



Source details

Research Journal of Pharmacy and Technology

Scopus coverage years: 1997, 2005, from 2011 to 2022

Publisher: A and V Publication

ISSN: 0974-3618 E-ISSN: 0974-360X

Subject area: Pharmacology, Toxicology and Pharmaceutics: Pharmacology, Toxicology and Pharmaceutics (miscellaneous)

Medicine: Pharmacology (medical)

Source type: Journal

CiteScore 2021

1.3



SJR 2021

0.234



SNIP 2021

0.618



[View all documents >](#)

[Set document alert](#)

[Save to source list](#)

[CiteScore](#) [CiteScore rank & trend](#) [Scopus content coverage](#)

Improved CiteScore methodology

CiteScore 2021 counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters and data papers published in 2018-2021, and divides this by the number of publications published in 2018-2021. [Learn more >](#)

CiteScore 2021

$$1.3 = \frac{4,996 \text{ Citations 2018 - 2021}}{3,865 \text{ Documents 2018 - 2021}}$$

Calculated on 05 May, 2022

CiteScoreTracker 2022

$$1.2 = \frac{4,646 \text{ Citations to date}}{3,750 \text{ Documents to date}}$$

Last updated on 05 January, 2023 • Updated monthly

CiteScore rank 2021

Category	Rank	Percentile
Pharmacology, Toxicology and Pharmaceutics	#13/30	58th
Pharmacology, Toxicology and Pharmaceutics (miscellaneous)		
Medicine	#180/255	29th

[View CiteScore methodology >](#) [CiteScore FAQ >](#) [Add CiteScore to your site](#)



Published with Hindawi

Math, Eng., & Comp. Sci. Articles Are Peer Reviewed, Open Access Ar Available Online

Hindawi

Research Journal of Pharmacy and Technology

COUNTRY	SUBJECT AREA AND CATEGORY	PUBLISHER	H-INDEX
India 	Medicine Pharmacology (medical) Pharmacology, Toxicology and Pharmaceutics Pharmacology, Toxicology and Pharmaceutics (miscellaneous)	A and V Publication	47
PUBLICATION TYPE	ISSN	COVERAGE	INFORMATION
Journals	0974360X, 09743618	1997, 2005, 2011-2021	Homepage How to publish in this journal editor.rjpt@gmail.com

SCOPE

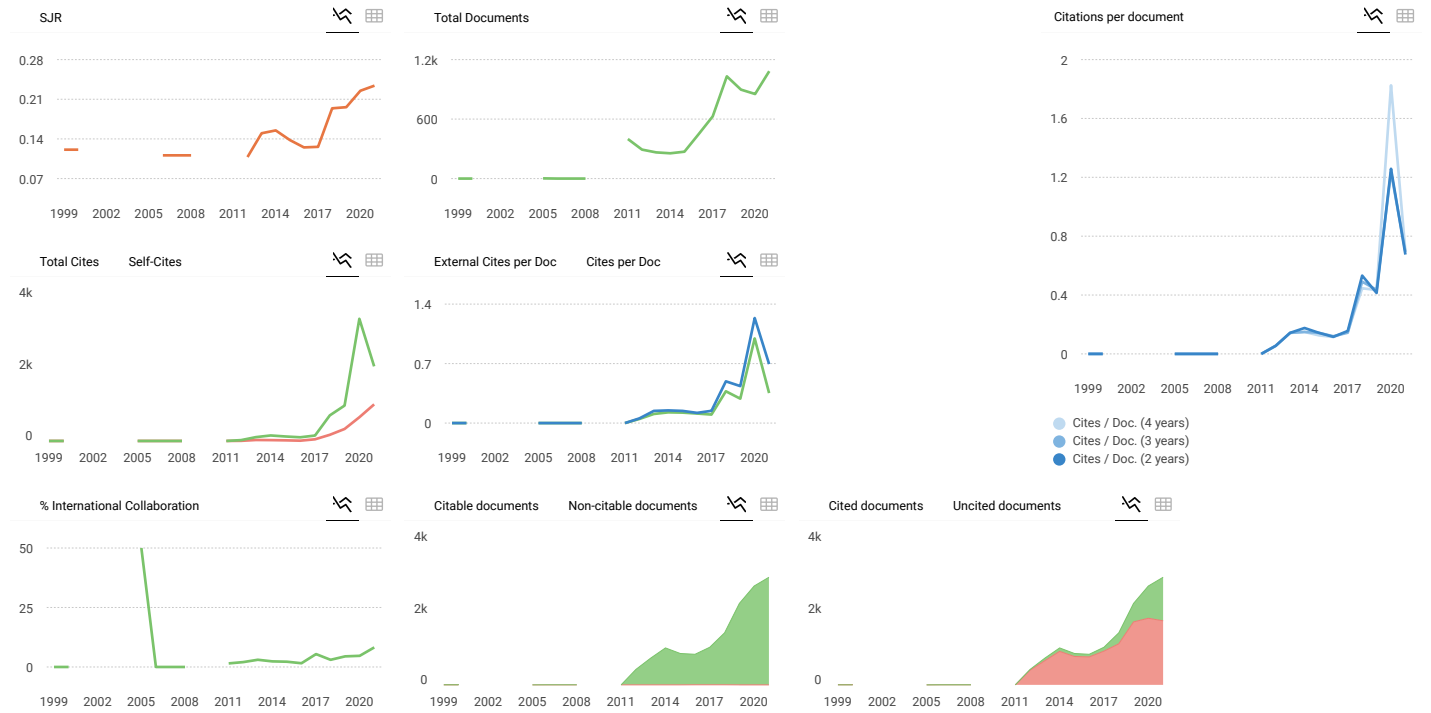
Research Journal of Pharmacy and Technology (RJPT) is an international, peer-reviewed, multidisciplinary journal, devoted to pharmaceutical sciences. The aim of RJPT is to increase the impact of pharmaceutical research both in academia and industry, with strong emphasis on quality and originality. RJPT publishes Original Research Articles, Short Communications, Review Articles in all areas of pharmaceutical sciences from the discovery of a drug up to clinical evaluation. Topics covered are: Pharmaceutics and Pharmacokinetics; Pharmaceutical chemistry including medicinal and analytical chemistry; Pharmacognosy including herbal products standardization and Phytochemistry; Pharmacology; Allied sciences including drug regulatory affairs, Pharmaceutical Marketing, Pharmaceutical Microbiology, Pharmaceutical biochemistry, Pharmaceutical Education and Hospital Pharmacy.

Join the conversation about this journal

FIND SIMILAR JOURNALS

options

<p>1 International Journal of Research in Pharmaceutical IND</p> <p>47% similarity</p>	<p>2 Journal of Applied Pharmaceutical Science IND</p> <p>44% similarity</p>	<p>3 Indian Journal of Pharmaceutical Sciences IND</p> <p>43% similarity</p>	<p>4 Brazilian Journal of Pharmaceutical Sciences BRA</p> <p>41% similarity</p>	<p>5 Turkish Journal of Pharmaceutical Sciences TUR</p> <p>40% similarity</p>
--	--	--	---	---



Research Journal of Pharmacy and Technology

Pharmacology (medical)

Q3 best quartile

SJR 2021 0.23

powered by scimagojr.com

Show this widget in your own website

Just copy the code below and paste within your html code:

`https://www.scimagojr.com`

SCImago Graphica

Explore, visually communicate and make sense of data with our **new data visualization tool**.

