Tel: 0866-2479775

Kommareddy Venkata Sadasiva Rao
Siddhartha College of Pharmaceutical Sciences
Siddhartha Nagar, Vijayawada - 520010, AP, INDIA
(Sponsors : Siddhartha Academy of General & Technical Education)
ISO 9001:2015, ISO 14001:2015 & ISO 50001:2011 CERTIFIED INSTITUTION
Affiliated to Krishna University, Machilipatnam
Approved by AICTE, PCI, New Delhi and Govt. of Andhra Pradesh

E-mail :kvsrsiddharthapharma@gmail.com Web: www.kvsrsiddharthapharma.edu.in

## RESEARCH PUBLICATIONS -2021

| S.No | Faculty name | Title of the paper | Name of the journal | It is listed in UGC SCOPUS, WEB OF SCIENCE | Link to abstract | Article count year wise |
|---|---|---|---|---|---|---|
| 1. | DevalaRao G | Neuropharmacological Screening of Flavaniods Against MK-801 Induced Stereotypy and Anti-Anxiety Activity | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | 10.31838/jcdr.2021.12.03.131 | 1 |
| 2. | Naveen BabuKilaru, | Effect of Naringenin on The Pharmacokinetics of Metoprolol Succinate in Rats | Xenobiotica | Scopus preview - Scopus - Xenobiotica | https://doi.org/10.1080/00498254.2021.1942311 | 1 |
| 3. | A. Bharathi | PterocarpusMarsupiumRoxburgh Heartwood Extract/Chitosan Nanoparticles Loaded Hydrogel as an Innovative Wound Healing Agent in the Diabetic Rat Model | Materials Today Communications | Scopus preview - Scopus - Materials Today Communications | https//doi.org/10.1016.j.mtcomm.2020.101916 | 1 |
| 4. | A. Bharathi | Design, Optimization And Evaluation of TelmisartanChronotherapeutics Press Coated Tablets Employing as Novel Synthetic Disintegrnte and as Novel Coated Chronotherapeutic Polymers | Research Journal of Pharmacy and Technology | Scopus preview - Scopus - Research Journal of Pharmacy and Technology | 10.5958/0974-360X.2021.00291.2 | 1 |
| 5. | K Durga Devi | In Silico Docking of Endophytic Fungi Cytoglobolosins to Bovine Coronavirus 3C14 Receptor | Online Journal of Veterinary Research. | Web of Science Master Journal List - Search (clarivate.com) | http://onljvetres.com/bovinecoronaabs2020.htm | 1 |
| 6. | T.Devadoss | Synthesis of 1,6-Naphthyridine and its Derivatives: A Systematic Review | Chemistry select | Scopus preview - Scopus - ChemistrySelect | https://doi.org/10.1002/slct.202004462 | 1 |
| 7. | Lakshmi Sudeepthi | Protective Effects of Duloxetine Against Chronic Immobilisation Stress-Induced Anxiety, Depression, Cognitive Impairment and Neurodegeneration in Mice | Journal of Pharmacy and Pharmacology | Scopus preview - Scopus - Journal of Pharmacy and Pharmacology | https://doi.org/10.1093/jpp/rgaa003 | 1 |



PRINCIPAL
K.V.S.R.SIDDHARTHA COLLEGE OF PHARMACEUTICAL SCIENCES

Tel: 0866-2479775

Kommareddy Venkata Sadasiva Rao
Siddhartha College of Pharmaceutical Sciences
Siddhartha Nagar, Vijayawada - 520010, AP, INDIA
(Sponsors : Siddhartha Academy of General & Technical Education)
ISO 9001:2015, ISO 14001:2015 & ISO 50001:2011 CERTIFIED INSTITUTION
Affiliated to Krishna University, Machilipatnam
Approved by AICTE, PCI, New Delhi and Govt. of Andhra Pradesh

E-mail :kvsrsiddharthapharma@gmail.com Web: www.kvsrsiddharthapharma.edu.in

| | | | | | | |
|---|---|---|---|---|---|---|
| 8. | Iswarya Obilineni | A Review on Global Health Complication Obesity and It's Treatment with Natural Products | Journal of Cardio Vascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.05.161 | 1 |
| 9. | Iswarya Obilineni | Bullous Pemphigoid- A Rare Disease Case Report | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.05.206 | 1 |
| 10. | Iswarya Obilineni, A. Lakshmi Pavani, K. Viswa Srujani, G.Vijaya Kumar | A Review on Autoimmune Disorders | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.03.163 | 4 |
| 11. | BuchiN.Nalluri TP.Rao | Effect of Recrystallization on Oral Bioavailability of Olmesartan | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | 62481431d501f6.94 596591.pdf (jcdronline.org) | 2 |
| 12. | M.Vijayalakshmi | RP-HPLC Method for the Estimation of Lornoxicam in Tablets and in Dissolution Samples using Mass Spectrometric Compatible Buffers. | Indian Drugs | Scopus preview - Scopus - Indian Drugs | DOI: 10.53879/id.58.07.1 2068 | 1 |
| 13. | A Suneetha & D.S.N.B.K Prasanth | Some Selected Phyto Constituents from Rhus Succedanea as SARS Cov-2 Main Protease and Spike Protein (COVID-19) Inhibitors | Iranian Journal of Pharmaceutical Sciences | Scopus preview - Scopus - Iranian Journal of Pharmaceutical Sciences | Doi:10.22034/IJPS. 2021.140083.1753 | 2 |
| 14. | G.Ramana Reddy | Formulation and In-Vitro, Ex-Vitro Characterization of Orlistat Self-Emulsifying Drug Delivery System | Pensee | Scopus preview - Scopus - Pensee | PNS-0421-160.pdf \| Powered by Box | 1 |
| 15. | BuchiN.Nalluri & TP Rao | Development of Reservoir Type Ketoprofen Transdermal Patches Using Chemical Permeation Enhancers | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.05.231 | 2 |
| 16. | T.Devadoss | 5-HT3 Receptor Antagonism: A Potential Therapeutic Approach for the Treatment of Depression and Other Disorders. | Current Neuropharmacology | Scopus preview - Scopus - Current Neuropharmacology | 10.2174/1570159X 1866620101515581 6 | 1 |

PRINCIPAL
K.V.S.R.SIDDHARTHA COLLEGE OF PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010

Tel: 0866-2479775

Kommareddy Venkata Sadasiva Rao
Siddhartha College of Pharmaceutical Sciences
Siddhartha Nagar, Vijayawada - 520010, AP, INDIA
(Sponsors : Siddhartha Academy of General & Technical Education)
ISO 9001:2015, ISO 14001:2015 & ISO 50001:2011 CERTIFIED INSTITUTION
Affiliated to Krishna University, Machilipatnam
Approved by AICTE, PCI, New Delhi and Govt. of Andhra Pradesh

E-mail :kvsrsiddharthapharma@gmail.com Web: www.kvsrsiddharthapharma.edu.in

| | | | | | | |
|---|---|---|---|---|---|---|
| 17. | IswaryaObilineni | A Review of Spinal Muscular Atropy: Its Cause, Diagnosis and Treatment | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.05.153 | 1 |
| 18. | IswaryaObilineni | Rare Disease Case Report -Microcephaly | Journal of Cardiovascular Disease Research | Scopus preview - Scopus - Journal of Cardiovascular Disease Research | doi: 10.31838/jcdr. 2021.12.04.121 | 1 |

Siddhartha College of Pharmaceutical Sciences K.V.S.R. VIJAYAWADA 520 010

PRINCIPAL

PRINCIPAL
K.V.S.R.SIDDHARTHA COLLEGE OF PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010

Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

( UGC 2021 Scopus )

# NEUROPHARMACOLOGICAL SCREENING OF FLAVONOIDS AGAINST MK-801 INDUCED STEREOTYPY AND ANTI ANXIETY ACTIVITY

[1]Supriya.chatla*, [2]SaiSrilakshmi.G;[3] Devalarao.G;[4] Sk.AbdulRahman

Nirmala College of pharmacy; Atmakuru; Guntur Dt; Andhra Pradesh; Pin:522503

Krishna University, Machilipatnam; Andhra Pradesh; Pin:52100.
E.mail.id: supriya.chatla@gmail.com

## ABSTRACT:

**Objective:**The effects of Quercetin and Naringin were investigated on stereotypyes induced by the N-methyl-D-Aspartate (NMDA)-type glutamate receptors agonist MK-801 (Diazocilpine maleate) and Diazepam induced anxiety in SD rats.

**Methods:** Glutamate/NMDA receptors are located throughout the brain; Glutamatergic models predict widespread cortical dysfunction with particular involvement of NMDA receptors throughout the brain. Further, NMDA receptors are located on brain circuits that regulate dopamine release, suggesting that dopaminergic deficits in schizophrenia may also be secondary to underlying glutamatergic dysfunction.NMDA receptors are widely distributed throughout cortex. MK801- induced stereotypic behaviour was also measured. **Results and conclusion:**The selective flavonoids Quercetin and Naringin exhibited significant antipsychotic activity in a dose dependent manner comparable to the standard drugs, Haloperidol (0.5mg/kg, i.p.) and Diazepam(10 mg/kg, i.p.) at the dose of 100, 50 and 25 mg/kg for Quercetin; 80; 40 and 20mg/kg for Naringin respectively.

**KEY WORDS:** Quercetin, Naringin, MK-801, Haloperidol, Diazepam

## INTRODUCTION

Glutamatergic models are based upon the observation that the psychotomimetic agents such as phencyclidine (PCP) and ketamine induce psychotic symptoms and neurocognitive disturbances similar to those of schizophrenia by blocking neurotransmission at N-methyl-D-aspartate (NMDA)-type glutamate receptors. Further, NMDA receptors are located on brain circuits that regulate dopamine release, suggesting that dopaminergic deficits in schizophrenia may also be secondary to underlying glutamatergicdysfunction.NMDA receptors are widely distributed throughout cortex. In contrast, dopaminergic innervation is much more circumscribed, with relatively sparse innervations of primary sensory cortex[1,2]; Schizophrenia has also been shown to be associated with reduced levels of GSH[3,4,5]; leading to potential dysfunction of NMDA receptors[6]. Second, based upon the observation that NMDA blockade leads to rebound increases in glutamate release that may themselves be pathological[7]it has been proposed that compounds that inhibit presynaptic glutamate release may also be therapeutic [8].Agents that stimulate NMDA receptor-mediated neurotransmission, together with glycine-site agonists and glycine transport inhibitors, have shown encouraging ends up in presymptomatic studies and are presently undergoing clinical development. Overall, these findings counsel that glutamatergic theories may result in new conceptualizations and treatment approaches that might not be attainable based mostly upon dopaminergic models alone. Anxiety is common downside that embrace feeling anxious a couple of employment interview, speech, a primary date, are traditional responses to a nerve-racking scenario. Elevated stress hormones (cortisol, adrenaline) will cause or exacerbate anxiety. Like depression, anxiety will be a learned behaviour.There are many diagnostic classes for anxiety disorders. They include: Generalized mental disturbance (GAD), anxiety disorder (anxiety attacks). Flavonoid glycosides, the most category of flavonoids, are shown to exert CNS-mediated activities, significantly as sedative-hypnotics, analgesics or each, still no studies have evaluated these agents in anxiety. apparently, the consumption of flavonoid-rich foods, specially fruits and vegetables, has been epidemiologically related to a reduced risk of heart condition, neurodegenerative illness, cancer and alternative chronic diseases, most likely thanks to their activity as inhibitors activity.

