



JSS College of Pharmacy, Rocklands, Ooty

(An ISO 9001 : 2015 Certified Institution)

(Ranked 7th in India by NIRF - 2021)

(QS 3 Star in Pharmacy Program)

Transcending Pharmaceutical Research & Innovation

Research Brochure

 JSS ACADEMY OF HIGHER EDUCATION & RESEARCH (DEEMED TO BE UNIVERSITY) MYSURU	 2021 NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL A+	 NATIONAL INSTITUTIONAL RANKING FRAMEWORK 34th (University Category)	 ASIAN UNIVERSITY RANKINGS 291-300 31st in INDIA	 THE WORLD UNIVERSITY RANKINGS 2022 351-400 2nd in INDIA	 ARIIA ANAL RANKING OF INSTITUTIONS ON INNOVATION ACHIEVEMENTS 2020 Band A Rank Band 6 to 25
 JSS Medical College - 24th ★ JSS Dental College & Hospital - 12th ★ JSS College of Pharmacy, Mysuru - 9th ★ JSS College of Pharmacy, Ooty - 7th					



JSS College of Pharmacy, Rocklands, Ooty

(An ISO 9001 : 2015 Certified Institution)
(Ranked 7th in India by NIRF - 2021)
(QS 3 Star in Pharmacy Program)

Transcending Pharmaceutical Research & Innovation

RESEARCH BROCHURE

 2021	 A+	 34th (University Category)	 291-300 31st in INDIA	 351-400 2nd in INDIA	 2020 Band A Rank Band 6 to 25
 JSS Medical College - 24 th ★ JSS Dental College & Hospital - 12 th ★ JSS College of Pharmacy, Mysuru - 9 th ★ JSS College of Pharmacy, Ooty - 7 th					

WORK IS WORSHIP

His Holiness Jagadguru Dr. Sri Shivarathri Rajendra Mahaswamiji, the 23rd pontiff of the Sri Suttur Math, was born on 29.8.1916 and ascended the holy seat on 24.02.1928 when he was hardly twelve years. He took up the responsibilities of the Srimath along with his guru Manthra Maharshi Jagadguru Sri Shivarathreeshwara Mahaswamiji. A firm believer in the good of one and all, he was at the helm of affairs of the Srimath for more than half a century – a period full of events and activities. He sought nothing but welfare of all.

He completed his primary education at Suttur and took to studying Sanskrit in Mysuru at his young age. During this time, Swamiji used to engage in lengthy spiritual and academic discussions with spiritual leaders. To pursue higher education, Swamiji went to Varanasi. However, as per the desire of his predecessor His Holiness Jagadguru Sri Shivarathreeshwara Mahaswamiji and Sri Gowrishankara Mahaswamiji of Panchagavi Math, he returned to Mysore to continue studies and involved in social service.

He was a scholar in Kannada and Sanskrit and a patron of art and literature. He was thoughtful and sensitive to an astonishing level. Unlike others, he had mastered the art of turning every good thought of his into a reality. The wisdom of all his predecessors seemed to have culminated in him. Every step he took was a step forward in search of new areas of service. That is how he could build a galaxy of educational institutions. He served the society tirelessly, without any selfish ends. His Holiness started a hostel in 1940s at Niranjanalaya (his rented residence) for needy students in Mysuru. Primary Schools, High Schools, PU Colleges, Degree Colleges, Engineering Colleges, Medical College, etc. soon followed. He also established many Trusts and Societies such as JSS Medical Service Trust, Sri Shivarathreeshwara Rural Development Foundation, JSS Sangeetha Sabha, Shivarathreeshwara Endowment Trust, Akhila Bharatha Sharana Sahitya Parishath, etc. that catered to many social needs.

Sri Rajendra Swamiji who succeeded the Srimath with a great legacy did not limit himself only to religious activities but responded to the problems of inequality, poverty and misery in society. The services of the Srimath were extended accordingly to the needs of society. Much before India attained independence, Swamiji had identified that lack of knowledge was the cause of several problems faced by the masses and thus started the JSS Mahavidyapeetha (1954) for providing education. Under the aegis of JSS Mahavidyapeetha, he began schools and



**RAJAGURUTHILAKA HIS HOLINESS
JAGADGURU DR. SRI SHIVARATHRI
RAJENDRA MAHASWAMIJI**

FOUNDER PRESIDENT OF JSS MAHAVIDYAPEETHA

colleges for Jnana Dasoha (education), hostels for Anna Dasoha (boarding and lodging) and hospitals for Arogya Dasoha (health services) that led to all-around social development. He was very compassionate to support the poor and the down trodden and provided opportunities to thousands who needed shelter.

The early period of his pontification was very hard. It was often said that he had to struggle relentlessly to get even a small work done. A single-minded dedication to a task aimed at the welfare of all prompted him to tread the path of sacrifice. His Holiness attained heavenly abode on 6th December, 1986, and his shrine can be visited at Suttur. Sri Jayachamarajendra Wadiyar conferred on His Holiness the title of 'Rajagurutilaka' in 1970 as a recognition of his immense contribution to society. Posthumously, Sri Shivaratri Rajendra Mahaswamiji was awarded honorary doctorate by the University of Mysore in 1989.





HIS HOLINESS JAGADGURU
SRI SHIVARATHRI

DESHIKENDRA MAHASWAMIJI

CHANCELLOR

JSS ACADEMY OF HIGHER EDUCATION & RESEARCH,
MYSURU

ॐ
|| SRI SHIVARATHREESHWARAYA NAMAHA ||

JAGADGURU SRI SHIVARATHRI DESHIKENDRA MAHASWAMIGALU
JAGADGURU SRI VEERASIMHASANA MAHASAMSTHANA MATH SUTTURU SRIKSHETHRA 571 159

SRI SUTTUR MATH (MYSORE BRANCH), MYSORE 570 025

Date : 5.5.2021

Message

The Research Brochure that is being brought out by the JSS College of Pharmacy, Ooty is praiseworthy, and we are happy that the research potential of the college is showcased for the larger interest of the academics and pharmaceutical industry. Today, it is an acknowledged fact globally that India is the pharmacy of the world, and capable of producing high-quality drugs at a low cost through research and innovation. The pandemic has caused untold misery to the people all over, yet provided an opportunity for the Indian pharmaceutical industry to compete with world Pharma MNCs. India operates a significant number of WHO Good Manufacturing Practices compliant plants, and ranks 14th globally in terms of value and 3rd in terms of volume. Academia contributes significantly to this astonishing growth, through young and motivated researchers. JSS College of Pharmacy, Ooty with its track record of sound academic culture would be able to provide the much-needed vital inputs to the Pharma industry through its publications, consultations, and collaborations. This brochure would certainly serve as a reference guide for the industry.