Fast Journal publication

ugc listed journals

ugc care journal policy how to publish paper with free of cost publication journal

ijcrt.org

OPEN

Metrics based on Scopus® data as of April 2022



CONTENT

- **A Computational approach in identifying the herbal compounds as Lactation inducer**
Jeyabaskar Suganya, G. Rajesh Kumar, Mahendran Radha, Sagolsem Mandaly Devi 3345
- **Effect of Administration of Sea Cucumber (*Phyllophorus sp.*) extract on the pain response of Mice (*Mus musculus*) Induced by Acetic Acid**
I Gusti Made Baskara Teragnya Mahaputra, Lestari Dewi, Sihning E. J. T., Dora Dayu Rahma Turista, Arif Nur Muhammad Ansori 3351
- **Cytotoxicity and Promising Anti-Biofilm of *Curcuma* Silver Nanoparticles against *Candida albicans***
Amr A. El-Waseif, Ghada S. Abd El-Ghani, Sabah A. Abo El maaty, Mervat G. Hassan 3355
- **N-Ethyl-N-Nitrosourea (ENU) induced Osteoporosis in Rats by inducing mutation in Collagen Type 1 protein—A Novel Method Development**
M. Mayuri, B. Pushpa Kumari, M. Kishore Babu, M. Hima Saila, Sk. Niha Faiz, D. Ranganayakulu 3360
- **Evaluation of Nootropic activity of *Bacopa monnieri* and *Convolvulus pluricaulis* herbs extracts with Panchagavya ghrita**
Rasmita Jena, Diptirani Rath, Monalisa Rout, Sovan Pattanaik, Durga Madhab Kar 3365
- **Bioactive Composition Analysis using HPLC-UV Profile and Evaluation of Antioxidant activities of different extracts from Aerial parts of *Atractylis aristata* batt.**
Asma Abid, Messaouda Dekmouche, Lazhar Bechki, Kamilia Bireche, Hakim Belkhalifa, Abdeldjabbar Messaoudi, Mohamed Lakhder Belfar 3370
- **Prevalence of Oral mucosal lesion in patients with Tobacco related habits among Chidambaram population – A Cross-sectional study**
Reethu Ravichandiran, J. Venkatesh, A. John William Felix, K. Ramya 3377
- **Design, Molecular Docking Studies, Synthesis and Characterization of some New 4,5-dihydro-1H- Pyrazole-1-yl acetate Derivatives as Cyclooxygenase Inhibitors**
Shahlaa Zuhair Abdul-Majeed, Monther Faisal Mahdi, Suhad Faisal Hatem Al-Mugdadi 3382
- **Green Synthesis of Silver Nanoparticles from *Solanum Lycopersicum* L. - Catalytic effect in Decolorisation of Bromocresol green and Congo Red**
Sandra Santa Horta, N. Agnel Arul John, S. Parijatham Kanchana 3391
- **Formulation Design and Evaluation of Ornidazole Microsphere in a Bioadhesive gel for Local Therapy of Vaginal Candidiasis**
Shajan Abraham, Vijayan K., Sherin Koshy, Namitha Navas, Steffy P. Raju, Shahana S., Elessey Abraham, Beena P. 3396
- **Prevalence of Insomnia among university students in the United Arab Emirates**
Farah Hamad Farah Ahmed, Aya El Sayed Shawky, Zainab Kasem Al Sarraf 3401
- **Assessment of Upper Respiratory Tract Diseases Empiric Management in community pharmacies of Sulaymaniyah City, Kurdistan, Iraq**
Bereket Molla Tigabu, Dilan Salam Omer, Mohammed I.M. Gubari, Tarza Jamal Thanoon Siahmansur, Noel Vinay Thomas 3407

●	A Facile Synthesis of Octadecanoic acid [4-(3-phenyl-acryloyl)-phenyl]-amides and their Antimicrobial Activity <i>Shurhovie Tsurho, Prabhakar Maddela</i>	3412
●	Evaluation of Antitubercular activity and Hepatoprotective activity of <i>Aristolochia bracteolata</i> – in vitro study <i>Nivedhitha S, Indumathy R</i>	3417
●	The Mixing of Ethanol Extract of <i>Terminalia catappa</i> L in Transparent Soap Base to maintaining it's the Organoleptic properties, Solid quality and Inhibition of <i>Staphylococcus aureus</i> <i>Munira Munira, Ampera Miko, Muhammad Nasir, Basri A. Gani</i>	3423
●	Study of Short-term toxicity of Cyclophosphamide and Doxorubicin on the Cardiovascular System in women with Breast cancer treated at the center of radiation and chemotherapy at Tishreen University Hospital <i>Rafif Dali, Zeina Hamama, Nader Abdullah</i>	3429
●	Development of the composition and research of soft dosage forms with carbon dioxide extract from <i>Scabiosa ochroleuca</i> L. <i>Maira Zhunussova, Shynar Tursynova, Raisa Abdullabekova, Gulnara Murzalieva, Yokut Karieva, Saule Akhmetova</i>	3434
●	Studies on Drug Compatibility with different Pharmaceutical excipients in Nanoparticle Formulation <i>R. Devi, M. Komala, B. Jayanthi</i>	3443
●	Relationship between the Dose administered and Toxicity level after Acute Oral Exposure to Lupeol and Naringin combination in rats <i>Firoj Alam, Badruddeen, Anil Kumar Kharya, Akhtar Juber, Mohammad Irfan Khan</i>	3447
●	Synthesis, Identification, Thermodynamic and Biological Studies of New Ligand Derivative from L-ascorbic acid and its Complexes with some Metal ions <i>Fawzi Yahya Wadday, Ahmed Ali Hussein</i>	3452
●	Study the effect of biosynthesized gold nanoparticles on the enzymatic activity of alpha-Amylase <i>Rusul Y. Hameed, Israa Nathir, Waleed K. Abdulsahib, Haider Abdulkareem Almashhadani</i>	3459
●	Correlation of Angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers with serum GDF-15 in a group of hypertensive Iraqi patients <i>Roaa Hatem Al Gburi, Raid D. Hashim, Hayder Ahmed Kadhim, Şevki Adam, Haider Abdulkareem Almashhadani</i> ...	3466
●	Evaluation of Anti-ulcer activity of Polyherbal preparation in Ulcerogenic Wistar rats <i>Himani Gupta, Manish Kumar Shakya, Gyanendra Kumar Sharma</i>	3471
●	Status of HBeAg in association with other baseline tests in Iraqi patients with CHB <i>Aya Raed Alheany, Shatha Farouk Abdullah</i>	3475
●	Role of Nacre and Biodentine to Inducing the TGF-β1 in the Dentin Tertiary Formation on the Pulpitis Reversible of <i>Rattus norvegicus</i> <i>Yeamy Agustina Marpaung, Trimurni Abidin, Syafruddin Ilyas, Irwana Nainggolan, Basri A. Gani</i>	3479
●	Phytochemical screening and <i>Invitro</i> Anticancer activity of <i>Lonicera ligustrina</i> leaf extract on Breast and Colorectal carcinoma cell lines <i>Chaganti Sai Sri Rama Chandra Murthy, Arun Kumar Sanapala, Unnam Sambamoorthy, Kasireddy Paul babu, Namratha Sunkara</i>	3485
●	The Role of Liver Function Tests in Monitoring the effect of Enzyme Replacement Therapy in Children with Gaucher Disease <i>Haidar A. Abdulamir, Ameer A A Aldafaay, Ahmed Hamza Al-Shammari</i>	3490
●	The Viability of Collagen Peptide from <i>Osphronemus goramy</i> Fish Scale Extract on Human Gingival Fibroblast <i>Noer Ulfah, Samuel Rehuel Santoso, Lambang Bargowo, Shafira Kurnia, Chiquita Prahasanti</i>	3497
●	Simultaneous Spectrophotometric Estimation of Curcumin and Quercetin in mixture <i>Shaveta Sharma, Vimal Arora</i>	3502
●	Atorvastatin induced liver injury: A Case Series <i>Anjana Sreenivasan, Lekshmpriya KS, Meenu Vijayan, Praveen G Pai</i>	3507

