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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 2022

S.No.	Title of paper	Name of the author/s	Department	Name of journal	ISSN number
1	Assessment of Anthelmintic Activity and *in silico* Study of Phytoconstituents in Decaschistia crotonifolia Wight & Arn. Root Extract.	P.Raveesha	Pharmacognosy	Journal of Young Pharmacists.	0975-1505
2	Assessment of Anthelmintic Activity and *in silico* Study of Phytoconstituents in Decaschistia crotonifolia Wight & Arn. Root Extract.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of Young Pharmacists.	0975-1505
3	Development and Validation of a LC-MS/MS Method for Simultaneous Quantification of Ivabradine and Metoprolol in Rat Plasma.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of Pharmacological and Toxicological Methods.	1873-488X
4	Prediction of Linearity and Non-Linearity in Pharmaceutical Optimization Studies with Python.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of Research in Ayush and Pharmaceutical Sciences	2456-9909

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5	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum.	Sk.Aminabee	Pharmacology	Journal of Drug and Alcohol Research	2090-8342
6	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum.	P.Raveesha	Pharmacognosy	Journal of Drug and Alcohol Research	2090-8342
7	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of Drug and Alcohol Research	2090-8342
8	Development and Validation of Novel Analytical Method for the Simultaneous Estimation of Bempedoic Acid and Ezetimibe in Bulk and Pharmaceutical Dosage Form by RP-UPLC.	A.Sai Datri	Pharmaceutical Analysis	Journal of Drug and Alcohol Research.	2090-8342

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9	Development and Validation of Novel Analytical Method for the Simultaneous Estimation of Bempedoic Acid and Ezetimibe in Bulk and Pharmaceutical Dosage Form by RP-UPLC.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of Drug and Alcohol Research.	2090-8342
10	Formulation and Evaluation of Herbal Lipstick using Rosa Mister Lincoln.	A.Sai Datri	Pharmaceutical Analysis	International Journal of Medical Laboratory Research	2546-4400
11	Formulation and Evaluation of Herbal Lipstick using Rosa Mister Lincoln.	A.Lakshmana Rao	Pharmaceutical Chemistry	International Journal of Medical Laboratory Research	2546-4400
12	RP-HPLC Method Development and Validation for Simultaneous Determination of Decitabine and Cedazuridine in Pure and Tablet Dosage Form. Current Trends in Biotechnology and Pharmacy	A.Lakshmana Rao	Pharmaceutical Chemistry	Current trends in biotechnology and pharmacy	2230-7303
13	Comparative In Vivo Evaluation of Marketed and Optimized Formulations of Teneligliptin and Metformin Bilayered Tablets. Current Trends in Biotechnology and Pharmacy.	A.Lakshmana Rao	Pharmaceutical Chemistry	Current trends in biotechnology and pharmacy	2230-7303

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14	Novel Approach of Stability Indicating Method Development for Determination of Metformin and Empagliflozin by High Performance Liquid Cheromatography.	A.Sai Datri	Pharmaceutical Analysis	Journal of pharmaceutical and medicinal chemistry	0973-8916
15	Novel Approach of Stability Indicating Method Development for Determination of Metformin and Empagliflozin by High Performance Liquid Cheromatography.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of pharmaceutical and medicinal chemistry	0973-8916
16	In Silico Investigation on Phytoconstituents in Pamburus missionis S. for Antioxidant Activity.	P.Raveesha	Pharmacognosy	Pharmacognosy research	0974-8490
17	In Silico Investigation on Phytoconstituents in Pamburus missionis S. for Antioxidant Activity.	A.Lakshmana Rao	Pharmaceutical Chemistry	Pharmacognosy research	0974-8490
18	Novel Validated LC-MS/MS Method for Simultaneous Estimation of Celecoxib and Amlodipine in Rat Plasmaand its Application to a Pharmacokinetic Study.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journel of pharmaceutical negative results	2229-7723
19	RP-HPLC Method Development and Validation for the Determination of Ezetimibe using Design of Experiments Approach.	A.Sai Datri	Pharmaceutical Analysis	Journal of drug and alcohol research	2090-8342

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20	RP-HPLC Method Development and Validation for the Determination of Ezetimibe using Design of Experiments Approach.	A.Lakshmana Rao	Pharmaceutical Chemistry	Journal of drug and alcohol research	2090-8342
21	Anticancer Activity of Isolated Constituents from Coccinia grandis by Sulphorhodamine (SRB) Assay on DU-145 and PC-3 Cell Lines.	Sk.Aminabee	Pharmacology	European journal of molecular & clinical medicine (EJMCM)	2515-8260
22	Anticancer Activity of Isolated Constituents from Coccinia grandis by Sulphorhodamine (SRB) Assay on DU-145 and PC-3 Cell Lines.	A.Lakshmana Rao	Pharmaceutical Chemistry	European journal of molecular & clinical medicine (EJMCM)	2515-8260
23	Artificial Intelligence: Applications in Healthcare Industry.	A.Lakshmana Rao	Pharmaceutical Chemistry	International Journal of Research in Ayush & Pharmaceutical Sciences	2456-9909
24	Clinical Trials Status and Approaches of COVID-19 Vaccines Developed Globally: The Recent Updates	A. Lakshmana Rao	Pharmaceutical Chemistry	Pharma Times	0973-452X
25	Clinical Trials Status and Approaches of COVID-19 Vaccines Developed Globally: The Recent Updates	Sk.Aminabee	Pharmacology	Pharma Times	0973-452X
26	Stability Indicating RP-HPLC Method Development and Validation of Meropenem and Vaborbactam in Pharmaceutical Dosage Form	A.Lakshmana Rao	Pharmaceutical Chemistry	Indian Drugs	0019-462X

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27	Stability Indicating RP-HPLC Method Development and Validation of Meropenem and Vaborbactam in Pharmaceutical Dosage Form	Prasanthi T	Pharmaceutical Analysis	Indian Drugs	0019-462X
28	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum	A. Lakshmana Rao	Pharmaceutical Chemistry	Journal of Drug and Alcohol Research	2090-8342
29	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum	Shaik Aminabee	Pharmacology	Journal of Drug and Alcohol Research	2090-8343
30	In-Vivo Antinociceptive Activity and In-Silico Molecular Docking of Selected Phytoconstituents of Methanolic Extract of Hypericum Japonicum	Raveesha Peeriga	Pharmacognosy	Journal of Drug and Alcohol Research	2090-8344
31	Antioxidant and Cardioprotective Activity of Indigofera barberi on Doxorubicin Induced Toxicity on Rats	Shaik Aminabee	Pharmacology	Biomedical & Pharmacology Journal	0974-6242

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32	Antioxidant and Cardioprotective Activity of Indigofera barberi on Doxorubicin Induced Toxicity on Rats	A. Lakshmana Rao	Pharmaceutical Chemistry	Biomedical & Pharmacology Journal	0974-6243
33	Computational Study Phytoconstituents in Myxopyrum Smilacifolium Blume against Inflammatory Mediator TNF-α	Skaik Aminabee	Pharmacology	Journal of Drug and Alcohol Research	2090-8342
34	Computational Study Phytoconstituents in Myxopyrum Smilacifolium Blume against Inflammatory Mediator TNF-α	A. Lakshmana Rao	Pharmaceutical Chemistry	Journal of Drug and Alcohol Research	2090-8342
35	Computational Study Phytoconstituents in Myxopyrum Smilacifolium Blume against Inflammatory Mediator TNF-α	Raveesha Peeriga	Pharmacognosy	Journal of Drug and Alcohol Research	2090-8343
36	Computational Study Phytoconstituents in Myxopyrum Smilacifolium Blume against Inflammatory Mediator TNF-α	Parimala Kolli	Pharmaceutical Analysis	Journal of Drug and Alcohol Research	2090-8344
37	Assessment of Anthelmintic Activity and Insilico Study of Phytoconstituents in Dechaschistia crotonifolia Wight and Arn. Root Extract	Raveesha Peeriga	Pharmacognosy	Journal of Young Pharmacists	0975-1505

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38	Assessment of Anthelmintic Activity and Insilico Study of Phytoconstituents in Dechaschistia crotonifolia Wight and Arn. Root Extract	A.Lakshmana Rao	Pharmaceutical Chemsitry	Journal of Young Pharmacists	0975-1505

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J Young Pharm, 2022; 14(2) : 169-173

Original Article

Assessment of Anthelmintic Activity and *in silico* Study of Phytoconstituents in *Decaschistia crotonifolia Wight & Arn.* Root Extract

Raveesha Peeriga*, Keerthi Priyanka Adarapu, Kavya Sri Sanivarapu, Jyothsna Kanumuri, Rikith Swamy Akunuri, Lakshmana Rao Atmakuri
Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, INDIA.

ABSTRACT

Background: Worm infections in developing countries were reported high. Phytoconstituents have been a vital role for the treatment of many ailments. The current study was aimed assess for anthelmintic activity of different root extracts of *Decaschistia crotonifolia* belongs to the family Ebanaceae against *Pheretima posthuma*. Further *Insilico* study was carried out for phytocompounds present in *Dechaschistia*. **Methods:** The chloroform, ethylacetate and ethanol extract of *Decaschistia crotonifolia* were considered for the study of anthelmintic property on earthworms at concentrations 20 mg/ml, 40 mg/ml and 60 mg/ml. During this study, the parameters paralysis time and Death Time of adult Indian earthworms was observed. As a standard and control Albendazole 10 mg/ml and 2% Tween 80 in distilled water were taken respectively. **Results:** The study resulted that ethanolic extract was significant when compared with the Albendazole 10 mg/ml. Docking studies revealed all phytocompounds in *Dechaschistia* shown binding affinity, however comparatively scopoletin and stigmasterol had shown a good binding affinitiy about -7.7 Kcal/mol and -7.6 Kcal/mol compared to standard drug Albendazole which was shown about -8.7 Kcal/mol. **Conclusion:** The study revealed that the ethanol extract of *Decaschistia crotonifolia* at a concentration of 60mg/ml exhibited a stronger anthelmintic property compared to Albendazole 10mg/ml. A dose dependent anthelmintic activity is exerted by all the extracts in an ascending manner Chloroform<Ethyl acetate<Ethanol. These observations were made evidenced by docking studies of phytocompounds in *Dechaschistia* as the phytocompounds were shown excellent docking score when compared with standard Albendazole.

