

An Open Access Peer Reviewed Journal

International Journal of Pharmacy & Pharmaceutical Sciences

IJPPS



INTERNATIONAL JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES

Online ISSN: 0975-1491 | Print ISSN: 2656-0097

[Home](#) [About](#) [Current](#) [Archives](#) [Submissions](#)

[Instructions to Authors](#) [Contact Us](#)

Editor-in-Chief

Prof. M. S. Bhatia, India
(Bharati Vidyapeeth College of Pharmacy, Kolhapur, India)
Email: manish.bhatia@bharativedyapeeth.edu
Email: editor@ijppsjournal.com

Associate Editors

Dr. Avijeet Jain, India
(Shri Sathya Sai Institute of Pharmaceutical Sciences, Bhopal, India)
Email: avijeet_9826275340@rediffmail.com

Diah Ayu Maharani
Department of Preventive and Public Health, Dentistry Faculty of Dentistry, University of Indonesia
Email: raniabdillah@gmail.com

Dr. Subhash C Mandal, India
(Department of Pharmaceutical Technology, Jadavpur University, Kolkata, India)
Email: subhashmandal@yahoo.com

Dr. Lokesh Deb, India
(Medicinal Plants and Horticultural Resources Division, Institute of Bioresources and Sustainable Development (IBSD), Department of Biotechnology, Government of India, Takyelpat Institutional Area, Imphal, Manipur, India)
Email: lokesh_deb@rediffmail.com

Dr. Wong Tin Wui, Malaysia
(Non-Destructive Biomedical and Pharmaceutical Research Center, University of Technology MARA, Malasiya)
Email: wongtinwui@yahoo.com

Assistant Editors

Dr. Idress Hamad Attittala, Libya
(Omar El-Mukhtar University, Faculty of Science, Botany Department, El-Beida, Libya)
Email: idressattitalla2004@yahoo.com

Dr. Alok Nahata, Malaysia
(Alor Star, Malaysia)
Email: aloknahata@gmail.com

Executive Editor

Mr. Niranjana Pathak, India

(Dept. of Pharmaceutical Sciences, Dr H S Gour Central University, Saugor, India)

Email: niranjanpathaklib@gmail.com

Editorial Board Members

Dr. Furhan Iqbal

Bahauddin Zakariya University Multan, Pakistan

Dr. Ebtessam Ahmed Mohammed Essa

Department of Pharmaceutical Technology, Faculty of Pharmacy, Tanta University, Tanta, Egypt

Dr. Syed Muhammad Farid Hasan

Faculty of Pharmacy, University of Karachi, Karachi, Pakistan

Dr. Abdel Raheim Mohammed Ahmed Donia

College of Pharmacy – Salman Bin Abdul Aziz University, Egypt

Dr. Pranay Jain

Institute of Engineering & Technology, Kurukshetra University, Kurukshetra, Haryana, India

Dr. Dr. Niaz Ali

Institute of Basic Medical Sciences, Khyber Medical University, Peshawar, Pakistan

Dr. M. Saeed Arayne

Chairman, Department of Chemistry, University of Karachi, Pakistan

Dr. Wanzala Wycliffe

School of Pure and Applied Sciences, South Eastern Kenya University, Kenya

Dr. Mayuree Tangkiatcumjai

Faculty of Pharmacy, Srinakharinwirot University, Ongkharak, Nakhonnayok, Thailand

Dr. Anup Naha

Dept. of Pharmaceutic, MCOPS, Manipal, Karnataka, India

Dr. Jagdish Labhubhai Kakadiya

Indubhai Patel College of Pharmacy and Research Centre, Petlad-Khambhat Road, Dharmaj, Anand, Gujarat, India

Dr. Maha Ali Eissa Ahmed

Department of Pharmacology, Faculty of Pharmacy, MISR University for Science and Technology (MUST), Giza Governorate, Egypt.

Dr. Javed Intekhab

G. F. College (Rohilkhand University), Shahjahanpur, U.P., India

Dr. Manish P. Patel

Dept. of Pharmaceutics and Pharmaceutical Technology, Nootan Pharmacy College, Visnagar, Gujarat, India

Dr. Narendra Babu Shivanagere Nagojappa

J.N. Medical College, KLE University, Belgaum, Karnataka, India

Dr. C. Chellaram

Vel Tech Multi Tech Engg. College, Chennai, India

Dr. Mehdi Shafiee Ardestani

Department of Medicinal Chemistry and Radiopharmacy, Tehran University of Medical Sciences, Tehran, Iran

Dr. Amal Amin Mohamed

Plant Biochemistry Department; Agriculture Division -National Research Center, Dokki, Cairo, Egypt

Dr. Rabab Kamel Mahmoud

National Research Center, Cairo, Egypt

Dr. Syed Adnan Ali Shah

Universiti Teknologi MARA (UiTM), Puncak Alam Campus, Bandar Puncak Alam, Selangor D. E., Malaysia

Dr. Sat Pal Singh Bisht

Roland Institute of Pharmaceutical Sciences Berhampur, Orissa, India.

Dr. Shahu Ingole

Smt. Kashibai Navale Medical College & Hospital, Pune India

Dr. Gina Samy El-Feky

Pharmaceutics Department, Faculty of Pharmacy, Modern Science and Arts University, Egypt

Dr. Abdalla Ahmed Elbashir Ahmed

Khartoum University, Sudan

Dr. Rajesh Mukthavaram
Health Science Drive, University of California, San
Diego, Lajolla, CA, California, USA

Dr. Saifullah Khan
International Islamic University, Malaysia

Norhaniza Aminudin
Institute of Biological Sciences, Faculty of Science,
University of Malaya, Kuala Lumpur, Malaysia.

Dr. Shazia Jamshed
Kulliyyah of Pharmacy, International Islamic
University Malaysia (IIUM), Kuantan, Pahang,
Malaysia

Dr. Mayuree Tangkiatkumjai
Department of Clinical Pharmacy and Social
Pharmacy Faculty of Pharmacy, Srinakharinwirot
University, Nakhonnayok, Thailand

Dr. İsmail Murat Palabiyik
Faculty of Pharmacy, University of Ankara,
Tandoğan, Ankara, Turkey

Nadeem A. Kizilbash
Faculty of Medicine, Northern Border University
Arar, Saudi Arabia

Dr. Debajit Kalita
Department of Botany, Morigaon College, Assam,
India

Dr. Seyed Mohammad
Department of Biology, Faculty of Basic Sciences,
University of Mazandaran, Babolsar, Iran

Dr. Shalini Sivadasan
Faculty of pharmacy, AIMST University, Semeling,
Kedah, Malaysia

Dr. Sujimon Tanvichien
Srinakharinwirot University Nakornayok Rd. A.
Ongkarak T.Ongkarak, Nakornayok, Thailand

Prof. Dr.-Ing. habil. Dr. h. c. Lothar Mörl
Institute für Apparate- und Umwelttechnik Otto-
von-Guericke-Universität Magdeburg, Germany

Dr. V. Ravichandran
Faculty of Pharmacy, AIMST University, Semeling,
Kedah, Malaysia

Dr. Zahid Hussain
Department of Pharmaceutics, Faculty of Pharmacy,
Universiti Teknologi MARA, Puncak Alam Campus,
Malaysia

Dr. Ajay Kumar Meena
Department of AYUSH, Ministry of Health & Family

Dr. Yesudass Dominic Ravichandran
School of Advanced Sciences, VIT University,
Vellore, Tamil Nadu, India

Dr. Seema Akbar
Research Institute of Unani Medicine, The
University of Kashmir Campus, Srinagar, J. & K.,
India

Dr. P. Thillai Arasu
Department of Chemistry, Wollega University,
Nekemta, Ethiopia

Dr. Sooraj S. Nath
Safi Institute of Advanced Study, Kozhikode, India

Dr. Erum Shireen
Dept. of Biochemistry, University of Karachi,
Pakistan

Dr. M. M. Gupta
School of Pharmacy, Faculty of Medical Sciences,
The University of The West India, India

Dr. Najma Sultana
United Biotechnologies, Karachi, Pakistan

Dr. Sivakumar P
Department of Petroleum Engineering, JCT College
of Engineering and Technology, Pichanur, Tamil
Nadu, India

Dr. Evren Algin Yapar
Department in Ministry of Health, Turkish
Medicines and Medical Devices Agency, Ankara,
Turkey

Dr. Vishal Vijay Pandey
Jayawantrao Sawant College of Pharmacy &
Research, Hadapsar, Pune, India

Dr. Shamkuwar Prashant Babarao
Government College of Pharmacy, Thiba Palace,
Ratnagiri, India

Dr. S. K. Starling
Department of Chemistry, Mewar University
Chittorgarh, Rajasthan, India

Dr. Syed Sajjad Hussen
Manipal College of Pharmaceutical Sciences,
Manipal University, India

Dr. Ahmed Osman
Department of Psychology, Faculty of Education,
Assiut University, Malaysia

Dr. Abdel-Tawab Halim Mossa Abd El-Aziz
Department of Pesticide Chemistry, National
Research Centre (NRC) Dokki, Cairo, Egypt

Welfare, Government of India, India

Dr. Ashish C. Suthar
Herbal R & D, Piramal Life Sciences Ltd., Mumbai,
India

Dr. Manish A. Rachchh
Pharmacological Research and IPR University road,
Rajkot, Gujarat, India

Kiran Kumar Chereddy
Manager at Novartis Pharma AG
Postfach 4002, Basel
Switzerland

Dr. Fahd M. Abd Al Galil
Department of Zoology, Faculty of Applied
Science, Thamar University, Yemen

Dr. Priyanka Bhatt
Department of Pharmaceutical Sciences, College of
Pharmacy, University of South Florida, USA

Dr. Beril Anilanmert
Istanbul University-Cerrahpasa Institute of Forensic
Sciences, Cerrahpasa/Istanbul

Dr. Andleeb Shahzadi
Istanbul University Cerrahpasa-Fatih Istanbul,
Turkey 34098

Dr. Mohd Masih Uzzaman Khan
Unaizah College of Pharmacy Unayzah 56264, Saudi
Arabia

Dr. V. Vinod Prabhu
Department of Biochemistry, University of Madras,
Guindy campus, Tamil Nadu, India

Dr. Ching Siew Mooi
University Putra, Malaysia

Dr. Asif Husain
Jamia Hamdard University, New Delhi, India

Dr. Muhammad Shahzad Aslam
School of Bioprocess Engineering, Universiti
Malaysia Perlis, Kompleks Pusat Pengajian
Jejawi, Arau, Perlis

Dr. Gláucio Diré Feliciano
State University Center Foundation of the West
Zone / Rio de Janeiro, Brazil

Dr Dilipkumar Pal
Department of Pharmaceutical Sciences, Guru
Ghasidash Vishwavidyalaya, Bilaspur, C.G., 495 009,
India

Ali Abdullah Ali Al-yahawi
Assistant Professor of Clinical Pharmacy &
Therapeutics, Yemen

Dr. Maha Zaki Rizk
National Research Center, Therapeutic Chemistry
Dept., National Research Center, Dokki, Cairo,
Egypt