●	The Role of Chitosan-Silver Nitrate Nano Gel to improve the Desensitization of Dentine Hypersensitivity <i>Rina Oktavia, Trimumi Abidin, Harry Agusnar, Basri A. Gani</i>	3511
●	The Distribution of ABO blood groups among type 2 Diabetes mellitus patients with or without Chronic Microvascular Complications <i>Sarah Jaafar Mohammed, Seenaa S. Amin</i>	3518
●	Chemical Constituents of Moringa oleifera Leaves of Ethanol Extract and its Cytotoxicity against Enterococcus faecalis of Root Canal Isolate <i>Cut Soraya, Zulfan M. Alibasyah, Muhammad Nazar, Basri A. Gani</i>	3523
●	Fourier Transform Infrared Spectrophotometry: An Eco-friendly green tool for quantification of Omeprazole in Pharmaceutical formulation <i>Parixit Prajapati, Chandni Chandarana</i>	3531
●	RP - HPLC Method Development and Validation for Simultaneous Estimation of Pyrantel Pamoate, Praziquantel, Febantel in Tablet <i>Bhoomi Dineshkumar Patel, Anamika Mishra, Ankit Chaudhary</i>	3535
●	Technology for Obtaining Dosage Forms (Tinctures, Extracts) from Local Plant Raw Materials and studying their Toxicity <i>Shirin Turzhigitova, Nurtleu Zamanbekov, Yerganat Korabayev, Zhambul Kaziyev, Almas Tuganbay</i>	3540
●	Sorafenib Induced Oxidative Stress in Testicular Tissue of Male Swiss Albino Mice <i>Surekha D. Shetty, Laxminarayana Bairy K., Ashwini Aithal P.</i>	3549
●	Antimicrobial investigation, Formulation and Evaluation of <i>Andrographis paniculata</i> aqueous herbal cream for topical application <i>Avbunudiogba John Afokoghene, Okafo Sinodukoo Eziuzo, Nwobi Chidimma Lynda</i>	3553
●	Effect of Topical H₁-antihistamine on the level of Transforming growth factor beta (TGF-β) and Collagen of Acute wound in animal model <i>Magda Rosalina Hutagalung, David S. Perdanakusuma, Pratidina Wulandari</i>	3559
●	Selection of Suitable Dosage Form in the Treatment and Management for Onychomycosis by Implementing Analytical Hierarchy Process <i>Limce Thampi, Aswani Balakrishnan, Muhsena P M, Sona Grace Nelson, T M Fathima Lulu, Veena Jayan, Gini E.J</i>	3563
●	Phytochemical Analysis and Evaluation of Antimicrobial, Antioxidant, Anti-inflammatory and Antiangiogenic activities of Methanol extract of <i>Urochloa ramosa</i> <i>Abhijith M Singh, N. D. Rekha, Arakere C. Udayashankar, K. Sumana</i>	3571
●	Review on Peptic ulcer and its effective Management and Treatment with Herbals <i>Manisha Bhatti, Divya Dhawal Bhandari, Jitender Singh</i>	3580
●	Antifungal activity of Propolis, Fluconazole and Chlorhexidine against Oral <i>Candida albicans</i> – A Comparative in-vitro Study <i>Nidhi Sharma, Sudhanshu Sanadhya, Ramesh Nagarajappa, Gayathri Ramesh, Debasruti Naik</i>	3589
●	Schiff bases compounds prepared from Phenyl hydrazine as a starting material were Synthesized, Characterized, and their Biological activity was Investigated <i>Nuha Salman Salih, Widad Ibrahim Yahya, Hutham Mahmood Yousif Al-Labban, Ahmed Abduljabbar Jaloob Aljanaby</i>	3595
●	Formulation and <i>In-vitro</i> Antibacterial Activity of Gel containing Ethanolic extract of Purple Sweet Potato Leaves (<i>Ipomoea batatas</i> (L.) Loaded Poly Lactic Co-Glycolic Acid Submicroparticles against <i>Staphylococcus aureus</i> <i>Mardiyanto Mardiyanto, Elsa Fitria Apriani, Muhammad Hafizhaldi Alfarizi</i>	3599
●	Efficacy of Neck Retraction Exercises with Ultrasound Therapy Versus Muscle Energy Technique on patients with Mechanical Neck Pain having Forward Neck Posture using Neck Disability index - A Comparative Study <i>S. Swathi, Shenbaga Sundaram Subramanian, Senthil P, Venkata Ramaiah.valluri, Riziq Allah Mustafa Gaowgzeh, Thamer Ahmad Altaim, Syed Abudaheer Kajamohideen, Mahendran Jayaraman</i>	3606
●	Identification of Chemical Constituents, Chromatographic profiling of PHE (Poly Herbal Extract) of selected Indian Medicinal Herbs and its Antioxidant activity Evaluation <i>P. Manorama, Valmiki Aruna, Gangadhara Angajala, D. Geetha</i>	3611

<ul style="list-style-type: none"> ● Development and Validation of a High-performance Liquid Chromatography Method for Simultaneous Determination of Five Active Compounds in Kleeb Bua Daeng Formula <i>Nittaya Ngamkhae, Yaowared Chulikhit, Orawan Monthakantirat, Juthamart Maneenet, Charinya Khamphukdee, Chantana Boonyarat, Supawadee Daodee</i>..... 	3618
<ul style="list-style-type: none"> ● Stability indicating RP-HPLC Method for Simultaneous estimation of Valsartan and Sacubitril in Pharmaceutical Dosage Form <i>Priyanka Yadav, Hiral Panchal</i>..... 	3627
<ul style="list-style-type: none"> ● Structural and Spectral studies of new mixed Ligand complexes for 2-Amino-4-nitrophenol with some Metallic ions and Evaluation their Biological Activities <i>Shaimaa Ahmad Hassan, Widyan Flayih Hassan</i>..... 	3634
<ul style="list-style-type: none"> ● Synthesis, NMR Study and Antioxidant potency of 3,5-dimethyl-2,6-bis(2,4-dichlorophenyl) piperidin-4-one <i>J. Dineshkumar, P. Parthiban</i>..... 	3641
<ul style="list-style-type: none"> ● Folic Acid Supplementation in Pregnant Mice: An Approach to reduce the Expression of TNF-A and Placental Apoptosis Index in Maternal Stress <i>Ivon Diah Wittarika, Agus Sulistyono, Budi Prasetyo, Lunardhi Susanto, Rize Budi Amalia, Erni Rosita Dewi</i>..... 	3645
<ul style="list-style-type: none"> ● Formulation and Characterization of Mouth Dissolving Films of Amlodipine using Natural Polymer <i>Prateek Kumar, Rajneesh Kumar Gupta</i>..... 	3651
<ul style="list-style-type: none"> ● Influence of RANKL and OPG in Hemophilic arthropathy <i>Yussur Falah Faraj, Fatma Abd Alhamza Obed, Baan Abdulatif Mtashar, Nidal Karim Al-Rahal, Jaafar Hussien Kareem</i>..... 	3656
<ul style="list-style-type: none"> ● Complications of Haemoperitoneum due to Sexual Encounter in Pregnancy: A Case Study <i>Ni Ni Soe, Mon Mon Yee, Khin May Thuang</i>..... 	3659
<ul style="list-style-type: none"> ● Computational Design for The Development of Monomer Selectivity to α-Mangostin in Molecularly Imprinted Polymer <i>Winasih Rachmawati, Aliya Nur Hasanah, Fauzan Zein Muttaqin, Muchtaridi Muchtaridi</i>..... 	3663
<ul style="list-style-type: none"> ● Quantitative determination content for the Residual Organic Solvents in a combined drug based on Jacob's Ladder herbs, motherwort herbs and hawthorn fruit by GC- FID <i>Fadi Hajjar, S. V. Goriainov, O. G. Potanina</i>..... 	3669
<ul style="list-style-type: none"> ● Pre-Clinical Evaluation of Antidepressant and Antioxidant Activities of a Renowned Polyherbal Formulation <i>Afshan Khan, Aisha Siddiqui, M. A Jafri, Divya Vohora, Mohd Asif</i>..... 	3674
<ul style="list-style-type: none"> ● In- vitro Design and Formulation of Levitiracetam Extended-Release Tablets <i>Ch. Taraka Ramarao, Somireddy. Madhuri</i>..... 	3681
<ul style="list-style-type: none"> ● Extraction for Mo(VI), W(VI) and Mn(VII) as Oxyanions by Incorporation Cloud Point with Liquid Ion Exchange Methods <i>Safa Majeed Hameed, Sahar Aqeel Hussain, Alaa J. AL-Khkany</i>..... 	3685
<ul style="list-style-type: none"> ● Substitution of Dragon Fruit Peels on Vitamin C, Water content, and Fiber in Milk Pie to improve human health <i>Latifahtur Rahmah, Arif Nur Muhammad Ansori, Nurul Azizah Choiriyah, Hilda Tjahjani Iskandar, Gilbert Yanuar Hadiwirawan, Maksim Rebezov, Olga Gorelik</i>..... 	3690
<ul style="list-style-type: none"> ● The significance of Liver Function Tests in detecting prediabetes as a prognostic factor <i>Ola H. Jasim, Majid M. Mahmood, Ali H. Ad'hiah</i>..... 	3697
<ul style="list-style-type: none"> ● Preparation and Evaluation of Taste Masked Paracetamol Microcapsules <i>Roaa Alhamidi, Wehad Ibrahim</i>..... 	3703
<ul style="list-style-type: none"> ● Computational and Experimental Insights in Design and Development of Aceclofenac Co-Crystals <i>Chetan Hasmukh Mehta, Poojary Pooja Srinivas, Anusha SB, Kirillos Bahaa Fathy Mahany, KB Koteshwara, Usha Yogendra Nayak</i>..... 	3709
<ul style="list-style-type: none"> ● Assessment of Perception and Attitude of health care providers regarding COVID-19 Symptoms, Transmission, Progression, and Prevention in the UAE <i>Ayman Kakah, Moyad Shahwan, Nageeb Hassan, Ammar Jairoun, Sara Hammami</i>..... 	3717

