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PATENTS

- ✓ Daud Anwar, Sapkal Nidhi, Bonde Minal. Thin Film Formulations of 4-Diphenylmethyl-1-Piperazine Derivatives and Their Salts. Indian Patent no. 466750. Date of grant: 7.11.2023
- ✓ Dr. Nidhi Sapkal were co-inventor of the granted Indian patent entitled, "Pharmaceutical Microemulsion Immobilized In A Thin Polymer Matrix And Methods Of Making Them; (Patent No. 546778 on 31/07/2024).
- ✓ Dr. Nidhi Sapkal were co-inventor of the granted Indian patent entitled, "Water Soluble Pharmaceutical Film With Enhanced Stability; (Patent No. 526043 on 14/03/2024).
- ✓ Dr. Nidhi Sapkal were co-inventor of the granted Indian patent entitled, "Improved Mucosal Delivery Of Vitamin B12; (Patent No. 525982 on 14/03/2024).
- ✓ Dr. Vaishali Kilor and Dr. Nidhi Sapkal were co-inventor of the granted Indian patent entitled, "Composition Of Active Ingredient Loaded Edible Ink And Methods Of Making Suitable Substrates For Active Ingredient Printing On Orodispersible Films; (Patent No. 515171 on 26/02/2024).
- ✓ Dr. Nidhi Sapkal were co-inventor of the granted Canadian patent entitled, "Water Soluble Pharmaceutical Film With Enhanced Stability; (Patent No. 2927334 on 29/08/2023).

RESEARCH PROJECTS

- ✓ Gurunanak College of Pharmacy completed its DST-SERB project successfully. The project was for the development of medicine printing technology, and it was granted under the IRRD scheme of SERB, Govt. of India. The expert review committee rated the project as "very good" with grade 8.1/10. During this project, a scale-up model of the printing machine was developed that can print the medicine loaded films in the industrial set up. The scale-up model was installed at Zim Laboratories Limited. The sanctioned project cost was 67 lakhs. Dr. Nidhi Sapkal and Dr. Vaishali Kilor were the principal investigators of this project.
- ✓ Rashtrasant Tukadoji Maharaj Nagpur University, through the University Research Project Scheme, has granted financial assistance of Rs. 3,00,000/- (Three Lakh only) on 30th March 2024, for the research project titled "Development of a novel multicomponent formulation for the treatment of neurodegenerative diseases," spanning two years from April 2024 to March 2026. Dr. S. K Arora and Dr. N. P Sapkal are working as Principal investigator and Co-investigator respectively.

BOOK CHAPTER

- ✓ **Vaishali Kilor**, Vipin Dhote, **Nidhi Sapkal** and Shagufta Khan “Targeted breast cancer treatment: progress and challenges” in Nanotechnology Principles in Drug Targeting and Diagnosis edited by Dr. Mahendra Rai, Dr. Shagufta Khan, Dr. Aarti Belgamwar. Elsevier; 1st edition - July 26, 2023; ISBN: 978-0-323-91763-6; eBook ISBN: 978-0-323-98348-8.