Online ISSN: 0975-1491

Print ISSN: 2656-0097

Journal Metrics 2018

Source Normalized Impact per Paper (SNIP): 2.029

SCImago Journal Rank (SJR): 0.23

ISSN: 0975-1491



Visitor No. 134484

[Our Journals](#) || [Open Access Policy](#) || [Publication & Peer Review Policy](#) || [Publication Ethics](#)

The publication is licensed under a [Creative Commons License \(CC BY\)](#). [View Legal Code](#)

Copyright © 2018 All Rights Reserved, **Innovare Academic Sciences** | Powered By **CyberDairy**

INTERNATIONAL JOURNAL OF PHARMACY AND PHARMACEUTICAL SCIENCES

Vol 6 Suppl 2, 2014

Review Articles

APPLICATIONS OF IMPLANTABLE MEDICAL SENSORS FOR HEART FAILURE: A REVIEW	1-5
MURUGESH SHIVASHANKAR, VENKATA RAMANATHAN VINODINI, PUJA MISHRA, KALIAPPAN UMA	
IS MANGANESE INDUCED NEUROTOXICITY A POTENTIAL MODEL FOR PARKINSON'S DISEASE? AN OVERVIEW ON ITS COMPLICATIONS	6-15
MAHALAKSHMI A.M, RAMESH B. NIDAVANI, B. SURESH	
SIGNIFICANCE OF BENZOTHAZOLE MOIETY IN THE FIELD OF CANCER	16-22
JITENDRA JENA	
2, 5-DIHYDROXY-3-UNDECYL-1, 4-BENZOQUINONE (EMBELIN)-A SECOND GOLD OF INDIA- A REVIEW	23-30
N. RADHAKRISHNAN, A. GNANAMANI.	
MICROPARTICULATE DRUG CARRIERS: A PROMISING APPROACH FOR THE DELIVERY OF ANTI HIV DRUGS	31-39
SELLAPPAN VELMURUGAN, MOHAMED ASHRAF ALI, PRAVEEN KUMAR	
HERBAL MEDICINES USED IN THE TRADITIONAL INDIAN MEDICINAL SYSTEM AS A THERAPEUTIC TREATMENT OPTION FOR OVERWEIGHT AND OBESITY MANAGEMENT: A REVIEW	40-47
ROHIT KUMAR VERMA, THOMAS PARADATHATHU	
ENHYDRA FLUCTUANS: A REVIEW ON ITS PHARMACOLOGICAL IMPORTANCE AS A MEDICINAL PLANT AND PREVALENCE AND USE IN NORTH-EAST INDIA.	48-50
UPASANA SARMA, VEDANT V. BORAH, KANDARPA KR. SAIKIA, N. K. HAZARIKA	
RECENT ADVANCES IN BRAIN TARGETED DRUG DELIVERY SYSTEMS: A REVIEW	51-57
AASAVARI H. GUPTA, HARSHA T. KATHPALIA	
HEXOSOMES AS A NOVEL DRUG DELIVERY SYSTEM: A REVIEW	58-63
ARTICLE WAS REMOVED DUE TO PLAGIARISM AND COPYRIGHT VIOLENCE	
ALOE VERA IN ORAL DISEASES - A REVIEW	64-66
B. DHEEPIKA, DR.T.N.UMA MAHESWARI	
UNDERSTANDING OUR NATURAL NAIL – ANTIFUNGAL AGENTS	67-73
FLOWERLET MATHEW, BINDUMOL K C, JIMSHA PAUL, ROCILIN P PATHADAN AND VINCY VARGHESE	
DIAGNOSTICS AND THERAPEUTIC APPLICATION OF GOLD NANOPARTICLES	74-87
"ARTICLE HAS BEEN REMOVED FROM PUBLICATION DUE TO PLAGIARISM AND COPYRIGHT VIOLENCE"	
BONE GRAFTS AND BONE SUBSTITUTES	88-91
TERESA MAO, KAMAKSHI V	
DEVELOPMENTS AND EMERGING ISSUES IN PUBLIC AND PRIVATE HEALTH CARE SYSTEMS OF KERALA	92-98
LEKSHMI S , G.P.MOHANTA, K.G.REVIKUMAR, P.K.MANNA	
TRENDS OF CLICK SYNTHESIS: A REVIEW	99-103
PBABODH SAPKALE, MEGHA SAHU, MAYUR CHAUDHARI DR. P. R. PATIL	
Research Articles	
A VALIDATED STABILITY-INDICATING RP-HPLC ASSAY METHOD FOR BOLDENONE UNDECYLENATE AND ITS RELATED SUBSTANCES	104-109
V. VENKATESWARLU AND K. HUSSAIN REDDY	
HEPATOPROTECTIVE AND ANTI-PYRETIC EFFECT OF BARK OF NYCTANTHES ARBORTRISTIS LINN.	110-114
L. SHYAMALI SINGHA, MEENAKSHI BAWARI, MANABENDRA DUTTA CHOUDHURY	
ANALGESIC AND ANTHELMINTIC ACTIVITY OF VARIOUS EXTRACTS OF ANDROGRAPHIS PANACULATANEES. STEM	115-118
SATYAJIT DUTTA	
FORMULATION AND EVALUATION OF SR MATRIX TABLETS OF GLIPIZIDE USING ION EXCHANGE RESIN	119-125
P PRASHANT, J SAURABH, J POOJA	
ANTIOXIDANT ACTIVITY OF SELECTED PLANTS	126-128
KRISHNAVENL M	
ANTI DIABETIC ACTIVITY OF POLY HERBAL FORMULATIONS	129-130
T. VISWANATH, A. SUVARCHALA KIRANMAI , K. HEMAMALINI, M. VIJUSHA, G. GIRISHA	

<u>ISOLATION AND CHARACTERIZATION OF OLIGOSACCHARIDES COMPOSITION IN ORGANICALLY GROWN RED PITAYA, WHITE PITAYA AND PAPAYA</u>	131-136
R. MOHD ADZIM KHALILI, A. B. CHE ABDULLAH AND A. ABDUL MANAF	
<u>TABLETS CONTAINING MICROSPHERES OF EUDRAGITE, POLY(3-HYDROXYBUTYRATE) AND SIMVASTATIN WITH IMPROVED DRUG DISSOLUTION RATE</u>	137-141
BIANCA R. PEZZINI, PAOLA A. A. BORBA, IZABEL C. CELESKI, MELISSA ZÉTOLO, MARCOS A. SEGATTO SILVA, GIOVANA C. BAZZO	
<u>SYNTHESIS AND ANTI-MICROBIAL ACTIVITY OF SOME SUBSTITUTED BIS[2-((E)-2-(4-BENZYLIDENEAMINO)THIAZOL-4-YL)-4-METHYLPHENOL] METAL COMPLEXES</u>	142-146
AJAY M. GHATOLE, KUSHAL R. LANJEWAR, MAHESH K. GAIDHANE	
<u>TOTAL GLUCOSE AND CRUDE FIBER IN LOCAL RED SWEET POTATO [IPOMOEA BATATAS L. (LAM)] TUBER</u>	147-149
RAMDAN PANIGORO, DIAH DHIANAWATY	
<u>CURATIVE EFFECT OF WOODFORDIA FRUTICOSA KURZ FLOWERS ON N-NITROSODIETHYLAMINE INDUCED HEPATOCELLULAR CARCINOMA IN RATS</u>	150-155
A. NITHA, S. P PRABHA, P. N ANSIL, M. S LATHA	
<u>MANAGEMENT OF TYPE 2 DIABETES MELLITUS: ASSESSMENT OF THE COMMUNITY PHARMACISTS' CONTRIBUTION IN SELECTED DISTRICTS OF TAMIL NADU STATE, INDIA</u>	156-158
RAJA D. P.R. ANAND VIJAYAKUMAR, SATHYA SANTHY D, KRISHNA KUMAR M. S, JAYAKUMAR C, 3DR. P. VIJAYAN	
<u>PHARMACOGNOSTIC EVALUATION OF CURCUMA NEILGHERRENSIS WT.</u>	159-168
N. YASODAMMA, D. CHAITHRA, C. ALEKHYA	
<u>NEW VALIDATED ISOCRATIC RP-HPLC METHOD FOR ASSAY OF FENOFIBRATE</u>	169-172
DILLIP KUMAR SAHOO, PRAFULLA KUMAR SAHU, CHANDRA SEKHAR PATRO	
<u>LYSOSTAPHIN AS AN ALTERNATE THERAPY IN METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) INDUCED ENDOPHTHALMITIS: AN EXPERIMENTAL STUDY</u>	173-175
N.ASKARI, SHAMIM AHMAD, ABHISHEK, ABDUL WARIS, MOUSUMI MALAKAR	
<u>A SURVEY OF UTILIZATION OF MEDICATIONS WITHOUT PRESCRIPTION AMONG IN DIFFERENT AGE GROUPS</u>	176-178
G. RAGESH	
<u>DRYOPTERIS COCHLEATA RHIZOME: A NUTRITIONAL SOURCE OF ESSENTIAL ELEMENTS, PHYTOCHEMICALS, ANTIOXIDANTS AND ANTIMICROBIALS.</u>	179-188
A. KATHIRVEL, A. K. RAI, G. S. MAURYA, V. SUJATHA	
<u>ANTIMICROBIAL, ANTIOXIDANT AND CYTOTOXIC PROPERTIES OF STREPTOMYCESSP. (ERINLG-01) ISOLATED FROM SOUTHERN WESTERN GHATS</u>	189-196
C. BALACHANDRAN, V. DURAI PANDIYAN, M. VALAN ARASU, S. IGNACIMUTHU	
<u>PHYTOCHEMICAL SCREENING AND EVALUATION OF (INVITRO) ANTIOXIDANT ACTIVITY OF ACHYRANTHES ASPERA LINN ROOT EXTRACT</u>	197-199
M. ANAND, V. SELVARAJ, M. ALAGAR	
<u>EFFECT OF NANO MOLAR CONCENTRATION OF METHYL PARATHION ON GOAT TESTIS</u>	200-202
SHARMA R. K., GOYAL A. K., THAREJA K. AND BHAT R. A.	
<u>INSILICO DRUG DESIGN AND MOLECULAR DOCKING STUDIES OF SOME NOVEL BENZOTHAZOLE DERIVATIVES AS ANTI-CANCER AND ANTI-INFLAMMATORY AGENTS</u>	203-208
DEEPTHY CHANDRAN, LEENA. K. PAPPACHEN, MANJU PRATHAP, JINSHA.M.J, JILSHA.G.	
<u>PHYSICO-CHEMICAL SCREENING OF ALGERIAN LINSEED OIL AND CHARACTERIZATION OF THEIR FREE ACIDS METHYL ESTERS (FAMES)</u>	209-215
BENMEHDI HOUCINE, AMROUCHE ABDELILLAH, MEZIANE ABDELKADER, ZAABOUB IMENE, CHABANE SARI MERIEM, DAUDI CHABANE SARI	
<u>PREPARATION AND EVALUATION OF FLUOXETINE HYDROCHLORIDE ORAL DISPERSIBLE TABLETS</u>	216-222
L. DIVYA, V.RAVICHANDIRAN, V. LAVAKUMAR, C. SOWMYA, N.VENKATESHAN, M.NIRANJAN BABU	
<u>DPPH FREE RADICAL SCAVENGING ACTIVITY OF TOMATO, CHERRY TOMATO AND WATERMELON: LYCOPENE EXTRACTION, PURIFICATION AND QUANTIFICATION</u>	223-228
TEHNIAT SHAHZAD, IJAZ AHMAD, SHAHNAZ CHOUDHRY, MUHAMMAD K SAEED, MUHAMMAD N KHAN	
<u>METHOD DEVELOPMENT AND VALIDATION OF STABILITY INDICATING RP-HPLC FOR SIMULTANEOUS ESTIMATION OF RUPATADINE FUMARATE AND MONTELUKAST SODIUM IN COMBINED TABLET DOSAGE FORM</u>	229-233
AASHKA JANI, JALDIP JASOLIYA, DIPESH VANSJALIA	
<u>A STUDY TO EVALUATE THE EFFECT OF SPARFLOXACIN ON PENTOBARBITONE INDUCED SLEEP IN MICE</u>	234-235
AKSHYA ALVA, H N GOPALA KRISHNA, RAMYA KATEEL, CHARISHMA P R, MOHANDAS RAI, HARSHA S NAIK	
<u>ANTHELMINTIC ACTIVITY OF TRACHYSPEERMUMAMMI(L) EXTRACT</u>	236-238
AISHWARYA K. APTE, V. S. KHOT, N. S. BIRADAR, S. B. PATIL	
<u>STUDIES ON FORMULATION AND EVALUATION OF OSMOTICALLY CONTROLLED DRUG DELIVERY SYSTEM OF CARBAMAZEPINE</u>	239-250
PANCHAXARI MALLAPPA DANDAGI, CHIRAG PRAKASHBHAI PATEL, ROHIT SHARMA, ANAND PANCHAKSHARI GADAD, VINAYAK MASTI HOLIMATH	
<u>PREPARATION AND IN VIVO EVALUATION OF POORLY SOLUBLE DEFERASIROX DISPERSIBLE TABLETS BY HYDROXY PROPYL BETA CYCLODEXTRIN COMPLEXATION</u>	251-256
PANCHAXARI MALLAPPA DANDAGI, SURYASRI LAVANYA ADAVI, SEEPRARANI RATH, ANAND PANCHAKSHARI GADAD	
<u>PREPARATION AND COMPARATIVE EVALUATION OF LIQUISOLID COMPACT AND SOLID DISPERSION OF CANDESARTAN CILEXETIL</u>	257-266
AHMED A. ABDUL ABBAS, ALAA A. ABDUL RASOOL, NAWAL A. RAJAB	
<u>EFFECT OF CALCIUM, ALFACALCIDOL AND HEMODIALYSIS ON SECONDARY HYPERPARATHYROIDISM</u>	267-272
A. SHOPIT, ADNAN AL -ADHAL, ABDUL-KARIM SHEIBAN, M. AMOOD AL-KAMARANY	
<u>HEPATOPROTECTIVE ACTIVITY OF KIRGANELIA RETICULATA POIR. (BAILL.) ROOT AGAINST PARACETAMOL INDUCED HEPATO-TOXICITY IN WISTAR RATS</u>	273-278
RAJESH KUMAR SONI, RAGHUVVEER IRCHHAIYA, VIHANGESH DIXIT, ZAHID AHMAD BHAT, HILAL AHMAD WANI, ASHIQ HUSSAIN NAJAR	
<u>ALLERGIC REACTION OF P-PHENYLENEDIAMINE ON SKIN</u>	279-280
ANISHA BRIGIT SHAJAN	