Xenobiotica
the fate of foreign compounds in biological systems

ISSN: 1366 5928

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ixen20

# Effect of naringenin on the pharmacokinetics of metoprolol succinate in rats

Ravindra Babu Pingili, Sridhar Vemulapalli, Vijaya R. Dirisala, Surya Sandeep Mullapudi, Yamini Gullapalli & Naveen Babu Kilaru

To cite this article: Ravindra Babu Pingili, Sridhar Vemulapalli, Vijaya R. Dirisala, Surya Sandeep Mullapudi, Yamini Gullapalli & Naveen Babu Kilaru (2021) Effect of naringenin on the pharmacokinetics of metoprolol succinate in rats, Xenobiotica, 51:8, 926-932, DOI: 10.1080/00498254.2021.1942311

To link to this article: https://doi.org/10.1080/00498254.2021.1942311

Published online: 28 Jun 2021.

Materials Today Communications 26 (2021) 101916

Contents lists available at ScienceDirect

Materials Today Communications

Journal homepage: www.elsevier.com/locate/mtcomm

# *Pterocarpus marsupium* Roxburgh heartwood extract/chitosan nanoparticles loaded hydrogel as an innovative wound healing agent in the diabetic rat model

Anupama Ammulu Manne[a], Bharathi Arigela[b], Ajay Kumar Gidduturi[a], Ravi K. Komaravolu[c], Ushakiranmayi Mangamuri[d], Sudhakar Poda[a,b]

[a] Department of Biotechnology, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, Andhra Pradesh, 522510, India
[b] Department of Pharmaceutics, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada, Andhra Pradesh 520008, India
[c] Cardio-Metabolism and Immuno-Inflammation Researcher, University of Cincinnati, OH, USA
[d] Department of Botany and Microbiology, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, Andhra Pradesh, 522510, India

ARTICLE INFO

*Keywords:*
*Pterocarpus marsupium* Rox.b
Chitosan nanoparticles
Anti-bacterial
Diabetic wound healing
Histological analysis

ABSTRACT

The application of modern nanomedicines to enhance wound healing is growing due to their simplicity for topical organization and fast flexibility with molecules that can boost and reinforce the process of healing even in patients with diabetes. The point of the present investigation was to synthesize effective *Pterocarpus marsupium* heartwood extract/chitosan nanoparticles (PM-CNPs) loaded hydrogel (PM-CNPsH) and evaluate its drug release efficiency, *in-vitro* anti-microbial activity and wound healing action in streptozotocin administered diabetic rat models. The prepared PM-CNPs further utilized for the preparation of various carbopol hydrogel formulations. Hence, prepared hydrogels are characterized for pH, morphology, consistency, and spreadability; thus, PM-CNPsH-1 is found to be the optimized formulation. *In-vivo* rats treated with PM-CNPsH-1 displayed significantly much quicker healing of wounds in diabetic and non-diabetic rats. The histological examination revealed re-epithelization and growth of granular tissue and an improvement in collagen deposition. These results indicate the effectiveness of optimized nanocomposites as a potential treatment for curing diabetic wounds.

## 1. Introduction

The wound healing cycle is a complex and vital controlled series of many well organized biochemical and cellular processes for restoring skin integrity. Throughout the wound healing process, wound develops in three distinct but overlapping stages: infection, proliferation (neo-angiogenesis, granulation, re-epithelialization), and maturation (extra-cellular matrix remodelling [ECM]) [1]. Wound control and wound healing potency of wound tissue deformation may depend heavily on products that are used in wound dressing. The medicinal plants are regarded as the strong and successful treatment for improving wound healing processes dependent on the various active and efficient components like phenolic compounds, essential oils, alkaloids, flavonoids, fatty acids, terpenoids, etc. Because of the low expense, minimal side effects, bioavailability, and effectiveness, these herbal drugs are considered favoured to modern therapy [2]. Apart from the benefits of medicinal plants to wound treatment, one of the essential strategies for promoting their effectiveness is to introduce them to nanosizing methods or to integrate them into nanostructures. Owing to their nanoscale dimensions and wide surface area by volume, nanomaterials have peculiar characteristics, and medicinal plants may be nanosized in combination with modifications in their physical and chemical properties [3,4].

Diabetes mellitus is a disease considered to be correlated with several defects in the connective tissue. Following diminished biosynthesis and increased degradation of freshly synthesized collagen, the collagen

*Abbreviations:* PM, *Pterocarpus marsupium*; PM-CNPs, *Pterocarpus marsupium* synthesized chitosan nanoparticles; PM-CNPsH, *Pterocarpus marsupium* synthesized chitosan nanoparticles loaded hydrogel; PM, *Pterocarpus marsupium* synthesized chitosan nanoparticles; SEM, Scanning Electron Microscopy; TPP, Sodium Tripolyphosphate; STZ, Streptozotocin; ZOI, Zone of Inhibition; H&E, Hematoxylin and Eosin staining.

* Corresponding author.
*E-mail addresses:* anupamanag90@gmail.com (A.A. Manne), bharathi.arigela004@gmail.com (B. Arigela), ajaygidduturi@gmail.com (A.K. Gidduturi), Ravikumar.komaravolu@gmail.com (R.K. Komaravolu), drmangamuri@gmail.com (U. Mangamuri), sudhakarpodha@gmail.com (S. Poda).

https://doi.org/10.1016/j.mtcomm.2020.101916
Received 24 May 2020; Received in revised form 16 November 2020; Accepted 20 November 2020
Available online 25 November 2020
2352-4928/

ISSN 0974-3618 (Print)
0974-360X (Online)

www.rjptonline.org

RJPT

RESEARCH ARTICLE

# Design, Optimization and Evaluation of Telmisartan Chronotherapeutics press coated tablets Employing as Novel synthetic Disintegrate and as Novel coated Chronotherapeutic Polymers

(pharmaceutics) Indexed: SCOPUS

**A. Bharathi, D. Chandra Sekhar Naik**

K.V.S.R Siddhartha College of Pharmaceutical Sciences, Siddhartha Nagar, Vijayawada, A.P, India.

*Corresponding Author E-mail: **bharathi.arigela004@gmail.com**

## ABSTRACT:

Starch Glutarate prepared by reacting potato starch with Glutaric acid at elevated temperatures was found to be a white, crystalline powder. Starch glutarate prepared exhibited excellent flow characteristics it was insoluble in water and aqueous fluids of acidic and alkaline buffers. It also exhibited good swelling (70%) in water. It has no gelling property when heated at 100C° in water for 30 min. It is considered as a promising disintegrant in tablet formulations and was evaluated as disintegrant in tablet formulations. Tablets of Telmisartan were prepared by direct compression method employing starch glutarate at 0-10% as novel super disintegrate and were evaluated. In the present research work, $2^3$ factorial design was used for optimization of level of independent variables (starch glutarate, sodium starch glycolate and croscarmellose sodium) on dependent variables (disintegration time, water absorption, wetting time and percent released in 5 minutes) in the formulations. The optimized formula was further press coated by synthetic controlled time released polymers such as *starch acetate, starch succinate* in varying ratios. The best formulation was selected based on post-compression parameters and dissolution data was subjected to accelerated stability studies for 3 month. Amongst 5 formulations prepared for coating tablets we are F2CC1 produced convincing results with a maximum cumulative drug release of 99.21%. in 8 hr. By virtue of its release pattern and delivering the drug at the right time, right place and in right amounts, the developed delivery system holds good promises of benefiting the patients suffering from hypertension.

**KEYWORDS:** Starch, glutarate, Disintegrate, Tablets, Telmisartan.

## INTRODUCTION:

Chronopharmacotherapy, the drug regime based on circadian rhythm, regulates many body features in human beings, viz., metabolism, physiology, behavior, sleep patterns, hormone production, etc[1]. Human beings considerably differ in their biochemical and physiologic popularity over a 24-hour length due to the existence of a number of circadian rhythms[2]. Various ailments like bronchial asthma has been reported to have multiplied airway responsiveness and worsening of lung function measured over a 24-hour cycle will show a characteristic circadian rhythm with the height at some point of the afternoon and the trough in the early hours of the morning Heart fee and blood strain both showcase a strong circadian sample with values for blood pressure, double product typically peaking in the Early morning period compare with until late afternoon, and then drops off at some point of night (hypertension), gastric acidity was located toward an increase in intragastric acidity in the course of the time duration from the center of the night time to the early dawn, and toward a reduce in intragastric acidity during the early morning rheumatoid arthritis experience more pain in the morning hours show circadian variation that demand time-dependent drug launch for effective drug action, for example, more pain with morning body stiffness, asthma, and coronary heart assault in early hours of the day[3]. Circadian rhythm disturbances are observed in kids with attention deficit/ hyperactivity ailment and sleep onset insomnia.

Received on 11.03.2020 Modified on 25.04.2020
Accepted on 21.05.2020 
*Research J. Pharm. and Tech 2021; 14(3):1639-1644.*
DOI: 10.5958/0974-360X.2021.00291.2

### Optimization Technique:

Optimization technique provide both a depth of understanding and an ability to explore and define ranges for formulation and processing factors with a rational approach to the selection of several experimental and

OJVR™

Online Journal of Veterinary Research©

*24(7): 407-412, 2020.*

# *In silico* docking of endophytic fungi cytoglobolosins to bovine coronavirus 3Cl4 receptor.

VN Sai Bindu Madhavi Patiballa, Ramya Bandarupalli, Chandana Madala, Anjani Gayatri Vegesena, Rupa Sree Devi Vemuri, Kanaka Durga Devi Nelluri*

KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada,Andhra Pradesh, India.*Corresponding author

## ABSTRACT

*Madhavi Patiballa VN, Bandarupalli R, Vegesena AG, Madala C, Vegesena AG, Devi Vemuri RS, Devi Nelluri KD., In silico docking endophytic fungi cytoglobolosins to bovine coronavirus 3Cl4 receptor, Onl J Vet Res., 24(7): 407-412, 2020.* Bovine coronavirus infects upper and lower intestine and respiratory tracts in cattle inducing diarrhea and respiratory infections. One hundred secondary metabolites of marine endophytic fungi protein crystal structure were screened for *In silico* docking with bovine coronavirus hemagglutinin-esterase3Cl4 receptor. We found that cytoglobosins D (8.3Kcal/mol)CID: 46209919 and C (8.2Kcal/mol) had best binding affinity to bovine coronavirus hemagglutinin-esterase 3Cl4 receptor compared with standard Darunavir (-6.6 Kcal/mmol). *In vitro* and *in vivo* tests may support therapeutic use for endophytic fungi CID: 46209919 against bovine coronavirus.

Key-words: In silico, protein binding, bovine coronavirus, hemagglutinin-esterase endophytic fungi, cytoglobosins, Darunavir.



## INTRODUCTION

Bovine coronavirus *Coronaviridae* family order *Nidovirales*[1], is an important pathogen in neonatal diarrhea in calves but also in winter dysentery in adult cattle[2] and is similar in spike protein structure to Canine respiratory coronavirus[3]. The virus is pleomorphic and enveloped by a double layer of long and short projections on the surface and measures 65nm to 210nm[6]. The virus infects epithelial cells in the respiratory tract, intestine, trachea, lungs, and nasal turbinates[4,5] and can be Isolated from lung tissues and nasal secretion of cattle with fatal pneumonia.[5] In neonatal calves and adult cattle with diarrhea, the virus can cause enteropathies.[7] Coronavirus proteins are classified as spiked, integral membrane,

# Synthesis of 1,6-Naphthyridine and Its Derivatives: A Systematic Review

Thangaraj Devadoss,* Veldhi Sowmya, and Ravali Bastati[a]

The naturally and synthetically obtained 1,6-naphthyridine derivatives possess a wide range of pharmacological properties. This factor inspired the medicinal chemists and organic chemists to develop new methods for the synthesis of 1,6-naphthyridine derivatives. This review will discuss the synthesis of 1,6-naphthyridine and its derivatives from diverse starting materials or key intermediates in a systematic manner with appropriate mechanisms.

