus mirabilis*, otitis media caused by *Haemophilus influenza,* pharyngitis and tonsillitis caused by *S. pyogenes*, uncomplicated gonorrhea (cervical/urethral) caused by *Neisseria gonorrhoeae etc.*

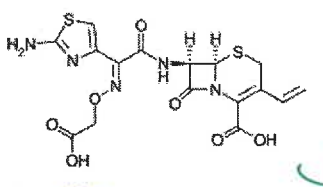

Fig. 1 : Structure of Cefixime

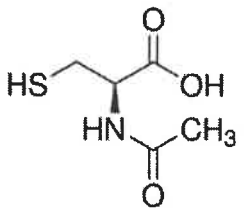

Fig. 2 : Structure of Acetylcysteine

Acetylcysteine (Fig. 2), is primarily used as a mucolytic agent and in the management of acetaminophen poisoning. It is chemically known as (2R)-2-acetamido-3-sulfanylpropanoic acid [2]. It is a derivative of cysteine with an acetyl group attached to the amino group of cysteine. Acetylcysteine can also be used as a general antioxidant which can help mitigate symptoms for a variety of diseases exacerbated by reactive oxygen species (ROS). N-acetylcysteine is now widely used in the treatment of HIV. Acetylcysteine is also being successfully used to treat a variety of neuropsychiatric and neurodegenerative disorders including cocaine, cannabis, and smoking addictions, Alzheimer's and Parkinson's diseases, autism, compulsive and grooming disorders, schizophrenia, depression, and bipolar

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Validated stability indicating RP-HPLC method for simultaneous determination of Cefixime and Acetylcysteine in pharmaceutical dosage form

A. Lakshmana Rao*, T. Prasanthi , V. Aswini
Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India.

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***Corresponding author:**

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INTRODUCTION

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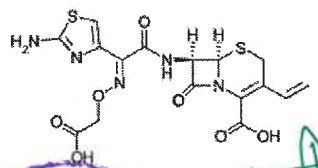

Fig. 1 : Structure of Cefixime

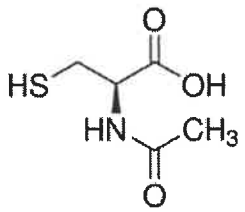

Fig. 2 : Structure of Acetylcysteine

Acetylcysteine (Fig. 2), is primarily used as a mucolytic agent and in the management of acetaminophen poisoning. It is chemically known as (2R)-2-acetamido-3-sulfanylpropanoic acid [2]. It is a derivative of cysteine with an acetyl group attached to the amino group of cysteine. Acetylcysteine can also be used as a general antioxidant which can help mitigate symptoms for a variety of diseases exacerbated by reactive oxygen species (ROS). N-acetylcysteine is now widely used in the treatment of HIV. Acetylcysteine is also being successfully used to treat a variety of neuropsychiatric and neurodegenerative disorders including cocaine, cannabis, and smoking addictions, Alzheimer's and Parkinson's diseases, autism, compulsive and grooming disorders, schizophrenia, depression, and bipolar

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RESEARCH ARTICLE

Validated Stability Indicating RP-HPLC method for estimation of antiviral class of drugs Sofosbuvir and Velpatasvir in combination and its comparison with reported methods

P. Venkateswara Rao[1*], A. Lakshmana Rao[2], S.V.U.M. Prasad[3]

[1]PhD Research Scholar, JNTUK, Kakinada and Vikas College of Pharmacy, Vissannapeta, Krishna DT, AP, India.

[2] V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, AP, India.

[3]School of Pharmacy, JNTUK, Kakinada, AP, India

*Corresponding Author E-mail: **venkats0425@gmail.com**

ABSTRACT:

A simple, specific, accurate and stability-indicating reverse phase high performance liquid chromatographic method was developed for simultaneous determination of Sofosbuvir and Velpatasvir, using a BDS C8 (150 x 4.6 mm, 5 µm) column and a mobile phase composed of Buffer (0.1% OPA): Acetonitrile (50:50, v/v).The retention time of Sofosbuvir and Velpatasvir was found to be 2.267 mins and 2.983 mins respectively when compared with the developed methods the retention time was very less. Linearity was established in the range of 100-600 µg/ml and 25-150 µg/ml for Sofosbuvir and Velpatasvir respectively. The percentage recoveries of Sofosbuvir and Velpatasvir were found to be 100.34% and 101.37% respectively. The drugs were subjected to acid, alkali, hydrolysis, oxidation, dry heat, photolytic and UV degradation and showed very less degradation where no method has reported about the degradation data. The developed method can be successfully employed for simultaneous quantitative analysis of Sofosbuvir and Velpatasvir in bulk and formulations.When the validation parameters of the method developed are compared with those of the earlier reported methods. The developed method was found to be superior in the aspects such as retention time, system suitability and the method was more economical when compared to others as the run time is only 5 minutes.