SINGLE NUCLEOTIDE POLYMORPHISM (SNPS) ANALYSIS OF MU-OPIOID RECEPTORS (<i>OPRM1</i>) USING DENATURING HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (DHPLC) AMONG THE INTRAVENOUS DRUG USERS	281-287
TEH LK, BANNUR Z, ZAKARIA ZA, FAZLEEN HMH, SALLEH MZ, MOHD ZAKI SALLEH	
METABOLOMICS AND PHARMACOGENETICS BASED 5-FLUOROURACIL MONITORING IN COLORECTAL CANCER PATIENTS	288-295
BANNUR Z, SALLEH MZ, HASHIM H, HENNESSY T, AZMI MN, ZAILANI MH, RAMASAMY P, ZAKARIA ZA, S SUNEET, H NGOW, G HENRY, TEH LK	
PHYSICAL CHARACTERISTIC AND VIABILITY OF <i>LACTOBACILLUS ACIDOPHILLUS</i> MICROPARTICLE USING HPMC K100LV AND HPMC K4M AS MATRICES	296-298
SUGIYARTONO,, DIKE BAGUS PAMUJI, AGIL ANTONO,,IDHA KUSUMAWATI , ISNAENI	
PRELIMINARY PHYTOCHEMICAL SCREENING AND INVITROANGIOTENSION ACTIVITY OF BIOACTIVE COMPOUND - STEROID ISOLATED FROM <i>SARGASSUM ILICIFOLIUM</i>	299-301
S. FAROOK BASHAC. MUTHUKUMAR	
DEVELOPMENT AND VALIDATION OF A GC/FID METHOD FOR IDENTIFICATION AND QUANTIFICATION OF MAIN COMPONENTS OF SATUREJA MONTANAL. ESSENTIAL OIL	302-306
ENTEHA HALOCI,VILMA TOSKA, SILVIA VERTUANI, AGRON METO, ENKELEJDA GOCI, ENVER MUSTAJAJ, STEFANO MANFREDINI	
METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS QUANTITATIVE ESTIMATION OF CALCIUM DOBESILATE AND TROXERUTIN IN TABLETS BY REVERSE PHASE HPLC	307-311
N.J.R. HEPSEBAH, P. PADMA, A.ASHOK KUMARS	
DEVELOPMENT AND VALIDATION OF RP-HPLC AND HPTLC METHOD OF ANALYSIS FOR SIMULTANEOUS ESTIMATION OF AMBROXOL HCL, DEXTROMETHORPHAN HBR AND GUAIFENESIN IN PHARMACEUTICAL COUGH COLD PREPARATION AND STATISTICAL COMPARISON OF DEVELOPED METHODS	312-316
KRUNAL SAGATHIYA, HINA BAGADA	
ANALYTICAL METHOD DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF METRONIDAZOLE AND AMOXICILLIN IN SYNTHETIC MIXTURE BY UV- VISIBLE SPECTROSCOPY	317-319
PARTH PATEL, PRIYA VARSHNEY, MINAL ROHIT	
AN EPIDEMIOLOGICAL SURVEY ON PREVALENCE OF OBESITY AND DISEASES BURDEN IN COMMON PUBLIC	320-322
G.LAKSHMI DURGA, CH.JHANSI, V.RAGHU RAM, RAMA RAO NADENDLA	
ANTIOXIDANT AND ANTICANDIDAL ACTIVITY STUDIES ON PHYLLANTHIN COMPOUND FROM PHYLLANTHUS NIRURI	323-326
ANUSHA JR , REMYA RV, SASI PREMILA JM, ALBIN T FLEMING	
DETERMINATION OF BIOACTIVE COMPONENTS OF THE LEAVES OF <i>COCCULUSHIRSUTUS(L.)</i> DIELS USING GC-MS ANALYSIS	327-329
MUKESH KUMAR MEENA, NEELAM SINGH AND VIDYA PATNI	
MICROBIOLOGICAL ANALYSIS OF TOPICALS AVAILABLE IN BANGLADESH	330-332
JWEL RANA, TOHURA SULTANA, KAMAL KANTA DAS, RASHED NOOR	
CYTOTOXIC AND APOPTOTIC NATURE OF MIGRASTATIN, A SECONDARY METABOLITE FROM <i>STREPTOMYCES</i> EVALUATED ON HEPG2 CELL LINE	333-338
VINAYAGAM RAMBABU, S. SUBA, P.MANIKANDAN, SUBURAMANIYAN VIJAYAKUMAR	
EVALUATION OF ANTIULCER AND IN-VITRO ANTIOXIDANT ACTIVITIES OF IXORACOCINEA FLOWERS AND POLYHERBAL EXTRACT IN WISTAR ALBINO RATS	339-344
PATIBANDLA NARESH BABU, NAGARAJU B, VINAY KUMARI	
TOXICITY PROFILE OF CINNAMON OIL BASED DRUG DELIVERY SYSTEM IN <i>OREOCHROMIS MOSSAMBICUS (TILAPIA)</i>	345-350
M. JOYCE NIRMALA, JOHN THOMAS, ANDREW EBENAZER, SRIVATSAVA VISWANADHA, AMITAVA MUKHERJEE, N. CHANDRASEKARAN	
SYNTHESIS, CHARACTERIZATION AND EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF SOME NOVEL SUBSTITUTED L-ARGININE ANALOGUES	351-354
S. K. ARIFA BEGUM, M. MADHURI, K. BHARATHI, KVSRG. PRASAD, A. RAJANI, K.HEMAMALINI, K. RUPA	
ANTI-PYRETIC ACTIVITY OF SOME SYNTHESIZED NOVEL L-ARGININE ANALOGUES (PEPTIDES)	355-356
SK. ARIFA BEGUM, M. MADHURI, A. RAJANI, K. HEMAMALINI	
ANTIOXIDANT ACTIVITY AND QUANTIFICATION OF PHENOLIC COMPOUNDS OF <i>EUPHORBIA ECHINUS</i>	357-360
FATIMA AZZAHRA LAHLOU, FOUZIA HMIMID, MOHAMMED LOUTFI, NOUREDDINE BOURHIM	
INHIBITION OF CALCIUM OXALATE (CAOX) CRYSTALLIZATION <i>IN VITRO</i> BY THE EXTRACT OF BEET ROOT (<i>BETA VULGAIS L.</i>)	361-365
R. SARANYA, N. GEETHA	
FABRICATION OF MACHINERY FOR CONTINUOUS FORMATION OF THIN SHEET OF WOUND DRESSING MATERIAL	366-368
VIJAYAN SUMATHI, THOTAPALLI PARVATHALESWARA SASTRY, RETHINAM SENTHIL, CHANDRABABU SHANTHI	
FORMULATION DEVELOPMENT, STANDARDIZATION AND ANTIMICROBIAL ACTIVITY OF <i>AGERATUM CONYZOIDES</i> EXTRACTS AND THEIR FORMULATION	369-374
RAJMANI PRAJAPATI, SUNITA ROY, SUDEEP MISHRA, S.K. RAZA AND L.K. THAKUR	
FORMULATION AND EVALUATION OF FLURBIPROFEN SOLID DISPERSION	375-384
AHMED LAITH DR. SHAIMAA N. ABD AL HAMMIDALAA A. ABD ALRASOOL	
PURIFICATION OF <i>STREPTOCOCCUS PNEUMONIAE</i> CAPSULAR POLYSACCHARIDES USING ALUMINIUM PHOSPHATE AND ETHANOL	385-387
CHANDRASHEKAR MACHAARAVINDALAVANYARAMASWAMY NANNA	
EFFECTS OF <i>CENTELLA ASIATICA L.</i>, <i>CURCUMA LONGA L.</i>, AND <i>STROBILANTHESCRISPUS L.</i> EXTRACTS ON 3 KIDNEY CELL LINES: <i>IN VITRO</i> CYTOTOXICITY ANALYSIS	388-392
H. HANISA, M.L. MOHDAZMI, M. SUHAILA, M.N.HAKIM	
EVALUATION OF DRUG CANDIDATURE OF SOME QUINAZOLINE- 4-(3H)-ONES AS INHIBITOR OF HUMAN DIHYDROFOLATE REDUCTASE ENZYME: MOLECULAR DOCKING AND IN SILICOSTUDIES	393-400
BIPRANSH KUMAR TIWARY, RAVI KANT PATHAK, KIRAN PRADHAN, ASHIS KUMAR NANDA, ASIM KUMAR BOTHRA, RANADHIR CHAKRABORTY	
FORMULATION AND EVALUATION OF FRANITIDINE HYDROCHLORIDE AS FLOATING IN SITU GEL	401-405
MILAD JAWAD HASAN, BALKIS AHMED KAMAL	
POTENTIAL <i>IN VITRO</i> COLLAGEN BIOSYNTHESIS STIMULATING AND ANTIOXIDANT ACTIVITIES OF EDIBLE MUSHROOM <i>VOLVARIELLA VOLVACEA (BULLIARD EX FRIES)</i> SING AQUEOUS EXTRACT	406-412