## 1. Introduction

Naphthyridines are nitrogen-containing heterocyclic analogues of naphthalenes. It contains a nitrogen atom in each of the benzene rings. Therefore, in the replacement system of nomenclature, naphthyridines are named as diazanaphthalenes. Similarly, in the fused heterocyclic system of nomenclature, it is referred to as pyridopyridines.[1] Based on the location of the two nitrogen atoms in each benzene ring (other than the bridgehead position), the naphthyridines are classified into six types.[1] The chemical structures of naphthalene (1) and different types of naphthyridines are presented in Figure 1.

Naphthyridines-based compounds exhibit a wide range of pharmacological properties. Particularly, 1,6-naphthyridine derivatives, they act as anticancer agents,[2,3,4,5,6] antiviral,[7] antiasthmatic,[8] anticonvulsant,[9] analgesic,[10] PDE10 A inhibitors,[11] 5-$HT_4$ receptor antagonists,[12] $CB_2$ antagonists,[13] etc.

1-methoxy-4,5,9,10-tetrahydropyrido[3,2,1][1,6]naphthyridine-6(8H)-one (8) is a natural product present in roots of trees belonging to the genus Sophora, it exhibits antibacterial activity.[14] Similarly, aaptamine (9), isoaaptamine (10), demethyl(oxy)aaptamine (11) and 3-(phenyethylamino) demethyl(oxy)aaptamine (12) are 1;6-naphthyridine-based natural products isolated from the marine sponge *Aaptos aaptos*.[15,16] They possess antineoplastic, α-adrenoreceptor antagonistic, and anti-microbial properties.[15,16] The chemical names and structures of these natural products are given in Figure 2.

Due to owning a wide range of pharmacological properties, the 1,6-naphthyridine is considered a privileged scaffold in the field of medicinal chemistry. This factor triggered the medicinal chemists and organic chemists to develop new methods for the facile synthesis of 1,6-naphthyridine derivatives.

This review aimed to describe the different methods or synthetic routes available for the construction of 1,6-naphthyridine and its derivatives from a wide range of starting materials. Wherever applicable, the product formation described with an appropriate mechanism.

## 2. Synthesis of 1,6-naphthyridine

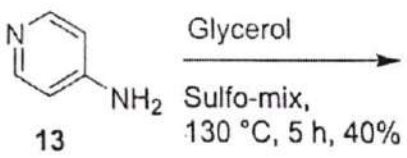
The synthesis of 1,6-naphthyridine from different starting materials is discussed in this section.

### 2.1. Cyclization

#### *2.1.1. From 4-aminopyridine*

Kress and Paudlers (1967) adopted Skraup synthesis with a slight modification to prepare 1,6-naphthyridine (3) in a single step from 4-aminopyridine (13) and glycerol in the presence of sulfo mix (a mixture of nitrobenzenesulphonic acids in sulphuric acid) instead of sulphuric acid (Scheme 1).[17] This reaction condition afforded the 1,6-naphthyridine in moderate yield.

A few years later, Hamada and Takeuchi (1971) demonstrated the preparation of 1,6-naphthyridine (3) using sodium *m*-nitrobenzene sulphonate instead of sulfo mix while adopting the Skraup synthesis.[18] This condition afforded the 1,6-naphthyridine in improved yield (70%) compared to the condition adopted by Kress and Paudlers.




Scheme 1. Skraup synthesis of 1,6-naphthyridine from 4-aminopyridine.

[a] Dr. T. Devadoss, V. Sowmya, R. Bastati
Department of Pharmaceutical Chemistry,
KVSR Siddhartha College of Pharmaceutical Sciences,
Pinnamaneni Polyclinic Road, Siddhartha Nagar, Vijayawada, Andhra Pradesh, India, PIN-520010
E-mail: tdevadoss@gmail.com

JPP Journal of Pharmacy and Pharmacology

*Journal of Pharmacy and Pharmacology*, 2021, Vol 73, 522–534
doi:10.1093/jpp/rgaa003
Research Paper
Advance Access publication 4 February 2021

OXFORD

Research Paper

# Protective effects of duloxetine against chronic immobilisation stress-induced anxiety, depression, cognitive impairment and neurodegeneration in mice

**Glory Florence Meejuru[1], Anushri Somavarapu[1], Ravi Chandra Sekhara Reddy Danduga[1], Lakshmi Sudeepthi Nissankara Roa[2] and Phani Kumar Kola[1]**

[1]Department of Pharmacology, University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, Andhra Pradesh 522510, India
[2]Department of Pharmacology, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada, Andhra Pradesh 522510, India

*Correspondence: Phani Kumar Kola, Department of Pharmacology, University College of Pharmaceutical Sciences, Acharya Nagarjuna University, Nagarjuna Nagar, Guntur, Andhra Pradesh 522510, India. Email: drphanikumarkola@gmail.com

Received April 28, 2020; Accepted October 5, 2020.

## Abstract

**Objectives** This study aimed to evaluate the effect of duloxetine (10 and 20 mg/kg) against chronic immobilisation stress (CIS)-induced anxiety, depression, cognitive impairment and neurodegeneration in mice.

**Methods** CIS, 2 h/10 days (11:00 AM–1:00 PM) was applied after 30 min of pretreatment with saline, duloxetine 10 mg/kg and 20 mg/kg to the respective groups of animals, except the control group. Animals were examined for physiological (body weight, locomotion and grip strength), psychological (memory impairment, anxiety and depression), neurochemical (GABA and glutamate), biochemical (MDA, catalase, glutathione, superoxide dismutase) and histopathological changes.

**Key findings** CIS exposure revealed anxiety-like behaviour, depression-like behaviour, motor in-coordination and learning and memory impairment in mice. Besides, CIS induction decreased the antioxidant enzymes (GSH, SOD and catalase), GABA and the viable neuronal cell count, whereas CIS exposure significantly elevated the MDA, AChE activity and glutamate content in the cortex and hippocampus. Pretreatment with duloxetine10 and 20 mg/kg showed dose-dependent ameliorated effect against the CIS-induced alterations in mice.

**Conclusion** In conclusion, the results of this study demonstrated the protective effect of duloxetine against neuropsychiatric symptoms, memory impairment caused by CIS-induction through inhibition of oxidative stress, AChE activity and glutamate release.

**Keywords:** duloxetine; cognitive impairment; reactive oxygen species; neurochemicals; neuroprotection

## Introduction

Stress is an uncomfortable emotional experience associated with behavioural, biochemical and physiological changes, leading to disturbance in homeostasis.[1] Usually, it occurs when an individual experiences demands or threats without sufficient resources to meet those demands.[2] People of all ages and genders can be affected by stress, resulting in physical and psychological disorders. World Health Organization (WHO) reported that stress was one of the top 10 determinants of health disparities.

Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

# A Review on Global Health Complication Obesity and its treatment with Natural Products

K.Satvik Harsha[1],Srikala Kamireddy[2],Iswarya Obilineni[2], K.Lilly Prasana[3],G.Amulya[4], K.Manasa[5],B.Indrani[6],P.Vyshnavi[7]

Nirmala College Of Pharmacy,Atmakuru,Mangalagiri,AP,India-522503

[1]PharmD-student,Nirmala College Of Pharmacy,Atmakuru,Mangalagiri

[2]Assistant Professor,Department of Pharmaceutics, Nirmala College Of Pharmacy,Atmakuru,Mangalagiri

[2]Assistant Professor,KVSR Siddhartha College of Pharmaceutical Sciences,Vijayawada.

[3,4,5,6,7]PharmD-student,Nirmala College Of Pharmacy,Atmakuru,Mangalagiri.

**Corresponding Author :**

Srikala Kamireddy, Assistant professor, Department of Pharmaceutics, Nirmala College of Pharmacy, Atmakur,Mangalagiri,AP,India-522503, Email:srikalamadhu@gmail.com

**ABSTRACT**—Obesity is a complex disorder involving excessive deposition of Adipose tissue in the body. The increased prevalence of obesity significantly affects human health worldwide. It isone of the most common disorder worldwide which leads to many complications like diabetes, strokes, and other cardiovascular disorders. The above complications cause one-third of mortality worldwide. This problem arises due to the considerable dissimilarity of calorie consumption and energy expenditure and the treatment of obesity is mostly based upon equalizing the above-mentioned reason. The use of natural products as medicine has been in use for hundreds of years in various traditional systems of medicine throughout the world. To promote safe, efficient, and long-term effective methods to diagnose obesity, multiple natural products for the inhibition of adipogenesis had revealed. This review provides information regarding the treatment of obesity with natural products.

Keywords—Obesity, Accumulation of fat, Calorie consumption, Energy expenditure, Body mass index.

## 1. INTRODUCTION

The excess of adipose tissue is called obesity, and it is associated with a state of chronic subclinical inflammation. According to the World Health Organization (WHO), in 2016, at least 1.9 billion adults showed obesity or overweight, thus being equivalent to more than 25 percent of the world's population.Obesity has been confessed as an important considering factor in the development of various diseases1. Obesity is defined as abnormal or excessive fat accumulation in adipose tissue, that presents a risk to the health of human body. The accumulation of excess fat and dispensation of fat in the body - either around the waist and trunk (abdominal, central or android obesity) or peripherally around the body (gynoid obesity) - have main health complications2. The underlying cause of overweight/obesity associated with a number of chronic diseases such as coronary heart disease, hypertension, diabetes mellitus, gallbladder disease, osteoarthritis and some types of cancer3.People leading sedentary life style instead of active life. More calorie diet together with an inactive lifestyle has been noticed as a prospective risk factor for cardio vascular diseases, cancer, diabetes mellitus4. The rise in obesity in the past several decades has been dramatic worldwide, particularly in the Western world5.Obesity is prevalent in the U.S. population and contributes significantly to morbidity and mortality6. The frequency of obesity in the developed world is raising approximately 23% of adult, Canadians 5. 5 million people are obese and an additional 36% are overweight7. A foresight scientific report used to guide UK government policy, has predicted by 2025, nearly half of men and over a third of women will be obese. Obesity associated risk is also expand in individual with normal weight and BMI (Body mass index) who have more growth of waist circumference of more than 102cm (40 inches) in men and more than 88cm (35 inches) in women poses a significant risk8. The rise in obesity is multi factorial. Specific habitat factors are also involved including excess portion size, dietary macronutrient composition and sedentary lifestyle9. Obesity is associated with increased risks for type 2 diabetes mellitus (T2DM), hypertension (HTN), dyslipidemia, metabolic syndrome, coronary heart disease, other atherosclerotic diseases, and non-alcoholic fatty liver disease10.

PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

VIJAYAWADA 520 010

Journal of Cardiovascular Disease Research

ISSN 0975-3583,0976-2833 VOL 12,ISSUE 05,2021

# Bullous Pemphigoid – A Rare Disease Case Report

Sk. Mohammed Rafi[1], S.Venkatesh[1], R. Mourya Sri[1], M. Sahithi[1], S. Amrutha[1], Iswarya Obilineni[2], Dr. Shaik Abdul Rahaman[3]

[1]Pharm D students, Nirmala college of Pharmacy, Atmakur, Mangalagiri, AP, India-522503

[2]Assistant professor, Department of Pharmacology, KVSR Siddhartha College of pharmaceutical sciences, Vijayawada

[3]Principal and Professor, Nirmala College of Pharmacy, Atmakur, Mangalagiri, AP, India-522503

*Corresponding author: Mr. Sarvasiddi Venkatesh, III Pharm – D, Nirmala college of Pharmacy, Atmakur, Mangalagiri, AP, India-522503 Email: siddivenkatesh2001@gmail.com

**Abstract**

Bullous pemphigoid is a rare, chronic and a most common blistering disorder, characterized by the appearance of large fluid-filled blisters on the skin. It can be diagnosed based on clinical, immunologic, and histological criteria and is most commonly found in elderly persons. These blisters are often found on areas of the skin in the regions such as – lower abdomen, upper thighs or armpits. It manifests clinically with diffuse eczematous (inflamed or irritated skin), pruritic (unpleasant sensation that desires to scratch), urticarial-like lesions (reddish flat patches or swellings), eventually with the appearance of tense bullae or blisters typically filler with clear fluid. It is an auto-immune disorder, in which our body produces antibodies to the fibers that connect the outer layer of skin (epidermis) and the next layer of skin (dermis) and finally triggering the inflammation process, which leads to the production of blisters. The major aim of this case report is to present a typical case of this condition, to bring awareness on several treatment options, and to advocate referral to a dermatologist given its potential severity. Multiple treatment opportunities have been found for this condition, including anti-inflammatory medications that reduce antibody formation, and treatments to increase the elimination of antibodies [1].

**Keywords**: bullous pemphigoid, blistering disorder, autoimmune disorder, diffuse eczematous, pruritic urticarial lesions, dermatology

**Introduction**

Bullous pemphigoid is a rare skin disorder, in which there is an appearance of blisters on the skin, and most commonly found in older individuals. Bullous Pemphigoid can be resolved within five years, and it can be goes away on its own in a few months. The major aim of this case report is to highlight the several treatment options, to bring awareness about the disease and to advocate referral to a dermatologist given its potential severity.

**Patient information, clinical findings, timeline**

A 52 years old female patient was admitted in the hospital with the chief complaints of large and fluid filled blisters all over the body, with weight loss since 5 years.

**Diagnostic assessment**

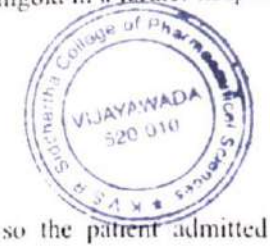
The patient is in a conscious and in a coherent state, with lymphocytosis and with afebrile temperature. The patient is diagnosed with the elevated levels of Serum glucose –fasting and Serum Total Iron with the abnormal values of **140mg/dl** and **24mg/dl** respectively, in Biochemical profile. Haematological profile is abnormal with normal to the platelet count. Microbiological record shows that Serum has been taken as a Specimen, in which the C-reactive Protein levels has been elevated with an abnormal value of **371.16mg/L**, by Immunoturbidometry method. Anti-Nuclear Antibody (ANA) has performed by ELISA method and value obtained is 0.40, considered as a negative value. AntiDS-DNA antibody (ELISA) has also conducted, in which the serum has been taken as a specimen, where the test value was obtained as 8IU/ml which is a negative value.

**Therapeutic interventions**

She was previously diagnosed with the disease i.e. bullous pemphigoid in a farther hospital, at where those doctors prescribed the following medications:

- Inj. Folitrax
- Inj. Hydrocortisone
- B. Plex Forte
- T. Azitpiral
- T. Folic acid

But still the condition has been worsening, so the patient admitted in another hospital for management and to control her disease.




PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

**Follow-up and outcomes**

According to all the Laboratory profiles, mentioned above, the patient has been diagnosed with Bullous Pemphigoid disease and physicians prescribed the following medications in order to control or to prevent the further complications of the disease.

| S.No | Trade Name | Generic Name | R.O.A | Dose | Frequency |
|---|---|---|---|---|---|

**Journal of Cardiovascular Disease Research**

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

# A REVIEW ON AUTOIMMUNE DISORDERS

**Iswarya Obilineni[1*], Anne Lakshmi Pavani[1], Viswa Srujani Kanagala[1], Atluri Deekshit[2], Bantupalli Suranjan[2], Gutha Bala Teja[2], Motupalli Sankeerth kumar[2], Ponnaluri Latha[2], Dr. Vijaya Kumar Ghanta[3]**

[1] Assistant Professors, KVSR Siddhartha College of pharmaceutical sciences.

[2] VI/VI PharmD students, KVSR Siddhartha College of pharmaceutical sciences.

[3] Professor and HOD, KVSR Siddhartha College of pharmaceutical sciences

Corresponding author*:

Iswarya Obilineni

Assistant professor

Mail id: aishwarya.111188@gmail.com

**Abstract:**

Our aim is to review different autoimmune disorders covering information about more than 10 autoimmune disorders along with their introduction, cause, diagnostic tests and treatment options. Here the treatment options include the name of the medications and their efficacy, availability. It also includes the necessary surgical options. This review clearly gives the necessary inputs regarding most common autoimmune disorders like psoriasis, rheumatoid arthritis, pernicious anaemia, myasthenia gravis, rheumatic fever etc along with rare autoimmune disorders like multiple sclerosis, Systemic lupus erythematosus. In this review, we particularly focussed on the symptoms of autoimmune disorders in order to identify the disease in starting stage itself, we focussed on the diagnostic tests to guide that which test gives the accurate results and we also focussed on the treatment options to give the information which medications are efficient and where they are available. This review also gives clear information about surgical options available. As the autoimmune disorders affecting mostly children and various autoimmune disorders taking the lives of children, it is important to save the lives of our children; hence we thought it is important to focus on this issue.

**Keywords:** Auto-immune disorders, Psoriasis, Rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus.

## Introduction:

In this review, we discussed about the following autoimmune disorders along with their symptoms, diagnostic tests, treatment etc

## Rheumatoid arthritis

Rheumatoid arthritis (RA) is the disease affecting the lining of synovial joints which may lead to progressive disability. It is seen more frequently in female when compared to male. It is a chronic autoimmune disease observed more in elderly people.

Symptoms include swelling, redness, arthralgia. This disease limits the range of movement. Rheumatoid arthritis may lead to joint destruction, functional disability, socioeconomic burdens, pre-mature death. If the disease is so severe, it leads to keratitis, vasculitis, and rheumatoid nodules.


PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

# A REVIEW ON AUTOIMMUNE DISORDERS

**Iswarya Obilineni[1*], Anne Lakshmi Pavani[1], Viswa Srujani Kanagala[1], Atluri Deekshit[2], Bantupalli Suranjan[2], Gutha Bala Teja[2], Motupalli Sankeerth kumar[2], Ponnaluri Latha[2], Dr. Vijaya Kumar Ghanta[3]**

[1] Assistant Professors, KVSR Siddhartha College of pharmaceutical sciences.

[2] VI/VI PharmD students, KVSR Siddhartha College of pharmaceutical sciences.

[3] Professor and HOD, KVSR Siddhartha College of pharmaceutical sciences

Corresponding author*:

Iswarya Obilineni

Assistant professor

Mail id: aishwarya.111188@gmail.com

**Abstract:**

Our aim is to review different autoimmune disorders covering information about more than 10 autoimmune disorders along with their introduction, cause, diagnostic tests and treatment options. Here the treatment options include the name of the medications and their efficacy, availability. It also includes the necessary surgical options. This review clearly gives the necessary inputs regarding most common autoimmune disorders like psoriasis, rheumatoid arthritis, pernicious anaemia, myasthenia gravis, rheumatic fever etc along with rare autoimmune disorders like multiple sclerosis, Systemic lupus erythematosus. In this review, we particularly focussed on the symptoms of autoimmune disorders in order to identify the disease in starting stage itself, we focussed on the diagnostic tests to guide that which test gives the accurate results and we also focussed on the treatment options to give the information which medications are efficient and where they are available. This review also gives clear information about surgical options available. As the autoimmune disorders affecting mostly children and various autoimmune disorders taking the lives of children, it is important to save the lives of our children; hence we thought it is important to focus on this issue.

**Keywords:** Auto-immune disorders, Psoriasis, Rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus.

## Introduction:

In this review, we discussed about the following autoimmune disorders along with their symptoms, diagnostic tests, treatment etc

## Rheumatoid arthritis

Rheumatoid arthritis (RA) is the disease affecting the lining of synovial joints which may lead to progressive disability. It is seen more frequently in female when compared to male. It is a chronic autoimmune disease observed more in elderly people.

Symptoms include swelling, redness, arthralgia. This disease limits the range of movement. Rheumatoid arthritis may lead to joint destruction, functional disability, socioeconomic burdens, pre-mature death. If the disease is so severe, it leads to keratitis, vasculitis, and rheumatoid nodules.

Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

# A REVIEW ON AUTOIMMUNE DISORDERS

**Iswarya Obilineni[1*], Anne Lakshmi Pavani[1], Viswa Srujani Kanagala[1], Atluri Deekshit[2], Bantupalli Suranjan[2], Gutha Bala Teja[2], Motupalli Sankeerth kumar[2], Ponnaluri Latha[2], Dr. Vijaya Kumar Ghanta[3]**

[1] Assistant Professors, KVSR Siddhartha College of pharmaceutical sciences.

[2] VI/VI PharmD students, KVSR Siddhartha College of pharmaceutical sciences.

[3] Professor and HOD, KVSR Siddhartha College of pharmaceutical sciences

Corresponding author*:

Iswarya Obilineni

Assistant professor

Mail id: aishwarya.111188@gmail.com

**Abstract:**

Our aim is to review different autoimmune disorders covering information about more than 10 autoimmune disorders along with their introduction, cause, diagnostic tests and treatment options. Here the treatment options include the name of the medications and their efficacy, availability. It also includes the necessary surgical options. This review clearly gives the necessary inputs regarding most common autoimmune disorders like psoriasis, rheumatoid arthritis, pernicious anaemia, myasthenia gravis, rheumatic fever etc along with rare autoimmune disorders like multiple sclerosis, Systemic lupus erythematosus. In this review, we particularly focussed on the symptoms of autoimmune disorders in order to identify the disease in starting stage itself, we focussed on the diagnostic tests to guide that which test gives the accurate results and we also focussed on the treatment options to give the information which medications are efficient and where they are available. This review also gives clear information about surgical options available. As the autoimmune disorders affecting mostly children and various autoimmune disorders taking the lives of children, it is important to save the lives of our children; hence we thought it is important to focus on this issue.

**Keywords:** Auto-immune disorders, Psoriasis, Rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus.

## Introduction:

In this review, we discussed about the following autoimmune disorders along with their symptoms, diagnostic tests, treatment etc

## Rheumatoid arthritis

Rheumatoid arthritis (RA) is the disease affecting the lining of synovial joints which may lead to progressive disability. It is seen more frequently in female when compared to male. It is a chronic autoimmune disease observed more in elderly people.

Symptoms include swelling, redness, arthralgia. This disease limits the range of movement. Rheumatoid arthritis may lead to joint destruction, functional disability, socioeconomic burdens, pre-mature death. If the disease is so severe, it leads to keratitis, vasculitis, and rheumatoid nodules.

Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

# A REVIEW ON AUTOIMMUNE DISORDERS

**Iswarya Obilineni[1*], Anne Lakshmi Pavani[1], Viswa Srujani Kanagala[1], Atluri Deekshit[2], Bantupalli Suranjan[2], Gutha Bala Teja[2], Motupalli Sankeerth kumar[2], Ponnaluri Latha[2], Dr. Vijaya Kumar Ghanta[3]**

[1] Assistant Professors, KVSR Siddhartha College of pharmaceutical sciences.