● <i>In vitro</i> Pharmaceutical Quality Evaluation of different Ibuprofen tablet brands available on the Republic of Kosovo Market	
<i>Marigona Bytyqi, Driton Shabani, Adnan Bozalija</i>	3725
● Effect of Aqueous and Alcoholic Bee Pollen Extracts on Monoamine Oxidase Activity	
<i>Ali M. Abbed, Muna A. Shakir, Ali abdulrasool Hussein, Shaema H. Abdulsada, Lubna F. Mohammed, Ahmed M. Lifatah</i>	3731
● The Potency of <i>Lactobacillus fermentum</i> and <i>Moringa oleifera</i> Extract with different Fermentation Time to improve the Nutrient content of Fermented Rice Bran	
<i>Widya P. Lokapirnasari, Lilik Maslachah, Adriana M. Sahidu, Andreas B. Yulianto, Ninda R. Pramestya, Ratna D. Lestari</i>	3736
● Inhibition of <i>Candida</i> spp. growth in Vaginitis women using a Chitosan-silver nanocomposite	
<i>R. A. Sahib</i>	3743
● Formulation and Evaluation of Ophthalmic Novel In-Situ Gel Containing Acyclovir for the Treatment of Herpes Simplex Keratitis	
<i>Abrar Hussain, Arti Majumdar, Neelesh Malviya</i>	3747
● Presence of virulence genes of <i>Candida albicans</i> isolated from women with remarks to Antifungal susceptibility	
<i>Raghad S. Ibraheem, Basil A. Abbas</i>	3751
● Evaluation of the Antifungal effects of Rosemary Oil and comparison with Nystatin on the Growth of <i>Candida</i> species isolates from HIV/AIDS patients with Oral Candidiasis	
<i>Dwi Murtiastutik, Afif Nurul Hidayati, Septiana Widyantari, Astindari, Bernadya Yogatri A. Saputri, Lunardi Bintanjoyo, Evy Ervianti, Damayanti, Maylita Sari</i>	3755
● Knowledge, attitude and awareness of pharmacovigilance among medical students in a tertiary care centre	
<i>Yatish Byndoor, Tamilisetti Vidya Sagar, Anupam Das</i>	3759
● Development and Evaluation of Kukkutandatvak bhasma tablet by using Dry Granulation Techniques	
<i>Khalapurkar Priya, Baheti Akshay, Wani Manish, Polshettiwar Satish, Gawade Ashwini, Tagalpallewar Amol, Pande Varun, Sabale Mrunal, Joshi Ameya</i>	3764
● A Review on the Concept of Superfluity Mechanism in Solubility Enhancement	
<i>Uditi Handa, Anuj Malik, Kumar Guarve</i>	3769
● The Immunomodulatory effects of <i>Zingiber officinale</i> (Ginger): A Systematic Review	
<i>Nurul Hikmah Harun, Mohamad Firdaus Mohamad</i>	3776
● A Review on Progressive Trends in Pharmaceutical Nano Emulsions and their Assessment	
<i>Lakavath Sunil Kumar, Hindusthan Abdhul Ahad</i>	3782
● Pharmacological importance of <i>Bacopa monnieri</i> on Neurological disease (Alzheimer's Disease) and Diabetic neuropathy - A Concise Review	
<i>Dipanjan Karati, Tapan Kumar Shaw</i>	3790
● Cerebrospinal Fluid Serotonin level as Biomarker for Neurotoxicity after 3,4-Methylenedioxymethamphetamine (MDMA)	
<i>Fatin H. Zakaria, Samhani Ismail, Khadijah N.M.J</i>	3796
● Multi-Strain Human Papillomavirus (HPV) Vaccine Innovation via Computational Study: A Mini Review	
<i>Viol Dhea Kharisma, Arif Nur Muhammad Ansori, Vikash Jakhmola, Wahyu Choirur Rizky, Muhammad Hermawan Widyananda, Rasyadan Taufiq Probojati, Ahmad Affan Ali Murtadlo, Maksim Rebezov, Pavel Scherbakov, Pavel Burkov, Yulia Matrosova, Alexander Romanov, Maic Audo Eybi Mayer Sihombing, Yulanda Antonius, Rahadian Zainul</i>	3802
● New Shining Stars in The Sky of Breast Cancer Diagnosis and Prognosis: A Review	
<i>Nahla E. EL-Ashmawy, Enas A. EL-Zamarany, Naglaa F. Khedr, Hend M. Selim, Eman G. Khedr</i>	3808
● Exploring the research on neuroscience as a basis to understand work-based outcomes and to formulate new insights into the effective management of human resources in the workplace: A review study	
<i>Sheila Menon, Vidya Bhagat</i>	3814
● Instruction to author	3821

[ABOUT JOURNAL \(ABOUTJOURNAL.ASPX\)](#) [CONTACT US \(CONTACTUS.ASPX\)](#)



[\(Home.aspx\)](#)

Research Journal of Pharmacy and Technology

[\(Home.aspx\)](#)

ISSN

0974-360X (Online)

0974-3618 (Print)

[HOME ▾ \(HOME.ASPX\)](#)

[PAST ISSUES \(PASTISSUES.ASPX\)](#)

[EDITORIAL BOARD \(EDITORIALBOARD.ASPX\)](#)

[FOR AUTHORS ▾](#)

[MORE ▾](#)

[NEWS \(NEWS.ASPX\)](#)

[Submit Article \(SubmitArticle.aspx\)](#)

search



EDITOR IN CHIEF



DR. MRS. MONIKA S. DAHARWAL ()

Editor In Chief

A & V Publications, RJPT House, Lokmanya GrihNirman Society, Rohanipuram, In-front of Sector- 1, Pt. Deendayal Upadhyay Nagar, Raipur 492 010. (CG) India

Email: editor.rjpt@gmail.com

[🏠 Home Page \(\)](#)

ASSOCIATE EDITOR



MARWAN MAHMOOD SALEH ()

Associate Editor

Anbar-Ramadi- Habbaniya- 4-4-17

Email: bio.marwan92@gmail.com

[🏠 Home Page \(\)](#)



DHANANJAY BABANRAO DESHMUKH ()

Associate Editor

Ashvin college of pharmacy manchi hill ashvi Bk sangamner Ahmednagar

Email: dhananjaydeshmukh777@gmail.com

[🏠 Home Page \(\)](#)



DR.RER.NAT ARLI ADITYA PARIKES ()

Associate Editor



Department of Bioinformatics School of Life Sciences Indonesia International Institute for Life Sciences Jl. Pulomas Barat Kav.88 Jakarta 13210

Email: arli.parikesit@i3l.ac.id

[Home Page \(\)](#)



DR G KUMARASWAMY ()

Associate Editor

Dr.Kumara Swamy. Gandla Prof.& HeadDept.of Pharmaceutical AnalysisCare College of Pharmacy, Warangal, Telangana.Mobile: +91-9000973789

Email: kumaraswamy.gandla@gmail.com

[Home Page \(\)](#)



HARDIK PATHAK ()

Associate Editor

222 pashupatinath nagar, jaipur

Email: hardikaeshu@gmail.com

[Home Page \(\)](#)



MARIIA SHANAIDA ()

Associate Editor

46001, Ternopil, Voli Str., 1. Ukraine

Email: shanayda-mi@ukr.net

[Home Page \(\)](#)



DR. G. MANIKANDAN ()

Associate Editor

Dr. G.Manikandan Assistant Professor Department of Botany Sri Kaliswari College (Autonomous) Sivakasi - 626130 Tamil Nadu India

Email: rgmani.19@gmail.com

[Home Page \(\)](#)