KEYWORDS: Comparison, Degradation, RP-HPLC, Stability, Sofosbuvir and Velpatasvir.

INTRODUCTION:

Sofosbuvir N- [[P(S), 2′R] -2′-Deoxy -2′-fluoro -2′-methyl – P– phenyl - 5′-uridylyl] -l-alanine (fig.1). Sofosbuvir a recently approved nucleotide analog, is a highly potent inhibitor of the NS5B polymerase in the Hepatitis C virus (HCV), and has shown high efficacy in combination with several other drugs, with and without PEG-INF, against HCV.

Sofosbuvir is used for treatment of chronic HCV genotype 1, 2, 3, or 4 infection in treatment-naive (previously untreated) or previously treated adults without cirrhosis or with compensated cirrhosis, including those with HIV infection and those with hepatocellular carcinoma awaiting liver transplantation[1,2].

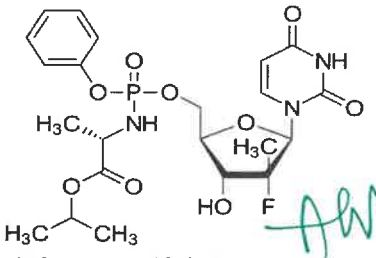

Fig. 1: Chemical structure of Sofosbuvir

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Research Article

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Method Development and Validation of Stability Indicating RP-HPLC Method for Simultaneous Estimation of Sofosbuvir and Velpatasvir in Tablet Dosage Form

Lakshmana Rao A* and Pallavi A

Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, India

***Corresponding author:** Dr. A Lakshmana Rao, Professor and Principal, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, Tel No: 9848779133; Email: dralrao@gmail.com

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Abstract

A simple, accurate and precise stability indicating RP-HPLC method was developed for the simultaneous estimation of the Sofosbuvir and Velpatasvir in tablet dosage form. Chromatogram was run through Discovery C18 (250 x 4.6 mm, 5µm) column. Mobile phase containing buffer 0.1% OPA: acetonitrile taken in the ratio 50:50 v/v was pumped through column at a flow rate of 1 ml/min. Temperature was maintained at 30°C. Optimized wavelength selected was 240 nm. The method was linear over the concentration range for Sofosbuvir is 100-600µg/ml and for Velpatasvir is 25-150µg/ml. The retention times of Sofosbuvir and Velpatasvir were found to 2.473 min and 3.316 min respectively. %RSD of the Sofosbuvir and Velpatasvir were found to be 0.2 and 0.3 for system precision, 0.4 and 0.5 for repeatability and 0.2 and 0.3 for intermediate precision respectively. %Recovery was obtained as 99.32% and 100.43% for Sofosbuvir and Velpatasvir respectively. LOD and LOQ values obtained from regression equations of Sofosbuvir and Velpatasvir were 0.44, 1.32 and 0.33, 1.01 respectively. Regression equation of Sofosbuvir is y=10179x+3201 and y=16944x+13228 for Velpatasvir respectively. The method was validated and was successfully employed for the routine quantitative analysis of pharmaceutical formulations containing Sofosbuvir and Velpatasvir in combined tablet dosage form.

Keywords: Sofosbuvir; Velpatasvir; RP-HPLC; Validation

Abbreviations: RP-HPLC: Reverse Phase High Performance Liquid Chromatography; USFDA: US Food and Drug Administration; EMA: European Medicine Agencies; ICH: International Conference on Harmonisation; LOD: Limit of Detection; LOQ: Limit of Quantitation; HCV: Hepatitis C Virus.