[2] VI/VI PharmD students, KVSR Siddhartha College of pharmaceutical sciences.

[3] Professor and HOD, KVSR Siddhartha College of pharmaceutical sciences

Corresponding author*:

Iswarya Obilineni

Assistant professor

Mail id: aishwarya.111188@gmail.com

**Abstract:**

Our aim is to review different autoimmune disorders covering information about more than 10 autoimmune disorders along with their introduction, cause, diagnostic tests and treatment options. Here the treatment options include the name of the medications and their efficacy, availability. It also includes the necessary surgical options. This review clearly gives the necessary inputs regarding most common autoimmune disorders like psoriasis, rheumatoid arthritis, pernicious anaemia, myasthenia gravis, rheumatic fever etc along with rare autoimmune disorders like multiple sclerosis, Systemic lupus erythematosus. In this review, we particularly focussed on the symptoms of autoimmune disorders in order to identify the disease in starting stage itself, we focussed on the diagnostic tests to guide that which test gives the accurate results and we also focussed on the treatment options to give the information which medications are efficient and where they are available. This review also gives clear information about surgical options available. As the autoimmune disorders affecting mostly children and various autoimmune disorders taking the lives of children, it is important to save the lives of our children; hence we thought it is important to focus on this issue.

**Keywords:** Auto-immune disorders, Psoriasis, Rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus.

## Introduction:

In this review, we discussed about the following autoimmune disorders along with their symptoms, diagnostic tests, treatment etc

## Rheumatoid arthritis

Rheumatoid arthritis (RA) is the disease affecting the lining of synovial joints which may lead to progressive disability. It is seen more frequently in female when compared to male. It is a chronic autoimmune disease observed more in elderly people.

Symptoms include swelling, redness, arthralgia. This disease limits the range of movement. Rheumatoid arthritis may lead to joint destruction, functional disability, socioeconomic burdens, pre-mature death. If the disease is so severe, it leads to keratitis, vasculitis, and rheumatoid nodules.


PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

# Effect of Recrystallization Technique on Oral Bioavailability of Olmesartan

TP. Rao[1], Buchi N. Nalluri*[1]

[1]Department of Pharmaceutics and Biotechnology, KVSR Siddhartha college of pharmaceutical sciences, Vijayawada, AP, India

*Email: buchinalluri@gmail.com

## ABSTRACT

Olmesartan medoxomil (OLM) is a widely prescribed anti-hypertensive agent with angiotensin II type I receptor antagonistic activity. OLM belongs to BCS class II having a low and variable oral bioavailability (BA) (29%) and its absorption is dissolution rate limited. Recrystallization of OLM from different organic solvents improved its aqueous solubility andthereby*in vitro* dissolution properties. In this investigation, oral BA of Olmesartan (OL) (parent drug molecule of OLM) from recrystallized products of OLM with acetonitrile and methanol (OACN and OMET respectively) solvents were evaluated in male Wistar rats. Also, a rapid, economical and reliable RP-HPLC-PDA method was developed for the estimation of OL in rat plasma samples and validated according to ICH guidelines. Chromatographic separation was achieved on an Agilent eclipse $C_{18}$ column (150×4.6mm, 5µ) with a mobile phase composition of 10mM ammonium acetate - Acetonitrile (62:38%v/v) at a flow rate of 1.2 mL/min. The retention time of OL was found to be 2.3 min and showed good linearity ($R^2$>0.99) in the selected concentration range of 0.2-1.0µg/mL. A 1.8, 1.6 folds increase in $C_{max}$ and a relative BA of 186, 160% were observed with OACN and OMET respectively, when compared to that of untreated OLM. Thus it can be inferred that recrystallization can be easily scalable and economical technique for enhancing the pharmaceutical properties like solubility, dissolution properties and oral BA of poorly water soluble drugs like OLM.

**Key words:** Bioanalytical method, Bioavailability, Male Wistar rats, Olmesartan, Recrystallization

## INTRODUCTION

Bioavailability (BA) is the rate and extent at which a drug moiety enters systemic circulation, thereby gaining access to the respective site of action. In case of oral administration, the oral BA depends on numerous factors like the physicochemical properties of drug, various aspects of dosage form, the physiological aspects of GI tract, etc. Oral BA of drugs from solid dosage forms (tablets, capsules) depends mainly on solubility of drug particles in GI fluids and permeability of dissolved drug molecules across GI membranes [1].

Olmesartan medoxomil (OLM) is widely prescribed, potent oral antihypertensive agents with angiotensin II type I ($AT_1$) receptor antagonistic activity. It is a BCS class II molecule and was reported to have a lowand variable absolute oral bioavailability of about 29% owing to low solubility and interference with efflux pumps in GIT, and its absorption is majorly dissolution rate limited [2, 3].OLM is a prodrug and it rapidly undergoes de-esterification in GIT during absorption to free Olmesartan (OL)[4]. Hence, even though OLM is administered, the pharmacokinetics and other parameters *in vivo* were given for its parent drug, OL.

Several techniques were reported to increase dissolution properties of OL and thus enhancing its oral BA including formulation of self-microemulsifying drug delivery system (SMEDDS), reduction in particle size (nanosuspensions), etc[4-6]. Crystal morphology of the drughas a great effect on the physicochemical properties of the drug and many drug molecules exist in more than one crystal forms (polymorphism). Modifying and controlling the crystalline nature of a drug *via* recrystallization can improve several pharmaceutical properties of drugs like stability, solubility, rate of dissolution, etc. which in turn may affect the absorption and BA of the drug [7]. An earlier study on the evaluation of the effect of recrystallizationon various properties of OL inferred in significant improvement in aqueous solubility and *in vitro* dissolution properties of recrystallized products when compared to untreated OLM [7]. Since, orally administered drugs must dissolve in the aqueous medium of gastrointestinal tract prior to absorption, the improvement of the solubility and the rate of dissolution of poorly soluble drugs can be seen as first steps towards the improvement in oral bioavailability. *In vitro* dissolution tests seem to be sensitive and reliable for prediction of BA, yet *in vitro* testing cannot always predict the *in vivo* performance.

Hence, in the present investigation, the oral BA of pure OL and its recrystallized products (OACN and OMET) were evaluated using male Wistar rats. Such enhancement in oral BA was represented in terms of improvement in various pharmacokinetic parameters like $C_{max}$, AUC, etc. Several analytical methods were reported in literature for estimation of OL alone and in combination with other drugs in bulk and pharmaceutical dosage forms [8-11]. It was also aimed to develop and validate a rapid, economical and sensitive RP-HPLC-PDA bioanalytical method for the estimation of OL in rat plasma samples.

## MATERIALS AND METHODS

### Materials

OLM and OL were provided by Aurobindo Pharma Ltd (Hyderabad, India). Acetonitrile, Ammonium acetate, Ethanol, Methanol, were purchased from Loba Chemie Pvt. Ltd., (Mumbai, India). Male Wistar rats were obtained

Journal of Cardiovascular Disease Research

ISSN:0975-3583.0976-2833 VOL12,ISSUE05,2021

# Effect of Recrystallization Technique on Oral Bioavailability of Olmesartan

TP. Rao[1], Buchi N. Nalluri*[1]

[1]Department of Pharmaceutics and Biotechnology, KVSR Siddhartha college of pharmaceutical sciences. Vijayawada, AP, India

*Email: buchinalluri@gmail.com

## ABSTRACT

Olmesartan medoxomil (OLM) is a widely prescribed anti-hypertensive agent with angiotensin II type I receptor antagonistic activity. OLM belongs to BCS class II having a low and variable oral bioavailability (BA) (29%) and its absorption is dissolution rate limited. Recrystallization of OLM from different organic solvents improved its aqueous solubility andthereby*in vitro* dissolution properties. In this investigation, oral BA of Olmesartan (OL) (parent drug molecule of OLM) from recrystallized products of OLM with acetonitrile and methanol (OACN and OMET respectively) solvents were evaluated in male Wistar rats. Also, a rapid, economical and reliable RP-HPLC-PDA method was developed for the estimation of OL in rat plasma samples and validated according to ICH guidelines. Chromatographic separation was achieved on an Agilent eclipse $C_{18}$ column (150×4.6mm, 5µ) with a mobile phase composition of 10mM ammonium acetate - Acetonitrile (62:38%v/v) at a flow rate of 1.2 mL/min. The retention time of OL was found to be 2.3 min and showed good linearity ($R^2$>0.99) in the selected concentration range of 0.2-1.0µg/mL. A 1.8, 1.6 folds increase in $C_{max}$ and a relative BA of 186, 160% were observed with OACN and OMET respectively, when compared to that of untreated OLM. Thus it can be inferred that recrystallization can be easily scalable and economical technique for enhancing the pharmaceutical properties like solubility, dissolution properties and oral BA of poorly water soluble drugs like OLM.

**Key words:** Bioanalytical method, Bioavailability, Male Wistar rats, Olmesartan, Recrystallization

## INTRODUCTION

Bioavailability (BA) is the rate and extent at which a drug moiety enters systemic circulation, thereby gaining access to the respective site of action. In case of oral administration, the oral BA depends on numerous factors like the physicochemical properties of drug, various aspects of dosage form, the physiological aspects of GI tract, etc. Oral BA of drugs from solid dosage forms (tablets, capsules) depends mainly on solubility of drug particles in GI fluids and permeability of dissolved drug molecules across GI membranes [1].

Olmesartan medoxomil (OLM) is widely prescribed, potent oral antihypertensive agents with angiotensin II type I ($AT_1$) receptor antagonistic activity. It is a BCS class II molecule and was reported to have a lowand variable absolute oral bioavailability of about 29% owing to low solubility and interference with efflux pumps in GIT, and its absorption is majorly dissolution rate limited [2, 3].OLM is a prodrug and it rapidly undergoes de-esterification in GIT during absorption to free Olmesartan (OL)[4]. Hence, even though OLM is administered, the pharmacokinetics and other parameters *in vivo* were given for its parent drug, OL.

Several techniques were reported to increase dissolution properties of OL and thus enhancing its oral BA including formulation of self-microemulsifying drug delivery system (SMEDDS), reduction in particle size (nanosuspensions), etc[4-6]. Crystal morphology of the drughas a great effect on the physicochemical properties of the drug and many drug molecules exist in more than one crystal forms (polymorphism). Modifying and controlling the crystalline nature of a drug *via* recrystallization can improve several pharmaceutical properties of drugs like stability, solubility, rate of dissolution, etc. which in turn may affect the absorption and BA of the drug [7]. An earlier study on the evaluation of the effect of recrystallizationon various properties of OL inferred in significant improvement in aqueous solubility and *in vitro* dissolution properties of recrystallized products when compared to untreated OLM [7]. Since, orally administered drugs must dissolve in the aqueous medium of gastrointestinal tract prior to absorption, the improvement of the solubility and the rate of dissolution of poorly soluble drugs can be seen as first steps towards the improvement in oral bioavailability. *In vitro* dissolution tests seem to be sensitive and reliable for prediction of BA, yet *in vitro* testing cannot always predict the *in vivo* performance.

Hence, in the present investigation, the oral BA of pure OL and its recrystallized products (OACN and OMET) were evaluated using male Wistar rats. Such enhancement in oral BA was represented in terms of improvement in various pharmacokinetic parameters like $C_{max}$, AUC, etc. Several analytical methods were reported in literature for estimation of OL alone and in combination with other drugs in bulk and pharmaceutical dosage forms [8-11]. It was also aimed to develop and validate a rapid, economical and sensitive RP-HPLC-PDA bioanalytical method for the estimation of OL in rat plasma samples.