Key words: *Decaschistia crotonifolia* Wight and Arn., Ebanaceae, *Pheretima* and Anthelmintic, Docking, Lipinski rule.

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DOI: 10.5530/jyp.2022.14.32

INTRODUCTION

Diseases caused by helminths are chronic. Helminthiasis is infested to human beings with worm's likely pinworm, round worm, or tapeworm.[1] The diseases caused by parasites results in morbidity and leads to the condition onchocorciasis and Schistosomiasis. A more number of worm infections has been reported in developing countries due to lack of proper hygienic conditions. By considering the affordability and various side effects of synthetic compounds, a preferability towards herbal medicines were chosen. An adult Indian earthworm *Pheretima posthuma* is selected for assessment of anthelmintic property as it shows similarity in anatomy and physiology of round worm parasites resides in intestine of human beings.

Decaschistia crotonifolia Wight and Arn is a shrub consists of dense whitish wooly on stems and branches. The leaves are in ovate lance shaped measures 3-6 cm long, 2-4 cm width. The base of leaf is heart shaped or rounded, pointed apex with coarsely toothed margins. Leaves are velvety, bears 1.5cm long stalks. It represents with yellow flowers with dark maroon centered in single leaf axils. The Sepal cup is bell in shape, 1-1.5cm long cup encloses capsules and seeds. The seeds are kidney shaped. It is most common in the deciduous forests of peninsular India. Flowering takes place in the month of March to June.

Earlier preliminary phytochemical assessment was made.[2,3] As the Investigations on *Decaschistia crotonifolia* Wight and Arn. were very limited based on literature survey and existence of insecticidal activity in the family Ebanaceae. The current study is focussed to evaluate anthelmintic activity of three extracts viz., Chloroform, Ethylacetate and Ethanol extract of *Decaschistia crotonifolia Wight and Arn.*

METHODS

Plant Material

The roots of *Decaschistia crotonifolia* Wight and Arn belonging to the family to Ebaenaceae were collected from surroundings of Tirumala, Andhra Pradesh, India in the month of June and it was authenticated by Dr. K. Madhava Chetty, Head of Department, Department of Botany, SV University, Tirupati. Voucher Specimen (PHCOG/VVIPS/056) were preserved. The roots of *Decaschistia crotonifolia* were shade dried, powdered and stored in well closed container.

Preparation of Extracts

About 300gm of dried root powdered drug of *Decaschistia crotonifolia* Wight and Arn. was extracted by successive solvent extraction using chloroform, ethyl acetate and ethanol by Soxhlet extraction for 72 hr. The extract was made concentrated by rotary evaporator and placed in desiccator for further use.

Evaluation of Anthelmintic Property

Anthelmintic property of chloroform, ethyl acetate and ethanol root extracts of *Decaschistia crotonifolia* Wight and Arn. was examined by using an Indian earthworm *Pheretima posthuma*.[4-5] Choosing of *Pheretima posthuma* is made as it resembles identical towards anatomy and physiology of roundworm parasite which occurs in alimentary tract of *Homosapiens*.

Adult earth worms measure an average size 4-7cm in length and 0.3–0.7 cm in width was collected from medicinal garden of

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Development and validation of a LC-MS/MS method for simultaneous quantification of Ivabradine and Metoprolol in rat plasma

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ARTICLE INFO

Keywords:
Ivabradine
LC-MS/MS
Metoprolol
Quantitation
Rat plasma
Validation

ABSTRACT

The combination of Ivabradine (IVA) and Metoprolol (MET) was approved by US-FDA for symptomatic treatment of chronic stable angina pectoris. Hence, a potential analytical method that can simultaneously quantify these two drugs is required. In view of this, a novel and fully validated LC-ESI-MS/MS method has been established for the quantification of IVA and MET in rat plasma. Analytes and their deuterated analogues were quantitatively extracted from rat plasma by protein precipitation technique. The analytes were separated using acetonitrile–water consisting 0.1% orthophosphoric acid buffer (30:70 *v/v*) as a mobile phase with a flow-rate of 1.0 mL/min and 5 min run time on Waters, X-Bridge-C18 (150× 4.6 mm, 3.5 μm) analytical column. The multiple reaction monitoring transitions, *m/z* 638.14 → 124.22 for IVA, 498.33 → 110.59 for MET; 644.37 → 130.41 for IVA-D6 and 504.46 → 116.28 for MET-D6 were chosen to achieve high selectivity in the analysis. The method exhibited great improvement in sensitivity and good linearity over the concentration range of 0.1–1.5 ng/mL for IVA, 1.0–15.0 ng/mL for MET, with satisfactory precision and accuracy according to USFDA guidelines. Accuracy was within 99.71–100.3% and 99.9–100.31% for IVA and MET. The intra- and inter-day precision ranged between 0.048 and 12.68% and 0.1–2.66% CV for IVA and MET respectively. Further, the results of the pharmacokinetic parameters including C_{max}, t_{max}, AUC_{0-t}, $AUC_{0-\infty}$ and $t_{1/2}$ values of drugs indicated that the method is useful for successful quantification of the drugs in rat plasma. The developed method is significant and is useful for simultaneous quantification of IVA and MET.

1. Introduction

Selective and sensitive analytical methods for the quantitative evaluation of drugs and their metabolites are critical for the successful evaluation of preclinical, biopharmaceutical and clinical studies (*Bioanalytical Method Validation - Guidance for Industry*, 2018). Bioanalytical method validation comprises the protocols that demonstrate a particular method that is used for the quantitative measurement of analytes in a given biological matrix, such as blood, plasma, serum, or urine. These methods are reliable and reproducible (Mukkanti Eswarudu, Lakshmana Rao. & Vijay, 2019).

Ivabradine (IVA) is a recently approved drug used for symptomatic management of chronic stable angina pectoris. It is chemically 3-[3({7 s)-3,4-dimethoxy bicycle [4,2,0] octa-1,3,5-trien-7yl-] methyl} (methyl) amino propyl]-7,8-dimethoxy-2,3,4,5-tetrahydro-H-3-benzazepine-2-one. It is a specific antiarrhythmic agent that acts by reducing the rate of cardiac pacemaker activity in the sinoatrial node (De Silva & Fox, 2009; Dilaveris. Giannopoulos. Synetos, Gatzoulis, & Stefanadis, 2006; Francesco. 2005; Postea & Biel, 2011). Metoprolol (MET) [1-[4-(2-methoxyethyl)-1-phenoxy]-3- [(1-methyl ethyl) amino]-2-propanol] on the other hand is a cardio selective β_1-adrenoreceptor antagonist that is used in the treatment of cardiovascular complications. For oral administration, it is available as immediate release (metoprolol tartrate) or controlled release tablets (metoprolol tartrate, metoprolol succinate). MET has good oral bioavailability and is almost completely absorbed from the gastrointestinal tract (Leonova, Maneshina, & Belousov, 2010; O'Neil, Heckelman, Koch. & Roman. 2006; Zhang, Cui, & Zhang, 2009).

Analytical chemists have established few methods for the estimation

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Research Article

PREDICTION OF LINEARITY AND NON-LINEARITY IN PHARMACEUTICAL OPTIMIZATION STUDIES WITH PYTHON

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Pharmaceutical formulations, Optimization, Variables, Experimental Design.

ABSTRACT

Novel simple user-friendly python programme was developed to predict linearity and non-linearity in pharmaceutical optimization. Optimization is the process of obtaining optimum formulation. There are independent and dependent variables in optimization techniques regarding pharmaceutical formulations. The number of levels of independent factor is usually selected based on the linear/ non-linear relationship existing between the dependent and independent variable. The programme is run after entering the independent and dependent variables. The program is used to detect the best fitted model based on the observed correlation between dependent and independent factors, to predict the outcome against the input (independent variables). The program output is the regression coefficients, regression equations, predicted dependent variable and standard error of point estimate. The model offering the low error of point estimate is assumed to be the best fitted model for the given data. The model is applied successfully for both linear and non-linear data.

INTRODUCTION

Optimization refers to obtaining resulting actions of our own interest by changing the independent variables one by one [1]. Orthogonal functions satisfying a second order differential equation, rotatable design and simplex lattice designs are commonly employed to optimise the composition of pharmaceutical formulations [2]. Evolutionary operations, Lagrangian, search and canonical analysis are commonly used for optimisation studies. The preferred optimization techniques are sequential optimization techniques, simultaneous optimization techniques and combination of both. A sequential model- based optimization (SMBO) study involves the performance of experiments repeatedly and the observations are fitted in to different models to identify the better choices about the configurations to be investigated. It allows interpolation of performance observed between parameter settings and facilitate for extrapolation to other regions of design space. Simultaneous methods involve (a) framing the experimental design (b) performing the experiments as per experimental design (c) insertion of the results in appropriate mathematical model (d) observing the maximum or minimum response through the best fitted model identified from a set of equations. To ascertain the system behaviour, a predictive model is required. Optimization algorithms are used in (a) experimental design, model development, parameter estimation, and statistical analysis; (b) process design, development, analysis, and retrofit; (c) model predictive control of risk factors and real-time optimization; and (d) identification, implementation and the coordination of a series of process operations related to the manufacturing and distribution of drug product. In the operation of pharmaceutical processes, there is huge interest in improving the scheduling and

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Research Article

In-Vivo Antinociceptive Activity and *In-Silico* Molecular Docking of Selected Phytoconstituents of Methanolic Extract of *Hypericum Japonicum*

Shaik Aminabee*, Raveesha Peeriga, V. Adithya, M. Mohansai, Shaherbanu, K. Harshitha, K. Himaja Kasthuri, M. Lakshmi Priya, G. Chandini Naga Mallika and Lakshmana Rao Atmakuri

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Keywords: *Hypericum Japonicum*; Kielcorin; Mesuaxanthone B; Analgesic; Celecoxib

Abbreviations: (TAE) Tannic Acid Equivalent; (GAE) Gallic Acid Equivalents; (CE) Catechin Equivalents; (AE) Atropine Equivalent; (RT) Retention Time; (PA) Peak Area