RESEARCH PUBLICATIONS

- ✓ Sapan Shah, Dinesh Chapple, Vijay H Masand, Magdi E A Zaki, Sami A Al-Hussain, Ashish Shah, **Sumit Arora**, Rahul Jawarkar, Mohammad Tauqeer. In silico study to recognize novel converting enzyme-I inhibitors by 2 D QSAR and constraint based molecular simulations. Journal of Biomolecular structure and Dynamics, 42(5); 2024; 2211-2230. doi: 10.1080/07391102.2023.2203261. Scopus, Web of Science
- ✓ Pranali Y. Umredkar, Vijay M. Tangde, Niraj T. Khaty, Samiksha S. Yelekar, **Nidhi Sapkal**, Sudhakar S. Dhondge. Unraveling the Solvation Behavior of Levocetirizine Dihydrochloride: Insights from Volumetric, Acoustic, Viscometric, and Electronic Absorption Studies in Aqueous L-Proline and L-Valine Solutions. Journal of Chemical & Engineering Data, 69(3), 2024, 915–932. Scopus
- ✓ Aayushi Yelgurwar, Chhavi Rahangdale, Divyani Dahake, Harshada Borekar, **Mitali Bodhankar**. Use Of Potato and Curry Leaves for Anti-Ageing Cream. Int. J. of Pharm. Sci., 2024, 2 (6), 623-633. <https://doi.org/10.5281/zenodo.11609456>. Google Scholar
- ✓ S. G. Khudare, **S. R. Yende** and **N. P. Sapkal**. Determination of total phenolic and total flavonoid contents of Jasminum grandiflorum Lin. GSC Advanced Research and Reviews, 2023, 17(01), 088–095. Google scholar
- ✓ V. J. Tiwari and **A. M. Ittadwar**, Semantic Study of Sanskrit Names of Indian Medicinal Plants. Bulletin of Regional Natural History (BORNH). 2024, 4, 16-24. <https://doi.org/10.6093/2724-4393/10948>

RESEARCH PRESENTATIONS

- ✓ Priya Dule, Vaishali Kilor, Nidhi Sapkal. The Application of Quality by Design (QBD) Approach in the formulation and Optimization of oral Films. ISBN :978-81-966001-4-3; Conference proceedings of the International Conference on Recent Advances in Science, Technology, Engineering, Management and Social Science (RASTEMS-2023 Online); organised by New Research and Innovation Society in association with Addis Ababa Science and Technology University, Biotechnology and Bioprocess Centre of Excellence, Ethiopia and Karpaga Vinayaga College of Engineering and Technology, Chengalpattu,

India held during, 06-08, October, 2023.

- ✓ Abhijeet Shinde, Ashika Rewatkar, Vaishali Kilor. International Conference and workshop on “Regulatory Milestones in Drug Development and Advancing Paediatric Drug Development in South Asia” organized by SAC-ACCP and VNS College of Pharmacy, Bhopal on 21st and 22nd July 2023.
- ✓ Apurva Fasate, Vaishali Kilor. International Conference and workshop on “Regulatory Milestones in Drug Development and Advancing Paediatric Drug Development in South Asia” organized by SAC-ACCP and VNS College of Pharmacy, Bhopal on 21st and 22nd July 2023.
- ✓ Abhijeet Shinde, Ashika Rewatkar, Vaishali Kilor. Annual Conference on “Role of Clinical Pharmacology in the Development of Transformative Medicine in This Era of Digital and Artificial Intelligence Technologies” organized by SAC- American College of Clinical Pharmacology from 4th-6th Jan. 2024 at Hyderabad
- ✓ Apurva Fasate, Vaishali Kilor. at Annual Conference on “Role of Clinical Pharmacology in the Development of Transformative Medicine in This Era of Digital and Artificial Intelligence Technologies” organized by SAC- American College of Clinical Pharmacology from 4th-6th Jan. 2024 at Hyderabad
- ✓ Kunjan Faye, Subhash Yende presented paper on To investigate antiarthritic activity of diosmine at INNOVATE 2024 organized by BITS Pilani on 07/03/24 to 09/03/2024.
- ✓ Kunjan Faye, Subhash Yende presented paper titled Anti oral ulcer activity of Jasmin on rat at national seminar on Rasabhishak 2024: formulation to prescription, Organized by Govt. Ayurved College, Nagpur on 24/02/2024 and 25/02/2024.