WARINTORN RUKSIRIWANICH, JAKKAPAN SIRITHUNYALUG, KORAWINWICH BOONPISUTTINANT, PENSAK JANTRAWUT EVALUATION OF IN-VITRO ANTIOXIDANT ACTIVITIES OF PTERIS BIAURITA L.	413-421
NISHIKA JAISHEE, USHA CHAKRABORTY DEVELOPMENT AND VALIDATION OF LC-MS/MS METHOD FOR THE SIMULTANEOUS QUANTITATIVE ANALYSIS OF OXCARBAZEPINE AND ITS METABOLITE 10-HYDROXYCARBAZEPINE IN K2EDTA PLASMA	422-429
KASHIF UL HAQ, NITESH KUMAR DEVELOPMENT AND VALIDATION OF A ULTRA PERFORMANCE LIQUID CHROMATOGRAPHIC METHOD FOR ASSAY OF CETIRIZINE DIHYDROCHLORIDE	430-432
P. RAVI KUMAR REDDY DR. V. KRISHNA REDDY, E. SASIKIRAN GOUD Y. RAMACHANDRA REDDY FORMULATION AND EVALUATION OF EXTENDED RELEASE METFORMIN HYDROCHLORIDE BEADS	433-441
MOHAMED M. NAFADY, KHALEID M ATALLA, MOHAMED A SAYED DEVELOPMENT AND VALIDATION OF A ULTRA PERFORMANCE LIQUID CHROMATOGRAPHIC METHOD FOR ASSAY OF MEBEVERINE HYDROCHLORIDE	442-445
PRAVI KUMAR REDDY, DR. V. KRISHNA REDDY, E. SASIKIRAN GOUD, Y. RAMACHANDRA REDDY STABILITY INDICATING RP-HPLC METHOD DEVELOPMENT AND VALIDATION FOR THE SIMULTANEOUS ESTIMATION OF EPROSARTAN MESYLATE AND HYDROCHLOROTHIAZIDE IN BULK AND TABLET DOSAGE FORM	446-451
SHARANYA GUMULAPURAM, SRIDHAR THOTA, VENISETTY RAJ KUMAR, VIJAY KUMAR NAGABANDI COMPARISON OF SUPPRESSIVE ACTIVITY OF THE CENTRAL NERVOUS SYSTEM FROM THE NEW DERIVATIVES N-BENZOYLPHENYLUREA	452-455
BAMBANGTRI PURWANTO DEVELOPMENT AND VALIDATION OF STABILITY INDICATING RP-HPLC METHOD FOR THE ESTIMATION OF NEUROLEPTIC DRUG ZOTEPINE IN BULK AND TABLET DOSAGE FORM	456-459
SHRUTHI KOLAGANI, SRIDHAR THOTA, VENISETTY RAJ KUMAR, VENUMADHAV NEERATI IDENTIFICATION OF MYCOLIC ACIDS OF MYCOBACTERIUM TUBERCULOSIS BY GAS CHROMATOGRAPHY-FLAME IONIZATION DETECTOR	460-464
ASRI DARMAWATI, DEBY KUSUMANINGRUM SYNTHESIS AND BRINE SHRIMP LETHALITY TEST OF SOME BENZOXAZINE AND AMINOMETHYL DERIVATIVES OF EUGENOL	465-467
MARCELLINO RUDYANTO, JUNI EKOWATI, TRI WIDIANDANI AND TOSHIO HONDA DRUG-EXCIPIENTS COMPATIBILITY STUDIES OF NICORANDIL IN CONTROLLED RELEASE FLOATING TABLET	468-475
ABDUL BAQUEE AHMED, LILA KANTA NATH ANTIOXIDANT ACTIVITY OF PROTEINS FROM FIFTEEN VARIETIES OF LEGUME SEEDS COMMONLY CONSUMED IN INDIA	476-479
C. PETCHIAMMAL, WAHEETA HOPPER THE DEVELOPMENT AND VALIDATION OF A CHIRAL HIGH PERFORMANCE LIQUID CHROMATOGRAPHY METHOD FOR THE IDENTIFICATION AND QUANTIFICATION OF (R)-ENANTIOMER IN 7-ETHYL-10-HYDROXYCAMPTOTHECIN (SN-38)	480-486
ARALA VENKATESHWARLU 1,2, A. V. RAMA RAO, K. MUKKANTI AND S. V. SUBBA REDDY TOXICITY OF MAGNESIUM OXIDE NANO PARTICLES IN TWO FRESH WATER FISHES TILAPIA (OREOCHROMIS MOSSAMBICUS) AND ZEBRA FISH (DANIO RERIO)	487-490
JOHN THOMAS, S. VIJAYAKUMAR, S. THANIGAIVEL, AMITAVA MUKHERJEE, NATARAJAN CHANDRASEKARAN HEPATO PROTECTIVE ACTIVITY OF METHANOL EXTRACT OF STEM BARK OF PROSOPISCINERARIA LINN AGAINST CARBON TETRACHLORIDE INDUCED HEPATOTOXICITY	491-493
VELMURUGAN V, ARUNACHALAM G A COMPARITIVE STUDY OF ANTIOXIDANT ACTIVITY OF BACCOPA MONNIERI (L.) PENNELL USING VARIOUS SOLVENT EXTRACTS AND ITS GC-MS ANALYSIS	494-498
B SUBASHRI, Y JUSTIN KOIL PILLAI FLURBIPROFEN FAST DISINTEGRATING TABLETS	499-505
AMAL S. M. ABU EL-ENIN OPTIMIZATION OF ANTIBIOTIC PRODUCTION BY MARINE ACTINOMYCETES STREPTOMYCES SP. KOD10	506-510
S. FEBINA BERNICE SHARON, RACHEL REGI DANIEL AND R. SHENBAGARATHAI NEW QUINAZOLIN-2,4-DIONES FROM (2,4-DIOXO-1,4-DIHYDRO-2H-QUINAZOLIN-3-YLAMINO) ACETIC ACID HYDRAZIDE	511-514
MAMDOUH ADLY HASSAN, AHMED MOHAMED MOSALLEM YOUNES, MOHAMED MOBARK TAHA, SAYED MOUSTAFA ABBODDY AND ABOU-BAKR HAREDI ABDEL-MONSEF FORMULATION AND IN VITRO EVALUATION OF DIACEREIN LOADED NIOSOMES	515-521
RANDA M. ZAKI, ADEL A. ALI, SHAHIRA F. EL MENSRAWI AND AHMED ABDEL BARY PHARMACOLOGICAL SCREENING AND EVALUATION OF ANTI-PEPTIC ULCER PROPERTY OF LEAVES OF ARTOCARPUS INTEGRIFOLIA	522-524
NEHA SHARMA, RAHUL P.K. MISHRA BACILLUS SP. MEDIATED EXTRACELLULAR SYNTHESIS OF SILVER NANOPARTICLES	525-527
K. VITHIYA, RAJENDRAN KUMAR, SHAMPA SEN IN SILICO SCREENING OF CARDIOPROTECTIVE ACTIVITY OF SOME FLAVONOLS	528-531
MONJUR AHMED LASKAR, MANABENDRA DUTTA CHOUDHURY, PANKAJ CHETIA FORMULATION DEVELOPMENT AND CHARACTERIZATION OF NISOLDIPINE FAST DISSOLVING TABLET	532-535
ANNA BALAJI, MEER ISMAIL ALI IDENTIFICATION OF LEAD COMPOUNDS WITH COBRA VENOM NEUTRALISING ACTIVITY IN THREE INDIAN MEDICINAL PLANTS	536-541
N.C. NISHA, S. SREEKUMAR, C.K. BIJU, P. N. KRISHNAN PREPARATION AND CHARACTERIZATION OF PHENYTOIN SODIUM NIOSOMES FOR ENHANCED CLOSURE OF SKIN INJURIES	542-546
AHMED M. ABDELHALEM ALI, HATEM A. SARHAN AND TAREK MAGDY ANTIHYPERLIPIDEMIC EFFECT OF WHEATGRASS ON ALCOHOL AND APUFA INDUCED LIVER TOXICITY IN MALE ALBINO WISTAR RATS	547-551