While commending the efforts of the faculty and the students in this regard, we hope the college would continue to stay ahead in its academic excellence for the growth and wellbeing of the society

Om Tat Sat

HH Jagadguru
Sri Shivarathri Deshikendra Mahaswamiji

MATH (MYSORE) 0821-254220, 221 SUTTURU, MYSORE DIST.: 08221232223,232224
VIDYAPEETHA: 0821-2548 201 TO 2548218 SUTTURU SADANA, BENGALURU: 080-22970101
EMAIL: jssashram@yahoo.com / sutturmata@jssonline.org

Editorial Board

Ideas &
Editor-in-Chief



Dr. S. P. Dhanabal
Principal

Advisors



Dr. K. P. Arun
Academic Coordinator



Dr. Suresh M. Kumar
Former Research Director



Mr. B. Shivaramakrishnan



Dr. K. Satyanarayana Reddy
Research Coordinator

Associate Editors

Editors



Mr. R. Arun



Dr. J. Srikanth



Dr. K. Shanker



Mr. J. Saravanan



Dr. M.R. Jeyaprakash



Mr. Alin Bose



Dr. J. Jeyaram

Technical Support



Mr. C. Jayakumar



Mr. Gautham GS



Dr S.P. Dhanabal, Principal, JSS College of Pharmacy & **Dr. M.J.N. Chandrasekar**, Head, JSS School of Life Sciences, met His Excellency, The President of India **Shri Ram Nath Kovind** and presented a brief profile of Jagadguru Sri Veerasimhasana Mahasamsthana Math, JSS Mahavidyapeetha & JSS Institutions at Ooty.



During their interaction with the Honourable President of India **Shri. Ram Nath Kovind**, **Dr. S.P. Dhanabal** & **Dr M.J.N. Chandrasekar** briefed about the unique and diverse strengths of JSS Institutions at Ooty in terms of Academic Excellence, Research Innovations & Outreach Activities.

Preface



The JSS College of Pharmacy, Rocklands, Ooty is a renowned centre for pharmacy education, research & innovation. The college exhibits a higher education brand synonymous with the most exemplary international standards of academic excellence. A notable and distinctive feature of the research and innovation at our institution is its sustained commitment to social responsibility, enhancing people's lives through knowledge transfer and education.

Our infrastructure, expertise, and ecosystems are among the best-in-class that facilitate the advancement of pharmaceutical research and innovations and deliver life-changing impacts to the society. As a dynamic and forward-looking research-led institution, we promote discovery at the frontiers of knowledge with substantive impact for basic, translational, and cross-disciplinary research, knowledge transfer, and innovation.

Evidently, we are ranked 7th (among 351 pharmacy colleges) in the "National Institutional Ranking Framework" (2021) by the Ministry of Education, Govt. of India. Such achievements of the JSSCPO have contributed enormously to the progress made by JSS Academy of Higher Education & Research, Mysuru, our affiliating university in the world rankings.

Our culture of research and innovation has always been valued and driven by exemplary engagements with stakeholders, including industry, health regulatory bodies, alumni, and others.

Thus, we thought to reach you all through this research brochure, "Transcending Pharmaceutical Research & Innovation," to showcase the glimpses of our journey, strengths, and our strategic way forward.

More importantly, through this brochure, we extend our sincere gratitude for your invaluable supports throughout our journey "Thank you" and we believe that you continue to support us to support our strategic path ahead, delivering sustained excellence in pharmaceutical sciences Research & Innovation.

Join us. Big ideas live here.

Dr.S.P.Dhanabal M.Pharm., Ph.D., FIC
Principal

MESSAGES



DR. C. G. BETSURMATH

Executive Secretary,
JSS Mahavidyapeetha,
Mysuru

Dr. C.G. Betsurmath
KAS (Retd.), Ph.D., MBA
Executive Secretary



JSS Mahavidyapeetha
Jagadguru Dr. Sri Shivarathri Rajendra Circle
Ramanuja Road, Mysuru - 570 004

MESSAGE

The entire globe now recognizes the exigency of healthcare transformation, and I am delighted to witness that one of our prestigious institutions, JSS College of Pharmacy, Ooty spearheading healthcare transformation with their distinguished track in pharmaceutical research & innovation. They are always at the forefront of their research credentials, capabilities, innovations, and resources.

I congratulate the leadership and team for the compilation of this book as it is one of the paramount priorities, and it is high time to cement Industry-Institution collaborations.

As collated in this book, the research accomplishments of JSSCP, Ooty have impacted commendably to benchmark our institutions nationally and globally. Also, it is praiseworthy that the JSSCP, Ooty research outcomes have a remarkable reach to broader capacities both within and beyond borders. The research portfolio showcased in this brochure is impressively collating their strengths in advancing healthcare research and innovation.

I firmly believe that JSSCPO can captivate external partners and ventures, and together they are much more to unveil shortly.

I congratulate the entire team at JSSCPO and my best wishes.

Dr C G Betsurmath
Executive Secretary



Shri S. K. Varshney
 Adviser & Head
 International Bilateral Cooperation Division
 Department of Science & Technology



Dr. Neeraj Saxena
 Adviser, Institutional Development Cell
 All India Council for Technical Education (AICTE)
 Nelson Mandela Marg, New Delhi 110070



S.K. VARSHNEY
 ADVISER & HEAD
 International Cooperative Division
 Tel: 011-26961912
 E-mail: skvdst@nic.in

भारत सरकार
 विज्ञान और प्रौद्योगिकी मंत्रालय
 विज्ञान और प्रौद्योगिकी विभाग
 टेक्नोलॉजी भवन, नया महरौली मार्ग
 नई दिल्ली-110 016

GOVERNMENT OF INDIA
 MINISTRY OF SCIENCE AND TECHNOLOGY
 DEPARTMENT OF SCIENCE AND TECHNOLOGY
 TECHNOLOGY BHAVAN, NEW MEHRAULI ROAD
 NEW DELHI-110 016

Dated 12-05-21

D.O. No.