Nanotechnology Principles in Drug Targeting and Diagnosis

Micro and Nano Technologies

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Chapter 7 - Targeted breast cancer treatment: progress and challenges

Vaishali Kilor¹, Vipin Dhote², Nidhi Sapkal¹, Shagufta Khan³

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Abstract

Breast cancer affects a large population having wide physical and emotional implications. As per current understanding of biological targets, it has been classified into hormone receptor-positive, human epidermal growth factor receptor 2 overexpressing (HER2+), and triple-negative breast cancer. The therapeutic spectrum for the varied breast cancer incidences is ever-evolving, and multiple biological agents target the critical molecular targets. However, not all therapeutic interventions are devoid of adverse effects. To treat the patient without deteriorating the already compromised physiological state is the need of the hour. Herein, we discussed the advances in drug delivery systems for the therapeutic agents and tried to shed light on the techniques that are instrumental in reducing the adverse effects associated with the current treatment of breast cancer. Development and application of the novel delivery system for existing effective biological or chemical agents could provide an edge over conventional therapeutics.

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**THE APPLICATION OF QUALITY BY DESIGN (QBD) APPROACH IN THE
FORMULATION AND OPTIMIZATION OF ORAL FILMS**

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Abstract

Oral films are more flexible and comfortable than other drug delivery systems. Pharmaceutical dosage development using inkjet printing is innovative and customizable. Solid precipitation was examined in stability studies of water-soluble drugs like ketorolac tromethamine. To solve this challenge, pneumatic inkjet printers were used for 2D drug printing. Quality by Design (QbD) using inkjet printing enhanced Ketorolac's formulation. The substrate and ink formulations were optimized using a 2-level factorial design and a central composite design model. The substrate was optimized by screening formulation parameters such as HPMC, PG, and Glycerin. This evaluation examined disintegration time, thickness, and tensile strength percentage. The study examined how HPMC and PG affect ink base viscosity optimization. Both model p-values were less than 0.1, confirming the statistical significance of the constructed model. Solvent casting produced the substrate, which was tested for physicochemical properties. Drug-loaded ink was printed on an enhanced placebo substrate using a modified inkjet printer. Physicochemical and analytical properties of optimized ketorolac-loaded printed oral thin film were evaluated. Average weight fluctuation, thickness, folding durability, surface pH, moisture content, tensile strength percentage, and disintegration time were measured. The parameters were in the optimal range. The HPLC technique determined the printed product's assay at 96.57%. This suggests the drug was stable in its printed form without precipitation.

Keywords: Oral Thin films, Ketorolac, QbD, Printing

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In silico study to recognize novel angiotensin-converting-enzyme-I inhibitors by 2D-QSAR and constraint-based molecular simulations

Sapan Shah^a, Dinesh Chapple^a, Vijay H. Masand^b, Magdl E.A. Zakl^c, Sami A. Al-Hussain^c, Ashish Shah^d, Sumit Arora^e, Rahul Jawarkar^f and Mohammad Tauqeer^g