DR.S.MOHANASUNDARAM ()

Associate Editor

Department of Biochemistry, Sri Sankara Arts and Science College (Autonomous), Kanchipuram - 631561, Tamilnadu, India

Email: sbmohan2007@gmail.com

[Home Page \(\)](#)



DR SHAEESTA K. BHAVIKATTI ()

Associate Editor

College of Dentistry, King Khalid University, Abha, Saudi Arabia

Email: drshaeesta@gmail.com

[Home Page \(\)](#)

**DR KARTEEK ESWARA ()**

Associate Editor

T2,staff quarters, ksr Institutions, ksr kalvi nagar, Tiruchengode-637215, Tamilnadu

Email: karteekeswara@gmail.com

[🏠 Home Page \(\)](#)**DR. CHUKWUEBUKA EMMANUEL UMEYO ()**

Associate Editor

Department of Pharmaceutics and Pharmaceutical Technology, Faculty of Pharmaceutical Sciences, Nnamdi Azikiwe University, Awka, Anambra State, Nigeria

Email: ec.umeyor@unizik.edu.ng

[🏠 Home Page \(\)](#)**DR. PRANAV KUMAR PRABHAKAR ()**

Associate Editor

Department of Transdisciplinary Research, Division of Research & Development, Lovely Professional University, Phagwara, Punjab, India-144402

Email: prabhakar.iitm@gmail.com

[🏠 Home Page \(\)](#)**EBAA ADNAN AZOOZ ()**

Associate Editor

Iraq, Najaf

Email: ebaaadnan.ed12p@uokufa.edu.iq

[🏠 Home Page \(\)](#)**PROF. VIJAY D. MENDHULKAR ()**

Associate Editor

Prof. and Head, Department of Botany The Institute of Science 15- Madame Cama Road Fort, Mumbai

Email: drmendhulkar@gmail.com

[🏠 Home Page \(\)](#)**DR. SUBRAT KUMAR PATTANAYAK ()**

Associate Editor

Department of Chemistry NIT Raipur -492010, India

Email: skpiitbbs@gmail.com

[🏠 Home Page \(\)](#)

**DR. UPENDRA PRASAD TRIPATHY ()**

Associate Editor
JAYKAYPUR[PAPRI], RAYAGADA, ODISHA
Email: uptripathy@gmail.com
[Home Page \(\)](#)

**SONAM BHATIA ()**

Associate Editor
Dept. of Pharmaceutical Sciences, Faculty of Health Science, Sam Higginbottom University of Agriculture, Technology and Sciences,
Prayagraj, India
Email: sonamniper.bhatia@gmail.com
[Home Page \(\)](#)

**DR. GURJEET KAUR ()**

Associate Editor
Amity Institute of Biotechnology Amity University Uttar Pradesh Lucknow India
Email: gkaur@lko.amity.edu
[Home Page \(\)](#)

**HUSSEIN O.M. AL-DAHMOUSHI ()**

Associate Editor
Iraq, Babylon Province Hilla City
Email: dr.dahmوشي83@gmail.com
[Home Page \(\)](#)

**DR. BISWAJIT BASU ()**

Associate Editor
Dr. Biswajit Basu. Associate Professor. Department of Pharmaceutics. Bengal School of Technology, Sugandha, Delhi Road, Hooghly - 712
102, West Bengal India.
Email: bbasu.pharma@gmail.com
[Home Page \(\)](#)

**BIMESH KUMAR ()**

Associate Editor
BLOCK-4B, ROOM NO 203, SCHOOL OF PHARMACEUTICAL SCIENCES, LOVELY PROFESSIONAL UNIVERSITY, PHAGWARA, PUNJAB,
144411
Email: bimlesh1pharm@gmail.com
[Home Page \(\)](#)

**DR. BELLAMKONDA RAMESH ()**



Associate Editor

Department of Food Technology, Vikrama Simhapuri University, Nellore, Andhra Pradesh, India-524320

Email: rammygp@gmail.com

[Home Page \(\)](#)



K. MAHALINGAN ()

Associate Editor

RR College of Pharmacy, RR Nagar, Chickabanawara, Bangalore- 560090

Email: kmahalingan@gmail.com

[Home Page \(\)](#)



DR. RUPESH K. GAUTAM ()

Associate Editor

MM School of Pharmacy, MM University, Ambala-Chandigarh Highway, Sadopur-Ambala (India) -134007

Email: drrupeshgautam@gmail.com

[Home Page \(\)](#)



DR LINU MOHAN P ()

Associate Editor

Professor Department of Pharmacy Practice Al Shifa College of Pharmacy Perinthalmanna- Kerala- India

Email: linumohanp@alshifacollegeofpharmacy.ac.in

[Home Page \(\)](#)



SHANKAR BALU KALBHARE ()

Associate Editor

YSPM'S Yashoda Technical Campus, Satara 415003

Email: kirankal786@gmail.com

[Home Page \(\)](#)



R. SUNDARALINGAM ()

Associate Editor

Assistant Professor, Department of Microbiology, Madras Christian College (Autonomous), Tambaram, Chennai - 600059. Tamilnadu

Email: sundaralingam@mcc.edu.in

[Home Page \(\)](#)



DR ANUPAM KR SACHAN ()

Associate Editor

Dayanand Dinanath College, Institute of Pharmacy, Kanpur Nagar, Uttar Pradesh-208027

Email: anupamkrsachan@gmail.com

[🏠 Home Page \(\)](#)



MANIKANDAN K ()

Associate Editor

SRM College of Pharmacy SRM Institute of Science and Technology Kattankulathur, Kancheepuram

Email: gurumani12@gmail.com

[🏠 Home Page \(\)](#)



DR. PAVAN KUMAR ()

Associate Editor

Koneru Lakshmaiah Education Foundation KLEF

Email: pavankmaths@gmail.com

[🏠 Home Page \(\)](#)



ASHEESH SINGH ()

Associate Editor

M-303, Swastik city near Pooja park, Lambha turning Narol-Ahemdabad-382405

Email: asheesh_parihar@yahoo.com

[🏠 Home Page \(\)](#)



SWARNIMA PANDEY ()

Associate Editor

Goel Institute of Pharmacy & Sciences, Faizabad road lucknow 226028

Email: yesgoldi@gmail.com

[🏠 Home Page \(\)](#)



DR. PARUL JOHRI ()

Associate Editor

C-1/167 indra nagar kanpur

Email: pjohri@lko.amity.edu

[🏠 Home Page \(\)](#)



MORTEZA SAKI ()

Associate Editor

Department of Microbiology, Faculty of Medicine Ahvaz Jundishapur University of Medical Sciences Ahvaz

Email: mortezasaki1981@gmail.com

[🏠 Home Page \(\)](#)

**HANA BAJES ()**

NJ-USA

Email: bajes80@gmail.com
[Home Page \(https://www.atlantic.edu/directory/faculty/bajes-hana.php\)](https://www.atlantic.edu/directory/faculty/bajes-hana.php)
**DR. J. SIVAKUMAR ()**

Assistant Professor, PG Department of Zoology, Guru Nanak College (Autonomous), Velachery, Chennai – 600 042, Tamil Nadu, India

Email: sivakumar.j@gurunanakcollege.edu.in
[Home Page \(https://gurunanakcollege.edu.in/school-of-science\)](https://gurunanakcollege.edu.in/school-of-science)
**DR.V.N.INDULATHA ()**

8/50RC Nagar extension, Othakkalmandapam, Coimbatore, Tamilnadu, India

Email: profindulatha@gmail.com
[Home Page \(https://nchs.nirmalacollege.edu.in\)](https://nchs.nirmalacollege.edu.in)
**RISHIKESH BACHHAV ()**

Anjaneri, Trymbakeshwar

Email: bachhavrss@rediffmail.com
[Home Page \(https://www.sapkalpharmacy.org\)](https://www.sapkalpharmacy.org)


Research Journal of Pharmacy and Technology (RJPT) is an international, peer-reviewed, multidisciplinary journal...