Message

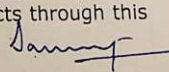
It is great pleasure to know that JSS College of Pharmacy, Ooty is bringing out a research brochure highlighting the research strengths and activities of the college and its departments.

Science and technology is the bedrock upon which the country relies for its knowledge, enterprises rely for their success, and the people rely for a better life. Present Pandemic has reinforced our belief that collaboration is the key for real success of any research and world over people are looking for research based solutions, be it new therapeutics (Vaccines or oral medication), new disinfectants, anti-viral coating as well as studying virus behaviour and to protect society from future virus attacks. This requires collaboration at different levels academic collaboration, industry-academic collaboration, academia- society collaboration, International collaboration, etc. I believe strongly that JSS College of Pharmacy, Ooty, has a proven track record of research and commercialization of innovations from the institute. I am sure that this informative research brochure will make a bridge between JSS College of Pharmacy, Ooty, and Pharma industries to develop indigenous technologies for the economic and social benefits for the people.

This initiative from the college is the need of the hour and will motivate for many other institutes in the near future.

I am confident that this brochure will add value towards technology development in the pharma industries in collaboration with JSS College of Pharmacy, Ooty.

My best wishes and advanced congratulations for the future developments of the institution and anticipating many commercial products through this platform.


 (S.K. VARSHNEY)

I am delighted to note that JSS College of Pharmacy, Ootacamund is bringing out an exclusive brochure showcasing its achievements, covering the entire spectrum of its research initiatives. The achievements do not surprise me as I have known the College since the year 2000, when it was selected to set up a TIFAC-Centre of Relevance and Excellence in Herbal Drugs, characterized by functional industry-academia linkages. Even though the primary mandate for it was human resource development, it impressed us with achievements on R&D front also.

The science and evolution of pharmaceuticals is forever in a dynamic state, marked by the introduction of new therapies through rapid advancements in drug research and technology. At the basic level, the seeds for such discovery processes are sown at the level of the pharmacy institution and the JSSCPO continues to lead in not only research programs across the various disciplines of pharmacy specialities but also sourcing graduates, to sustain them; thus, remain a much sought after institution among the students and researchers in pharmaceutical sciences. I firmly believe that it can impress external partners and ventures, and together do much more for the humanity.

The research portfolio showcased in the brochure is impressively collating strengths of JSSCPO in advancing healthcare research and innovation. This must have emerged out of pursuit of a vision, years of consistent efforts, passionate researchers, systematic investments and a disciplined approach to rigorous research work, resulting in several drug research programs and integrate them with the theory and practice of the science of pharmacy. I congratulate the leadership and team for the compilation, which should further intensify industry-institution collaboration.

I take this opportunity to extend my heartfelt appreciation to the JSS Mahavidyapeetha and the guidance and leadership of Dr.Dhanababably supported by the faculty, researchers, students and staff of JSSCPO. Furthermore, I congratulate them all, on this momentous occasion and look forward to encomiums come their way from all stakeholders.

MESSAGES

MESSAGES



Dr. B. Suresh
Pro Chancellor
JSS Academy of Higher Education & Research, Mysuru



Dr. Surinder Singh
Vice Chancellor
JSS Academy of Higher Education & Research, Mysuru

Message

I am so delighted to know that the JSS College of Pharmacy, Ooty, one of the constituent colleges of JSS Academy of Higher Education & Research (JSSAHER), Mysuru promulgates its research portfolio as a brochure '**Transcending Pharmaceutical Research & Innovation**'.

As research is the key strategic element of JSSAHER, within a decade from the inception, it has emerged as one of the Research-Intensive University and is being rated/ranked reputedly and consistently on par with the higher education institutions in the country that have celebrated jubilees.

The contribution of JSS College of Pharmacy, Ooty for these accolades is colossal. As a stand-alone institution, it has a rich history and outcomes of research and innovation in the fields of drug discovery, formulations, pre-clinical, bioanalytical, biotechnology and clinical research that are evident from hundreds & thousands of research theses & dissertations, more than thousand scientific publications, good number of patents, etc.

Also, it is noteworthy that the research potentials of the college in all the facets of drug discovery and development have been recognized by various Government funding agencies towards establishing centres of excellence such as TIFAC CORE in Herbal Drugs. The products successfully commercialized by the industrial partners speak for the potentials of the college in consultancy research. The unambiguous policies of JSSAHER for research and consultancy add strength for such collaborations.

The research infrastructure and intellectual potentials of the college are immensely supported by the integrated/interdisciplinary research and innovation ecosystems in medical institutions, school of life-sciences, centres of excellence of JSSAHER.

I am sure that this brochure will broaden the leadership role of JSS College of Pharmacy, Ooty in attracting collaborations in the new and emerging areas of research and innovation in the field of pharmacy and other inter-disciplines. By all such collaborations with industrial partners, Government and other research institutions on cross-cutting research themes, the college and JSSAHER will impact the society and economy both regionally and nationally.

My best wishes to the leadership and the research team at JSS College of Pharmacy, Ooty to get the successful outcomes of this effort.


Dr. B. Suresh
Pro Chancellor

16.6.2021

May 04, 2021

MESSAGE

I am glad that JSS College Of Pharmacy, Ooty, a constituent college of JSS Academy of Higher Education and Research, is bringing out an exclusive brochure on the college's research strength in various departments including faculty research expertise, research focus, advanced research facilities, grants, publications, patents, consultancy etc for the benefit of students and researchers and pharma industries.

I am sure that this brochure will attract many Pharma companies to the college facilitating development of various pharmaceutical products and bringing them to the market, by establishing collaborative ventures at JSS College of Pharmacy, Ooty. I am confident that this brochure will serve as a unique reference guide for national / international universities, pharma companies and stakeholders and benefit all the students, researchers and related pharma companies.