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ABSTRACT

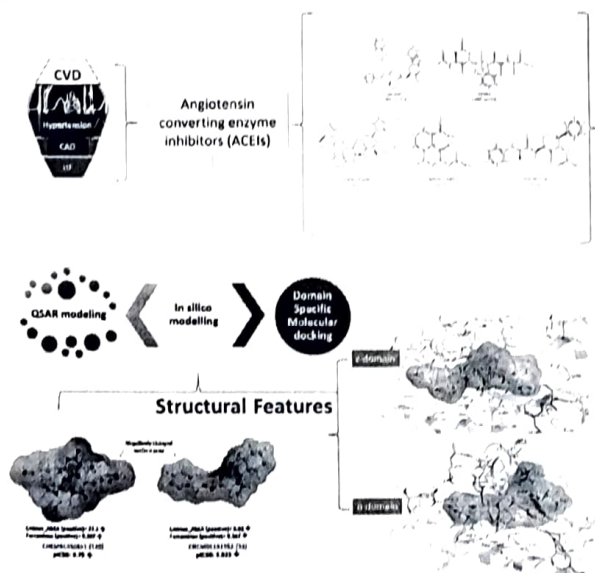
Cardiovascular diseases (CVD) such as heart failure, stroke, and hypertension affect 64.3 million people worldwide and are responsible for 30% of all deaths. Primary inhibition of the angiotensin-converting enzyme (ACE) is significant in the management of CVD. In the present study, the genetic algorithm-multiple linear regressions (GA-MLR) method is used to generate highly predictive and statistically significant ($R^2 = 0.70-0.75$, $Q^2_{LOO} = 0.67-0.73$, $Q^2_{LMO} = 0.66-0.72$, $CCC_{ex} = 0.70-0.78$) quantitative structure-activity relationships (QSAR) models conferring to OECD requirements using a dataset of 255 structurally diverse and experimentally validated ACE inhibitors. The models contain simply illustratable Padel, Estate, and PyDescriptors that correlate structural scaffold requisite for ACE inhibition. Also, constraint-based molecular docking reveals an interaction profile between ligands and enzymes which is then correlated with the essential structural features associated with the QSAR models. The QSAR-based virtual screening was utilized to find novel lead molecules from a designed database of 102 thiadiazole derivatives. The Applicability domain (AD), Molecular Docking, Molecular dynamics, and ADMET analysis suggest two compound D24 and D40 are inflexibly linked to the protein binding site and follows drug-likeness properties.

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Cardiovascular diseases; angiotensin-converting enzyme inhibitors; QSAR; validation; molecular docking; structural features



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Unraveling the Solvation Behavior of Levocetirizine Dihydrochloride: Insights from Volumetric, Acoustic, Viscometric, and Electronic Absorption Studies in Aqueous L-Proline and L-Valine Solutions

Pranali Y. Umredkar, Vijay M. Tangde,* Niraj T. Khaty, Samiksha S. Yelekar, Nidhi Sapkal, and Sudhakar S. Dhondge

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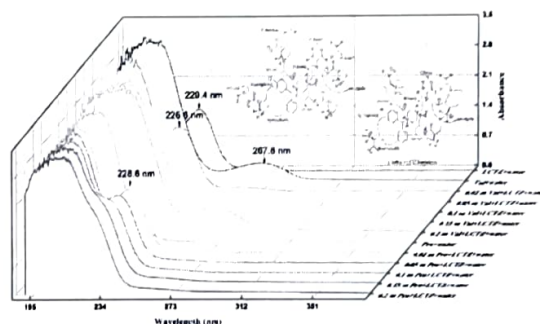
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Supporting Information

ABSTRACT: The present article delves into the solvation behavior of levocetirizine dihydrochloride (LCTZ) in aqueous environments, thoroughly examining its interactions with two primary amino acids, L-proline and L-valine. This study spans the entire human body temperature range of 288.15–318.15 K, shedding light on the molecular dynamics and properties of LCTZ in the presence and absence of these amino acids. The investigation explores the volumetric, acoustic, viscometric, and electronic absorption properties of the system, along with extensive calculations of various thermodynamic and transport parameters of significance. The preponderance of hydrophobic associations of LCTZ with the water structure along with the dominant amino acid–LCTZ interaction surfaces out of the volumetric analysis, wherein viscometric and compressibility studies offer further support to the speculation. In the same vein, the sign of the temperature derivative of the *B* coefficient as well as that of Hepler's constant underscores the chaotropic trait of studied molecules. The research thus contributes to a comprehensive understanding of intricate associations between LCTZ and the amino acids, unveiling the plausible intermolecular phenomenon for potential applications in drug delivery platforms. In this investigation, an attempt has been made to fill the gap in the existing literature, opening avenues for further research in this area.