VARALAKSHMI DURAIRAJ, GARIMA SHAKYA, RUKKUMANI RAJAGOPALAN DEVELOPMENT AND CHARACTERIZATION OF CO-GROUND MIXTURES AND SOLID DISPERSIONS OF ARIPIRAZOLE WITH HYDROPHILIC CARRIERS	552-557
MUNEERA BEGAM, D V GOWDA, VISHNU DATTA M, ARAVINDARAM S, SIDDARAMIAH H PALLIATIVE EFFECT OF CURCUMIN ON STZ-INDUCED DIABETES IN RATS	558-563
REHABKAMEL, AMEL ABD ALLAH HASHIM, SAHAR ABD EL-MOHSEN ALI MEDICATION ADHERENCE TO ANTIDIABETIC THERAPY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS	564-570
MANJUSHA SAJITH, MADHU PANKAJ, ATMATAM PAWAR, AMIT MODI, RONAK SUMARIYA BALANCING ANTI-AMYLOID AND ANTI-CHOLINESTERASE CAPACITY IN A SINGLE CHEMICAL ENTITY: IN-SILICODRUG DESIGN	571-574
PAVADAI PARASURAMAN, RAMALINGAM SURESH, DHANARAJ PREMNATH FORMULATION AND EVALUATION OF ANTIBACTERIAL ACTIVITY OF A HERBAL OINTMENT PREPARED FROM CRUDE EXTRACTS OF <i>AEGLE MARMELLOS</i>. (BAEL)	575-579
JAYESH MHATRE, SMITA NAGARAL, SHRADDHA KULKARNI A STUDY ON THE ADVERSE EFFECTS OF ANTICANCER DRUGS IN AN ONCOLOGY CENTER OF A TERTIARY CARE HOSPITAL	580-583
KIRTHI C, AZRA AFZAL, MOUNIKA REDDY, SYED AAMIR ALI, APARNA YERRAMILI, SANJEEV SHARMA STABILITY INDICATING CHIRAL HPLC METHOD FOR THE ESTIMATION OF ZALTOPROFEN ENANTIOMERS IN PHARMACEUTICAL FORMULATION	584-587
BYRAN GOWRAMMA, SUBRAMANIA NAINAR MEYYANATHAN, SUBRAMANIAN GOMATHY, BASAWAN BABU, NAGAPPAN KRISHNAVENI, BHOJRAJ SURESH PREPARATION, EVALUATION AND COMPARISON OF LIPID BASED DRUG DELIVERY SYSTEMS OF TACROLIMUS	588-591
PRANAV PATEL, TEJAL MEHTA#, SHITAL PANCHAL# PREPARATION AND EVALUATION OF NYSTATIN LOADED-SOLID-LIPID NANOPARTICLES FOR TOPICAL DELIVERY	592-597
LAITH HAMZA SAMEIN COMPARISON OF TOTAL PHENOLIC CONTENT OF SOME SELECTED INDIGENOUS GARCINIA SPECIES FOUND IN ASSAM	598-601
TARALI CHOWDHURY ANALGESIC ACTIVITY OF WITHANIACOAGULANS DUNAL FRUIT EXTRACTS IN EXPERIMENTAL ANIMAL MODELS	602-605
MS. ARCHANA K. SHENDKAR, MRS. SUGANDHA G. CHAUDHARI, DR. YOGESH K. SHENDKAR DEVELOPMENT AND VALIDATION OF HPLC METHOD FOR THE SIMULTANEOUS ESTIMATION OF QUERCETIN AND RUTIN IN AGANOSMADICHOTOMA [ROTH] K. SCHUM	606-608
GOMATHY SUBRAMANIAN, SUBRAMANIA NAINAR MEYYANATHAN, YAMJALA KARTHIK, ANJANA KARUNAKARANAI AND DHANABAL S PALANISAMY IMPROVED BACTERICIDAL PROPERTY OF SILVER NANOPARTICLES FROM PENICILLIUM PINOPHILUM (MTCC 2192) IN A COMBINED FORM WITH CARBICILLIN AND MOXIFLOXACIN	609-612
ANIMA NANDA, SHAHNAZ MAJEED A PRELIMINARY ANTIHYPERGLYCEMIC AND ANTINOCICEPTIVE ACTIVITY EVALUATION OF AMORPHOPHALLUS CAMPANULATUS CORMS	613-616
MD MIZANUR RAHAMAN, MOHAMMED MEHDI HASAN, IMRUL HASAN BADAL, AUDITI SWARNA, SHAHNAZ RAHMAN, MOHAMMED RAHMATULLAH HEPATOPROTECTIVE ACTIVITY AND SUB ACUTE TOXICITY STUDY OF WHOLE PART OF THE PLANT ANOECTOCHILUSFORMOSANUSHAYATA (ORCHIDACEAE)	617-621
AMARESH PANDA, SEEMANCHALA RATH, DEBASHIS PRADHAN, ARPAN MAHANTY, BIJAN KUMAR GUPTA, NRIPENDRA NATH BALA ANTI-INFLAMMATORY AND ANALGESIC ACTIVITIES OF METHANOL EXTRACT OF <i>VALLARIS SOLANACEA</i> LEAVES	622-624
JOSHI PUNAM , PRIYA BHANU AND GAHLOT MANOJ DEVELOPMENT AND IN-VITRO EVALUATION OF NICOTINE HARD CANDY LOZENGES FOR SMOKING CESSATION	625-629
PRENUKA, SHAYEDA, MADHUSUDAN RAO YAMSANI EFFECT OF NATURAL SUNFLOWER OIL AND ITS COMPONENTS ON THE SKIN PERMEABILITY TO WATER AND SOME DRUGS	630-636
HASSAN M. GHONAIM, MASSIMO G. NORO AND JAMSHED ANWAR SYNTHESIS, CHARACTERIZATION, ANTIMICROBIAL ACTIVITY AND CYTOTOXICITY STUDIES OF 2-((6-METHOXYBENZO[D] THIAZOL-2-YLIMINO) METHYL)-6-ETHOXYPHENOLAND ITS METAL COMPLEXES	637-643
MUDAVATH.RAVI, BATHINI USHAIAH, PALLIMONI SUJITHA, KARUNAKAR RAO KUDLE, CH.SARALA DEVI FACTOR INFLUENCE STUDY OF IVABRADINE HCL OSMOTIC PUSH PULL TABLETS USING FRACTIONAL FACTORIAL DESIGN	644-651
SONA.P.S, C. MUTHULINGAM, DR. G.GEETHA , DR. R VEKATA NARAYANAN DEVELOPMENT AND VALIDATION OF A STABILITY-INDICATING HYDROPHILIC INTERACTION LIQUID CHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF SULFAQUINOXALINE SODIUM IN WATER SOLUBLE POWDER FORMULATION	652-657
MASHHOUR GHANEM, SALEH ABU-LAFI, DIYAA MOHAMMAD VALIDATION OF IN VITRO ANALYTICAL METHOD TO MEASURE PAPAINE ACTIVITY IN PHARMACEUTICAL FORMULATIONS	658-661
CAROLINE C. FERRAZ, GUSTAVO HC VARCA, MARTA MDC VILA, PATRICIA S LOPES SMEDDS FORMULATION: DEMONSTRATION OF ENHANCED BIOAVAILABILITY OF PIOGLITAZONE IN RATS	662-665
HYMA.P, ABBULU.K.SUNIL S JALALPURE STATISTICAL DESIGNING OF ENRICHED PECTIN EXTRACT MEDIUM FOR THE ENHANCED PRODUCTION OF PECTINASE BY ASPERGILLUSNIGER	666-672
NARAYANANMAHESH, RANGARAJANVIVEK, MANI ARUNKUMAR, SRINIVASAN BALAKUMAR IN-VITRO AND IN-VIVO RELATIONSHIP AND INFLUENCE OF COVARIATES ON PHARMACOKINETICS OF URAPIDIL SUSTAINED RELEASE CAPSULES	673-678
M. SUNDARAMOORTHY NAINAR, RAVISEKHAR KASIBHATTA, D.PRABAKARAN, V. PRAVEEN KUMAR AND ASHISH SAXENA HPLC DETERMINATION OF PHENOLICS AND FREE RADICAL SCAVENGING ACTIVITY OF ETHANOLIC EXTRACTS OF TWO POLYPORE MUSHROOMS	679-684
IMTIYAZ AHMAD SHEIKH, DEEPAK VYAS, MOHD ANIS GANAIE, KEERTI DEHARIYA, VINITA SINGH OPTIMIZATION AND CHARACTERIZATION OF BIODEGRADABLE POLYMERIC NANOCAPSULES OF A CAMPTOTHECIN DERIVATIVE	685-689
SHILPI PRASAD, J.S.DANGI ROLE OF MULTIPLE ION CHANNEL BLOCKER -AMIODARONE IN MODEL OF CONVULSION, LOCOMOTOR ACTIVITY AND COGNITION IN ALBINO RATS	690-692
LOKRAJ SUBEDEE, RN SURESHA, MD. SIBGATULLAH, SIDDAMMA A., BRAHADEESH M	