I congratulate and appreciate the efforts of the JSS College of Pharmacy in bringing out this research brochure and convey my best wishes on this occasion.



Dr Surinder Singh
Vice Chancellor

MESSAGES

MESSAGES



Dr. B. Manjunatha
Registrar
JSS Academy of Higher Education & Research, Mysuru



Dr. S. Balasubramanian
Director - Research
JSS Academy of Higher Education & Research, Mysuru

Dr. B. Manjunatha
REGISTRAR

Date: 12th May, 2021

MESSAGE

I am very happy to note that JSS College of Pharmacy, Ooty is bringing out the Institutional Research Brochure.

JSS College of Pharmacy, Ooty has always been in the forefront and is the torch bearer of our Research activities.

This Institutional Research Brochure will showcase the research activities being conducted at this institution and will provide a platform for budding researchers to showcase their ideas.

Bringing out this Brochure during these difficult times shows the dedication of all the staff, research scholars and students concerned.

I congratulate the Principal, editorial board and all those involved in preparation of this document.

Dr. B. Manjunatha

Dr. S. Balasubramanian
Director- Research
[email:director_research@jssuni.edu.in](mailto:director_research@jssuni.edu.in)

MESSAGE

I am pleased to know that JSS College of Pharmacy, a constituent college of JSSAHER is publishing a Research Compendium which is a compilation of research and development activities conducted in the college. This compendium comprises detailed information of the publications, ongoing and completed research projects, the number of workshops and seminars conducted and attended by the students, research scholars, and the faculties. In continuing the dedication of the researchers and the research scholars, the college is aiming to set a model research institute of excellence in the field of pharmacy. The students of the College will get excellent practical training and enable them to compete in the field with other competitors.

The pharmacy field is now becoming more research-oriented which needs to facilitate the department with sophisticated instruments. The college has advanced and modern research facilities and attracting industrial projects. The compendium reflects our continuous strength and hard work showing the inclination of the students and the faculty towards the research in various fields of pharmacy. To enhance the research environment, our university has framed the research incentive schemes. The enthusiasm of our dedicated faculties has been to encourage our students to do high-impact research projects. I assure you that this encouragement and commitment of the faculties of the department will be continued in the time to come.

I would like to compliment all the researchers and the researcher scholars who have contributed their knowledge for novel research.

The Principal, Faculty, and Research scholars hope that their compendium will guide health professionals who seek to improve their skills in Health Professions Education & Research.

I congratulate the compilation team and the Principal for bringing upon this compendium as a ready reference of their dedication towards research and development.

Dr. S. Balasubramanian

MESSAGES

MESSAGES

CONTENTS	PAGE NO.
JSS ACADEMY OF HIGHER EDUCATION & RESEARCH, MYSURU	I
JSS COLLEGE OF PHARMACY, OOTY	III
• DRUG TESTING LABORATORY (DTL)	VIII
• CENTRE FOR ADVANCED DRUG RESEARCH AND TESTING (CADRAT)	IX
• TIFAC - CENTRE OF RELEVANCE AND EXCELLENCE IN HERBAL DRUGS (TIFAC CORE HD)	XI
• CENTRE OF EXCELLENCE IN NANOSCIENCE & TECHNOLOGY	XIII
CENTRE FOR FORMULATION & DEVELOPMENT (CFD) Department of Pharmaceutics	1
CENTRE FOR MOLECULAR MODELLING & DRUG DESIGN (CMMD) Department of Pharmaceutical Chemistry	13
CENTRE FOR NATURAL PRODUCTS RESEARCH (CNPR) Department of Pharmacognosy	25
CENTRE FOR PRECLINICAL RESEARCH (CPR) Department of Pharmacology	37
CENTRE FOR ANALYTICAL RESEARCH & SERVICES (CARS) Department of Pharmaceutical Analysis	49
CENTRE FOR MOLECULAR BIOLOGY & DRUG SCREENING (CMBD) Department of Pharmaceutical Biotechnology	61
CENTRE FOR PATIENT CARE & EDUCATION (CPCE) Department of Pharmacy Practice	73
INTERNATIONAL FELLOWSHIPS	84
PHD AWARDEES	87
ONGOING PHD	95



JSS Academy of Higher Education & Research, formerly known as JSS University, is a Deemed to be University located in Mysuru, Karnataka. It was established in 2008 under Section 3 of the UGC Act 1956 and is part of JSS Mahavidyapeetha, which runs a variety of educational institutions. The Deemed to be University has been focusing on teaching, research and health services since its inception.

Under the leadership and gracious Patronage and Blessings of His Holiness Jagadguru Sri Shivarathri Deshikendra Mahaswamiji, the JSS Academy of Higher Education & Research, Pro Chancellor, Dr. B. Suresh, a noted multifaceted leader of repute and Vice Chancellor, Dr. Surinder Singh, an acclaimed Administrator, the Deemed to be University has made great progress in grooming graduates, postgraduates and Ph.D. researchers by providing effective value based education across institutions by focusing on overall development of an individual through state-of-art facilities to make the learner a useful citizen to the society. JSS Academy of Higher Education & Research being a Health Science based University, has motivated students and staff to be actively involved in research. The research output is translated much beyond patents and publications with a robust Innovation strategy & policy to propel benefits to society and support achievements of global sustainable development goals.

ACCREDITATIONS

- The Deemed University has been accredited with "A+" Grade with CGPA of 3.48 by National Assessment and Accreditation Council (NAAC) in the second cycle in 2018.
- The Pharm D. programme of JSS Academy of Higher Education & Research has been granted with International Certification by Accreditation Council for Pharmacy Education (ACPE), USA, and is the first among the Universities in the Asia Pacific region to have this privilege.