Introduction

To recognize the location that is damaged and harmed by numerous stimulations, pain is a tool that is beneficial in body's immune system. For the treatment of pain, many drugs like non-steroidal anti-inflammatory drugs (NSAIDs), analgesics opioid in nature, opioid anaesthetics and steroidal medicines are used [1]. They are having many harmful effects like kidney failure, liver damage, cardiac problems, high blood pressure, erectile dysfunction, skin degeneration, manic depression, reduced bone density, constipation, abscess and respiratory problems. So it gained importance for herbal based antinoceptive drug which can be available at low cost, more potent and has less negative effects [2]. In order to generate highly active compound with minimum adverse effects, drug design has become a vital tool in medicinal chemistry field where novel compounds are synthesized by chemical or molecular modification of lead moiety. *In-silico* docking method was a huge breakthrough in drug design and development to predict therapeutic efficacy of the novel molecules [3]. To design new drugs, molecular docking has become an essential element where selected protein will show binding affinity for ligand. To understand chemical properties and drug receptor interactions, *In-silico* docking methods are largely useful [4]. *Hypericum Japonicum* is an annual herb flowering plant belonging to the family hypericaceae. It is only 2-5 cm long. Its stems are green, 4 angled and 2-52 mm long internodes that exceed the leaves. The leaves are persistent, spreading and sessile. This species is 30 flowered and flowers are branched upto 3 nodes. The flowers are 4-8 mm in diameter and petals are bright orange or yellow. The stamens are 5-30 in number arranged in irregular groups. Seeds are 50 mm long approximately. It is distributed in India, China, Laos, Japan, Vietnam, Myanmar, Thailand, Malaysia, and Indonesia, Philippines to New Guinea, New Zealand, and Australia. It is well grown in good drained and soil that retains moisture. Flourish and semi shade under sun. Sunny region is better foe flowers. Mostly this species was distributed in wet soils. The plant is harvested from the wild for local use as a medicine. The plant is antiphlogistic, alternative, astringent, febrifuge, depurative, vulnerary and stomachic. For use it can be boiled with water. Also used in the therapy of dysentery, appendicitis, acute hepa-

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Research Article

Development and Validation of Novel Analytical Method for the Simultaneous Estimation of Bempadoic Acid and Ezetimibe in Bulk and Pharmaceutical Dosage Form by RP-UPLC

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[2]*Shri Vishnu College of Pharmacy, Andhra Pradesh, India.*
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Abstract

Objectives: A selective and novel method has been optimized for the evaluation of Bempadoic Acid and Ezetimibe using RP-UPLC.

Materials and methods: The principle analytes chromatogram was run through SB C18 100 x 1.8 mm, 2 µm. Mobile Phase containing 0.01% OPA:Acetonitrile (60:40%, v/v) was pumped through column at 0.3 mL/min flow rate. Optimized wavelength selected was 226 nm.

Results: The retention times of Bempadoic Acid and Ezetimibe were 1.865 min and 1.234 min respectively with a total run time of 5 min. The calibration curve indicates that the correlation coefficient (r2) was superior with a value of 1.000 in the linear range of 22.5 - 135 µg/mL for Bempadoic Acid and 1.25 – 7.5 µg/mL for Ezetimibe. The lower limits of quantification and detection for Bempadoic Acid and Ezetimibe were found to be 2.34 µg/mL and 0.77 µg/mL and 0.28 µg/mL and 0.09 µg/mL, respectively.

Conclusion: The developed method was validated and applied to the bulk drug and formulation of Bempadoic Acid and Ezetimibe. All the results obtained with this method were accurate and precise.

Keywords: Bempadoic Acid; Ezetimibe; Bulk drug; Formulation; UPLC

Introduction

Bempadoic Acid [1] (8-hydroxy-2,2,14,14-tetramethylpentadecanedioic acid) is a prodrug that requires activation in the liver. The very-long-chain acyl-CoA synthetase-1 (ACSVL1) enzyme is responsible for its activation to ETC-1002-CoA, the pharmacologically active metabolite. ATP lyase (also known as ATP synthase) plays an important part of cholesterol synthesis. ETC-1002-CoA directly inhibits this enzyme after the parent drug is activated in the liver by coenzyme A (CoA). This inhibition leads to upregulation of the LDL cholesterol receptor, reducing serum LDL-C via increased uptake and LDL clearance in the liver. Ezetimibe2 [(3R,4S)-1-(4-fluorophenyl)-3-[(3S)-3-(4-fluorophenyl)-3-hydroxypropyl]-4-(4-hydroxyphenyl) azetidin-2-one] mediates blood cholesterol-lowering effect via selectively inhibiting the absorption of cholesterol and phytosterol by the small intestine without altering the absorption of fat-soluble vitamins and nutrients.

Based on a literature survey, only two analytical methods are reported for this new formulation, i.e., Bempadoic Acid and Ezetimibe. One is with HPLC3 and other is with UPLC4. For the Bempadoic Acid and Ezetimibe combination, there was a lack of sensitive analytical methods for the identification and quantification in bulk and in formulations. The proposed methods are simple, convenient, precise, accurate, and economical than the reported method and validated as per ICH guidelines.

Materials and Methods

Diluent

Based up on the solubility of the drugs, diluent was selected, Methanol and Water taken in the ratio of 50:50.

Buffer (0.1N Potassium dihydrogen Ortho phosphate)

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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF HERBAL LIPSTICK USING ROSA 'MISTER LINCOLN'

Sai Datri A[1], Lakshmana Rao A[2], B.D.VVinayaki M[3], Zakir Md[4], Sri Snigdhanjani M[5], Pavani N[6]

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ABSTRACT: Objectives: The objective of the present study was to synthesis a lipstick with natural color pigment - anthocyanin which extracted from Rosa 'Mister Lincoln' and studies its color stability during storage period. **Materials and Methods:** Different organic ingredients such as beeswax, Shreeji Wax, vanilla essence, castor oil, olive oil, lemon juice and Anthocyanin extracted from Rosa 'Mister Lincoln' was used for the formulation of herbal lipstick. **Results:** The Physico-chemical properties of the synthesized lipstick such as spreadability, skin irritation test, and breaking point, surface anomalies, melting point, and perfume stability, homogeneity and color uniformity were determined and compared with commercial lipsticks. The stability of the synthesized lipstick found to be stable under dark condition while color loss was greater for lipstick in light condition. **Conclusion:** Due to the low pigmentation from method, Anthocyanin is suggested incorporate in to lip balm application. This study has proven that Anthocyanin could replace synthetic dye in cosmetics industry for lip balm application.

KEYWORDS: Anthocyanin, Organic ingredients, Rosa 'Mister Lincoln' and lip balm.

INTRODUCTION:

Herbal cosmetics [1-4] are defined as the beauty products which having desirable physiological activity like enhancing, smoothing appearance, healing, conditioning properties due to the presence of herbal ingredients. These are purely made by herbs and shrubs and thus are side effects free. These products provide nutrients and other useful nutrients to the body. Herbal lipsticks are the natural products that are prepared by using herbal ingredients. These products moisturize and smoothen your lips and also impart color to lips by using pigments. Rose flowers grow in many different places with different colors usually red in color. Anthocyanins [5-10] are responsible to produce red color in Rose's which are belonging to the family of flavonoids. These anthocyanins are obtained from anthocyanins by adding sugars. Anthocyanins are present in the cell vacuoles which are generally water-soluble pigments. Additionally, anthocyanin pigments have been used as antibacterial agent.

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RESEARCH ARTICLE

FORMULATION AND EVALUATION OF HERBAL LIPSTICK USING ROSA 'MISTER LINCOLN'

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ABSTRACT: Objectives: The objective of the present study was to synthesis a lipstick with natural color pigment - anthocyanin which extracted from Rosa 'Mister Lincoln' and studies its color stability during storage period. **Materials and Methods:** Different organic ingredients such as beeswax, Shreeji Wax, vanilla essence, castor oil, olive oil, lemon juice and Anthocyanin extracted from Rosa 'Mister Lincoln' was used for the formulation of herbal lipstick. **Results:** The Physico-chemical properties of the synthesized lipstick such as spreadability, skin irritation test, and breaking point, surface anomalies, melting point, and perfume stability, homogeneity and color uniformity were determined and compared with commercial lipsticks. The stability of the synthesized lipstick found to be stable under dark condition while color loss was greater for lipstick in light condition. **Conclusion:** Due to the low pigmentation from method, Anthocyanin is suggested incorporate in to lip balm application. This study has proven that Anthocyanin could replace synthetic dye in cosmetics industry for lip balm application.

KEYWORDS: Anthocyanin, Organic ingredients, Rosa 'Mister Lincoln' and lip balm.

INTRODUCTION:

Herbal cosmetics [1-4] are defined as the beauty products which having desirable physiological activity like enhancing, smoothing appearance, healing, conditioning properties due to the presence of herbal ingredients. These are purely made by herbs and shrubs and thus are side effects free. These products provide nutrients and other useful nutrients to the body. Herbal lipsticks are the natural products that are prepared by using herbal ingredients. These products moisturize and smoothen your lips and also impart color to lips by using pigments. Rose flowers grow in many different places with different colors usually red in color. Anthocyanins [5-10] are responsible to produce red color in Rose's which are belonging to the family of flavonoids. These anthocyanins are obtained from anthocyanins by adding sugars. Anthocyanins are present in the cell vacuoles which are generally water-soluble pigments. Additionally, anthocyanin pigments have been used as antibacterial agent.

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RP-HPLC Method Development and Validation for Simultaneous Determination of Decitabine and Cedazuridine in Pure and Tablet Dosage Form

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Abstract

A simple, rapid, accurate and precise isocratic reversed phase high performance liquid chromatographic method has been developed and validated for simultaneous estimation of Decitabine and Cedazuridine 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 0.01N potassium dihydrogen phosphate buffer and acetonitrile in the ratio of 65:35% v/v as a mobile phase at a flow rate of 1.0 mL/min. UV detection was performed at 245 nm. The retention times were 2.263 minutes and 3.001 minutes for Decitabine and Cedazuridine respectively. Calibration plots were linear (r^2=0.999 for both Decitabine and Cedazuridine respectively) over the concentration range of 8.75-52.5 µg/mL for Decitabine and 25-150 µg/mL for Cedazuridine. The method was validated for linearity, precision, accuracy, ruggedness and robustness. The proposed method was successfully used for simultaneous estimation of Decitabine and Cedazuridine 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 Decitabine and Cedazuridine in bulk and tablet dosage form.