[Read more >>> \(AboutJournal.aspx\)](#)

RNI: CHHENG00387/33/1/2008-TC

DOI: 10.5958/0974-360X

0.38

56th percentile

2018
CiteScorePowered by **Scopus**https://www.scopus.com/sourceid/21100197160?dgcid=sc_widget_citescore

[INDEXING INFORMATION \(INDEXED_IN.ASPX\)](#)

LATEST ISSUES

[DECEMBER 2022 \(91\) \(ISSUES.ASPX?VID=15&IID=12\)](#)[NOVEMBER 2022 \(91\) \(ISSUES.ASPX?VID=15&IID=11\)](#)[OCTOBER 2022 \(88\) \(ISSUES.ASPX?VID=15&IID=10\)](#)[SEPTEMBER 2022 \(87\) \(ISSUES.ASPX?VID=15&IID=9\)](#)[AUGUST 2022 \(82\) \(ISSUES.ASPX?VID=15&IID=8\)](#)[JULY 2022 \(80\) \(ISSUES.ASPX?VID=15&IID=7\)](#)[JUNE 2022 \(82\) \(ISSUES.ASPX?VID=15&IID=6\)](#)[MAY 2022 \(78\) \(ISSUES.ASPX?VID=15&IID=5\)](#)

POPULAR ARTICLES

[\(AbstractView.aspx?PID=2017-10-9-42\)](#)**Detection of Food Adulterants in Chilli, Turmeric and Coriander Powders by Physical and Chemical Methods**[\(AbstractView.aspx?PID=2017-10-9-42\)](#)[\(AbstractView.aspx?PID=2020-13-1-43\)](#)**Formulation and Evaluation of Herbal Face Cream**[\(AbstractView.aspx?PID=2020-13-1-43\)](#)[\(AbstractView.aspx?PID=2013-6-2-15\)](#)**Medicinal Plants from Solanaceae Family**[\(AbstractView.aspx?PID=2013-6-2-15\)](#)[\(AbstractView.aspx?PID=2020-13-4-16\)](#)**Formulation and Evaluation of Herbal Lipsticks**[\(AbstractView.aspx?PID=2020-13-4-16\)](#)[\(AbstractView.aspx?PID=2019-12-1-69\)](#)**Recent Advances in Preventive Resin Restoration (PRR)**[\(AbstractView.aspx?PID=2019-12-1-69\)](#)[\(AbstractView.aspx?PID=2020-13-7-74\)](#)**Pharmaceutical Incompatibilities: Causes, Types and Major ways of Overcoming in Extemporaneous Medicinal forms**[\(AbstractView.aspx?PID=2020-13-7-74\)](#)[\(AbstractView.aspx?PID=2018-11-2-70\)](#)**Recent Advancements in Laminates and Veneers in Dentistry**[\(AbstractView.aspx?PID=2018-11-2-70\)](#)[\(AbstractView.aspx?PID=2014-7-9-14\)](#)**The Use of Neem in Oral Health**[\(AbstractView.aspx?PID=2014-7-9-14\)](#)

(AbstractView.aspx?PID=2017-10-12-61)

Mathematical Models in Drug Discovery, Development and Treatment of Various Diseases – A Case Study

(AbstractView.aspx?PID=2017-10-12-61)

(AbstractView.aspx?PID=2019-12-11-80)

Dental Waxes – A Review

(AbstractView.aspx?PID=2019-12-11-80)

(AbstractView.aspx?PID=2017-10-9-19)

Formulation and Evaluation of Aspirin Tablets by Using Different Lubricants in Combination for better Kinetic Drug Release Study by PCP

(AbstractView.aspx?PID=2017-10-9-19)

(AbstractView.aspx?PID=2010-3-3-60)

Evaluation of Ayurvedic Marketed Formulations Asava's and Arista's.

(AbstractView.aspx?PID=2010-3-3-60)

(AbstractView.aspx?PID=2014-7-9-16)

Project Writing for Retail Pharmacy Practical Training: A Proforma

(AbstractView.aspx?PID=2014-7-9-16)

(AbstractView.aspx?PID=2012-5-5-5)

A comparative, Bioequivalence study to evaluate the safety and pharmacokinetic profile of single dose Ivabradine 7.5mg Tablets in healthy, adult, human subjects under fasting condition.

(AbstractView.aspx?PID=2012-5-5-5)

(AbstractView.aspx?PID=2020-13-3-81)

Regulatory requirements for conducting Clinical Trials in India

(AbstractView.aspx?PID=2020-13-3-81)

Recent Articles

Tags

Not Available

ABOUT JOURNAL

Research Journal of Pharmacy and Technology (RJPT) is an international, peer-reviewed, multidisciplinary journal, devoted to pharmaceutical sciences. The aim of RJPT is to increase the impact of pharmaceutical research both in academia and industry, with strong emphasis on quality and originality. RJPT publishes Original Research Articles, Short Communications, Review Articles in all areas of pharmaceutical sciences from the discovery of a drug up to clinical evaluation. Topics covered are: Pharmaceutics and Pharmacokinetics; Pharmaceutical chemistry including medicinal and analytical chemistry; Pharmacognosy including herbal products standardization and Phytochemistry; Pharmacology: Allied sciences including drug regulatory affairs, Pharmaceutical Marketing, Pharmaceutical Microbiology, Pharmaceutical biochemistry, Pharmaceutical Education and Hospital Pharmacy.

Read More >>> (AboutJournal.aspx)

VISITORS

RESEARCH ARTICLE

Evaluation of the Antifungal effects of Rosemary Oil and comparison with Nystatin on the Growth of *Candida* species isolates from HIV/AIDS patients with Oral Candidiasis

Dwi Murtiastutik^{1*}, Afif Nurul Hidayati^{1,2}, Septiana Widyantari¹, Astindari¹, Bernadya Yogatri A. Saputri¹, Lunardi Bintanjoyo¹, Evy Ervianti¹, Damayanti¹, Maylita Sari¹

¹Department of Dermatology and Venereology, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Academic Hospital, Surabaya 60285, Indonesia.

²Universitas Airlangga Teaching Hospital, Surabaya 60115, Indonesia.

*Corresponding Author E-mail: dwimurtiastutik@yahoo.co.id

ABSTRACT:

Background: Oral candidiasis is an infection due to the activity of *Candida albicans* in the oral cavity. Oral candidiasis is one of the most common opportunistic infections occurring among Human Immunodeficiency Virus (HIV)/Acquired immune deficiency syndrome (AIDS) patients. Due to increasing resistance and adverse effects to commonly used antifungal drugs, many recent studies have examined the use of herbal essential oils as antifungal agents. In this study, essential oil of *Rosmarinus officinalis* (Lamiaceae) and nystatin were examined for in vitro antifungal activity against *Candida* species. **Aim:** To evaluate antifungal activity of essential oil of *Rosmarinus officinalis* (Lamiaceae) and nystatin by comparing inhibition zone diameters. **Methods:** This study was an experimental laboratory study with a posttest only design conducted in Dr. Soetomo General Academic Hospital, Surabaya. Forty isolates consisted of 20 isolates of *Candida albicans* and *Candida non-albicans* were subjected to test for antifungal activity using the diffusion disk method using paper discs or blank discs and inhibitory zones were recorded. **Results:** Diffusion test results revealed stronger antifungal effect of nystatin against all analyzed *Candida* strains. This study showed the mean diameter of the inhibitory zone for *Candida albicans* formed by rosemary essential oil is 2.25 mm and the average inhibition zone formed by rosemary essential oil for *Candida non-albicans* is 1.5 mm. **Conclusion:** The antifungal activity of nystatin is stronger when compared to rosemary essential oil as seen from a greater inhibition zone than rosemary essential oil in the diffusion method.

KEYWORDS: Antifungal activity, nystatin, *Rosmarinus officinalis*, HIV, *Candida albicans*, *Candida non-albicans*.