RANKINGS

- **National Institutional Ranking Framework (NIRF)**, Ministry of Education, Govt. of India has ranked JSS Academy of Higher Education & Research (JSS AHER) **34th rank** in India (2021).
- **The NIRF, Ministry of Education, Govt. of India has also ranked Constituent Colleges of JSS AHER, Mysuru (2021) :**
 - ❖ JSS Medical College ranked 24th among the medical institutions.
 - ❖ JSS Dental College and Hospital ranked 12th among the dental institutions.
 - ❖ JSS College of Pharmacy, Ooty ranked 7th and JSS College of Pharmacy, Mysuru ranked 9th among the pharmacy institutions.
- **ATAL RANKING OF INSTITUTIONS ON INNOVATION ACHIEVEMENTS (ARIIA) 2020 MHRD**, has placed the institution in the Rank band A (Ranked Top 6 to 25 among the private educational institutions in India)
- **The Quacquarelli Symonds (QS) Asia Ranking** has ranked JSS AHER in the band of 291-300 for excellence in education and research, at a rank of 98th in Asia. JSS AHER is ranked 37th (overall) in India and secures 1st in Papers per faculty, 14th in citations per paper and 19th in faculty students ratio in India.
- **The QS World University Rankings** by subject in the year 2021, in the field of Pharmacy and Pharmacology, has ranked our institution at 201-250 rank band among 1453 institutions across the world and in top 5 in India under the subject.
- **The Times Higher Education Innovation and Impact Ranking 2021** has positioned JSS AHER in 2nd rank in India and in the 52nd rank globally in the UN Sustainable Development Goal (SDG) 3: Good Health and Wellbeing.
- **The Times Higher Education Global University Rankings 2022** has ranked JSS AHER in the band of 351-400 among 1600 Universities across 99 Countries & Territories. JSS AHER stands 2nd in the top three Institutions in India among the 72 universities that participated in the Ranking from India.

Since its inception in 2008, the institution has strived hard to emerge as one of the pioneering research institutes in the health care sector. The research outputs have supported high impact publication in premier scientific journals and have contributed new knowledge to the understanding of newer drugs, therapy and treatment through innovations and patents. There is a wealth of knowledge that is being generated every single day in the field of molecular biology through the excellence of Molecular Biology and Natural Product Research to address important societal problems. JSS AHER combines leading medical research and compassionate patient care to face the world's most pressing medical challenges.

TIFAC - CENTRE OF RELEVANCE AND EXCELLENCE IN HERBAL DRUGS (DST., GOVT. OF INDIA)

Technology Information, Forecasting and Assessment Council (TIFAC) has been carrying out Mission and Programs under the Technology Vision 2020 projects. One of these missions, code names REACH (Relevance and Excellence in achieving new heights in educational institutions), aims at upgrading select science and engineering colleges, in the country as “Centres of Relevance and Excellence (CORE)” to broaden the level of education and meet the scientific technological manpower requirements of India in advanced areas promising to show-up on the horizon in the years to come.

The Apex Committee appointed by TIFAC selected JSS College of Pharmacy, Ooty, to locate a CORE in Herbal Drugs under the TIFAC, MISSION REACH Projects. The TIFAC CORE in Herbal Drugs is functioning since January 2001. As per the mandate entrusted to JSS College of Pharmacy, Ooty by TIFAC, Department of Science and Technology, Govt. of India, the major goal of the TIFAC-Centre of Relevance and Excellence in Herbal Drugs is to undertake research programmes for the Indian industries engaged in manufacturing Herbal Drugs/Traditional Medicinal Products in addition to meet the specialized demands of human resource requirements of these industries.

SPECIFIC OBJECTIVES OF TIFAC CORE HD

- To function as a skill-development centre for all stake holders of natural products
- To serve as a training/knowledge centre for empowering tribal youth to sustain indigenous tribal/folk medicine
- To serves as a consultant for natural product industry and regulatory needs at various capacities
- To design and offer new academic (industry relevant) programme
- To become an international leader in natural product research & development

KEY OUTCOMES OF TIFAC CORE HD

- HAPENZ, a polyherbal syrup formulation (natural appetizer) for children was developed and the technology transferred to our industrial partner. The product was commercialized by M/S TABLETS INDIA Ltd., Chennai and it is well received by the market.
- “NSF-3”, a polyherbal tablet formulation for sleep was developed and the technology was transferred to our industrial partner, M/S TABLETS INDIA Ltd., Chennai. It has been commercialized.
- The centre has filed 5 patents to its credit, out of which two have been granted.



Technology Transfer to M/s. Tablets (India) Pvt. Ltd, Chennai

Recognition

Bharat Ratna Atal Bihari Vajpayee Award for Innovation 2017 by
Re:Think INDIA, a Nationalist think tank on May 21, 2017

TIFAC CORE- HERBAL DRUGS EXPERTISE AND SERVICES WE OFFER..

CUTTING EDGE RESEARCH FACILITIES & EXPERTISE

- ⇒ Expert researchers in basic, translational and clinical research
- ⇒ Medicinal plant garden, herbarium and plant extract library/inventory
- ⇒ Well-equipped pharmacognostical and phytochemical facilities
- ⇒ Approved analytical and testing laboratories
- ⇒ Well-equipped tissue culture and animal pharmacology/toxicology labs
- ⇒ Formulation and new product development
- ⇒ Regulatory and document preparation assistance to industries

AWARDS AND RECOGNITION

Re:Think INDIA, a Nationalist think tank has conferred upon JSS College of Pharmacy, Ootacamund, the Bharat Ratna Atal Bihari Vajpayee Award for Innovation 2017, on May 11, 2017, the National Technology Day, at India International Centre, New Delhi, for the patented Herbal Drugs, namely Hapenz& NSF-3 developed by TIFAC Centre of Relevance and Excellence in Herbal Drugs, JSS College of Pharmacy, Ootacamund and marketed by M/s Tablets (India) Ltd., Chennai.