Keywords: Decitabine, Cedazuridine, Validation, HPLC.

Introduction

Decitabine is indicated for the treatment of patients with myelodysplastic syndromes (MDS) including refractory anaemia, refractory anaemia with ringed sideroblasts, refractory anaemia with excess blasts, refractory anaemia with excess blasts in transformation and chronic myelomonocyticleukaemia (1). Chemically it is, 4-amino-1-[(2R,4S,5R)-4-hydroxy-5-(hydroxymethyl)oxolan-2-yl]-1,2-dihydro-1,3,5-triazin-2-one (2) (Fig. 1). It acts as nucleoside metabolic inhibitor, Decitabine is recognized as a substrate by DNA methyl transferase enzymes (DNMTs). This mode of action depletes DNMTs and results in global DNA hypomethylation (3).

Cedazuridine is acytidine deaminase inhibitor co-administered with the hypomethylating agent. Decitabine is indicated for the treatment of variable forms of myelodysplastic syndrome (MDS) (4). Chemically it is, (4R)-1-[(2R,4R,5R)-3,3-difluoro-4-hydroxy-5-(hydroxymethyl)oxolan-2-yl]-4-hydroxy-1,3-diazinan-2-one (Fig.2). It acts as DNA methyltransferase (DNMT) inhibitor

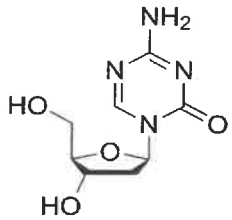

Fig 1. Chemical structure of decitabine

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Comparative *In Vivo* Evaluation of Marketed and Optimized Formulations of Teneligliptin and Metformin Bilayered Tablets

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Abstract

The combination of Metformin and Teneligliptin is an attractive approach for the management of type-2 diabetes because the two pharmacological approaches have different and potentially complementary targets. A novel bilayer tablet, consisting of an immediate release layer containing Teneligliptin (20 mg) and prolonged release layer containing Metformin (500 mg) was developed. *In vivo* studies were carried out in rabbits by using the optimised formulation as a test product and marketed formulation as a reference. Based on the *in vivo* performance, the developed bilayer tablets showed superior bioavailability than the marketed tablets. A simple, sensitive and selective HPLC method was developed for the simultaneous determination for Metformin and Teneligliptin in rabbit plasma using a novel sample extraction procedure. Method validation was carried out according to ICH guidelines in rabbit plasma in order to evaluate the method for selectivity, linearity of response, accuracy, precision, recovery and stability of analytes during processing and storage. The total area under plasma concentration time curve ($AUC_{0-\infty}$), the maximum plasma concentration (C_{max}), and time to reach the maximum plasma concentration (Tmax) were selected as parameters for pharmacokinetic evaluation. The C_{max} and Tmax were obtained directly from the experimental data of plasma concentration versus time. $AUC_{0-\infty}$ was obtained by adding the AUC_{0-24h}, which was calculated by the trapezoidal rule. The differences in average of data were compared by sample analysis of variance (one way analysis of variance) or independent sample t test. The significance of the difference was determined at 95% confident limit (P=0.05).

Keywords: Metformin, Teneligliptin, Bilayer Tablets, Formulation.

Introduction

Teneligliptin is a potent and selective inhibitor of dipeptidyl peptidase-IV (DPP-4), orally active, that improves glycemic control in patients with type 2 diabetes (T2DM) primarily by enhancing pancreatic (α and β) islet function. Thus Teneligliptin has been shown both to improve insulin secretion and to suppress the inappropriate glucagon secretion seen in patients with T2DM. Teneligliptin reduces HbA_{1c} when given as monotherapy, without weight gain and with minimal hypoglycemia, or in combination with the most commonly prescribed classes of oral hypoglycemic drugs: Metformin, a sulfonylurea, a thiazolidinedione, or insulin. Metformin, with a different mode of action not addressing β-cell dysfunction, has been used for about 50 years and still represents the universal first line therapy of all guidelines (1). However, given the multiple pathophysiological abnormalities in T2DM and the progressive nature of the disease, intensification of therapy with combinations is typically required over time.

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ORIGINAL ARTICLE

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Novel Approach of Stability Indicating Method Development for Determination of Metformin and Empagliflozin by High Performance Liquid Chromatography

A Sai Datri [1], A Lakshmana Rao[2], Ch Purna Durganjali[3]

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Abstract

A simple, accurate, precise RP-HPLC method was developed for the simultaneous estimation of the Metformin and Empagliflozin in the tablet dosage form. ***Materials and Methods:*** Chromatogram was run through Std Agilent 18 (150 x 4.6mm, 5µm). Mobile phase taken as 0.1% OPA Buffer: Acetonitrile in 60:40% v/v ratio, and pumped through the column at a flow rate of 1mL/min. The buffer used in this method was 0.1% OPA buffer. The temperature was maintained at 25°C. ***Results and Discussion:*** Optimized wave length selected was 245 nm. The retention times of Metformin and Empagliflozin were found to be 2.193 min and 2.668 min respectively. %RSD of the Metformin and Empagliflozin was found to be 1.4 and 0.8 respectively. %Recovery was obtained as 99.66% and 100.24% for Metformin and Empagliflozin respectively. LOD, LOQ values obtained from regression equations of Metformin and Empagliflozin were 0.02, 1.48, and 0.05, 4.93 respectively. Regression equation of Metformin is y = 20952x + 9914.5 and y = 41842x + 571.79 of Empagliflozin. Retention times were decreased and that run time was decreased, The Reverse Phase HPLC isocratic method for Metformin and Empagliflozin is developed and validated as per ICH guidelines. ***Conclusion:*** The test method is found to be sensitive, accurate, precise, linear, convenient, and economical that can be adopted in regular quality control tests in Industries.

Keywords: Metformin; Empagliflozin; RP-HPLC; Validation.

INTRODUCTION

Metformin (Fig. 1) is chemically 1,1-dimethyl biguanide hydrochloride. Metformin is an antihyperglycemic agent that decreases blood glucose levels by decreasing hepatic glucose production, decreasing intestinal absorption of glucose, and improving insulin sensitivity by increasing peripheral glucose uptake and utilization.[1]

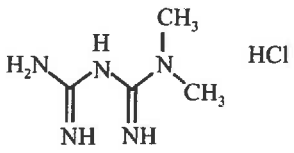

Fig. 1: Molecular structure of Metformin Hydrochloride

Empagliflozin (Fig. 2) is chemically (2S,3R,4R,5S,6R)-2-[4-chloro-3-[[4-[(3S)-oxolan-3-

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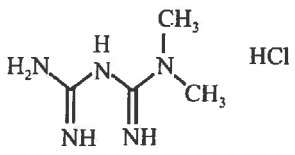

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Original Article

In silico Investigation on Phytoconstituents in *Pamburus missionis* S. for Antioxidant Activity

Raveesha Peeriga[1,*], Keerthi Priyanka Adarapu[1], Akhila Kurama[1], Naseemunnisa Mohammed[1], Lakshmana Rao Atmakuri[1], Deepak Kumar[2]

ABSTRACT

Background: *Pamburus missionis* is geographically originated from southern India and it has been used for ailments. **Objectives:** This current research was performed to analyze *in silico* evaluation of phytoconstituents present in *Pamburus missionis* for antioxidant activity. **Materials and Methods:** *In silico* activity of the isolated constituents for antioxidant activity was carried out by Autodock 4.0 and absorption, distribution, metabolism, excretion/toxicity assessed by online tools. **Results:** The results revealed that the phytocompounds, benzoic acid 2,3-dimethyl showed the good docking score of -5.8 kcal/mol, which was a mere docking score of standard curcumin, i.e., -6.6 kcal/mol hence proving that a good binding compatibility among the ligand and the receptor site NADPH oxidase. The Absorption, distribution, metabolism, excretion/toxicity evaluation of phytoconstituents assures that they had obeyed Lipinski's guideline of five suggesting their safety consumption. **Conclusion:** To conclude, *Pamburus missionis* can be a good resource of antioxidant activity and simulation studies is needed to ensure the antioxidant activity of benzoic acid 2,3-dimethyl.

Keywords: Lipinski's, *Pamburus missionis, in silico*, Benzoic acid 2,3-dimethyl, Docking.

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INTRODUCTION

Rutaceae family comprises of about 150 genera and 1310 species out of 71 species were identified only in India. The plants under family were widely spread in tropical and temperate regions. *Pamburus* genus is characterized crown compact or dense. Leaflets will have the fragrance of lemon when crushed. Fruits will be broad and long usually colored of orange to yellowish.[1] All the species under this particular genus of *Pamburus* were categorized under subtribe of Triphasiinae, as it consists of leaves of very short, non-articulated petioles. Earlier investigations were carried out to evaluate on antiarthritic and anti-inflammatory activity.[2-3]

Oxidative stress is the risk factor leads to numerous chronic diseases. The free radicals and other reactive oxygen species are identified to be involved in the pathogenesis of diseases such as asthma, inflammatory diabetes, cancers, atherosclerosis and as many. Reactive oxygen species are said to be cause for the human aging.[4-5] Many antioxidant compounds like phenolic acids, polyphenols and flavonoids scavenge free radicals such as peroxide, hydroperoxide or lipid peroxyl and thus inhibit the oxidative mechanisms that lead to degenerative diseases.[6] Herbal plants are considered as good antioxidant sources since ancient times. Hence the current study is focused on to evaluate *in vitro* and *in silico* antioxidant activity of *Pamburus missionis* Swingle.