INTRODUCTION:

Candida species are opportunistic yeasts and the etiologic agent of candidiasis, the most frequent fungal infection in humans. In the oral cavity, *Candida albicans* (*C. albicans*) is the most abundant *Candida* species in health and disease state. As an opportunistic pathogen, it usually causes infection in immunosuppressed or immunodeficient individuals such as HIV/AIDS patients.¹

Various strategies are being used to manage candida infections, including the use of topical or systemic fungistatic or fungicidal agents. Antifungal agents including polyenes (nystatin, amphotericin B), azoles (fluconazole, itraconazole and miconazole), and antimetabolites agents (5-fluorocytosine) are most common medications used to treat candidiasis. However, occasionally consumption of the effective dose cannot be tolerated due to side effects.²

antimicrobial compounds of botanical extracts, in the form of crude extracts, essential oils and molecules, including flavonoids and terpenes. Recent studies have also addressed the association between conventional medications and natural products to achieve better treatment efficacy.³

Essential oils are defined as volatile and hydrophobic aromatic natural substances extracted from various parts, such as flowers, leaves, peels, barks, roots, seeds, resins, of aromatic plants, containing highly concentrated effective compounds. Rosemary (*Rosmarinus officinalis L.*), of the *Lamiaceae* family, is a perennial shrub with pleasant scent that grows in several regions globally. Most of these are used in the local folk tradition for many purposes.⁴ Historically, rosemary has been used as a medicinal agent to treat renal colic and dysmenorrhea. It has also been applied for relief of respiratory symptoms, stimulation of hair growth, as aromatherapy for anxiety treatment and increasing alertness.

Rosemary essential oils have varying biological activities according to their chemical compositions. Around 13 chemotypes of rosemary essential oil have been recognized, which differ in their relative amounts of camphor, borneol, verbenone, pinene, 1, 8-cineole, and bornyl acetate. Nature-derived compounds which are effective against resistant *Candida* species are necessary options to control oral candidiasis. Fungistatic properties of *Rosmarinus officinalis* essential oil has been studied in several researches.⁵ Fontenelle et al. stated that at low concentrations rosemary essential oil produced antifungal activity against *Candida*, but the anti-adherent activity of this oil has not been studied. Thus, further investigation of the antifungal activity of these oils is necessary to substantiate the use of essential oils clinically. The mechanism of antifungal action of rosemary essential oils has not been fully elucidated. Hammer et al. proposed that interaction of essential oils with lipid components results in changes in the cell membranes.⁶ Other studies found that *Rosmarinus officinalis L.* possesses several antifungal mechanisms. It has been shown to alter cellular structure and fungal membrane permeability thus inhibiting the adhesion of *Candida albicans*. A study even showed that bionanosystem consisting of nanoparticles coated with rosemary essential oil was able to reduce the adhesiveness and to prevent the development of highly resistant biofilms of *Candida*.⁷

Various in vitro studies have examined the antifungal activity of rosemary essential oil against *C. albicans*. Hosein Nejati et al. studied topical rosemary for wound caused by *C. albicans* in mice, and found that topical rosemary has antifungal and anti-inflammatory properties in the wound due to its high terpenoids, limonene, 1,8

cineol content.⁸ Other studies examined the effect of rosemary essential oil against *C. albicans* isolated from vaginal smears, and found that rosemary essential oil has a minimum inhibition concentration (MIC) of 0.1 mg/ml.⁴ Cavalcanti et al. compared rosemary essential oil with nystatin against *Candida* species isolates and showed that rosemary essential oil has a MIC value of 2.25mg/ml which was better than 100,000 IU/ml nystatin.⁶ This study evaluated the antifungal activity of rosemary essential oil compared with synthetic nystatin against isolates of *Candida* species.

MATERIAL AND METHODS:

This is an experimental laboratory study with a posttest only design conducted in Dr. Soetomo General Academic Hospital, Surabaya. Forty isolates used in this study, which consisted of 20 isolates of *Candida albicans* and 20 isolates of *Candida non-albicans*, were obtained from forty HIV/AIDS patients with oral candidiasis. This research has been reviewed and approved by the Ethics Committee of the Dr. Soetomo General Academic Hospital (1614/KEPK/XI/2019). Analyzed essential of rosemary (*Rosmarinus officinalis L.*), were commercial product produced by Young Living USA, according to the producer's notification, characterized as 100% natural essential oil. This essential oil were analyzed by GC containing 45.12% 1,8-cineol, 12.78% alpha-pinene, 10.79% camphor, 3.50% borneol. Nystatin used as susceptibility test. The isolates were tested for antifungal activity using the disc diffusion method. The colonies were mixed in 0.85% sterile normal saline (5ml volume). Mueller Hinton agar with 2% glucose and 0.5µg/ml of methylene blue was used. Strain suspensions (10⁶ CFU/ml) were swabbed on Saboraud Dextrose Agar. Filter paper disc (6 mm diameter) were placed on the agar surface and added with 10µl of 100% concentrate rosemary essential oil and 100% concentrate of nystatin. Plates were incubated at 37°C for 48 hours. The zone diameters were interpreted according to Clinical Laboratory Standards Institute (CLSI) guidelines. The obtained results (mean and standard deviation) were analyzed using SPSS. The data for diffusion methods were analyzed by Mann-Whitney test. Statistical significance was determined at p≤0.05.

RESULTS:

The isolates used in this study consisted of 20 isolates of *Candida albicans* and 20 isolates of *Candida non-albicans* taken from HIV/AIDS patients with oral candidiasis. The investigation on antimycotic activity of rosemary essential oils and nystatin against *Candida* species was done by agar diffusion technique. The zone of inhibition in 100% concentrations of essential oils and nystatin against *Candida albicans* is recorded and tabulated in Table 1.

Table 1: Inhibitory zones (mm±sd) of rosemary essential oils and nystatin in disc-diffusion assay

Species	Concentration	n	Means±SD (mm)	p value
<i>Candida albicans</i>	Nystatin 100%	20	16.50 ±4.7	< 0.001*
	Rosemary 100%	20	2.25 ± 4.1	
<i>Candida non-albicans</i>	Nystatin 100%	20	12.45±4.1	< 0.001*
	Rosemary100%	20	1.5±3.1	

*Significant differences (p<0.05), SD: Standard deviation

Table 1 shows the inhibition zone formed by rosemary essential oil is smaller when compared to the inhibition zone formed by nystatin. The mean value of inhibition zone formed by nystatin is 16.5mm which indicates that nystatin is still sensitive against *Candida albicans*. Statistically, the p value obtained from this study is p <0.001, showing a significant difference between inhibition zones formed by nystatin and inhibitory zones formed by rosemary essential oil. This study also showed inhibition zones formed by rosemary essential oil on the growth of *Candida non-albicans* were smaller when compared to inhibition zones formed by nystatin. The average value of inhibition zone formed by nystatin is 12.45mm, where this value indicates that nystatin is not sensitive but is included in the intermediate classification against *Candida non-albicans*. The statistical value obtained from this study is the value of p<0.001 where there is a significant difference between the inhibition zone formed by nystatin and the inhibition zone formed by rosemary essential oil.

DISCUSSION:

This study was conducted to examine the in vitro antifungal activity of rosemary essential oils and nystatin against *Candida albicans* and *Candida non-albicans*. When fungal isolate is given substances with antifungal properties, its growth will be inhibited. In disc diffusion method, inhibition of fungal growth can be observed as inhibitory clear zones found around paper discs on media that have been inoculated with *Candida albicans* and *Candida non-albicans*.⁹ The formation of inhibition zones around disc paper depends on the presence or absence of active compounds in the extract, while the size of the inhibition zone correspond to the level of activity of the substances in the extract. Hermawan et al. in 2007 stated that interpretation of inhibition zones refers to the general standard issued by the Ministry of Health in 1988 in which microbes are defined to be sensitive to active compounds of a plant if the measurement of power diameter resistance is 12 to 24mm.¹⁰ Disc diffusion method is easier to perform, can be interpreted within 24hours and can be used for diagnostic purposes on daily basis whereas broth microdilution method is more cumbersome and requires more practical skills.⁹

In this study, the mean diameters of the inhibitory zone formed by nystatin and rosemary essential oil against *Candida albicans* are 16.5mm and 2.25mm respectively.

Candida non-albicans were also included in this study which consisted of 9 isolates of *Candida krusei*, 4 isolates of *Candida glabrata*, 2 isolates of *Candida dubliniensis*, 2 isolates of *Candida parapsilosis*, 2 isolates of *Candida tropicalis* and 1 isolate of *Candida lipolytica*. The mean diameters of the inhibitory zone formed by nystatin and rosemary essential oil against *Candida non-albicans* are 12.45mm and 1.5mm respectively. The largest inhibitory zone formed by nystatin was observed against two isolates of *Candida dubliniensis* which was 20mm and 18mm respectively. The largest inhibitory zone formed by rosemary essential oils were observed against *Candida krusei* with a diameter of 8mm.