PRODUCT DEVELOPMENT CYCLE

SELECTION OF
HERBAL DRUGS
&
PROOF OF CONCEPT

- Selection & Collection of Plant material
- Characterization of plant extracts/powders
- Proof of concept and selection of dose as per study protocol

PRODUCT
DEVELOPMENT

Product of interest will be developed by following Ayurvedic formulary and AYUSH guidelines

IN-VITRO/IN-VIVO
STUDIES
&
PATENT SERVICES

Evaluation of product using *in-vitro* & *in-vivo* screening of herbal compounds / products for various biological activities; Facilitation for Intellectual Property Rights for herbal products



CENTRE FOR NATURAL PRODUCTS RESEARCH

DEPARTMENT OF PHARMACOGNOSY CENTRE FOR NATURAL PRODUCTS RESEARCH

PREAMBLE

The Department was established in the year 1988, with the vision to explore the treasure of medicinal plants of Niligiri Biosphere and become the leader in launching commercial products. The centre for Natural Products Research aims to isolate lead molecules from natural sources to targets infectious, neurodegenerative & metabolic disorders by isolating the lead molecules from the natural source. The Centre is also pursuing a high level of advanced and competent research on solubility and bio-availability issues of herbal drugs by making nano-herbal formulations using green synthesis. Department has been awarded research grants from various Government organizations such as DST, AYUSH, ICMR, AICTE including private consultancies. The Department has developed two commercial products– Hapenz & NSF– 3 and transferred the technology to Industry.

RESEARCH FOCUS/THRUST AREAS

COGNITIVE IMPAIRMENT

COSMETIC HERBAL FORMULATIONS

GREEN SYNTHESIS

NANO HERBAL FORMULATIONS

SOLID ORAL HERBAL TABLETS

CANCER RESEARCH

DEPARTMENT OF PHARMACOGNOSY CENTRE FOR NATURAL PRODUCTS RESEARCH

INVESTIGATOR'S PROFILE

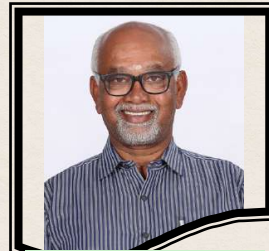
"HERBAL FORMULATIONS & ISOLATION"



Dr. S. P. Dhanabal

Mob: +91--94430 95697
Email- spdhanabal@jssuni.edu.in

"COGNITIVE IMPAIRMENT RESEARCH"



Dr. B. Duraiswamy

Mob: +91-94420 83818
Email- bdurais@jssuni.edu.in

"NANO-HERBAL FORMULATIONS FOR
ALZHEIMER'S DISEASE"



Dr. K. Shanker

Mob: +91-94438 42380
Email- drshanker@jssuni.edu.in

"PHARMACOBOTANICAL STUDIES"



Mr. G. Ramu

Mob: +91-99723 17434
Email- ramu@jssuni.edu.in

"PSORIASIS & CERVICAL CANCER"



Dr. L. Priyanka

Mob: +91-98852 78482
Email- lalithapriyanka25@jssuni.edu.in

"IMMUNOMODULATORY STUDIES"



Ms. S. Priyadharshini

Mob: +91-94438 01876
Email- priya@jssuni.edu.in

UNIQUE AND ADVANCED RESEARCH FACILITIES



Well maintained Herbal Garden with over 50 species of medicinal plants



Tablet disintegrating machine & Sieve shaker



Freeze drier

Tablet Disintegrating machine, Sieve shaker, Cyclograph, HPTLC, Flash Chromatography, Gas Chromatography, Tap density tester, Rotary evaporator



Cyclograph



HPTLC



Flash Chromatography



Tap Density tester



Gas Chromatography



Rotary Evaporator

COLLABORATIONS WITH INDUSTRIES, INTERNATIONAL & NATIONAL UNIVERSITIES

MAJOR
CLIENTS



TECHNOLOGY TRANSFER AVAILABLE

- * Patent No: 210741010426, Awarded: 28.11.2018. S.P. Dhanabal S.Jubie, MVNL Chaitanya. solution of 5-heptadeca-5, 11-trienyl 1,3,4-oxadiazole-2 as a novel human topoisomerase II inhibitor.
- * Patent No: 201741101450, Awarded: 28.11.2018. S.P. Dhanabal, S.Jubie, MVNL Chaitanya Isolation of Sulpha quinovosyl diacyl glycerol—a human topoisomerase II inhibitor using Flash Chromatography.

RESEARCH ACHIEVEMENTS

EXTERNAL FUNDED PROJECTS (COMPLETED)

PI : Dr B. Duraiswamy

Agency : Ministry of Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa-Rigpa and Homoeopathy (AYUSH) -New Delhi

Title : Mechanism of action of certain Aurvedic medicinal plants on Alzheimer's by Dipeptidyl peptidase-4 inhibition using herbs

Grant : 25 L

Period : 2015-2018

PI : Dr. S. P. Dhanabal

Agency : Dept of Science & Technology, Govt. of India -Indo-South Africa

Title : Pharmacological evaluation of medicinal plants from India & South Africa based on Indigenous knowledge for anti-cancer and anti-tuberculosis potential

Grant : 29 L

Period : 2014-2017

PI : Dr. S. P. Dhanabal

Agency : DST-Science & Engineering Research Board

Title : Biological Evaluation of constituents of *Spirulina platensis* on macromolecular entities

Grant : 49 L

Period : 2013-2017



Total No. of PhD : Awarded- 26, On-going- 26

PhD Fellowships awarded by Govt. Agencies



Ministry of Ayurveda, Yoga, Naturopathy, Unani, Siddha, Sowa-Rigpa and Homoeopathy
(AYUSH) -New Delhi
Indian Council of Medical Research
Council of Science & industrial Research
University Grants Commission
AICTE- National Doctoral Fellowship
AICTE-Quality Improvement Programme



PUBLICATIONS

TOTAL PUBLICATIONS: 276

CUMULATIVE IMPACT FACTOR: 134

HIGHEST IMPACT FACTOR: 17.12

SELECT PUBLICATIONS (LAST 10 YEARS)