## MATERIALS AND METHODS

### Materials

OLM and OL were provided by Aurobindo Pharma Ltd (Hyderabad, India). Acetonitrile, Ammonium acetate, Ethanol, Methanol, were purchased from Loba Chemie Pvt, Ltd., (Mumbai, India). Male Wistar rats were obtained

# RP-HPLC METHOD FOR ESTIMATION OF LORNOXICAM IN TABLETS AND IN DISSOLUTION SAMPLES USING MASS SPECTROMETRIC COMPATIBLE BUFFERS

Vijaya Lakshmi Marella[a*] and Chaitanya S. N.[a]

(Received 07 August 2019) (Accepted 27 August 2020)

ABSTRACT

A selective and sensitive reverse phase High Performance Liquid Chromatographic method has been developed and validated for the estimation of lornoxicam in bulk, pharmaceutical dosage forms and in dissolution samples. The analysis was performed isocratically on an Inertsil column (250* 4.6 mm, 5 µm) using a mass spectrometric compatible mobile phase of 10 mM ammonium acetate: acetonitrile (50:50 V/V) at a flow rate of 1 mL/min.The detection wavelength was 290 nm. The retention time was found to be 4.573 min for lornoxicam. The linearity of the method has been satisfied with Beer Lambert's law in the concentration range of 5-25 µg/mL with a correlation coefficient of 0.9988. The mean recoveries assessed for lornoxicam were in the range of 100.39-101.86 %, indicating good accuracy of the method. The limit of detection and limit of quantification were found to be 0.03 and 0.11 µg/mL, respectively. The developed method has been statistically validated in accordance with ICH guidelines and found to be mass spectrometric compatible, simple, precise, and accurate with the prescribed values. Thus, the proposed method was successfully applied for the estimation of lornoxicam in routine quality control analysis of bulk, formulations and in dissolution samples.

ırds: RP-HPLC, mass spectrometric compatible, cam, method validation, dissolution samples

## )DUCTION

rnoxicam (LXM) is a non-steroidal anti-inflam- / drug (NSAID) of the oxicam class (Fig.1) with ısic, anti-inflammatory and anti pyretic properties[1]. liffers from other oxicam compounds in its potent on of prostaglandin biosynthesis, a property that ıs the pronounced efficacy of the drug.It is used for atment of various types of pain, especially resulting from inflammatory diseases of joints, osteoarthritis, surgery, sciatica and other inflammations. Lornoxicam has the solubility in water with pKa of 4.5.

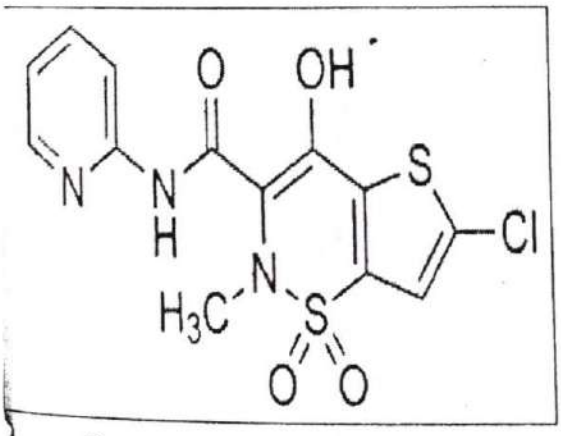



Fig.1: Structure of Lornoxicam

Different analytical methods have been reported in the literature for the determination of LXM individually and in combination with other drugs like paracetamol and tolperisone by LC-MS[2] , HPLC[3-10] and stability indicating HPLC. Till date, no publication has been reported with RP-HPLC method with LC-MS compatible buffers in bulk and in *in vitro* dissolution samples.

Hence, the present investigation was aimed to develop a simple, economical and rapid RP-HPLC-PDA method for the estimation of LXM in bulk, pharmaceutical formulations and *in vitro* dissolution sample analysis which would be accurate, precise and sensitive. Also, the method is targeted to develop the LC conditions compatible to MS detection and to validate as per ICH guidelines[11].

## MATERIALS AND METHODS

Pure lornoxicam was supplied by Sun Pharma Gujarat, India and lornoxicam tablets (Lorcam 8mg) were purchased from local pharmacy. All the solvents and reagents are of HPLC grade (Merck, Mumbai).

tment of Pharmaceutical Analysis, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada - 520 010, Andhra Pradesh, India
orrespondence: E-mail: analysis.scops@gmail.com

doi.org/10.53879/id.58.07.12068

Iranian Journal of Pharmaceutical Sciences
2021: 17 (4): 107-122
www.ijps.ir

Original Article

# Some Selected Phytoconstituents from *Rhus succedanea* as SARS CoV-2 Main Protease and Spike protein (COVID-19) Inhibitors

Prasanth D. S. N. B. K.[a*], Suneetha Achanta[b], Siva Prasad Panda[c], Lakshmana Rao Atmakuri[d], Chakravarti Guntupalli[a], Narayana Rao Alla[a], Risy Namratha Jamullamudi[e], Jahasultana Mohammed[c], Haritha Lanka[e], Teja Nayudu[f], Sandhya Tera[g], Bhargavi Koti[f], Monika Chigurupati[f], Likhith Kolla[d], Praveena Tata[d], Purnadurganjali Chittiprolu[d]

[a]*Department of Pharmacognosy, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India,* [b]*Department of Pharmaceutical Analysis, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India,* [c]*Department of Pharmacology, Institute of Pharmaceutical Research, GLA University, Mathura,Uttar Pradesh, India,* [d]*Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India,* [e]*Department of Pharmacy, K L College of Pharmacy, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India,* [f]*Department of Pharmaceutics, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India,* [g]*Department of Pharmacology, Institute of Pharmaceutical Technology, Sri Padmavati Manila Viswavidyalayam, Tirupati, Andhra Pradesh, India.*

## Abstract

*Rhus succedanea* (Anacardiaceae) was used to treat multiple human afflictions. Literary works demonstrate that it has many biological activities. Today's research aims to recognize Rhus succedanea Phyto-derived anti-viral compounds against the main protease and spike protein of the viral agent of COVID-19 (SARS-CoV-2) gain insight into the molecular interactions. In the current study, ten molecules taken from *R. succedanea* are analyzed through docking, derived from the PubChem database. Docking experiments with Autodock vina and PyRx tools were conducted. AdmetSAR and DruLito servers were eventually used for drug-like prediction. Our research shows that the phytoconstituents from *R. succedanea*, namely, Amentoflavone, Rhoifolin, and Agathisflavone acts against SARS CoV-2 main protease with the binding affinity of -9.3, -8.6 and -8.4 Kcal/mol; Hinokiflavone Robustaflavone and Amentoflavone acts against the SARS-CoV-2 receptor-binding domain of spike protein with a binding affinity of -10.5, -10.4 and -10.1 Kcal/mol respectively. These phyto-compounds can use contemporary strategies to develop effective medicines from natural origins. The substances identified potential anti-viral as likely. However, *In-vitro* studies are even more necessary to assess their effectiveness versus SARS CoV-2.

*Keywords*: ADMET, In-silico, Lipinski's Rule, PyRx, Rhus succedanea.

Corresponding Author: Prasanth D. S. N. B. K., Department of Pharmacognosy, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India
Tel: +91-7382027437
Email: dsnbkprasanth@gmail.com
Cite this article as: D. S. N. B. K. P., Achanta S, Panda S. P., Atmakuri L. R., Guntupalli C, Alla N. R., Namratha Jamullamudi R.,Mohammaed J., Lanka H., Nayudu T., Tera S., Koti B, Chigurupati M, Kola L., Tata P., Chittiprolu P., *Some Selected Phytoconstituents from Rhus succedanea as SARS CoV-2 Main Protease and Spike protein (COVID-19) Inhibitors*, 2021, 17 (4): 107-122.

## 1. Introduction

WHO has currently stated a typical emergency and pandemic for the novel coronavirus (SARS CoV-2) that has proactively propagated worldwide. The virus SARS-CoV-2 can easily trigger signs and symptoms such as fever, coughing, pneumonia, nausea, as well as

Iranian Journal of Pharmaceutical Sciences
2021: 17 (4): 107-122
www.ijps.ir

Original Article

# Some Selected Phytoconstituents from *Rhus succedanea* as SARS CoV-2 Main Protease and Spike protein (COVID-19) Inhibitors

Prasanth D. S. N. B. K.[a]*, Suneetha Achanta[b], Siva Prasad Panda[c], Lakshmana Rao Atmakuri[d], Chakravarti Guntupalli[a], Narayana Rao Alla[a], Risy Namratha Jamullamudi[e], Jahasultana Mohammed[e], Haritha Lanka[e], Teja Nayudu[f], Sandhya Tera[g], Bhargavi Koti[f], Monika Chigurupati[f], Likhith Kolla[d], Praveena Tata[d], Purnadurganjali Chittiprolu[d]

[a]*Department of Pharmacognosy, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India,* [b]*Department of Pharmaceutical Analysis, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India,* [c]*Department of Pharmacology, Institute of Pharmaceutical Research, GLA University, Mathura,Uttar Pradesh, India,* [d]*Department of Pharmaceutical Analysis, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India,* [e]*Department of Pharmacy, K L College of Pharmacy, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India,* [f]*Department of Pharmaceutics, V. V. Institute of Pharmaceutical Sciences, Gudlavalleru, Andhra Pradesh, India,* [g]*Department of Pharmacology, Institute of Pharmaceutical Technology, Sri Padmavati Manila Viswavidyalayam, Tirupati, Andhra Pradesh, India.*

**Abstract**

*Rhus succedanea* (Anacardiaceae) was used to treat multiple human afflictions. Literary works demonstrate that it has many biological activities. Today's research aims to recognize Rhus succedanea Phyto-derived anti-viral compounds against the main protease and spike protein of the viral agent of COVID-19 (SARS-CoV-2) gain insight into the molecular interactions. In the current study, ten molecules taken from *R. succedanea* are analyzed through docking, derived from the PubChem database. Docking experiments with Autodock vina and PyRx tools were conducted. AdmetSAR and DruLito servers were eventually used for drug-like prediction. Our research shows that the phytoconstituents from *R. succedanea*, namely, Amentoflavone, Rhoifolin, and Agathisflavone acts against SARS CoV-2 main protease with the binding affinity of -9.3, -8.6 and -8.4 Kcal/mol; Hinokiflavone Robustaflavone and Amentoflavone acts against the SARS-CoV-2 receptor-binding domain of spike protein with a binding affinity of -10.5, -10.4 and -10.1 Kcal/mol respectively. These phyto-compounds can use contemporary strategies to develop effective medicines from natural origins. The substances identified potential anti-viral as likely. However, *In-vitro* studies are even more necessary to assess their effectiveness versus SARS CoV-2.

*Keywords*: ADMET, In-silico, Lipinski's Rule, PyRx, Rhus succedanea.

Corresponding Author: Prasanth D. S. N. B. K., Department of Pharmacognosy, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, AP, India
Tel: +91-7382027437
Email: dsnbkprasanth@gmail.com
Cite this article as: D. S. N. B. K. P., Achanta S, Panda S. P., Atmakuri L. R., Guntupalli C, Alla N. R., Namratha Jamullamudi R.,Mohammaed J., Lanka H., Nayudu T., Tera S., Koti B, Chigurupati M, Kola L., Tata P., Chittiprolu P., *Some Selected Phytoconstituents from Rhus succedanea as SARS CoV-2 Main Protease and Spike protein (COVID-19) Inhibitors*, 2021, 17 (4): 107-122.