1. INTRODUCTION

(*R*)-{2-[4-[(4-Chlorophenyl) phenylmethyl]-1-piperazinyl] ethoxy} acetic acid dihydrochloride, commonly referred to as levocetirizine dihydrochloride (LCTZ), is chemically a carbonylated metabolite of its racemate cetirizine, belonging to the class of piperazine derivatives. With its worldwide exclusivity as the most potent modern-generation histamine H_1 receptor antagonist, it improves the quality of life throughout all therapeutic domains, demonstrating anti-inflammatory/antiallergic traits as well. Notably, it exhibits near-ideal pharmacological and pharmacokinetic characteristics, manifesting minimal propensity for central nervous system side effects associated with antihistamines.¹ Classically, it attenuates the secretion of additional allergenic substances and curbs the augmented blood supply to affected sites by preventing histamine binding to hH_1R sites, offering relief from intermittent and chronic allergic rhinitis, idiopathic urticaria, and typical hay-fever symptoms.² Besides, recent clinical trials have shed light on the synergistic effect of LCTZ when combined with leukotriene receptor antagonist Montelukast

for treating varied aspects of “Long Covid” along with preventing disease progression to a major stage.³

It functions via selective, combative, pseudo-irreversible binding to blood plasma proteins. Studies have shown that at biological pH, LCTZ primarily prevails in the zwitterionic form, with over 90% of the bioavailable drug being fastened to human serum albumin (HSA).⁴ It is thus circulating in the bloodstream either in its freely dissolved state or as a plasma protein-bound complex. Certainly, in the pharmaceutical industry, identification of the target proteins, their binding with the intended drug molecule, and examination of the drug–protein interactions serve as a foundation for drug discovery and are the most important determinants for investigating accumulation and allocation of the drug.⁵ In

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Research Article

Use of Potato and Curry Leaves for Anti-Ageing Cream

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Mitali Bodhankar

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ABSTRACT

Creams are considered an important part of cosmetic product as topical preparations from time immemorial due to their ease of application to the skin and also their removal. From cosmetic purposes, Pharmaceutical creams have a variety of applications such as cleansing, beautifying, altering appearance, moisturizing etc. to skin protection against bacterial, fungal infections as well as healing cuts, burns, wounds on the skin. Skin aging is a complex biological process influenced by a combination of endogenous or intrinsic and exogenous or extrinsic factors. Because of the fact that skin health and beauty is considered one of the principal factors representing overall "well-being" and the perception of "health" in humans, several anti-aging strategies have been developed during the last years. It is the intention of this article to review the most important anti-aging strategies that dermatologists have nowadays in hand, including preventive measurements, cosmetological strategies, topical and systemic therapeutic agents and invasive procedures. Potato contains zinc, sulphur and copper, these are effective as controlling acne, and eliminating toxins from the skin. Potatoes are effective at diminishing premature signs of ageing and lightening of skin because they contains antioxidants and glow inducing vitamin A, B and C. Curry leaves are an important part of spicing up dishes, thus used for garnishing as well as a taste enhancer. Apart from its culinary uses, it has a vast number of therapeutic applications in medicinal as well as cosmetic uses. Curry leaves, biologically named as Murraya koenigii which belongs to family Rutaceae. It has a characteristic aroma. It is an important herb mainly of Asian origin. The present review elaborates the description of curry leaves, its chemical composition and about the bioactive compound β -caryophyllene present in it. β -caryophyllene is a sesquiterpene, it has properties such as inhibition of melanogenesis and can reduce melanin synthesis. Curry leaves cream is formulated for the purpose of reduction of dark spots due to presence of β -caryophyllene present in curry leaves.

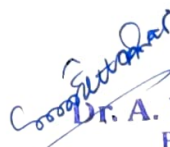
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Semantic Study of Sanskrit Names of Fifteen Indian Medicinal Plants

Vijay J Tiwari¹ and Abhay M Ittadwar²

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Abstract

The purpose of the study is to analyze the semantic motivation of Sanskrit names of Indian Medicinal Plants therefore it is essential to know true literary meanings of names and their indication about pharmacological and medicinal uses of plants. Ancient herbalist and Ayurveda practitioners have studied the medicinal properties of plants and accumulated information about their uses through the process of long term cognitive and transformative activities. As a result vast amount of information about ancient uses of plants is available in Ayurveda. Keeping these views in mind semantic study of Sanskrit names of 15 Indian medicinal plants have been undertaken to find out rationale behind these names and decipher their hidden meanings.