Discovery of therapeutic drugs is possible by molecular docking in multiple ways like Identification, screening, designing, prediction and synthesis of chemical compounds. Molecular docking is considered as a efficient method for the designing, synthesis and discovery of therapeutically important drugs. It is being implemented in medicinal chemistry, protein engineering, cheminformatics, bioremediation and many other biological and medicinal fields. Molecular docking method has been used to predict potent drug molecules especially from naturally occurring compounds against various disease. Molecular docking is cost and time effective to analyze complexity of protein-ligand interaction.[7-8]

MATERIALS AND METHODS

Molecular docking: Receptor and Ligand Preparation

In earlier study, the chemical composition of *Pamburus missionis* was investigated by GC and GC-MS.[9] The structures of phytoconstituents in *Pamburus missionis* was retrieved by PubChem and the receptor NADPH oxidase was retrieved from

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Research Article

Novel Validated LC-MS/MS Method for Simultaneous Estimation of Celecoxib and Amlodipine in Rat Plasma and its Application to a Pharmacokinetic Study

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Abstract

The combination of celecoxib (CLX) and Amlodipine (AMD) was approved for hypertensive patients with osteoarthritis by US-FDA. Hence, a potential analytical method that can simultaneously quantify these two drugs is required. In view of this, a novel and fully validated liquid chromatography-electrospray ionization-tandem mass spectrometric (LC-ESI-MS/MS) method has been established for the quantification of CLX and AMD in rat plasma simultaneously. Protein precipitation extraction technique was employed for the extraction of analytes and their deuterated analogues from rat plasma quantitatively. The analytes were separated using the mobile phase comprising of acetonitrile–water with 0.1% formic acid buffer (70:30 v/v) and a flow-rate of 1.0 mL/min and 10 minutes run time on Agilent SB-C18 analytical column. The multiple reaction monitoring transitions, m/z 504.7→98.1 for CLX, 492.8→129.3 for AMD; 385.6→102.8 for CLX-D4 and 496.8.5→412.3 for AMD-D4 were utilized for the analysis in order to attain high selectivity. The method showed good sensitivity and linearity in the range of the concentration 20 ng/mL–800 ng/mL for CLX and 0.25 ng/mL–10 ng/mL for AMD respectively. Moreover, the method also displayed decent accuracy (87.9%-100.27% and 99.28%-103.26%) for CLX and AMD and precision according to US-FDA guidelines. The precision values for inter-and intra-day were between 1.92.02%-7.085% and 0.083%-3.43% and for CLX and AMD respectively. Further, the results of the pharmacokinetic parameters including Cmax, tmax, AUC_{0-t}, $AUC_{0-\infty}$ and $t_{1/2}$ values of drugs indicated that the developed method is valuable for the successful quantification of the analytes in rat plasma. The developed method is significant and is useful for simultaneous quantification of CLX and AMD.

Keywords: Amlodipine; Celecoxib; LC-MS/MS; Rat plasma; Validation

Introduction

Due to modern lifestyles and stress, hypertension and osteoarthritis are significant health issues in the middle and older age population. In general, these two illnesses coexist, with hypertension being identified in 40% of osteoarthritis patients [1]. Hence, a fixed dose combination of Celecoxib and Amlodipine besylate was approved by US-FDA for the treatment of hypertension and osteoarthritis [2,3].

Celecoxib (CLX) is chemically 4-[5-(4-methylphenyl)-3,7-(trifluoromethyl)-1H-pyrazol-1-yl] benzene sulphonamide. It is an NSAID that selectively inhibits cyclooxygenase-2 (COX-2) enzyme and is used to treat osteoarthritis with superior in action to other NSAIDS with minimal gastrointestinal and renal toxicity [4-6]. Amlodipine (AMD) is chemically [3-ethyl5-methyl (4RS)-2-[(2-aminoethoxy) methyl]-4-(2-chlorophenyl)-methyl-1-dihydropyridine3,5-dicarboxylate] benzenesulfonate that inhibit L-type calcium ion channels of the blood vessels and is used in the treatment of hypertension and angina pectoris. The Absolute bioavailability of CLX and AMD are 64%-88% and 64%-90% respectively [7].

Scientists have reported different analytical methods for the quantification of the above fixed dose combination in synthetic mixtures, pharmaceutical formulation and biological fluids. For instance, UV, TLC, HPLC and LC-MS/MS methods have been developed [8-17]. Overall, 10 studies have been reported for the estimation of Celecoxib and Amlodipine simultaneously among which only two papers had

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Research Article

RP-HPLC Method Development and Validation for the Determination of Ezetimibe Using Design of Experiments Approach

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Abstract

The present research aims to develop and validate a simple and accurate RP-HPLC method for the determination of Ezetimibe by using the Design of Experiments Approach. This approach was useful for multivariate optimization of the method. The critical method parameters (CMPs) were optimized using the Box-Behnken design. Minitab software was equipped for the study. Chromatographic separation was done on Phenomenex C18 column with specifications 150 mm × 4.6 mm × 5 µm at 30°C. The predicted and optimized data from the software consisted of mobile phase 0.02 N Ortho phosphoric acid (OPA) and Acetonitrile (53:47% v/v), pumped at a flow rate of 0.96 ml/min brought the desirability function of 1. The UV detector was adjusted at 232.6 nm. The developed method was shows linearity with a correlation coefficient of 0.999. The optimized chromatographic method was validated as per the guidelines of ICH Q2 (R1). The stability of drug was forcibly studied under different stress conditions.

Keywords: Ezetimibe; Design of Experiments Approach; Box-Behnken design; ICH Q2 (R1).

Introduction

Ezetimibe [1,2] is marked under the brand name Zetiheal, which is approved for the management of hypercholestrerolemia. Generally, this drug decreases the absorption of cholesterol and phytosterol via small intestine without disturbing the absorption of fat-soluble vitamins and minerals by that means it lowers blood cholesterol levels. The IUPAC name of the compound is (3R,4S)-1-(4-fluorophenyl)-3-[(3S)-3-(4-fluorophenyl)-3-hydroxypropyl]-4-(4-hydroxyphenyl)azetidin-2-one and the chemical structure of the compound is shown in Figure 1. After detailed literature review of Ezetimibe, a few methods are reported based on a variety of techniques such as UV-spectroscopy, Liquid chromatographic-tandem mass spectrometric (LC-MS/MS) methods and HPLC Methods [3-5]. None of the reported analytical methods describes a simple HPLC method for studying the effect of stress on pharmaceutical dosage forms of Ezetimibe. Hence the present work was focused on the development and validation of the estimation of Ezetimibe by Analytical Quality by Design (AQbD) approach with the help of Minitab software. This approach helps in understanding the empirical relationship between one or more measured responses and several independent variables in the form of a polynomial equation. Mapping of those responses related to the experimental domain helps in developing an optimized method. Optimization of the method for the present research was performed with the help of the Box-Behnken design.

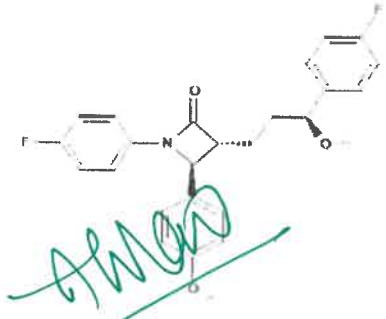

Figure 1: Chemical structure of Ezetimibe

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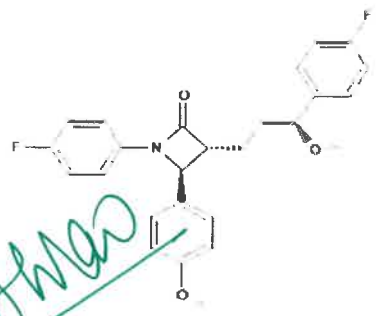

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ANTICANCER ACTIVITY OF ISOLATED CONSTITUENTS FROM *COCCINIA GRANDIS* BY SULPHORHODAMINE (SRB) ASSAY ON DU-145 AND PC-3 CELL LINES

Shaik Aminabee[*1], V. Deepthi[1], S. Haribabu[1], Shaherbanu[1], S. Karthik[1], M. Tejaswi[1], P. Naga Sai[1], Atmakuri Lakshmana Rao[1]

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

ABSTRACT:

Aim: To study the anticancer activity of isolated compounds from root of *Coccinia grandis* whole plant by SRB assay method on DU-145 and PC-3 human prostate cancer cell lines. Materials and methods: Anticancer activity of isolated constituents of *Coccinia grandis* was performed on SCC-29B and Ishikawa cancer cell lines by the Advanced Centre for Treatment Research and Education in Cancer (ACTREC) Mumbai, India. Cell line had been developed within RPMI 1640 medium that contains 10% fetal bovine serum and 2 mM L-glutamine with the help of SRB assay along with the absorbance had been recorded on an Elisa plate reader at a wavelength of 540 nm with 690 nm. Results: Isolated constituents particularly kampferol showed LC50, TGI and GI50 activity at >80, 69.7 and <10µg/ ml on DU-145 and >80µg/ ml of GI50 activity on PC-3 cell lines. Conclusion: Kampferol from *Coccinia grandis* has showed potent anticancer activity on DU-145 and PC-3 human prostate cancer cell lines.

Keywords: *Coccinia grandis*, Kampferol, Anticancer activity and Human prostate cancer.

INTRODUCTION:

Plants, the most wonderful gift from nature have been used as an origin of drugs. Various types of drugs are obtained from them. These types of plants are known as medicinal plants[1]. We use one or more of its organ for therapeutic purpose as a precursor of synthesizing of many useful drugs[2]. According to some generous estimates, almost 80% of the present day medicines are directly or indirectly obtained from plants[3].

Coccinia grandis is a type plant belonging to the Cucurbitaceae (commonly known as gourd). It is commonly known as Telachucha, Tindora, Scarlet-fruited gourd and Ivy-gourd. It is natively found in India, Asia and Central Africa[4]. It is a climbing perennial herb which spread vegetatively or by seed. Seeds may be the valuable sources for oils and proteins which can cover both industrial and edible demand[5]. The stem is an herbaceous climber or perennial slender climber with occasional adventitious roots forming where the stem runs

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Review Article

ARTIFICIAL INTELLIGENCE: APPLICATIONS IN HEALTHCARE INDUSTRY

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ABSTRACT

Artificial intelligence (AI) is becoming a core part of the digital health systems to shape and support modern medicine. The situations such as pandemic COVID-19 pressing health systems to consider technology, such as artificial intelligence powered clinical decision support for faster and more informed decisions. AI utilises machine learning models to search medical data and uncover insights to improve health outcomes and patient experiences. AI is mainly used for clinical decision support and imaging analysis. Clinical decision support tools help the physician to take decisions about treatments, medications, physical and psychological health and other patient needs by providing quick access to information or research that's relevant to their patient. In medical imaging, AI tools are used to analyze CT scans, X-rays, MRIs and other images/ findings that a human radiologist might miss. Many healthcare organizations around the world started field-testing new AI-supported technologies to overcome the challenges like COVID-19 pandemic created. Various healthcare applications with AI are presented in this article.