## 1. Introduction

WHO has currently stated a typical emergency and pandemic for the novel coronavirus (SARS CoV-2) that has proactively propagated worldwide. The virus SARS-CoV-2 can easily trigger signs and symptoms such as fever, coughing, pneumonia, nausea, as well as

# FORMULATION AND *IN-VITRO, EX-VIVO* CHARACTERIZATION OF ORLISTAT SELF-EMULSIFYING DRUG DELIVERY SYSTEM

Ramana G[1*], Sahithi Gadde[1], Ravindra Babu Pingili[2]

[1]Department of Pharmaceutics, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, Andhra Pradesh, India

[2]Faculty of Pharmacy, Vignan's Foundation for Science, Technology and Research (Deemed to be University), Vadlamudi, Guntur-522213, Andhra Pradesh, India

## Abstract

The objective of the study was to develop self-emulsifying drug delivery system (SEDDS) of a poorly soluble drug Orlistat (ORT) to enhance the bio-availability by increasing its solubility. According to Biopharmaceutical Classification System (BCS), ORT is a class-II molecule, having low solubility and high permeability. The rate and extent of the class-II drug is highly dependent on the performance of the formulated product. In this experiment, solubility of ORT was evaluated in various non-aqueous carriers that include oils, surfactants, and co-surfactants, of which oleic acid, tween 80, isopropyl alcohol has shown greater solubility. Pseudo ternary phase diagrams were constructed to identify the micro-emulsification region. Self-micro emulsifying formulations were prepared using mixtures of oils, surfactants and co-surfactants in various proportions which are clear and were evaluated for micro emulsion properties, droplet size and thermodynamic stability studies. FTIR studies indicate there was no interaction between the drug and excipients. *In-vitro* diffusion and *In-vitro* dissolution studies were done which indicates higher drug release from formulation (F11). Similarly, *Ex-vivo* intestinal absorption studies were also performed on gut sacs and the results showed that absorption of ORT increased from the formulation. Histopathological studies of the rat gut sacs also revealed that there is no damage of cell lining and the formulation is safe. Release kinetics were also done and compared with marketed and pure drug. The results of the study demonstrated the potential use of SEDDS as a means of improving solubility, dissolution and bio-availability.

**Key-words**: Self-emulsifying drug delivery system, Orlistat, Pseudo ternary phase diagram, Histopathological studies, Ex-vivo studies

## Corresponding Author*

Dr. G. Ramana, Associate Professor, Department of Pharmaceutics, KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada-520010, Andhra Pradesh, India.

Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

# Development Of Reservoir Type Ketoprofen Transdermal Patches Using Chemical Permeation Enhancers

Spoorthi K[1], Krishna Tulasi Kankanampati[1], Harika Kakumanu[1], Rao P. Tatineni[1], Buchi N. Nalluri*[1]

[1]Department of Pharmaceutics and Biotechnology, KVSR Siddhartha college of pharmaceutical sciences, Vijayawada, AP, India

*Email: buchinalluri@gmail.com

## ABSTRACT

The purpose of the present study was to formulate reservoir type transdermal patches for Ketoprofen (KP) that may eliminate the potential adverse events that are associated with its oral delivery. Initially, the effect of different chemical permeation enhancers (Labrasol, Transcutol P, Lauroglycol 90 and Labrafil M 1944 CS at 5% level) on *in vitro* KP release from hydro-alcoholic gels was evaluated using Franz diffusion cells. Based on the results obtained from the permeation studies, suitable permeation enhancers were selected and the reservoir patches of KP were prepared by loading 2.5% w/w of KP in HPMC (E5) hydro-alcoholic gel with Cotran 9702 and Scotchpak 9733 as rate controlling and backing membranes respectively. Results from the permeation studies revealed that, among the permeation enhancers used, Lauroglycol 90 showed superior *in vitro* KP permeation rates i.e. 12.29 ± 0.29 µg/mL at the end of 24h, which is 2.58 folds higher compared to control. Overall, the *in vitro* KP release from the patches was in the order of Lauroglycol 90 >Labrafil M >Transcutol P >Labrasol. *In vitro* KP release from the reservoir patches was evaluated using USP Type V dissolution rate testing apparatus and the results revealed a significant enhancement in KP release ($p$<0.05) from patches containing Lauroglycol 90 (1.4 fold) and Labrafil M (1.1 fold) compared to control. Overall, the results from the present investigation can form basis to perform further *ex-vivo* studies that can be useful for the development of an optimised reservoir type transdermal system for KP.

**Keywords:** Ketoprofen, Transdermal reservoir patches, Chemical permeation enhancers, Hydro-alcoholic gels.

## INTRODUCTION

Ketoprofen (KP), an arylcaboxylic acid derivate belonging to the class of non-steroidal anti-inflammatory drugs (NSAID) is one of the widely used therapeutic agent for the treatment of pain associated with musculoskeletal disorders [1]. Ketoprofen is known to have analgesic, anti-inflamatory and antipyretic properties and works by inhibiting cyclooxygenase (COX 1 and COX 2) enzymes. Inhibition of the COX enzymes results in the decreased production of inflammatory mediators (prostaglandins) thereby regulating the symptoms of pain [2].

Ketoprofen is commonly administered through oral route with doses ranging from 150-300mg for the management of arthritis and osteoarthritis as well as mild to moderate pain [3]. However, the oral administration of KP is associated with several adverse effects related to gastrointestinal track such as ulcerations, upper abdominal pain, vomiting and stomach bleeding [4]. Therefore, delivery of KP by routes alternative to oral route will overcome the adverse effects associated with the KP.

Transdermal route is one of the alternative routes that can be used overcome the adverse effects associated with oral delivery of KP[4]. Transdermal delivery offers controlled delivery of drugs through the skin into the systemic circulation, thereby maintain the constant plasma drug concentrations which results in improved drug therapy [5]. Also, the approach prevents the direct exposure of drug to the gastrointestinal track thereby avoiding the adverse effects such as ulcerations, bleeding in stomach, vomiting etc [4]. Therefore, development of transdermal delivery systems for KP may successfully overcome the gastrointestinal adverse effects associated with oral delivery along with providing the optimal therapeutic advantage.

However, despite of its advantages transdermal route suffers from drawbacks which are largely due to the barrier function of skin, particular the stratum corneum layer that is composed of flat dead cells filled with keratin fibres surrounded by lipid bilayers [6]. The drug molecules have to pass through the stratum corneum layer before reaching the systemic circulation. Due to the intrinsic barrier function of the skin the transdermal delivery is largely restricted to delivery of minimal number of drug molecules [4].


PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

Journal of Cardiovascular Disease Research

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

# Development Of Reservoir Type Ketoprofen Transdermal Patches Using Chemical Permeation Enhancers

Spoorthi K[1], Krishna Tulasi Kankanampati[1], Harika Kakumanu[1], Rao P. Tatineni[1], Buchi N. Nalluri*[1]

[1]Department of Pharmaceutics and Biotechnology, KVSR Siddhartha college of pharmaceutical sciences, Vijayawada, AP, India

*Email: buchinalluri@gmail.com

## ABSTRACT

The purpose of the present study was to formulate reservoir type transdermal patches for Ketoprofen (KP) that may eliminate the potential adverse events that are associated with its oral delivery. Initially, the effect of different chemical permeation enhancers (Labrasol, Transcutol P, Lauroglycol 90 and Labrafil M 1944 CS at 5% level) on *in vitro* KP release from hydro-alcoholic gels was evaluated using Franz diffusion cells. Based on the results obtained from the permeation studies, suitable permeation enhancers were selected and the reservoir patches of KP were prepared by loading 2.5% w/w of KP in HPMC (E5) hydro-alcoholic gel with Cotran 9702 and Scotchpak 9733 as rate controlling and backing membranes respectively. Results from the permeation studies revealed that, among the permeation enhancers used, Lauroglycol 90 showed superior *in vitro* KP permeation rates i.e. 12.29 ± 0.29 µg/mL at the end of 24h, which is 2.58 folds higher compared to control. Overall, the *in vitro* KP release from the patches was in the order of Lauroglycol 90 >Labrafil M >Transcutol P >Labrasol. *In vitro* KP release from the reservoir patches was evaluated using USP Type V dissolution rate testing apparatus and the results revealed a significant enhancement in KP release ($p$<0.05) from patches containing Lauroglycol 90 (1.4 fold) and Labrafil M (1.1 fold) compared to control. Overall, the results from the present investigation can form basis to perform further *ex-vivo* studies that can be useful for the development of an optimised reservoir type transdermal system for KP.

**Keywords:** Ketoprofen, Transdermal reservoir patches, Chemical permeation enhancers, Hydro-alcoholic gels.

## INTRODUCTION

Ketoprofen (KP), an arylcaboxylic acid derivate belonging to the class of non-steroidal anti-inflammatory drugs (NSAID) is one of the widely used therapeutic agent for the treatment of pain associated with musculoskeletal disorders [1]. Ketoprofen is known to have analgesic, anti-inflamatory and antipyretic properties and works by inhibiting cyclooxygenase (COX 1 and COX 2) enzymes. Inhibition of the COX enzymes results in the decreased production of inflammatory mediators (prostaglandins) thereby regulating the symptoms of pain [2].

Ketoprofen is commonly administered through oral route with doses ranging from 150-300mg for the management of arthritis and osteoarthritis as well as mild to moderate pain [3]. However, the oral administration of KP is associated with several adverse effects related to gastrointestinal track such as ulcerations, upper abdominal pain, vomiting and stomach bleeding [4]. Therefore, delivery of KP by routes alternative to oral route will overcome the adverse effects associated with the KP.

Transdermal route is one of the alternative routes that can be used overcome the adverse effects associated with oral delivery of KP[4]. Transdermal delivery offers controlled delivery of drugs through the skin into the systemic circulation, thereby maintain the constant plasma drug concentrations which results in improved drug therapy [5]. Also, the approach prevents the direct exposure of drug to the gastrointestinal track thereby avoiding the adverse effects such as ulcerations, bleeding in stomach, vomiting etc [4]. Therefore, development of transdermal delivery systems for KP may successfully overcome the gastrointestinal adverse effects associated with oral delivery along with providing the optimal therapeutic advantage.

However, despite of its advantages transdermal route suffers from drawbacks which are largely due to the barrier function of skin, particular the stratum corneum layer that is composed of flat dead cells filled with keratin fibres surrounded by lipid bilayers [6]. The drug molecules have to pass through the stratum corneum layer before reaching the systemic circulation. Due to the intrinsic barrier function of the skin the transdermal delivery is largely restricted to delivery of minimal number of drug molecules [4].


PRINCIPAL
K.V.S.R. SIDDHARTHA COLLEGE OF
PHARMACEUTICAL SCIENCES
VIJAYAWADA-520 010.