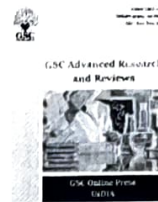
Keywords: Semantic Study, Rationale, Sanskrit Names, Indian Medicinal Plants, Pharmacology

Riassunto

Lo scopo dello studio è quello di analizzare la motivazione semantica dei nomi sanscriti delle piante medicinali indiane: è essenziale conoscere i significati letterari dei nomi e le loro indicazioni sugli usi farmacologici e medicinali delle piante. Gli antichi erboristi e i praticanti dell'Ayurveda hanno studiato le proprietà medicinali delle piante e hanno accumulato informazioni sui loro usi attraverso un processo di attività cognitiva e trasformativa a lungo termine. Di conseguenza, in Ayurveda è disponibile una grande quantità di informazioni sugli antichi usi delle piante. Tenendo conto di questi punti di vista, è stato intrapreso uno studio semantico dei nomi sanscriti di 15 piante medicinali indiane per scoprire la logica alla base di questi nomi e decifrarne i significati nascosti.

Review

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(RESEARCH ARTICLE)



Determination of total phenolic and total flavonoid contents of *Jasminum grandiflorum* Lin

Samiksha ghanshyam khudare *, Subhash R. yende and Nidhi P. sapkal

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Abstract

The current study was focused on the standardization & validation of hydroalcoholic extract of *Jasminum grandiflorum* (JG). *Jasminum grandiflorum* Linn. Belonging to family Oleaceae is a well-known medicinal plant. It is an Ayurveda (herbal) medicinal plant. This review is to give comprehensive information on the chemical constituents and medicinal importance of *Jasminum grandiflorum*. It is commonly known as Chameli in Hindi. The process such as which involved the morphological, microscopical, and physical evaluation. Quantitative determination of phenols and flavonoid in *Jasminum grandiflorum* hydroalcoholic extract was carried out using chromatographic methods.

Keyword: *Jasminum grandiflorum*; Extraction; Phenols; Flavonoids

1. Introduction

Standardization of drugs means confirmation of its identity and determination of its quality and purity detection of nature of adulterant by various parameters like morphological, physical, chemical and biological observation. (Kumari, Rajesh, and Mita Kotecha *et al*, 2016).

Validation of an analytical method is the process by which it is established, by laboratory studies, that the performance characteristics of the method meet requirements for the intended analytical applications. The process confirm that the analytical procedure employed for a specific test is suitable for intended use and that they support the identity, quality, purity of the drug substances and drug products. (Gupta, 2015).

Jasminum grandiflorum commonly known as Royal Jasmine, is a highly fragrant flowering plant native to South Asia. The plant has been traditionally used for its therapeutic properties and its essential oil is extracted and used in perfumes, soaps, and other cosmetic products. In recent years, the photochemistry and therapeutic potential of *J. grandiflorum* has been extensively studied, revealing its wide range of applications in modern medicine.

In addition to its photochemistry properties, *J. grandiflorum* has also been found to have various therapeutic effects on the body. The plant has traditionally been used to treat a range of conditions, including anxiety, depression, and insomnia, and recent research has confirmed these traditional uses.

Jasminum grandiflorum Linn. Belonging to family Oleaceae is a well-known medicinal plant. It is an Ayurveda (herbal) medicinal plant. This review is to give comprehensive information on the chemical constituents and medicinal importance of *Jasminum grandiflorum*. It is commonly known as Chameli in Hindi. (Padmaa Paarakh, and P. M. Paarakh *et al*. 2009).

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