INTRODUCTION

The pandemic crisis such as COVID-19 stressed the need to develop effective drugs and drug delivery systems within short period of time. The traditional healthcare system approach involves lot of time, huge investment with limited success rate. Artificial intelligence is defined as a branch of computer science that enables computer systems to perform various tasks with intelligence similar to humans[1]. AI is mainly dealing with the design and application of algorithms for analyzing, learning and interpreting data [2]. The process of AI involves obtaining information, developing rules for using information, approximate or accurate conclusions, and self-correction [3].

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With the implementation of AI, the computers or machines exhibit the characteristics of humans such as reasoning, generalizing and learning from past experience, etc. The use of AI in diverse sectors of the pharmaceutical industry includes drug discovery and development, drug repurposing, improving pharmaceutical productivity and clinical trials [4]. AI allows the rapid discovery and development of drugs. Different AI tools are being applied to support the drug development process [5]. The response towards the administered drug is different from individual to individual and hence therapeutic drug monitoring is required. The monitoring of patient response and the dispensing of personalised medicine is possible with the help of AI. AI has inspired computer-aided drug discovery [6]. The pros of AI are improved diagnosis, better clinical decisions, streamlining of process and opportunity to serve rural community. The cons include complications of learning, difficulties to adapt, need of human assistance and problems involved in selection of correct AI platform. Several programmes of AI are reported along with their applications. AI appears to be transforming the future of healthcare field but still it has to make an impactful

CLINICAL TRIALS STATUS AND APPROACHES OF COVID-19 VACCINES DEVELOPED GLOBALLY: THE RECENT UPDATES

Shaik Aminabee[a] and Atmakuri Lakshmana Rao[a]
[a]Department of Pharmacology, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Krishna District, Andhra Pradesh.

Abstract

All around the world COVID-19 pandemic has influenced human life massively since 2019. Although many precautionary measures are followed worldwide, it is strongly believed that this vicious pandemic can be controlled only by an effective and safer vaccine. After the outbreak of COVID-19, China first initiated the vaccine development strategies and then it was declared as pandemic by WHO globally. By different technologies like viral vector, DNA, RNA, protein subunit, live attenuated and inactivated and approach efficacious and safe vaccines are designed for development. The researchers around the universe are associating with various medical agencies, pharmaceutical companies and educational institutions for designing and developing SARS-CoV2 advanced vaccines. This review illustrates details on vaccine development technologies for COVID-19, protocols, clinical Phase status and vaccines that failed to progress further.

Keywords: COVID-19, viral vector, DNA, RNA, protein subunit, live attenuated.

Vaccine Strategies

Around the globe many researchers and scientists had made greater efforts towards the evolution of vaccines against COVID-19. Currently, until 2nd week of May 2021, 25 vaccines are in Phase III, 35 vaccines in Phase II, 32 vaccines in Phase I and 184 vaccines are in pre-clinical Phase globally[1]. Regulatory authorities approved 14 vaccines and 4 vaccines are in Phase IV clinical trials in different countries. The enormous vaccine development approaches like protein subunit, viral vector, RNA, DNA, inactivated, live attenuated have been prospected. However, prior to comprehensive evolution of a vaccine with safety, efficacy and no side effects, considerable facts have to be taken into account[2].

Vaccine Development Approach

Protein Subunit Vaccine:

As protein subunit has less immunogenicity to potentiate immune responses that are induced by vaccine; it requires support of adjuvant[3]. It is of different types such as bacterial or viral pathogen, chains of sugar moieties are there in polysaccharide vaccines as found in the cell wall of many strains of bacteria (Figure 1). By using recombinant DNA technology, there is development of viral surface protein and by whole pathogen preparation purification there is development of bacterial protein vaccine[4]. Polysaccharide vaccine is prepared by bacteria grown in industrial bioreactors; they are opened and harvested for polysaccharides from cell walls before splitting them (Table 1).

Novax-CoV2373

Novavax in the United States of America developed this vaccine. By implanting nanoparticle technology this vaccine was designed for the spike protein of SARS-CoV-2 to develop antigen[5]. In August, 2020 Phase III clinical trials were started in South Africa and in September, 2020 Phase III clinical trials were initiated in the United Kingdom and in December, 2020 in the United States of America. Phase III trials demonstrated an 89.3% efficacy rate in the United Kingdom.

ZF2001

The Chinese Academy of Sciences and Anhui Zhifei Longcom Biopharmaceutical Company in China jointly developed the ZF2001 vaccine. In October, 2020 Phase I/II clinical trials were completed and now it is in the final Phase of clinical trials in Indonesia, Pakistan and Uzbekistan[6]. This vaccine was permitted for emergency use from 01st March, 2021 in Uzbekistan.

VAT00002

Sanofi Pasteur in France followed the same principle used in Flublok (vaccine for influenza virus) and developed the VAT00002 vaccine. In December 2020, Phase I/II clinical trials demonstrated that the old population were not responding firmly to VAT00002[7]. In February 2021 Phase II clinical trials are initiated with different formulations of VAT00002 and if there are promising results Phase IV trials will be initiated in 2021.

Finlay-FR-1

It is a protein subunit vaccine popularly known as Soberaba 01. In January 2021, Instituto Finlay De Vacunas in Cuba made an agreement with Pasteur Institute of Iran to initiate Phase III clinical trials for this vaccine[8].

EpiVacCorona

It is designed in Russia by the Russian Biological Research Center. Currently this vaccine is in Phase III trials but in October 2020, regulatory approval was given by the president of Russia. This is the 2nd vaccine for SARS-CoV-2 that got approval from the Russian government[9].

Abdala

Abdala was designed in Cuba by the Center for Genetic Engineering and Biotechnology of Cuba. In February 2021, Phase II clinical trials were initiated and expected that Phase III clinical studies will be done on 40,000 volunteers this year[10].

SCB- 2019

It is an s-trimer vaccine designed by Clover Biopharmaceuticals in Australia. In December 2020, Phase II/III clinical studies will be initiated.

UB-612

UB-612 (United Biomedical-612), Vaxxinity (also known as COVAXX) is a protein subunit vaccine. In February 2021, they started Phase II/III clinical trials in Brazil[11].

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SHORT COMMUNICATIONS

STABILITY INDICATING RP-HPLC METHOD DEVELOPMENT AND VALIDATION OF MEROPENEM AND VABORBACTAM IN PHARMACEUTICAL DOSAGE FORM

ABSTRACT

A simple, novel, rapid, accurate and precise stability indicating RP-HPLC method was developed and validated for simultaneous estimation of meropenem and vaborbactum in pharmaceutical dosage form. Meropenem an antibacterial, and vaborbactam, a beta-lactamase inhibitor are indicated for the treatment of complicated urinary tract infections including pyelonephritis caused by designated susceptible bacteria. The drugs in this combination were determined by using *o*-Phosphoric acid (OPA) buffer: acetonitrile (50:50 V/V) as a solvent. Meropenem and vaborbactum peaks were detected at 2.334 and 3.542 min, respectively. The flow rate was 1 mL min^{-1} and the effluent was monitored at 260 nm. The developed method was validated for different parameters according to ICH guidelines. Linearity range was adjusted to 25-150 µg mL^{-1} for both drugs. % RSD values for precision studies were found to be within the limits. The % mean recovery was found to be 98.93 for meropenem and 99.94 for vaborbactum. Degradation studies were conducted and the method separates the drug from its degradation products, hence it can be used as stability indicating method for estimation of both drugs in combined dosage form.

Keywords: Meropenem, vaborbactum, linearity and degradation

INTRODUCTION

Meropenem (Fig. 1) is a broad-spectrum carbapenem antibiotic. It is (4*R*,5*S*,6*S*)-3-{[(3*S*,5*S*)-5-(dimethylcarbamoyl)pyrrolidin-3-yl]sulfanyl}-6-[(1*R*)-1-hydroxyethyl]-4-methyl-7-oxo-1-azabicyclohept-2-ene-2-carboxylic acid[1]. It is active against Gram-positive and Gram-negative bacteria. Meropenem exerts its action by penetrating bacterial cells readily and interfering with the synthesis of vital cell wall components, which leads to cell death. Vaborbactam is a new beta-lactamase inhibitor based on a cyclic boronic acid pharmacophore. It is chemically 2-[(3*R*,6*S*)-2-hydroxy-3-[2-(thiophen-2-yl)acetamido]-1,2-oxaborinan-6-yl]acetic acid. It has been used in trials investigating the treatment of bacterial infections in subjects with varying degrees of renal insufficiency[2]. Vaborbactam is a potent inhibitor of class A carbapenemases, as well as an inhibitor of other class A and class C lactamases.

A thorough literature survey reveals that various methods have been reported for determination of meropenem and vaborbactum for individual estimation[3-5] and in combination with other drugs[6-8] only two methods[9-10] have been reported for analysis of these drugs in combination. The main objective here was to develop and validate a simple, precise, accurate and stability indicating RP-HPLC method for simultaneous estimation of meropenem and vaborbactum in pharmaceutical dosage form.

MATERIALS AND METHODS

Instrumentation

HPLC instrument used was of Waters HPLC 2965 system with auto injector and PDA 2996 detector. Software used was Empower 2. UV-VIS spectrophotometer (PG Instruments T60) with special bandwidth of 2 mm and 10 mm and matched quartz was used for measuring absorbance for meropenem and vaborbactum solutions.

Chemicals and solvents

Meropenem and vaborbactum pure drugs (API) were obtained from Spectrum Pharma Research Solutions, Hyderabad. Meropenem and vaborbactum combination tablets were obtained from a local pharmacy store. Acetonitrile and OPA were obtained from Rankem Chemicals Ltd., Mumbai, India.

Mobile phase

A mixture of 50 volumes of 0.1 % OPA buffer: 50 volumes of acetonitrile was prepared. The mobile phase was sonicated for 10 min to remove any gases.

Preparation of buffer (0.1 % OPA)

To 1 mL of OPA solution in a 1000 mL of volumetric flask, about 100 mL of milli-Q water was added and final volume made up to 1000 mL with milli-Q water. The buffer was filtered through 0.45 µm filter to remove all fine particles and gases.

vaborbactum in pharmaceutical dosage form. Retention times of meropenem and vaborbactum were found to be 2.334 min and 3.542 min, respectively. The developed method was successfully validated as per ICH guidelines and the results obtained satisfied the acceptance criteria. % RSD of meropenem and vaborbactum were found to be 0.9 and 0.6, respectively. % Recovery obtained was 98.44 % and 98.81 % for meropenem and vaborbactum. LOD and LOQ values obtained from regression equations of meropenem and vaborbactum were 0.06 µg mL^{-1}, 0.19 µg mL^{-1} and 0.18 µg mL^{-1} and 0.53 µg mL^{-1}, respectively. From the above results it was concluded that the method can have suitable application in routine laboratory analysis and in pharmaceutical industries.