FORMULATION AND EVALUATION OF AN HERBAL CREAM FOR WOUND HEALING ACTIVITY	693-697
TRAILOKYA DAS, JIBAN DEBNATH, DR. BIPUL NATH, SUVAKANTA DASH	
RP-LC GRADIENT ELUTION METHOD FOR SIMULTANEOUS DETERMINATION OF RELATED SUBSTANCES OF ZALTOPROFEN AND PARACETAMOL AND APPLICATION FOR DRUG EXCIPIENT COMPATIBILITY STUDY	698-703
PRADNYA A KARBHARI , SNEHA J JOSHI , SUVARNA I BHOIR	
ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF THE TISSUE EXTRACT OF <i>PERNA VIRIDIS</i> LINNAEUS, 1758 (MOLLUSCA: BIVALVIA) FROM VERSOVA COAST, MUMBAI	704-707
MADHU V. N&, P. SIVAPERUMAL, K. KAMALA, AJIT A. AMBEKAR AND B.G. KULKURNI	
MONONUCLEOTIDE PHOSPHATASE FROM GOAT LIVER: A POSSIBLE TARGET FOR DIVALENT HEAVY METAL CATIONS	708-714
SWAGATA MALLIK, MONALISA DEY, MOUSUMI DUTTA, ARNAB K. GHOSH, DEBASISH BANDYOPADHYAY	
EVALUATION OF ANTI-INFLAMMATORY ACTIVITY OF ALCOHOLIC EXTRACT OF LEAVES OF <i>LEUCAS ASPERAIN</i> ALBINO RATS	715-719
NAVIN PATIL, SOMASHEKAR HS, SUNEEL KUMAR REDDY, VINOD NAYAK, NARENDRANATH S,KL BAIRY,AMRITA PARIDA,CHAITHANYA MALALUR, RAHUL PKOTIAN.	
STATISTICAL CORRELATION AND QUANTIFICATION OF GLICLAZIDE BY SPECTROPHOTOMETRIC METHOD	720-722
LOPAMUDRA. ADHIKARI, P. N. MURTHY, ZUMA.SHANKAR MISHRA	
EFFECT OF NICORANDIL ON BASAL GLUCOSE LEVELS AND AFTER GLUCOSE CHALLENGE IN NORMAL EUGLYCEMIC ALBINO WISTAR RATS	723-725
SURESHA.R.N, MOHAMMED SIBGATULLAH, JAYANTHI.M.K, KALABHARATHI.H.L, SATISH A.M, PUSHPA V.H, PRATHIMA C	
PROTEIN BINDING INTERACTION STUDY OF OLMESARTAN MEDOXOMIL AND ITS METABOLITE OLMESARTAN BY FLUORESCENCE SPECTROSCOPY	726-729
RITESH N. SHARMA, SHYAM S. PANCHOLI	
FIRST ORDER DERIVATIVE AND DUAL WAVELENGTH SPECTROPHOTOMETRY METHODS DEVELOPMENT AND VALIDATION FOR SIMULTANEOUS ESTIMATION OF ALOGLIPTIN AND PIOGLITAZONE IN BULK AND DOSAGE FORM	730-738
RAVAL KASHYAP, U.SRINIVASA	
ANTI-OBESITY AND HYPOGLYCEMIC EFFECT OF ETHANOLIC EXTRACT OF <i>CROTALARIA JUNCEA</i> IN HIGH FAT DIET INDUCED HYPERLIPIDEMIC AND HYPERGLYCEMIC RATS	739-742
ORUGANTI RAJESH, VENISSETTY RAJ KUMAR, PULIGILLA SHANKARAIHAH	
DISSOLUTION ENHANCEMENT OF TELMISARTANBYLIQUISOLID COMPACTS	743-749
MAYS A. AL-SARRAF, AHMED A. HUSSEIN, AHMED S. ABDUL JABBAR	
EFFECT OF TYPE OF NON-VOLATILE SOLVENTS ON THE FORMULATION AND RELEASE OF VALSARTAN FROM LIQUID SOLID COMPACTS	750-754
CHELLA NAVEEN, RAMA RAO TADIKONDA	
GAS CHROMATOGRAPHY-MASS SPECTROMETRY ANALYSIS OF BIOACTIVE CONSTITUENTS IN THE ETHANOLIC EXTRACT OF <i>SACCHARUM SPONTANEUM</i> LINN.	755-759
J. AMUTHA ISWARYA DEVI, A. KOTTAI MUTHU	
DESIGN, SYNTHESIS, QSAR STUDIES AND <i>IN VITRO</i> EVALUATION OF NOVEL TRIAZOLOPIPERAZINE BASED B-AMINO AMIDES AS DIPEPTIDYL PEPTIDASE-IV (DPP-IV) INHIBITORS: PART-I	760-765
SANJAY D.SAWANT, AMIT G.NERKAR, ARCHANA V. VELAPURE, NAYANA D.PAWAR	
INSILICO APPROACHES TOWARDS THE DRUG TARGET AURORKINASES USING THE ORTHO OR META SUBSTITUTED BENZENE DERIVATIVES IN PYRAZOLES	766-770
SOBY DEVASIA, RANGADURAILA	
SCREENING FOR POTENTIAL ANTIMICROBIAL COMPOUNDS FROM <i>GANODERMABONINENSE</i> AGAINST SELECTED FOOD BORNE AND SKIN DISEASE PATHOGENS	771-774
KHATIJAH ISMAIL, SYAHRIEL ABDULLAH, KHIMPHIN CHONG	
EVALUATION OF ACTIVE FRACTION FROM PLANT EXTRACTS OF <i>ALSTONIA SCHOLARIS</i> FOR ITS IN-VITRO AND IN-VIVO ANTIVIRAL ACTIVITY	775-781
MOLLY ANTONY, CHANDRA SHEKHAR MISRA, THANKAMANI V	
HOMOLOGY MODELING FOR HUMAN ADAM12 USING PRIME, I-TASSER AND EASYMODELLER	782-786
P. RATHI SUGANYA, KABANI SUDEVAN, SUKESH KALVA, LILLY M. SALEENA	
SPECTROPHOTOMETRIC DETERMINATION OF PENEMS IN BULK AND INJECTION FORMULATIONS BY POTASSIUM FERRI CYANIDE AND FERRIC CHLORIDE	787-791
K. RAGHU BABU, N. ARUNA KUMARI, A.VASUNDHARA	
HEPATO-PROTECTIVE EFFECTS OF <i>PIMPINELLA TIRUPATIENSIS</i> EXTRACT ON CYTOSOLIC AND MITOCHONDRIAL ENZYMES AGAINST STREPTOZOTOCIN (STZ) -INJECTED PATHOGENIC DIABETIC RATS	792-797
GANAPATHI NARASIMHULU , SATHYAVELU REDDY KESIREDDYPASUPULETI VISWESWARA RAO, JAMALUDIN MOHAMED	
IN-VIVOANTI-INFLAMMATORY AND ANTI-ARTHRITIC ACTIVITY OF HYDROALCOHOLIC EXTRACTOF <i>PONGAMIA PINNATA</i> (L.) PIERRE SEED	798-803
DIVYA SINGH, RAHUL NAINWANI, AMIT GUPTA	
POLACRILIN RESIN AS MULTIFUNCTIONAL DIRECT COMPRESSION FILLER FOR PARACETAMOL TABLETS OPTIMIZED BY BOX-BEHNKEN DESIGN	804-807
SIRAPRAPA CHANSATIDKOSOL, PRANEET OPANASOPIT, TANASAIT NGAWHIRUNPAT, PRASERT AKKARAMONGKOLPORN	
COMPARISON OF ANTIMICROBIAL EFFICACY OF TRIPHALA, <i>WITHANIA SOMNIFERA</i> AND SODIUM HYPOCHLORITE AGAINST <i>ENTEROCOCCUS FAECALIS</i> BIOFILM-AN INVITRO STUDY	808-811
SHIRUR KRISHNARAJ SOMAYAJI, NIDAMBUR VASUDEV BALLAL , SHOBHA KL, MOHANDAS RAO KG	
DESIGN, SYNTHESIS, QSAR STUDIES AND BIOLOGICAL EVALUATION OF NOVEL TRIAZOLOPIPERAZINE BASED B-AMINO AMIDES AS DIPEPTIDYL PEPTIDASE-IV (DPP-IV) INHIBITORS: PART-II	812-817
SANJAY D. SAWANT, AMIT G. NERKAR, NAYANA D. PAWAR, ARCHANA V. VELAPURE	
METALLOTHIONEIN EXPRESSION IN MARINE CATFISH <i>ARIUS ARIUS</i> LIVER ON EXPOSURE TO CADMIUM USING IMMUNOHISTOCHEMISTRY AND WESTERN BLOT	818-821
RAMALINGAM MANI, BOOMINATHAN MEENA, KARUPPIAH VALIVITTAN	
THE COST OF MANAGEMENT OF INTRACRANIAL ANEURYSMS BY EMBOLIZATION IN MOROCCO: ABOUT 48 CASES	822-826
CHEIKH AMINE EL ABBADI NAJIA, ISMAILI HATIM, ABABOU ADIL, CHERRAH YAHYA, EL QUESSAR ABDELJALIL	

QUALITY ASSESSMENT OF SOME INDIAN HONEYS IN STORAGE THROUGH HMF CONTENT AND INVERTASE ACTIVITY	827-830
TRINA CHAKRABORTI, KASHINATH BHATTACHARYA	
SYNTHESIS OF SOME NOVEL 2, 4-THIAZOLIDINEDIONE INCORPORATED PYRAZOLE DERIVATIVES AS ANTI CANCER AGENTS	831-834
K.SUDHEER KUMAR, B.MADHAVA REDDY, V.HARINADHA BABU	
EVALUATION OF THE EFFECT OF <i>COSTUS IGNEUS</i> ON LEARNING AND MEMORY IN NORMAL AND DIABETIC RATS USING PASSIVE AVOIDANCE TASK	835-838
SHASHIKANTH CHETTY, SHALINI ADIGA, SHIVKUMAR REDDY	
CARDIOPROTECTIVE EFFECT OF ETHANOLIC EXTRACT OF <i>MEDICAGO SATIVA</i> STEM ON ISOPROTERENOL INDUCED MYOCARDIAL INFARCTION IN SWISS ALBINO RATS	839-842
GOMATHI R, VIJIPRIYA M, K USHA	
PHENOLIC CONTENT, ANTI-OXIDANT AND ANTIMICROBIAL ACTIVITY AND NUTRITIVE VALUE OF YOUNG TWIG OF <i>PSIDIUM GUAGAVA</i> LINN. FROM DIBRUGARH, ASSAM	843-846
J. CHETIA, S. UPADHYAYA, D.K. BORA AND L.R. SAIKIA.	
AN INSIGHT INTO THE LIPID ABNORMALITIES IN TYPE 2 DIABETES MELLITUS PATIENTS IN VELLORE REGION, SOUTH INDIA	847-850
SUDHA HARI A, ASOKAN P, RADHA SARASWATHY	
FABRICATION, EVALUATION AND PRELIMINARY CLINICAL STUDY OF BI-LAYER OROBUCCAL DEVICES CONTAINING KETOROLAC TROMETHAMINE AND CHLORHEXIDINE HCL FOR TREATMENT OF ORAL INFLAMMATION	851-857
EL- NABARAWI M. A, MAKKY A. M. , EL-SETOUHY D. A., ABD-ELMONIEM R. A, AMIN M. G., JASTI B. A.	
ANTIOXIDANT CAPACITIES FROM DIFFERENT POLARITIES EXTRACTS OF CUCURBITACEAE LEAVES USING FRAP, DPPH ASSAYS AND CORRELATION WITH PHENOLIC, FLAVONOID, CAROTENOID CONTENT	858-862
IRDA FIDRIANNY, AGUNG DARMAWATI , SUKRASNO	
THE ANTI ANGIOGENIC ACTIVITY OF <i>VITEX AGNUS CASTUS</i> LEAVES EXTRACTS	863-869
HAYDER B. SAHIB1, ADEEB A AL-ZUBAIDY1, SHALLAL M HUSSAIN2, GHAITH ALI JASSIM3	
INVESTIGATION OF ANTIOXIDANT ACTIVITY IN DIFFERENT SOLVENTS OF <i>GNAPHALIUM POLYCAULON</i>	870-873
SHANMUGAPRIYA, K. JINU UDHYABANU, THA. THAYUMANAVAN	
COMPARATIVE STUDY ON THE EFFECT OF DIFFERENT SOLVENT EXTRACTS OF <i>CALOTROPIS GIGANTEA</i> AND <i>CARICA PAPAYA</i> LATEX AGAINST NEW BACTERIAL ISOLATES – AN <i>IN VITRO</i> STUDY	874-879
KHUSRO A, AARTI C, PREETAMRAJ JP, PANICKER SG	
PYRROLOQUINOLINE QUINONE HAS THE POTENTIAL TO AMELIORATE PTU INDUCED LIPID PEROXIDATION AND OXIDATIVE DAMAGES IN MICE	880-885
NARENDRA KUMAR, ANAND KAR	
FORMULATION AND EVALUATION OF ENTERIC COATED MICROSPHERES OF KETOPROFEN USING NATURAL POLYMERS FOR COLON DRUG DELIVERY	886-892
NEHA SHARMA, S.L.HARIKUMAR	
ANTIDIABETIC ACTIVITY OF DIBOLIN (A POLYHERBAL FORMULATION) IN STREPTOZOTOCIN-NICOTINAMIDE INDUCED TYPE 2 DIABETIC RATS	893-897
RAJESH A MAHESHWARI, SONIYA KHATRI, R BALARAMAN, A K SETH	
EVALUATION OF HER2/NEU OVER EXPRESSION IN BREAST CANCER	898-900
KANAGATHARA.N, KAVITHA.K	
SYNERGISTIC ANTI-CANCER ACTIVITY OF CURCUMIN AND BIO-ENHANCERS COMBINATION AGAINST VARIOUS CANCER CELL LINES	901-903
C. MOORTHY, C. SENTHIL KUMAR, K. KATHIRESAN	
SYNTHESIS OF BIOLOGICALLY AND PHARMACEUTICALLY ACTIVE PYRIMIDINE AND FORMAMIDINE DERIVATIVES FROM 3-AMINO-1H,2H,4H,4AH,5H,10H,10AH-5,10-O-BENZOPYRIMIDINO-[4,5-B]NAPHTHALIN-2,4-DIONE	904-908
HEMMAT MOHAMMED DARDEER AND ABOU-BAKR HAREDI ABDEL-MONSEF	
ASSESSMENT OF PHARMACEUTICAL QUALITY CONTROL AND EQUIVALENCE OF VARIOUS BRANDS OF AMLODIPINE BESYLATE (5 MG) TABLETS AVAILABLE IN THE PAKISTANI MARKET UNDER BIOWAIVER CONDITIONS	909-913
MAHWISH FERAZ, NIGHAT RAZVI, SANA GHAYAS, FAKHSHEENA ANJUM, LUBNA GHAZAL, SAEED AHMAD SIDDIQUI	
OPTIMIZED ULTRASONIC-ASSISTED EXTRACTION OF ANTIOXIDANT FROM MULBERRY (<i>MORUS ALBA</i> L.) LEAVES USING MULTIPLE LINEAR REGRESSION ANALYSIS	914-917
BUNLEU SUNGTHONG, CHIRAPHA BUTIMAN, KUSUMA JITSANG	
PENTACYCLIC TRITERPENES FROM <i>MAYTENUS</i> GENUS AS ACETYLCHOLINESTERASE INHIBITORS	918-920
VANESSA G. RODRIGUES, FERNANDO C. SILVA, LUCIENIR P. DUARTE, JACQUELINE A. TAKAHASHI, BIBIANE L. G. MATILDES, GRÁCIA D. F. SILVA, ROQUELINE R. SILVA, SIDNEY A. VIEIRA-FILHO	
SYNTHESIS AND MOLECULAR DOCKING STUDY OF N-ALKYL/ARYL-2-ARYL INDOL-3-YL GLYOXYLAMIDES AS NOVEL ANTICANCER AGENTS	921-926
N. M. JAGADEESH, K. M. MAHADEVAN, M. N. KUMARA, N. PRASHANTHA	
WHAT IS THE COST OF ILLNESS OF TYPE II DIABETES MELLITUS IN A DEVELOPING ECONOMY?	927-931
GIWA ABDULGANIYU, TAYO FOLA	
CHARACTERISATION AND IN-VITRO EVALUATION OF TERMINALIA CHEBULA EXTRACT FOR ANTIBACTERIAL POTENTIAL	932-938
R. RATHINAMOORTHY, G. THILAGAVATHI	
PHYSICAL CHARACTERIZATION OF BEESWAX AND GLYCERYL MONOSTEARAT BINARY SYSTEM TO PREDICT CHARACTERISTICS OF SOLID LIPID NANOPARTICLE (SLN) LOADED PARA METHOXY CINNAMIC ACID (PMCA)	939-945
NOORMA ROSITA, DWI SETYAWAN, WIDJI SOERATRI, SUWALDI MRTODIHARDJO	
COMPARATIVE ANALYSIS OF PHYTOCHEMICALS, ANTIBIOGRAM OF SELECTED PLANTS IN SOLANACEAE FAMILY AND ITS CHARACTERIZATION STUDIES	946-950
AKILAN.C.A, SRIVIDHYA.M, MOHANA PRIYA.C, JEBA SAMUEL.C.S, SUNDARA MAHALINGAM.M.A	
FORMULATION AND EVALUATION OF ONCE DAILY OSMOTIC TABLET OF KETOPROFEN	951-957
DEGHAN MHG, KAZI MS, ANSARI MA.	
INSIGHTS INTO THE STRUCTURAL AND FUNCTIONAL ASPECTS OF RELA BY MOLECULAR MODELING AND DOCKING CALCULATIONS	958-967