1. Jayasankar Kosaraju, Rizwan Basha Katwal, Anil Dubala, Chinni Santhivardhan, MN Satish Kumar, Basavan Duraiswamy, P1-223 : Vildagliptin : A dipeptidyl peptidase-IV inhibitor ameliorates Alzheimer's disease. *Alzheimer's & Dementia Journal proceedings*, 2012, 08(5):185 [IF: 17.12]
2. Logesh Rajan., Dhanabal Palanisamy., Suresh K Mohankumar. Targeting obesity with plant-derived pancreatic lipase inhibitors: A comprehensive review. *Pharmacological Research*. 2020:151(10);10461 [IF : 5.8].
3. Kosaraju J., Gali C.C., Khatwal R.B., Dubala A., Chinni S., Holsinger R.M.D., Madhunapantula V.S.R., Nataraj S.K.M., Basavan D., Saxagliptin: A dipeptidyl peptidase-4 inhibitor ameliorates streptozotocin induced Alzheimer's disease, *Neuropharmacology*, 2013: 72(2);291 [IF : 4.91].
4. Jose A., Chaitanya M.V.N.L., Kannan E., Madhunapantula S.V., Tricaproin isolated from *Simarouba glauca* inhibits the growth of human colorectal Carcinoma cell lines by targeting Class-1 Histone deacetylases, *Frontiers In Pharmacology*: 2018:2018:9:150 [IF : 4.23].
5. Gupta S., Basavan D., Muthureddy Nataraj S.K., Raju K.R.S., Babu U.V., L.m. S.K., Gupta R., Assessment of inhibitory potential of *Pothos scandens* L. on ovalbumin-induced airway hyperresponsiveness in balb/c mice, *International Immunopharmacology*: 2014:18:151 [IF : 3.94].
6. Kamble B., Gupta A., Moothedath I., Khatal L., Janrao S., Jadhav A., Duraiswamy B., Effects of *Gymnema sylvestre* extract on the pharmacokinetics and pharmacodynamics of glibenclamide in streptozotocin induced diabetic rats, *Chemico-Biological Interactions*, 2016, 145:30 [IF : 3.72].
7. Kosaraju, J.; Tam, K. Y.; Basavan, D., Novel dual GLP-1 and GIP receptor analog attenuates high-fat diet-induced disease progression in 3XTg-AD mice, *Journal of The Neurological Sciences*: 2017:381:374 [IF : 3.12].
8. Kosaraju J., Madhunapantula S.V., Chinni S., Khatwal R.B., Dubala A., Muthureddy Nataraj S.K., Basavan D., Dipeptidyl peptidase-4 inhibition by *Pterocarpus marsupium* and *Eugenia jambolana* ameliorates streptozotocin induced Alzheimer's disease, *Behavioural Brain Research*, 2014: 267;55 [IF : 2.98].
9. Kosaraju J., Dubala A., Chinni S., Khatwal R.B., Satish Kumar M.N., Basavan D., A molecular connection of *Pterocarpus marsupium*, *Eugenia jambolana* and *Gymnema sylvestre* with dipeptidyl peptidase-4 in the treatment of diabetes, *Pharmaceutical Biology*, 2014: 52(2);268 [IF : 2.97].
10. Kosaraju J., Murthy V., Khatwal R.B., Dubala A., Chinni S., Muthureddy Nataraj S.K., Basavan D., Vildagliptin: An anti-diabetes agent ameliorates cognitive deficits and pathology observed in streptozotocin-induced Alzheimer's disease, *Journal of Pharmacy and Pharmacology*: 2013:65:12 [IF : 2.57].