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SHORT COMMUNICATIONS

STABILITY INDICATING RP-HPLC METHOD DEVELOPMENT AND VALIDATION OF MEROPENEM AND VABORBACTAM IN PHARMACEUTICAL DOSAGE FORM

ABSTRACT

A simple, novel, rapid, accurate and precise stability indicating RP-HPLC method was developed and validated for simultaneous estimation of meropenem and vaborbactum in pharmaceutical dosage form. Meropenem an antibacterial, and vaborbactam, a beta-lactamase inhibitor are indicated for the treatment of complicated urinary tract infections including pyelonephritis caused by designated susceptible bacteria. The drugs in this combination were determined by using *o*-Phosphoric acid (OPA) buffer: acetonitrile (50:50 V/V) as a solvent. Meropenem and vaborbactum peaks were detected at 2.334 and 3.542 min, respectively. The flow rate was 1 mL min^{-1} and the effluent was monitored at 260 nm. The developed method was validated for different parameters according to ICH guidelines. Linearity range was adjusted to 25-150 µg mL^{-1} for both drugs. % RSD values for precision studies were found to be within the limits. The % mean recovery was found to be 98.93 for meropenem and 99.94 for vaborbactum. Degradation studies were conducted and the method separates the drug from its degradation products, hence it can be used as stability indicating method for estimation of both drugs in combined dosage form.

Keywords: Meropenem, vaborbactum, linearity and degradation

INTRODUCTION

Meropenem (Fig. 1) is a broad-spectrum carbapenem antibiotic. It is (4*R*,5*S*,6*S*)-3-{[(3*S*,5*S*)-5-(dimethylcarbamoyl)pyrrolidin-3-yl]sulfanyl}-6-[(1*R*)-1-hydroxyethyl]-4-methyl-7-oxo-1-azabicyclohept-2-ene-2-carboxylic acid[1]. It is active against Gram-positive and Gram-negative bacteria. Meropenem exerts its action by penetrating bacterial cells readily and interfering with the synthesis of vital cell wall components, which leads to cell death. Vaborbactam is a new beta-lactamase inhibitor based on a cyclic boronic acid pharmacophore. It is chemically 2-[(3*R*,6*S*)-2-hydroxy-3-[2-(thiophen-2-yl)acetamido]-1,2-oxaborinan-6-yl]acetic acid. It has been used in trials investigating the treatment of bacterial infections in subjects with varying degrees of renal insufficiency[2]. Vaborbactam is a potent inhibitor of class A carbapenemases, as well as an inhibitor of other class A and class C lactamases.

A thorough literature survey reveals that various methods have been reported for determination of meropenem and vaborbactum for individual estimation[3-5] and in combination with other drugs[6-8] only two methods[9-10] have been reported for analysis of these drugs in combination. The main objective here was to develop and validate a simple, precise, accurate and stability indicating RP-HPLC method for simultaneous estimation of meropenem and vaborbactum in pharmaceutical dosage form.

MATERIALS AND METHODS

Instrumentation

HPLC instrument used was of Waters HPLC 2965 system with auto injector and PDA 2996 detector. Software used was Empower 2. UV-VIS spectrophotometer (PG Instruments T60) with special bandwidth of 2 mm and 10 mm and matched quartz was used for measuring absorbance for meropenem and vaborbactum solutions.

Chemicals and solvents

Meropenem and vaborbactum pure drugs (API) were obtained from Spectrum Pharma Research Solutions, Hyderabad. Meropenem and vaborbactum combination tablets were obtained from a local pharmacy store. Acetonitrile and OPA were obtained from Rankem Chemicals Ltd., Mumbai, India.

Mobile phase

A mixture of 50 volumes of 0.1 % OPA buffer: 50 volumes of acetonitrile was prepared. The mobile phase was sonicated for 10 min to remove any gases.

Preparation of buffer (0.1 % OPA)

To 1 mL of OPA solution in a 1000 mL of volumetric flask, about 100 mL of milli-Q water was added and final volume made up to 1000 mL with milli-Q water. The buffer was filtered through 0.45 µm filter to remove all fine particles and gases.

vaborbactum in pharmaceutical dosage form. Retention times of meropenem and vaborbactum were found to be 2.334 min and 3.542 min, respectively. The developed method was successfully validated as per ICH guidelines and the results obtained satisfied the acceptance criteria. % RSD of meropenem and vaborbactum were found to be 0.9 and 0.6, respectively. % Recovery obtained was 98.44 % and 98.81 % for meropenem and vaborbactum. LOD and LOQ values obtained from regression equations of meropenem and vaborbactum were 0.06 µg mL^{-1}, 0.19 µg mL^{-1} and 0.18 µg mL^{-1} and 0.53 µg mL^{-1}, respectively. From the above results it was concluded that the method can have suitable application in routine laboratory analysis and in pharmaceutical industries.

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Research Article

In-Vivo Antinociceptive Activity and *In-Silico* Molecular Docking of Selected Phytoconstituents of Methanolic Extract of *Hypericum Japonicum*

Shaik Aminabee*, Raveesha Peeriga, V. Adithya, M. Mohansai, Shaherbanu, K. Harshitha, K. Himaja Kasthuri, M. Lakshmi Priya, G. Chandini Naga Mallika and Lakshmana Rao Atmakuri

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Abstract

This research work was carried out to analyse and evaluate the antinociceptive activity of methanolic extract of *Hypericum Japonicum* (MEHJ) and *in-silico* molecular docking of selected phytoconstitutents with cyclooxygenase-2 (COX-2) enzyme along with absorption (A), distribution (D), metabolism (M), excretion (E) and toxicity (T) studies. *In-vivo* antinociceptive activity was performed by hot plate method, tail immersion method and acetic acid induced writhing response method in rat. In-silico molecular docking was done by using Autodock Vina and Discovery Studio Visualizer. Absorption, distribution, metabolism, excretion and toxicity (ADMET) studies were examined by Swiss ADME software. The results proved that methanolic extract of *Hypericum Japonicum* has dose dependent antinoceptive activity at all doses. Among all the phytoconstitutents saroaspidin B has very best docking rate of -7.1 kcal/mol which was better virtually than standard celecoxib which has docking rate of -7.4 kcal/mol. This shows that there is good binding affinity between ligand and receptor than the standard i.e celecoxib. ADMET evaluation using swissADME and admeSAR software assures that saroaspidin B has followed all the 5 Lipinski's guidelines suggesting that it is safety for consumption. Hence by this research, we conclude that *Hypericum Japonicum* can be a potent agent as antinociceptive activity and further studies are required to for the development of performance of saroaspidin B.

Keywords: *Hypericum Japonicum*; Kielcorin; Mesuaxanthone B; Analgesic; Celecoxib

Abbreviations: (TAE) Tannic Acid Equivalent; (GAE) Gallic Acid Equivalents; (CE) Catechin Equivalents; (AE) Atropine Equivalent; (RT) Retention Time; (PA) Peak Area

Introduction

To recognize the location that is damaged and harmed by numerous stimulations, pain is a tool that is beneficial in body's immune system. For the treatment of pain, many drugs like non-steroidal anti-inflammatory drugs (NSAIDs), analgesics opioid in nature, opioid anaesthetics and steroidal medicines are used [1]. They are having many harmful effects like kidney failure, liver damage, cardiac problems, high blood pressure, erectile dysfunction, skin degeneration, manic depression, reduced bone density, constipation, abscess and respiratory problems. So it gained importance for herbal based antinoceptive drug which can be available at low cost, more potent and has less negative effects [2]. In order to generate highly active compound with minimum adverse effects, drug design has become a vital tool in medicinal chemistry field where novel compounds are synthesized by chemical or molecular modification of lead moiety. *In-silico* docking method was a huge breakthrough in drug design and development to predict therapeutic efficacy of the novel molecules [3]. To design new drugs, molecular docking has become an essential element where selected protein will show binding affinity for ligand. To understand chemical properties and drug receptor interactions, *In-silico* docking methods are largely useful [4]. *Hypericum Japonicum* is an annual herb flowering plant belonging to the family hypericaceae. It is only 2-5 cm long. Its stems are green, 4 angled and 2-52 mm long internodes that exceed the leaves. The leaves are persistent, spreading and sessile. This species is 30 flowered and flowers are branched upto 3 nodes. The flowers are 4-8 mm in diameter and petals are bright orange or yellow. The stamens are 5-30 in number arranged in irregular groups. Seeds are 50 mm long approximately. It is distributed in India, China, Laos, Japan, Vietnam, Myanmar, Thailand, Malaysia, and Indonesia, Philippines to New Guinea, New Zealand, and Australia. It is well grown in good drained and soil that retains moisture. Flourish and semi shade under sun. Sunny region is better foe flowers. Mostly this species was distributed in wet soils. The plant is harvested from the wild for local use as a medicine. The plant is antiphlogistic, alternative, astringent, febrifuge, depurative, vulnerary and stomachic. For use it can be boiled with water. Also used in the therapy of dysentery, appendicitis, acute hepa-

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Antioxidant and Cardioprotective Activity of *Indigofera barberi* on Doxorubicin Induced Toxicity on Rats

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Worldwide, the major death causing diseases are cardiovascular diseases and today the need for herb based therapeutics is needed. Present study was undertaken the whole plant of Indigofera Barberi (IB) to evaluate its cardioprotective activity against cardiotoxicity on rats induced by Doxorubicin (DXR). Soxlet extraction was used to prepare extracts. Preliminary phytochemical tests and in-vitro antioxidant activity are the methods used for standardization of all the extracts. Chloroform extract of Indigofera barberi (CEIB) and aqueous extract of Indigofera barberi (AQIB) are two extracts obtained from above activity were selected against induced cardiotoxicity of DXR to determine in-vivo cardioprotective activity. Total flavonoid and phenol content was determined. Endogenous antioxidants (MDA, GSH), ECG and histophological studies are the parameters of serum (CK, CK-MB, LDH) and non serum to evaluate the cardioprotective activity. Serum elevated levels of biomarker, decreased antioxidant activity, changes in electrocardiogram (ECG) and histopathological studies are shown by DXR alone treated rats. The toxicity produced by DXR has reversed on the rats pre-treated with CEIB and AQIB. CEIB has shown more activity when compared to AQIB. Compared to standard vitamin E the activity of CEIB was found to be significant. The protective effect of IB plant on DXR induced cardiotoxicity was revealed. To understand the mechanism of action and to reveal phytochemical responsible for the said activity the further research to be undertaken.