Current Neuropharmacology, 2021, 19, 1545-1559

REVIEW ARTICLE

# 5-$HT_3$ Receptor Antagonism: A Potential Therapeutic Approach for the Treatment of Depression and other Disorders

Shvetank Bhatt[1,*], Thangaraj Devadoss[2], Santhepete Nanjundaiah Manjula[3] and Jayaraman Rajangam[4]

[1]Amity Institute of Pharmacy, Amity University Madhya Pradesh, Gwalior-474005, India; [2]Department of Pharmaceutical Chemistry, K. V. S. R. Siddhartha College of Pharmaceutical Sciences, Siddhartha Nagar, Vijayawada, Andhra Pradesh-520010, India; [3]Department of Pharmacology, JSS College of Pharmacy, Mysuru, JSS Academy of Higher Education & Research [JSSAHER], Mysuru-570015, India; [4]Department of Pharmacology, Sree Vidyanikethan College of Pharmacy – Tirupati-517 501, Andhra Pradesh, India

**Abstract:** ***Background***: Depression or Major depressive disorder (MDD) is a prolonged condition of sadness. MDD is the most common mental disorder that affects more than 264 million people worldwide. According to the monoamine hypothesis, serotonin (5-hydroxy tryptamine, 5-HT), dopamine (DA) and norepinephrine (NE) are the major neurotransmitters (NTs) involved in depression.

***Methods***: The methodology adopted for writing this review article is essentially based on the secondary literature search through a systematic literature review. This review mainly focussed on the role of 5-$HT_3$ receptor antagonists (5-$HT_3$RA) in depression and comorbid disorders like anxiety.

***Results***: Out of three major NTs mentioned above, serotonin has a predominant role in the pathophysiology of depression. The serotonin type-3 receptors (5-$HT_3$R) are well renowned to be expressed in the central nervous system (CNS) in regions which have significance in the vomiting reflex, perception of pain, the reward system, cognition, depression and anxiety control. 5-$HT_3$R are the receptors of serotonergic family that belong to ligand-gated ion channel. 5-$HT_3$RA inhibit the binding of serotonin to postsynaptic 5-$HT_3$R and increases its availability to other receptors like 5-$HT_{1A, 1B}$ and $_{1D}$ as well as 5-$HT_2$ receptors and produces anti-depressant-like effect. 5-$HT_3$RA also have an important role in mood and stress disorders. Some of the studies have shown the effectiveness of these agents in stress disorder.

***Conclusion***: The present article focussed on the role of 5-$HT_3$R and their antagonists in the treatment of depression and anxiety. Further studies are warranted to prove their efficacy with respect to other standard anti-depressants.

ARTICLE HISTORY

Received: June 25, 2020
Revised: September 11, 2020
Accepted: October 10, 2020

DOI: 10.2174/1570159X18666201015155816

CrossMark

**Keywords:** Co-morbid, depression, ion channel, serotonin, 5-$HT_3$ receptors, cognition.

## 1. INTRODUCTION

According to the latest report from the World Health Organization (WHO), MDD is the most common mental disorder that affects more than 264 million people worldwide [1]. The diagnostic and statistical manual for mental disorder-IV (DSM-IV) has given nine symptoms for assessment of depression. Out of these nine symptoms, if any five are present for more than 2 weeks, then the patient is said to be depressed, however, warrants further confirmation [2, 3]. The hormones like estrogen and progesterone may modulate the functioning of 5$HT_3$R as women are more susceptible to be affected with depression as compared to men [4-6].

According to this monoamine, the hypothesis level of three NTs, namely 5-HT, NE and DA, is decreased in depression [7, 8]. In addition, γ-amino butyric acid (GABA) and glutamate also have an important role in the pathophysiology of depression [9]. Moreover, recent studies also relate depression with alterations in the physiology of the brain, neuronal plasticity and reduced volume of the frontal cortex and the hippocampus [10]. Now, genetic involvement in the development of depression has also been identified. Genes such as SLC6A4 (previously known as SERT), DRDR4, SLC6A4 or 5-HTT and $TPH_2$ are also found to have a predominant role in the pathological progression of depression [11]. Various important causes of depression have are in (Fig. 1). Moreover, dysregulation of the hypothalamic-pituitary-adrenal (HPA)-axis and increased oxidative stress also has a predominant role in the development of MDD [12, 13]. Imbalance in antioxidant and oxidant enzyme levels in the bra

* Address correspondence to this author at the Amity Institute of Pharmacy, Amity University Madhya Pradesh, Gwalior-474005, India; Tel: +919414822323; Email: shvetankbhatt@gmail.com

1875-6190/21 $65.00+.00

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

# A Review on Spinal Muscular Atrophy: Its Cause, Diagnosis and Treatment

Vaddeswarapu Rajani[1*], Iswarya Obilineni[2] ,T.Lokeswari naga sai anjana[3] ,T.Vijaya tejaswini[3],G.Vuehitha[3],K.Mounika vinaya sri[3],P.Ganesh[3]

[1] Assistant professor, Nirmala College of Pharmacy, Mangalagiri, Andhrapradesh, India- 522503

[2] Assistant professor, KVSR Siddhartha College of Pharmaceutical sciences , Vijayawada, Andhrapradesh, India- 520010

[3]IV/IV B.Pharmacy students, Nirmala College of Pharmacy, Mangalagiri, Andhrapradesh, India- 522503

**Corrresponding Author:**

Vaddeswarapu Rajani* Email address: rajani.vaddeswarapu@gmail.com

**Abstract:**

The spinal muscular atrophy is considered as one of the familiar autosomal recessive disorder. Children suffering from spinal muscular atrophy suffer with diminished ability of normal growing processes like crawling, sitting, walking and controlling head movements. Even if SMA becomes severe, it may lead to damage of muscles helpful in breathing and swallowing which life is threatening. It was found that SMA occurs due to improper production of SMN (the survival motor neuron protein). The mutations on SMN1 and SMN2 gene are responsible for the improper production of SMN protein. The deletion of SMN1 gene is regarded as the primary level diagnostic test. Other conformation tests are electromyogram and Multiplex ligation-dependant probe amplification (MLPA) test. Treatment of SMA was done initially by using drugs like Quinozoline derivatives, aminoglycosides and neuroprotective drugs. However, these drugs increased the life span of SMA patients but could not offer relief from the disease. Hence, gene therapy came in to focus and found useful in the treatment of SMA. Currently used 3 forms of gene therapy are Nusinersen (Spinraza), Onaswmnogene abeparvovec – xioi (Zolgensma) and Risdiplam (Evrysdi). Stem cell therapy is used which involves the transplantation of stem cells.

**Keywords:** Evrysdi, Multiplex ligation-dependant probe amplication, Nusinersen, Risdiplam, Spinal muscular atrophy, Survival motor neuron protein.

## 1. Introduction:

Spinal muscular atrophy is the disorder that affects neurons and muscles which occurs due to alpha motor neurons degeneration of spinal cord that finally leads to muscle weakness and paralysis[1]. Children suffering from spinal muscular atrophy suffer with diminished ability of normal growing processes like crawling, sitting, walking and controlling head movements[2]. Even if SMA becomes severe, it may lead to damage of muscles helpful in breathing and swallowing[3].

### 1.1 Types of SMA:

**1.1.1 SMA type 0:** It is the rare and severe type of SMA which results in joint deformities and weak muscle tone of babies[4]. Due to weak muscle tone, the affected foetus cannot move freely in the womb itself[5]. The respiratory muscle tone is also very week in the affected infants[6]. These patients also seem to have congenital heart defects[7].

**1.1.2 SMA type I:** It is the most commonly occurring SMA and it is also called as Werdnig-Hoffmann disease. This type of SMA can be identified at birth time or first few months of their life. The affected children have swallowing problems which leads to feeding difficulties further leading to improper growth. The affected child also faces the problem in controlling their head movements and they cannot sit unassisted[8]. They also have bell shaped chest which does not allow their lungs to expand properly which leads to respiratory failure[9]. SMA type I is classified in to 3 groups based on the severity of clinical manifestations. They are i) severe weakness and head control is not possible, ii) weakness occurs after birth within 2 months and head control is not possible iii) severe weakness is seen but head control is possible[10].

1.1. **3 SMA type II:** It is also referred as Dubowitz disease. This disease develops in children at an age group of 6 to 12 months. At first, children affected with that disease can sit without assistance. At later stages in childhood, the patients require support to sit; these children cannot stand or walk without support. These children have curves in spinal cord which is termed as scoliosis, tremors and respiratory muscle weakness which is life-threatening[11]. On an average, the lifespan of individuals suffering with this condition is 20-30years.

**1.1.4 SMA type III:** It is also referred as Kugelberg-Welander disease[12]. In this condition, the patients can stand and walk without assistance, but during later stages of life, the patient needs wheel chair assistance[13]. These patients are having normal life expectancy as that of healthy individuals[14].

**1.1.5 SMA type IV:** it is a rare condition where the patient suffers from mild muscle weakness[15], tremors and mild respiratory problems[16]. These patients are having normal life expectancy as that of healthy individuals[17].

**Table 1:** Types of SMA occurring due to mutations of SMN gene

**Journal of Cardiovascular Disease Research**

ISSN: 0975-3583, 0976-2833 VOL 12, ISSUE 04, 2021

# RARE DISEASE CASE REPORT- MICROCEPHALY

**K.R.V.S.Hymavathi[1], Srikala kamireddy[2] ,Iswarya Obilineni[3] ,A.G.N.Harshitha devi[4], V.Jyothi[5],S.Venkatesh[6], MD.Rafi[7]**

,Nirmala college of pharmacy, Atmakuru, Mangalagiri,AP,India-522503.

[1]Pharm – D student, Nirmala College of pharmacy, Atmakuru, Mangalagiri, AP,India-522503

[2]Assistant professor, Department of Pharmaceutics, Nirmala College of pharmacy, Atmakuru, Mangalagiri.

[3]Assistant professor, Department of pharmacology, KVSR Siddhartha College of pharmaceutical sciences, Vijayawada

[4,5,6,7]PharmD students, Nirmala College of pharmacy, Atmakuru, Mangalagiri.

*Corresponding Author:K.R.V.S.Hymavathi

Student I Pharm D Nirmala college of pharmacyAtmakuru, Mangalagiri, AP, India-522503

Email: swaroopsaipada@gmail.com

Mobile no:9494224239.

**ABSTRACT:**

Microcephaly is a rare disorder[01]. We report on 8-year old girl who was being suffering with the Microcephaly was admitted in the hospital with chief complaints and the observed symptoms to admit in the hospital are "Seizures" and "Squint" and not even having a stable vision on any of the particular object. Microcephaly can be caused due to the neurodevelopmental problems which is phenotype in the patients, often genetic causes. Microcephaly can also be defined as lower occipitofrontal than the third percentile or more than two standard deviations below the mean for sex, age and ethnicity. Patients who were being suffering with this disease can have the various neurological manifestations, psychomotor problems, delayed developments, and epilepsy which are frequently shown by the affected patients and also, accompanied by the facial dysmorphism and also affects the major organs present in the body.

Congenital microcephaly is present at birth, whereas postnatal microcephaly occurs later in life[10]. Genetic abnormalities, syndromes, metabolic disorders, infections, prenatal, perinatal, and postnatal injuries[7,9]can cause both congenital & postnatal microcephaly[2].

Neuroimaging with magnetic resonance imaging (MRI) is often the first diagnostic test in evaluating children with microcephaly. Microcephaly is a lifelong condition with no known cure. The prognosis is usually worse for children who experienced an intrauterine infection. Microcephaly has become much more prevalent in the news and scientific community with the recent emergence of Zika virus as a cause of congenital[3].

The major aim of this case report is to present a typical case of this condition, to bring awareness on several diagnostic options and little in treatment too, and to advocate referral a neurologist given its potential severity. There were less treatment opportunities have been found for this condition. Medication, diet, speech or counselling tends to help the patient to improve their activeness or responding to the particular work.

**Keywords:**

Zika virus,Brain development,Microcephaly,Magnetic resonance imaging(MRI),Congenital microcephaly

Occipitofrontal circumference