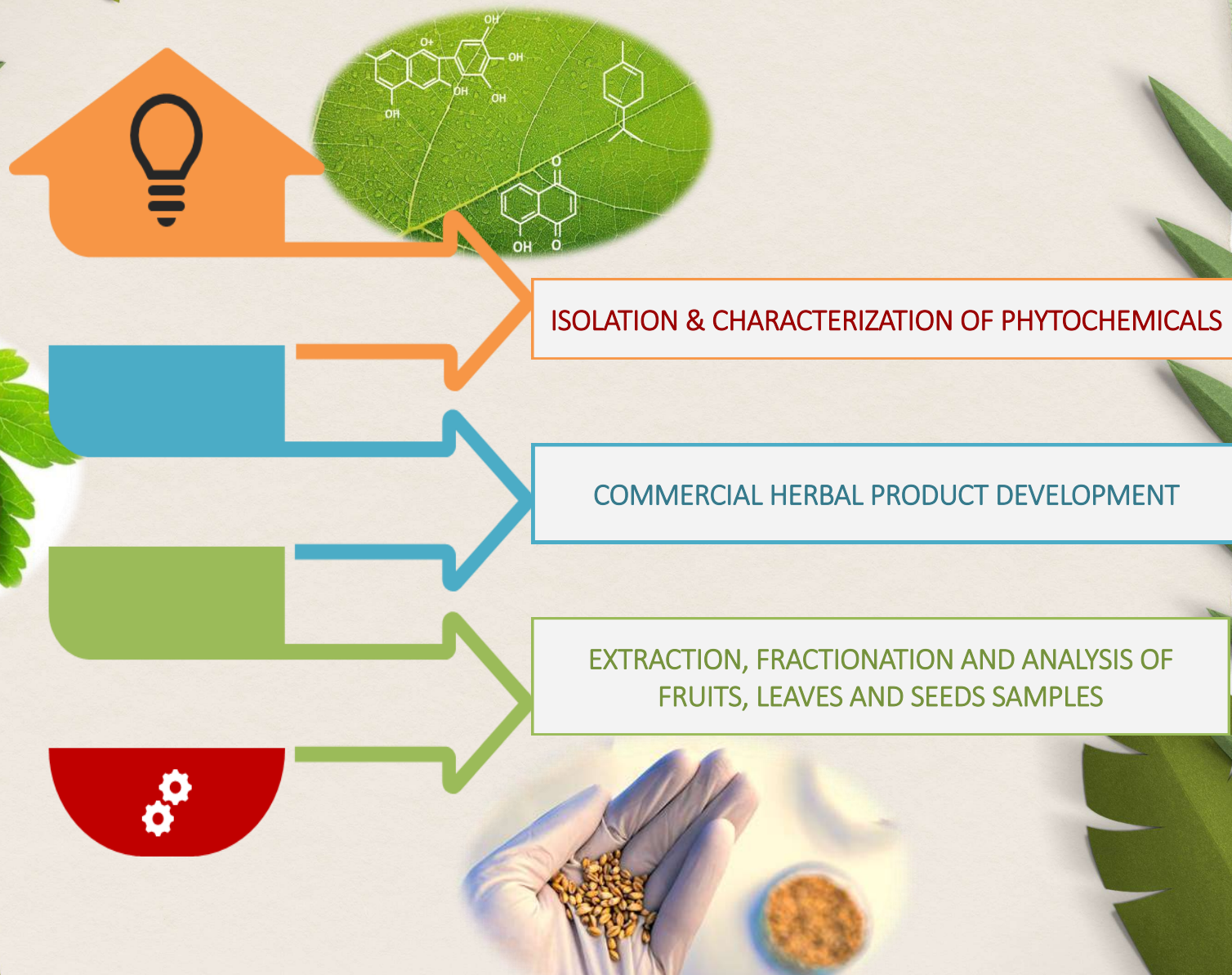


PUBLICATIONS

11. Kamble B., Gupta A., Patil D., Janrao S., Khatal L., Duraiswamy B., Quantitative estimation of gymnemagenin in *Gymnema sylvestre* extract and its marketed formulations using the HPLC-ESI-MS/MS method, *Phytochemical Analysis*, 2013;24(2);134 [IF : 2.77].
12. Basavan D., Chalichem NSS., Kumar SKM., Phytoconstituents and their possible mechanistic profile for Alzheimer's Disease - A Literature Review., *Current Drug Targets*, 2019, 14:03 [IF : 2.63].
13. Thekkekkara D., Basavan D., Chandna S., Nanjan M.J., A combination of resveratrol & diindolylmethane, a potent radioprotector, *International Journal of Radiation Biology*: 2018:94:554 [IF : 2.37].
14. Vedpal; Jupudi, S; Jubie, S; Deepika, NP; Dhanabal, SP, A new pyrimidine alkaloid from the roots of Tadehagi , triquetrum (L.) H.Ohashi, *Natural product research*: 2019:08:30 [IF : 2.16].
15. Unni Jayaram., Vedpal., Ashish Wadhvani., S. P. Dhanabal, Isolation and characterization of flavonoids from the roots of medicinal plant Tadehagi triquetrum (L.) H.Ohashi, *Natural product research*: 2020:34:19 [IF : 2.16].
16. Kamble B., Gupta A., Patil D., Khatal L., Janrao S., Moothedath I., Duraiswamy B., Determination of gymnemagenin in rat plasma using high-performance liquid chromatography-tandem mass spectrometry: Application to pharmacokinetics after oral administration of *Gymnema sylvestre* extract, *Biomedical Chromatography*: 2013:27:669 [IF : 1.73].
17. Kamble B., Gupta A., Moothedath I., Khatal L., Janrao S., Jadhav A., Duraiswamy B., Effects of *Gymnema sylvestre* extract on the pharmacokinetics and pharmacodynamics of glimepiride in streptozotocin induced diabetic rats, *Chemico-Biological Interactions*, 2016, 145:30 [IF : 1.73].
18. Ramu R., Shirahatti P.S., Dhanabal S.P., Zameer F., Dhananjaya B.L., Nagendra Prasad M.N., Investigation of antihyperglycaemic activity of banana (*Musa sp.* Var. Nanjangud rasa bale) flower in normal and diabetic rats, *Pharmacognosy Magazine*: 2017:13 [IF : 1.31].
19. Gupta S., Duraiswamy B., Satishkumar M.N., Peritoneal mast cell stabilization potential of *Pothos scandens* L., *Indian Journal of Pharmacology*, 2013: 45:83 [IF : 0.89].
20. Ramu G., Dhanabal S.P., Antioxidant studies on ethanol extracts from two selected genera of Indian Lamiaceae, *Indian Journal of Pharmaceutical Sciences*, 2015, 77:380 [IF : 0.72].



CONSULTANCY UNDERTAKEN



> 170 LAKHS WORTH INDUSTRY/INSTITUTIONAL PROJECTS (BOTH COMPLETED & ON-GOING)

EXPERTISE AND SERVICES WE OFFER..

HERBAL DRUG MARKET

- ◆ As per WHO, Traditional herbal medicines are getting significant attention in global health
- ◆ In Korea, traditional herbal medicine played a prominent role in the strategy to contain and treat severe acute respiratory & other chronic diseases
- ◆ 80% of African/Asian population uses traditional herbal medicine & the worldwide annual market for these products approaches US\$ 60 billion.

Evaluation of Herbal Products for
Sleep disorders, Alzheimer's, Malnutrition, Skin & Hair
cosmetics, Immunomodulatory action

Formulation of herbal based

- ◆ Creams
- ◆ Syrups
- ◆ Lotions
- ◆ Tablets

Nano-Herbal formulations

Solubility & Bioavailability studies-Green
nano technology
Pre-clinical *In-vitro* & *In-vivo* studies

- ◆ Extraction & Isolation of active molecules from plants
- ◆ Standardization of natural products
- ◆ Cutting Edge Infrastructure: HPTLC, F-Dryer, GC, Flash-chromatography, Rota

- ◆ New Product Development
- ◆ Technology transfer to Industries
- ◆ Laboratory setup as per GMP/Non-GMP Protocols
- ◆ All laboratory procedures as per SOPs

CENTRE FOR
NATURAL PRODUCTS RESEARCH

EXPERTISE AND SERVICES WE OFFER..

PRODUCT DEVELOPMENT CYCLE

SELECTION OF
HERBAL DRUGS
&
PROOF OF CONCEPT

PRODUCT
DEVELOPMENT

IN-VITRO / IN-VIVO
STUDIES
&
PATENT SERVICES

- Selection & Collection of Plant material.
- Characterization of plant extracts/powders
- Proof of concept and selection of dose as per study protocol

Product of interest will be developed by following Ayurvedic formulary and AYUSH guidelines.

Evaluation of product using In-vitro & In-vivo animal models for respective activity
Services-Intellectual Property Rights



FOR CORRESPONDENCE

Dr B. Duraiswamy
Professor & Head,
Centre for Natural Product Research
Dept. of Pharmacognosy
JSS College of Pharmacy Ooty
Mob- +91-9442083818
Email- cpocog1@jssuni.edu.in