Introduction

Sofosbuvir (Figure 1) is a direct acting antiviral medication used as part of combination therapy to treat chronic Hepatitis C, an infectious liver disease caused by infection with Hepatitis C Virus (HCV) [1]. Chemically it is Propan-2-(2S)-2-{[(S)-{[(2R,3R,4R,5R)-5-(2,4-dioxo-

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Article

Simultaneous determination of candesartan and hydrochlorothiazide in human plasma by LC-MS/MS

Mohan Gandhi Bonthu[1*], Lakshmana Rao Atmakuri[2], Venkateswara Rao Jangala[3]

[1]Department of Pharmaceutical Analysis, Sri Vasavi Institute of Pharmaceutical Sciences, Tadepalligudem, Andhra Pradesh, India, [2]Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India, [3]Department of Pharmaceutical Analysis, St. Paul's College of Pharmacy, Turkayamjal(V), Telangana, India

A simple, sensitive, rapid and highly efficient LC-MS/MS method was developed for the determination of Candesartan and Hydrochlorothiazide simultaneously in human plasma. The method employed Zorbax eclipse C18 (150 X 4.6 mm, 5µ) column using acetate buffer: acetonitrile (25:75%, v/v) as the mobile phase. The mobile phase flow rate is 1 mL/min which was delivered into the mass spectrometer electron spray ionization chamber. The Liquid/liquid extraction procedure was used in the method for the extraction of analytes. The chromatograph was attached to a negative ion mode tandem mass spectrometer and the method was validated for all the parameters as per the guidelines of US-FDA. The ions were detected in multiple reaction monitoring mode and the transitions are m/z 439.00→309.10 and 295.80→268.80 for candesartan and hydrochlorothiazide respectively. Isotopic standards were used as internal standards for effective recovery of the analytes. The drugs were analyzed over a calibration range of 1.027-302.047 ng/mL for candesartan and 1.044-306.945 ng/mL for hydrochlorothiazide respectively with regression coefficient greater than 0.99. The mean extraction recoveries are 96.95±5.61 and 100.55±4.82 for candesartan and hydrochlorothiazide respectively. The precision and accuracy values for all the studies were within the range of ≤15% and 85-115%. The performed stability studies indicate that the developed method is stable in plasma for 15 h at room temperature (bench top); 52 h (in injector); for 112 days at -70 °C for long term stability; five successive freeze and thaw cycles. The developed method could be successfully employed for the determination of selected drugs in biological samples.

Keywords: Candesartan. Hydrochlorothiazide. LC-MS/MS. Method validation. Human plasma.

INTRODUCTION

Candesartan (CAN), is chemically 2-ethoxy-1-({4-[2-(2*H*-1, 2, 3, 4-tetrazol-5-yl) phenyl] phenyl} methyl)-)-1*H*-1,3-benzodiazole-7-carboxylic acid. It is an angiotensin receptor blocking agent which can be used alone or in combination with other drugs for the treatment of hypertension. It competes with angiotensin-II for its receptors there by lowering blood pressure. It is also used as an effective alternative for the treatment of heart failure, myocardial infarction, coronary diseases and systolic dysfunction (The Merck Index, 2006).

Hydrochlorothiazide (HCT), is chemically 6-chloro-1, 1-dioxo-3, 4-dihydro-2*H*-1,2,4-benzo-thiadiazine-7-sulfonamide. It is a prototypical member of the thiazide diuretic. It helps in reduction of reabsorption of various electrolytes through renal tubules resulting in excretion of water along with different electrolytes like sodium, potassium, chloride, magnesium etc. It is widely used in the treatment of edema, hypertension, hyperparathyroidism, and diabetes insipidus (The Merck index, 2006).

Thorough survey of literature disclosed good number of analytical methods which include UV (Erk, 2003a; Naseem*et al.*, 2009), HPTLC (Bipin, Sachin*et al.*, 2008), HPLC (Qutab *et al.*, 2007; Be *et al.*, 1990; Richter, Oertel, Kir, 1996; Erk, 2003b; Zendelovska, Stafilovm Molisevski, 2004; Balamuralikrishna, Syamasundar, 2010; Annapurna, Narendra, Ravi, 2012; Veeranjaneyulu, Aneesha, Nandakishore, 2012; Narendra, Satyanarayana, Ganga, 2012), LC-MS (Brushinina *et al.*, 2014; Surbhi *et al.*, 2010; Bharathi *et al.*, 2012) and UPLC-MS (Singh

***Correspondence:** M. G. Bonthu. Assistant Professor, Sri Vasavi Institute of Pharmaceutical Sciences, Tadepalligudem-534201, Andhra Pradesh, India. E-mail:bmgandhipharma@gmail.com