Keywords: Antioxidant; Cardioprotective; Cardiotoxicity; doxorubicin; heart failure; Indigofera barberi.

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can be caused by bleeding from a blood vessel in the brain or from blood clots. The most important behavioral risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. The effects of behavioral risk factors may show up in individuals as raised blood pressure, raised blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks factors" can be measured in primary care facilities and indicate an increased risk of heart attack, stroke, heart failure and other complications.

The antioxidant properties of medicinal plants which could be ascribed to antioxidants phytochemicals related to therapeutics actions. Numerous medicinal plants and plant products

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Worldwide, the major death causing diseases are cardiovascular diseases and today the need for herb based therapeutics is needed. Present study was undertaken the whole plant of Indigofera Barberi (IB) to evaluate its cardioprotective activity against cardiotoxicity on rats induced by Doxorubicin (DXR). Soxlet extraction was used to prepare extracts. Preliminary phytochemical tests and in-vitro antioxidant activity are the methods used for standardization of all the extracts. Chloroform extract of Indigofera barberi (CEIB) and aqueous extract of Indigofera barberi (AQIB) are two extracts obtained from above activity were selected against induced cardiotoxicity of DXR to determine in-vivo cardioprotective activity. Total flavonoid and phenol content was determined. Endogenous antioxidants (MDA, GSH), ECG and histophological studies are the parameters of serum (CK, CK-MB, LDH) and non serum to evaluate the cardioprotective activity. Serum elevated levels of biomarker, decreased antioxidant activity, changes in electrocardiogram (ECG) and histopathological studies are shown by DXR alone treated rats. The toxicity produced by DXR has reversed on the rats pre-treated with CEIB and AQIB. CEIB has shown more activity when compared to AQIB. Compared to standard vitamin E the activity of CEIB was found to be significant. The protective effect of IB plant on DXR induced cardiotoxicity was revealed. To understand the mechanism of action and to reveal phytochemical responsible for the said activity the further research to be undertaken.

Keywords: Antioxidant; Cardioprotective; Cardiotoxicity; doxorubicin; heart failure; Indigofera barberi.

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can be caused by bleeding from a blood vessel in the brain or from blood clots. The most important behavioral risk factors of heart disease and stroke are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. The effects of behavioral risk factors may show up in individuals as raised blood pressure, raised blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks factors" can be measured in primary care facilities and indicate an increased risk of heart attack, stroke, heart failure and other complications.

The antioxidant properties of medicinal plants which could be ascribed to antioxidants phytochemicals related to therapeutics actions. Numerous medicinal plants and plant products

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Computational Study of Phytoconstituents in Myxopyrum Smilacifolium Blume against Inflammatory Mediator TNF-α

Author(s): Raveesha Peeriga*, Aminabee Shaik, Parimala Kolli, Adithya Veeroji, Anusha Kandula, Praneeth Varma, Mohansai Maraganti, Jhansi Chintalapudi, Sri Akhil Yenduri, Alekhya Kodali, Pravallika Gunturu, Sireesha Kancherla, Sindhu Sri Reddy, Lakshmana Rao Atmakuri and Bharghava Bhushan Rao Pathangi

Abstract

Secondary metabolites in plants have been used in health care for the treatment of various ailments since ancient times. The current study was carried out to investigate on phytoconstituents in *Myxopyrum smilacifolium* against an inflammatory mediator TNF-α. Ligand and protein pdbqt files were prepared and docking was done by using Autodock 4.0 and Biovia Studio Visualizer. The docking finding revealed Myxopyroside shown -5.1 kcal/mol which is high and mere significant docking score of natural immunosuppressive capsaicin and standard drug Methylprednisolone of -4.8 kcal/mol and -5.4 kca respectively. The obtained results were proven to posses the inhibition activity against TNF-α. The evaluated pharmacokinetic parameters of the only 3 phytoconstituents obeyed Lipinski's rule of 5. Exploration of simulation studies on Myxopyroside are in need to ensure inhibition of inflammatory mediator TNF-α.

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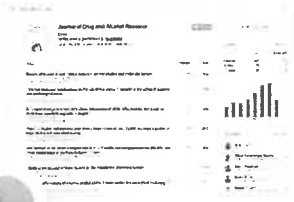

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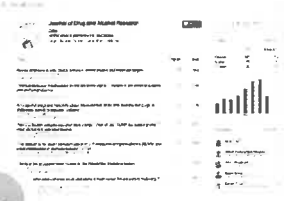

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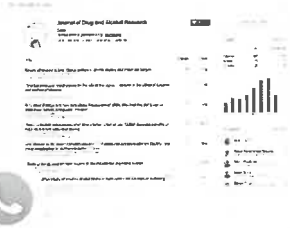

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Original Article

Assessment of Anthelmintic Activity and *in silico* Study of Phytoconstituents in *Decaschistia crotonifolia Wight & Arn.* Root Extract

Raveesha Peeriga*, Keerthi Priyanka Adarapu, Kavya Sri Sanivarapu, Jyothsna Kanumuri, Rikith Swamy Akunuri, Lakshmana Rao Atmakuri
Department of Pharmacognosy, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, INDIA.

ABSTRACT

Background: Worm infections in developing countries were reported high. Phytoconstituents have been a vital role for the treatment of many ailments. The current study was aimed assess for anthelmintic activity of different root extracts of *Decaschistia crotonifolia* belongs to the family Ebanaceae against *Pheretima posthuma*. Further *Insilico* study was carried out for phytocompounds present in *Dechaschistia*. **Methods:** The chloroform, ethylacetate and ethanol extract of *Decaschistia crotonifolia* were considered for the study of anthelmintic property on earthworms at concentrations 20 mg/ml, 40 mg/ml and 60 mg/ml. During this study, the parameters paralysis time and Death Time of adult Indian earthworms was observed. As a standard and control Albendazole 10 mg/ml and 2% Tween 80 in distilled water were taken respectively. **Results:** The study resulted that ethanolic extract was significant when compared with the Albendazole 10 mg/ml. Docking studies revealed all phytocompounds in *Dechaschistia* shown binding affinity, however comparatively scopoletin and stigmasterol had shown a good binding affinitiy about -7.7 Kcal/mol and -7.6 Kcal/mol compared to standard drug Albendazole which was shown about -8.7 Kcal/mol. **Conclusion:** The study revealed that the ethanol extract of *Decaschistia crotonifolia* at a concentration of 60mg/ml exhibited a stronger anthelmintic property compared to Albendazole 10mg/ml. A dose dependent anthelmintic activity is exerted by all the extracts in an ascending manner Chloroform<Ethyl acetate<Ethanol. These observations were made evidenced by docking studies of phytocompounds in *Dechaschistia* as the phytocompounds were shown excellent docking score when compared with standard Albendazole.

Key words: *Decaschistia crotonifolia* Wight and Arn., Ebanaceae, *Pheretima* and Anthelmintic, Docking, Lipinski rule.

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INTRODUCTION

Diseases caused by helminths are chronic. Helminthiasis is infested to human beings with worm's likely pinworm, round worm, or tapeworm.[1] The diseases caused by parasites results in morbidity and leads to the condition onchocorciasis and Schistosomiasis. A more number of worm infections has been reported in developing countries due to lack of proper hygienic conditions. By considering the affordability and various side effects of synthetic compounds, a preferability towards herbal medicines were chosen. An adult Indian earthworm *Pheretima posthuma* is selected for assessment of anthelmintic property as it shows similarity in anatomy and physiology of round worm parasites resides in intestine of human beings.

Decaschistia crotonifolia Wight and Arn is a shrub consists of dense whitish wooly on stems and branches. The leaves are in ovate lance shaped measures 3-6 cm long, 2-4 cm width. The base of leaf is heart shaped or rounded, pointed apex with coarsely toothed margins. Leaves are velvety, bears 1.5cm long stalks. It represents with yellow flowers with dark maroon centered in single leaf axils. The Sepal cup is bell in shape, 1-1.5cm long cup encloses capsules and seeds. The seeds are kidney shaped. It is most common in the deciduous forests of peninsular India. Flowering takes place in the month of March to June.

Earlier preliminary phytochemical assessment was made.[2,3] As the Investigations on *Decaschistia crotonifolia* Wight and Arn. were very limited based on literature survey and existence of insecticidal activity in the family Ebanaceae. The current study is focussed to evaluate anthelmintic activity of three extracts viz., Chloroform, Ethylacetate and Ethanol extract of *Decaschistia crotonifolia Wight and Arn.*

METHODS

Plant Material

The roots of *Decaschistia crotonifolia* Wight and Arn belonging to the family to Ebaenaceae were collected from surroundings of Tirumala, Andhra Pradesh, India in the month of June and it was authenticated by Dr. K. Madhava Chetty, Head of Department, Department of Botany, SV University, Tirupati. Voucher Specimen (PHCOG/VVIPS/056) were preserved. The roots of *Decaschistia crotonifolia* were shade dried, powdered and stored in well closed container.

Preparation of Extracts

About 300gm of dried root powdered drug of *Decaschistia crotonifolia* Wight and Arn. was extracted by successive solvent extraction using chloroform, ethyl acetate and ethanol by Soxhlet extraction for 72 hr. The extract was made concentrated by rotary evaporator and placed in desiccator for further use.

Evaluation of Anthelmintic Property

Anthelmintic property of chloroform, ethyl acetate and ethanol root extracts of *Decaschistia crotonifolia* Wight and Arn. was examined by using an Indian earthworm *Pheretima posthuma*.[4-5] Choosing of *Pheretima posthuma* is made as it resembles identical towards anatomy and physiology of roundworm parasite which occurs in alimentary tract of *Homosapiens*.

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