AMBILY NATH I.V, LOKA BHARATHI P. A, DEEPTI D. DEOBAGKAR*

Corrigendum

[ANTIDIABETIC AND HYPOLIPIDEMIC ACTIVITY IN STEM OF *JATROPHA GOSSYPIFOLIA* L. \(ORIGINAL ARTICLE\)](#)

968

NEHA RAHUJA, AKANSHA MISHRA, RAKESH MAURYA, MAHENDRA NATH SRIVASTAVA, AKHILESH KUMAR TAMRAKAR, SWATANTRA KUMAR JAIN, ARVIND KUMAR SRIVASTAVA

[Open Access Policy](#) || [Contact Us](#) || [Publication Ethics](#)

All Rights Reserved @ Innovare Academic Sciences Pvt. Ltd || Powdered By: CyberDairy | Anchal

PHYSICAL CHARACTERISTIC AND VIABILITY OF *LACTOBACILLUS ACIDOPHILLUS* MICROPARTICLE USING HPMC K100LV AND HPMC K4M AS MATRICES

SUGIYARTONO¹, DIKE BAGUS PAMUJI¹, AGIL ANTONO¹, IDHA KUSUMAWATI³, ISNAENI^{2*}

¹Department of Pharmaceutics, Faculty of Pharmacy, Airlangga University (AU), Surabaya, 60282, Indonesia. ²Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Airlangga University (UA), Surabaya, 60282, Indonesia. ³Department of Pharmacognosy, Faculty of Pharmacy, Airlangga University (UA), Surabaya, 60282, Indonesia. Email: sgytnff@yahoo.com

Received: 06 Nov 2013, Revised and Accepted: 27 Jan 2014

ABSTRACT

Objective: *Lactobacillus Acidophilus* is widely used in food supplement that requires viability in the range of $10^6 - 10^{12}$ cfu /per gram. This microbe is not stable in acidic conditions and has been reported that the number of their colonies in fermented milk products decreased by 5 logs in acidic solution. In the other side,, the probiotic microbe is required to survive GI tract passage and remains viable. In order to maintain their viability and increase their stability in such environments, *Lactobacillus Acidophilus*, were entrapped in HPMC K100LV as a protectant using microencapsulation technique.

Methods: The *Lactobacillus acidophilus* cells were inoculated in MRS broth media at 37 °C for 48 hours. A number of cell (more than 10^9 cfu/ml) was suspended in 10% milk solution. The cultures were then cooled at 20°C for about 12 hours, and subsequently mixed with suspension of HPMC K4M 0%, 0,3%, 0,5%, 0,8% and HPMC K100LV 0%, 0,5%, 1% and 1,5%. The mixtures were then dried using spray drying method.. The Physical characteristics of the microparticles and the viability of the microbe in the microcapsules were evaluated, including the microparticle morphology, size and moisture content. The viability was measured by Total Plate Count method.

Results: showed that all microparticles exhibited spherical shape with the size in range of 6,0 – 8,0 um. The moisture content was in range of 8,0 – 10,0 %. The highest viability was obtained by formulation of HPMC K100LV 1% and HPMC K4M 0,3%.

Conclusion: of this study is that HPMC K100LV and HPMC K100M are good matrices for probiotic microcapsule based on the physical characteristic and the microbe viability (probiotic viability $> 10^7$ cfu/g)

Keywords: *Lactobacillus acidophilus*, HPMC K100LV, HPMC K4M, Physical characteristic, Viability

INTRODUCTION

Most of the comensal bacteria, which are more than 2000 species live in human intestinal area and provides health benefits to the host, because of the improved microbial balance in the intestine. They are from two procaryotic microorganisms, i.e. *lactobacillus* and *bifidobacterium* with their various different species. The intestinal microbial colonization starts at birth and continues during the subsequent phases of life that form an individual intestinal microbiota. Such microorganisms are known as probiotics [1,2,3,4]. It has been generally accepted that the probiotics exerts health benefits if their minimum count is about 10^6 cfu per g of food per consumption (5). They should survive GI tract passage and adhere to the intestinal mucosa or other target sites in GIT [4]. It has been known that there were significant reduction of the number of living microorganisms in GIT. The reduction process in gastric juice was a pH dependent where the pH of gastric juice is ranging from 1 to 4. It was reported that pH plays an important role in cells death. There were 3,5 and 2,2 log reduction on the viability after *lactobacillus acidophilus* were inoculated for 90' in simulated gastric juice at pH 1,5 and 2,5 respectively [6,7]. Another research reported that *lactobacillus* and *bifidobacterium* sp. lost more than 90% after have been exposed to simulated gastric juice at pH 2 [6,7,8]

Lactobacillus acidophilus is widely used regarding to the health benefiting effect. *Lactobacillus* are extensively incorporated into yoghurts, cultured milk drinks, cheese or as dietary supplements in the form of dried dosage forms. [10,11]. Entrapment of living cells in a matrix called microencapsulation is a method used for protection of the immobilized materials as well as for a controlled release in intestinal mucosa. The outer layer or the wall of the microcapsule will protect the cell against moisture, heat, strong acidic and other extreme conditions during storage, manufacturing as well as during digestion. Microencapsulation method has a lot of advantages, including the protection effect from moisture, heat or other extreme conditions. However, it still causing significant cell death, since most common encapsulation method uses spray-drying that involves heating [11,12,13]. The microencapsulation method, allow the

incorporation of *Lactobacillus acidophilus* and another probiotic microorganism, in which a polymer acts as outer layer or protectant [12,13]. A number of microencapsulation techniques including: spray drying, inclusion complexation, extrusion, co-crystallization and gel entrapment (extrusion, emulsification, coacervation). Spray-drying (dehydration method) has been oftenly used in industries among other cell preservation methods, because it is cheaper, cost effective and suitable for a large-scale production. The cost effectiveness of spray drying was estimated to be six time cheaper per kilogram compared to freeze drying [14]. The disadvantage of this method is that many microorganisms can not tolerate the drying process due to the high heat involved. Other factors that may affect the survival during spray-drying process are the type of the strain, growth phase, protective medium used, outlet temperature of spray-drier and pre- treatment of the culture. [13,14] This study investigated the use of HPMC K100LV (0%, 0,5%, 1% and 1,5%) and HPMC K4M (0%, 0,3%, 0,5% and 0,8%) as protectant. The used of HPMC to enhance probiotic survival through heat treatment has been studied previously. HPMC is safe, nonionic polymer that minimize interaction problems when they are used in acidic, basic, or other electrolytic system. They can be used for preparing formulations with water soluble or insoluble drugs and at high or low doses. [15]. The polymer is therefore useful for the cell because it assist the adaption of microbe to the environment. Furthermore the polymer reduces the osmotic differences between the cellular internal compartment and the environment. In this study, a dried probiotic powder was produced using spray drying methods with temperature of 60° C.

MATERIALS AND METHODS

Materials

Lactobacillus acidophilus was obtained from Microbiology Laboratory-Brawidjaja University, Indonesia.

HPMC K4 M and HPMC K100LV (Pharmaceutical Grade) were purchased from PT. Lawzim Zecha. *de Man Ragosa Shorpe* (MRS) broth media was purchased from

Methods

1. Preparation of Spray Dried Milk-Probiotic -HPMC K4M

The *Lactobacillus acidophilus* cell in amount of 1 ose were inoculated in MRS broth media at 37 °C for 48 hours. The number of cell should be more than 10⁹ cfu/ml and suspended in 10% milk solution.

The cultures were than cooled at 20° C for about 12 hours, and subsequently mixed with suspension of HPMC K4M 0%, 0,3%, 0,5%, 0,8% and HPMC K100LV 0%, 0,5%, 1% and 1,5%,.

The mixtures were then dried using spray dryer (Lab-Plant SD-Basic Spray Dryer)

Physical Characterizations

1. pH measurement

The pH of the milk and milk-probiotic was measured using a pH meter SCHOTT glass mainz, CG 842 type.

Table 1: Composition of Probiotic Microparticle with HPMC K4M and PMC K100LV as a matrix

Composition	HPMC K100LV				HPMC K4M			
	F1	F2	F3	F4	F5	F6	F7	F8
Milk-Probiotic	400 ml	400 ml	400 ml	400 ml	400 ml	400 ml	400 ml	400 ml
HPMC K100LV	-	2,5 g	5 g	7,5 g	-	-	-	-
HPMC K100M	-	-	-	-	-	0,15 g	0,25 g	0,40 g
Aquadest	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml

2. Viscosity Measurement

The viscosity of the milk and milk probiotic was measured using VT-04 viscometer

3. Moisture content determination

The moisture content of the microparticles was determined using Moisture Analyzer HB43-S Metler Toledo

4. Size and morphology of probiotic microparticles

The size of microparticles was measured using optical microscope. The morphology of the particles was visualized using SEM (FEI-type:inspect-S50)

Viability measurement

Viability of lactobacili in milk (before spray drying) and in microparticle (after spray drying) was assesed using MRS media. 1 ml probiotic milk or 1 gram microparticel was mixed with 9 ml sterile Phosphate Buffer Salin (PBS) solution. A serial dilution (10⁻¹, 10⁻², 10⁻³, 10⁻⁴, 10⁻⁵, 10⁻⁶, 10⁻⁷, 10⁻⁸, 10⁻⁹ and 10⁻¹⁰) of this suspension was made and then spread on the MARS agar. and incubated at 37 oC for 48 hours. The viability of the probiotic was reported as TPC (cfu/ml or cfu/g) and survivability (N/No x 100%).