Diameter of inhibitory zone more than 15mm indicates sensitivity to nystatin.¹¹ This study showed that *Candida albicans* is still sensitive to nystatin. Carvalho et al. in 2012 examined the sensitivity of nystatin and essential oils, one of which was rosemary, showing that all 40 isolates of *Candida albicans* species were still sensitive to nystatin and rosemary essential oils with respective inhibitory zone's diameters of more than 15 mm and 12mm.⁵ Murtiastutik et al. in 2019 studied the sensitivity of *Candida albicans* and *non-albicans* isolated from HIV/AIDS patients at Dr. Soetomo General Academic Hospital to nystatin by the diffusion disk method, and showed that all isolates was still sensitive to nystatin.¹² This study also showed also that *Candida non-albicans* has intermediate sensitivity to nystatin, except *Candida krusei* which showed to be sensitive to nystatin. The result of this study slightly differs from study by Kengne et al. in 2017 on sensitivity of *Candida* species isolated from vulvovaginal candidiasis patients which showed that nystatin was the most sensitive antifungal against *Candida non-albicans*.¹¹ The mechanism of antifungals that causes inhibition of fungal growth is damage to cell membrane. This will disrupt the integrity of cellular components and impair the process of fungal cellular respiration. The end result is insufficient energy to transport active substances so that fungal growth is disrupted.^{13,14}

In this study, the formation of inhibitory zone by rosemary essential oil although smaller than those formed by nystatin indicated that rosemary essential oil has antifungal activity against both *Candida albicans* and *Candida non-albicans*, also that the antifungal

activity of nystatin was better than rosemary essential oil. This is possibly attributed to nystatin which could diffuse well on agar media and which was the first choice drug for infections by *Candida*. This also could be due other factors including the content of antifungal compound within rosemary essential oil that is not too high, diffusion power, types of fungi and the concentration of the extract.¹⁵

Periodic antifungal resistance surveillance protocols by susceptibility testing of all *Candida* isolates is essential to provide crucial information about the resistance pattern in a particular region. This also will guide in choosing the empiric or prophylactic drug before the antifungal resistance test result is available.¹⁶⁻²⁰ In conclusion, plants with medicinal properties are considered to be important source of novel potentially therapeutic compounds. The present study has shown the antimycotic activity of rosemary oil on *Candida* species. However, the antifungal activity of nystatin is stronger when compared to rosemary essential oil as seen from a greater inhibition zone than rosemary essential oil in the diffusion method.

ACKNOWLEDGEMENT:

We would like to thank Pepy Dwi Endraswari for helping us in carrying out the culture of *Candida* species in the Department of Microbiology Dr. Soetomo General Academic Hospital, Surabaya, Indonesia and Alvian Arifin Saiboo for helping us in the publication process of this journal.

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

REFERENCES:

1. Abdulaziz SM, Shaswary IA, Muhammad AA. In vitro antifungal activity of essential oils from local plants against fluconazole-resistant oral *Candida albicans* isolates. *Zanco J Med Sci*. 2015; 19(2):965–71.
2. da Silva ICG, de Pontes Santos HB, Cavalcanti YW, Nonaka CFW, de Sousa SA, de Castro RD. Antifungal Activity of Eugenol and its Association with Nystatin on *Candida albicans*. *Pesqui Bras Odontopediatria Clin Integr*. 2017; 17(1):e3235.
3. Sakkas H, Gousia P, Economou V, Petsios S, Papadopoulou C. Antifungal activity of four essential oils against *Candida* clinical isolates. *Asian J Ethnopharmacol Med Foods*. 2016; 2(1):22–5.
4. Jahani S, Bazi S, Shahi Z, Asadi MS, Mosavi F, Baigi GS. Antifungal Effect of the Extract of the Plants Against *Candida albicans*. *Int J Infect*. 2017; 4(2):e36807.
5. Carvalhinho S, Costa AM, Coelho AC, Martins E, Sampaio A. Susceptibilities of *Candida albicans* Mouth Isolates to Antifungal Agents, Essentials Oils and Mouth Rinses. *Mycopathologia*. 2012; 174:69–76.
6. Cavalcanti YW, de Almeida L de FD, Padilha WWN. Anti-adherent activity of *Rosmarinus officinalis* essential oil on *Candida albicans*: an SEM analysis. *Rev Odonto Cienc*. 2011; 26(2):139–44.
7. Patturaja K, Geetha R V. Evaluation of Antimycotic Activity of Three Essential Oils on *Candida Albicans* -An Invitro Study. *J Pharm Sci Res*. 2017; 9(4):480–2.
8. Nejati H, Farahpour MR, Nagadehi MN. Topical Rosemary officinalis essential oil improves wound healing against disseminated *Candida albicans* infection in rat model. *Comp Clin Path*. 2015; 24:1377–83.
9. Moghtader M, Salari H, Farahmand A. Evaluation of the antifungal effects of rosemary oil and comparison with synthetic borneol and fungicide on the growth of *Aspergillus flavus*. *J Ecol Nat Environ*. 2011; 3(6):210–4.
10. Andayani N, Susilowati A, Pangastuti A. Anti candida minyak atsiri lengkuas putih (*Alpinia galanga*) terhadap *Candida albicans* penyebab candidiasis secara invitro. *EL-Vivo*. 2014; 2(2):1–9.
11. Kengne M, Shu SV, Nwobegahay JM, Achonduh O. Antifungals susceptibility pattern of *Candida* spp. isolated from female genital tract at the Yaoundé Bethesda Hospital in Cameroon. *Pan Afr Med J*. 2017; 28:294.
12. Murtiastutik D, Maharani CS, Rahmadewi, Listiawan MY. Nystatin Profile on *Candida* Species in HIV / AIDS Patients with Oral Candidiasis: A Phenomenology Study. *J Pure Appl Microbiol*. 2019; 13(4):2013–9.
13. Lely N, Pratiwi RI, Imanda YL. Efektivitas Antijamur Kombinasi Ketokonazol dengan Minyak Atsiri Sereh Wangi (*Cymbopogon nardus* (L.) Rendle). *Indones J Appl Sci*. 2017; 7(2):10–5.
14. Nenoff P, Krüger C, Neumeister C, Schwantes U, Koch D. In vitro susceptibility testing of yeasts to nystatin – low minimum inhibitory concentrations suggest no indication of in vitro resistance of *Candida albicans*, *Candida* species or non-*Candida* yeast species to nystatin. *Clin Med Investig*. 2016; 1(3).
15. Khorram Z, Hakimaneh SM, Naeini A, Rafeinezhad R, Salari AM, Shayegh SS. The Antifungal Effects of Two Herbal Essences in Comparison with Nystatin on the *Candida* Strains Isolated from the Edentulous Patients. *J Contemp Dent Pract*. 2019; 20(6):716–9.
16. Ćosić J, Vrandečić K, Postić J, Jurković D, Ravlić M. In vitro antifungal activity of essential oils on growth of phytopathogenic fungi. *Poljoprivreda*. 2010; 16(2):25–8.
17. Bozin B, Mimica-Dukic N, Samojlik I, Jovin E. Antimicrobial and Antioxidant Properties of Rosemary and Sage (*Rosmarinus officinalis* L. and *Salvia officinalis* L., Lamiaceae) Essential Oils. *J Agric Food Chem*. 2007; 55:7879–85.
18. Murtiastutik D, Listiawan MY, Bintanjoyo L, Hidayati AN, Widiantari S, Astindari, et al. Ketoconazole: A Re-emerging choice for Oral candidiasis in patients with human immunodeficiency virus infection/acquired Immunodeficiency Syndrome. *Res J Pharm Technol*. 2022;15(3):1071–6.
19. Rezeki S, Pradono SA, Subita GP, Rosana Y, Sunnati S, Gani BA. The antifungal susceptibility of *Candida albicans* isolated from HIV/AIDS patients. *Dent J (Majalah Kedokt Gigi)*. 2021;54(2):82–6.
20. Reza NR, Tantari SHW, Basuki S. Uji Kepekaan In Vitro Flukonazol Terhadap Spesies *Candida* penyebab Kandidiasis Oral Pada Pasien HIV/AIDS dengan Vitek II (In Vitro Susceptibility Test of Fluconazole to *Candida* spp in Patients with Oropharyngeal Candidiasis and HIV/AIDS with Vitek II). *Berk Ilmu Kesehat Kulit dan Kelamin - Period Dermatol Venereol*. 2017;29(3):234–42.