Statistical analysis

One Way ANOVA with Honestly Significant Differenc (HSD) Tukey was used to analyze the results. Confidence limits of 95% (α = 0,05) were used to determine statistical signficance.

RESULT AND DISCUSSION

Table 2: The pH and viscosity of milk and milk-probiotic after 24 hours

Material	pH	Viscosity
Milk	6,41 ±0,01	0,4±0,01
Milk-Probiotic	4,33±0,00	0,7±0,00

The results showed that the fermented milk has a lower pH compared to the non-fermented milk (p<0.05) (Table 2). The decrease of pH indicated that there were accumulation of lactic acid and acetic acid as a result of lactosa metabolism. *Lactobacillus acidophilus* has an ability to metabolize lactose to lactic acid, acetic acid and CO₂. The viscosity data showed that milk- probiotic had a greater viscosity than normal milk. It indicated that microorganisms in the milk contribute the solid component and resulted in increasing viscosity. Spray dried powders of lactobacillus acidophilus -containing microparticle with HPMC has a mean size higher than microparticle without HPMC, and increasing HPMC concentration resulting in increasing particle mean size.

Table 3: The Mean Particle size and moisture content measurement

Measure ment	F 1	F II	F III	F IV	F V	F VI	F VII	F VII
Mean	6,7	7,2	7,1	8,4	7,6	7,3	8,1	8,0
Diameter (µm)	25	83	42	92	5	9	1	7
Moisture Content (%)	10,	7,4	7,7	8,7	10,	10,	9,5	8,9
	54	1	9	0	45	09	1	6

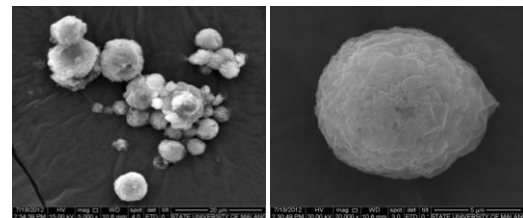


Fig. 1: Morphology of Probiotic Microparticle without a HPMC (5000x and 20.000x)

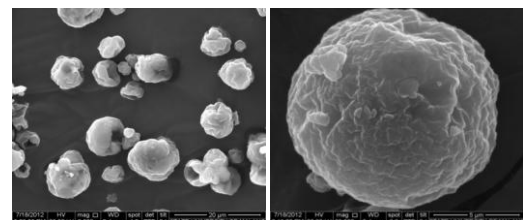


Fig. 2: Morphology of Probiotic Microparticle with HPMC K100LV (5000x and 20.000x)

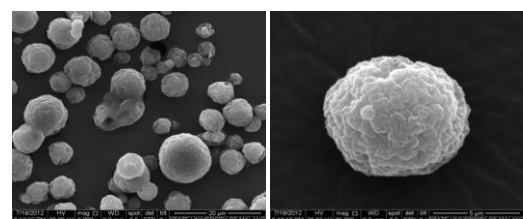


Fig. 3: Morphology of Probiotic Microparticle with HPMC K4M (5000x and 20.000x)

It might be explained that increasing HPMC concentration will increase the composition of wall microparticle. The microparticle morphology is spherical with rough surface. It might be explained

that rate of evaporation was not proportional to the rate of film formation.

The data obtained in these study showed that all microparticle had moisture content greater than recommended range, i.e. 2,80% – 5,60% [13] and the moisture contents increased with the greater matrix concentration (Table 3). This can be explained that the matrix used (milk and HPMC) exhibited a higrosopic properties. The drying temperatur, 60 °C was too low and was not necessary in regards to fulfill the recommended moisture content.

The morphology of microparticle (SEM image, Fig. 1) showed that the mcroparticles was spherical and have a rough surface.

Table 4: TPC value (cfu/ml or cfu/g) of *Lactobacillus acidophilus* in the probiotic microparticle with HPMC K100LV and HPMC K4M as a matrix

Group	HPMC K100LV	HPMC K4M
Probiotic milk	306,3x10 ⁷ ± 10,9x10 ⁷	162 x 10 ¹² ± 9,5 x 10 ¹²
Formula I	5,7x10 ⁷ ± 1,5x10 ⁷	157 x 10 ¹⁰ ± 5,29 x 10 ¹⁰
Formula II	4,8x10 ⁷ ± 3,2x10 ⁷	295 x10 ¹⁰ ± 1,53 x 10 ¹⁰
Formula III	24,4x10 ⁷ ± 6,3x10 ⁷	139 x 10 ⁹ ± 2,53 x 10 ⁹
Formula IV	20,5x10 ⁷ ± 5,1x10 ⁷	3,30 x 10 ⁷ ± 2,64 x 10 ⁷

Table 5: Viability (%) of *Lactobacillus* in the probiotic mikroparticle with HPMC K100LV and HPMC K4M as a matrix

Group	HPMC K100LV	HPMC K4M
Probiotic milk	100,00 ± 0,00	100,00 ± 0,00
Formula I	81,69 ± 1,29	85,99 ± 0,074
Formula II	81,03 ± 0,21	87,93 ± 0,153
Formula III	88,34 ± 1,01	78,58 ± 0,125
Formula IV	87,54 ± 1,01	53,01 ± 0,285

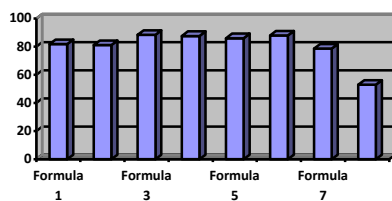


Fig. 4: Viability (%) of *Lactobacillus acidophilus* in the microparticle using HPMC K100LV and HPMC K4M as a matrix

Table 4 and 5 showed the viability (cfu) and percentage survival (%) of *Lactobacillus acidophilus* probiotic. The data indicated that viability of microparticles was lower than probiotic milk (before spray dried). There was a viability reduction by approximately 20%. The viability reduction of microparticle compared with probiotic milk can be explained as a result of heating process during spray drying.

No significant difference ($p > 0,05$) were obtained between *Lactobacillus Acidophilus* viability of HPMC K100LV 0% and 0,5%, HPMC K4M 0% and 0,3%. It showed that both polymers have an equal protective effect when using HPMC K100LV 0,5% and HPMC K4M. The profile of *Lactobacillus acidophilus* viability in HPMC K100LV group was different from HPMC K4M group (Statistic?). In HPMC K4M group, the greater the concentration, the greater the viability. It can be explained: that increasing HPMC concentration will result in increased viscosity and increasing microbe entrapment. During the viability test process, part of the cell still entrapped. However, it was still higher than 10⁷ cfu/g (3,30x10⁷ cfu/g)

CONCLUSION

1. *Lactobacillus Acidophilus* microparticle using HPMC K100LV and K4M as a matrices has a spheric and rough, and the particle size ranging from 6,0 to 8,0 µm.
2. *Lactobacillus Acidophilus* microparticle using HPMC K100LV and K4M as a matrices has moisture content 7,0 – 10,0 %, out of recommended range, 2,80 – 5,60
3. *Lactobacillus Acidophilus* microparticle using HPMC K100LV and K4M as matrices, result a probiotic viability > 10⁷ cfu/g

REFERENCES

1. Shinde PB. Probiotics an overview for selection and evolution. International Journal Pharmacy & Pharmaceutical Sciences 2012; 4. P. 14-21
2. Iannitti T, Palmieri B. Therapeutical use of probiotic formulations in cliical practice. Clinical Nutrition 2010.29. P 701-725
3. Schrezenmeir J, Vrese M. Probiotic, prebiotic and synbiotic-approaching a definition. Am.J Clin Nutr. 2001. 73 (supl). P.361S-364S
4. Hippe B, Zwielehner J, Pirker A, Smith WM, Haslberger AG. Detection and identification of probiotic microorganism and other beneficial oranism from the human GIT. In : Liang MT, editor. Probiotic : Biology, genetics and helath aspects, Springer Heidelberg Dordecht London Newyork
5. Kailasapathy,K, Chin,J.,2000. Survival and therapeutic potential of probiotic organism with reference of lactobacillus acidophilus and bifidobacterium spp. *Immuology and Cell Biology*, 78, pp 80-88
6. Corcoran BM, Stanton C, Filtered CGF, Ross RP. Survival of probiotic *Lactobacillus* in acidic environments is enhanced in the presence of metabolizable sugars. Applied and Environmental Microbiology.2005.71. 300-3067
7. Kos B, Suskovic J, Goreta J, Matosic S. Effects of protectants on the viability of *Lactobacillus acidophilus* M92 in simulated gastrointestinal conditions. Food Technol. Biotechnol 2000. 38 (2) P: 121-127
8. Huckle BD, Zhang Z. Maintenance and production of probiotics. In : Liang MT, editor. Probiotic : Biology, genetics and helath aspects, Springer Heidelberg Dordecht London Newyork; 2011. P. 87-108
9. Desmond C, Ross RP, Callaghan, Fitzgerald, Stanton C. Improved survival of *Lactobacillus*
10. *paracasei* NFBC 338 in spray dried powders containing gum acacia. Journal of Applied Microbiology. 2002. 93 P: 1003-1011
11. 10 Adhikari K, Mustapha A, Grun IU, Fernando L. 2000. Viability of microencapsulated bifidobacteria in set yogurt during refegerated storage, J. Dairy Sci. Vol. 83 p. 1946-1951
12. 11. Gibbs.S, Kermasha,I, Ali,C.H.Mulligan, 1999. Encapsulation in the food industry: A review. Int. J. Food. Sci. Nutr.,vol. 50., p. 2113-224
13. 12. Meng XC, Stanton C, Fitzgerald GF, Daly C, Ross RP. Anhydrobiotics: The chalenges of drying probiotic cultures. Food Chemistry. 2008. 106. P. 1406-1416
14. 13. Wong S, Kabeir BM, Mustafa S, Mohamad R, Hussin ASM, Manap MY. Viability of
15. *Bifidobacterium Pseudocatenulatum* G4 after spray-drying and freeze-drying. Microbiology Insights 2010:3 p.37-43
16. Teanpaisan R, Chooruk A, Wannun A, Wichienhot S, Piwat S. Survival rates of human-derived probiotic *Lactobacillus paracasei* SDI in milk powder using spray drying. Songklanakarin J. Sci. Technol. 20012. 34(3), P. 241-245
17. Manojlovic V, Medovic VA, Kailasapathy K, Zuidam Nj. Encapsulation of probiotics for use in food products. Encapsulation of probiotics for use in food products. In : Zidam NJ, Nedovic VA. Editors 2010. Springer New York Dordrecht Hedidelberg London