



PHARMILINE

The Official Publication of Kerala Pharmacy Graduates' Association
Thiruvananthapuram, Kerala, India



Volume 22, Issue 3, August 2023

OFFICE BEARERS OF KPGA

Mr. LS Shenoy	- Patron
Mr. SS Venkata Krishnan	- Patron
Dr. Padmaja V	- Ex-Officio Member
Dr.PK Sreekumar	- President
Dr. Kala D	- Vice-President
Mr. Abdussamad KM	- Vice-President
Mr. Abdul Nazeer PU	- Gen.Secretary
Dr. Nishith MC	- Joint Secretary
Mrs. R. Sangeetha	- Joint Secretary
Mr. Sunilkumar D	- Treasurer

Executive Committee Members

Dr. CS Satheesh Kumar
Mr. Mathew Kokad
Dr. P Jayasekhar
Adv.Unnikrishna Panicker
Mr. Ibrahim Sharafudheen
Dr. David Joseph Palayoor
Mr. Jaleel KA
Mr. Suresh Kamath P
Dr. K Krishnakumar
Mr. KP Anilkumar
Dr. Sandhya S
Mr. Dileep G

Pharmline Editorial Board

Chief Editor

Dr. Bobby Johns G

Professor & Head

Dept.of Pharmaceutics

St. Joseph's College of Pharmacy

Cherthala

Members

Dr. CS Satheesh Kumar

Drugs Controller (Rtd.), Kerala State

Head-Business Development

Agappe Diagnostics Ltd, Ernakulam

Dr. Subash Philip

Vice-Principal, Dr. Joseph Marthoma

Institute of Pharmaceutical Sciences

& Research, Kattanam

Dr. Biju CR

Vice-Principal, Devaki Amma Memorial

College of Pharmacy

Kozhikode

Ms. Jooly Kurien

Assoc.Professor-Pharmaceutics

Lisie College of Pharmacy

Ernakulam

Ms. Sowparnika Treasa Sabu

Sr. Research Associate,

ICMR, New Delhi

Ms. Manju CS

Asst.Professor-Pharmacy Practice

College of Pharmaceutical Sciences

Govt.Medical College, Kozhikode

Dr. Jijith US

Asst.Professor-Pharmacy Practice

College of Pharmaceutical Sciences

Govt. Medical College, Kozhikode

Dr. Anitha Mary Mathews

Professor & Head- Pharmacology

Nazareth College of Pharmacy,

Othera, Thiruvalla



Table of Contents

Contents	Page No.
From the Chief Editors Desk Dr. Bobby Johns G	5
The President Speaks Dr. PK Sreekumar	6
Scientific Session	
Unveiling the mysteries of the brain-eating amoeba: understanding naegleria fowleri and its impact Sowparnika Treasa Sabu	7
Embracing person-centeredness in pharmaceutical care: a paradigm shift for better healthcare in India Rajesh Thalapparambath	10
Revolutionizing clinical pharmacy through artificial intelligence Remya Gayathri S	12
The co-extensive warriors in health - allopathy and ethnopharmacology Roshitha K R	15
Dostarlimab- A Miracle drug Grita Maria Paul, Riya Ann Joyson	18
Sotagliflozin: A novel drug for heart failure Ann Rose Jose	19
Activities & News	
Inspire-2K23	20
Gallery	21
Student Project Fund-2023	23



Prof. Dr. Bobby Johns G

From The Chief Editor's Desk



Dear readers,

We are delighted to present the August 2023 issue of Pharmline- the Official Publication of Kerala Pharmacy Graduates' Association, dedicated to the advancement and betterment of the pharmacy profession in the state of Kerala. This issue holds special significance as it not only showcases the latest developments in the field but also highlights the association's commitment to supporting the future of pharmacy through the distribution of the student research fund -2023.

The student research fund-2023 is a commendable initiative aimed at empowering B.Pharm, M.Pharm, and Pharm.D students across Kerala, by providing financial support. This program encourages students to engage in research activities and explore innovative ideas that have the potential to shape the future of pharmacy. This investment in student research fosters a culture of curiosity, critical thinking, and evidence-based decision-making, which are fundamental to advancing the pharmacy profession.

Pharmline, as a platform for scholarly discourse, is dedicated to nurturing the research endeavours of students. In this issue, we are proud to showcase articles authored by talented students and researchers, offering a glimpse into the innovative research being conducted across various areas of pharmacy. These contributions highlight the immense potential and creativity of the student community, whose work holds the promise of improving patient care, pharmaceutical management, and healthcare outcomes in our country.

We applaud the Kerala Pharmacy Graduates Association for its visionary approach in bridging the gap between academia and practice sector. By distributing the student research fund -2023, the association not only provides financial assistance but also instils a sense of confidence and pride in the student researchers. This initiative not only benefits the individual students but also contributes to the overall advancement of the pharmacy profession, ensuring a brighter future for pharmaceuticals and healthcare in Kerala.

This issue of Pharmline stands as a testament to the dedication and commitment of the Kerala Pharmacy Graduates Association to the advancement of the pharmacy profession in our State. Through the distribution of the student research fund -2023 and the publication of student-authored articles, the association empowers students and encourages them to contribute to the growth and development of the pharmacy field. We extend our appreciation to the association, the student researchers, and all contributors to Pharmline for their invaluable efforts in shaping the future of pharmacy profession in our State.

Sincerely,

Prof. Dr. Bobby Johns G
Chief Editor - Pharmline

The President Speaks



Dr. PK Sreekumar

Dear Members,

It gives me great pleasure to address all the esteemed members of the Kerala Pharmacy Graduates Association. As the President of this prestigious association, I am humbled and honored that I represented a community of talented and dedicated pharmacy professionals who have made significant contributions to the healthcare sector in our state.

Pharmacy is a noble profession that plays a crucial role in ensuring the well-being and betterment of society. As graduates or post graduates from esteemed institutions, you have acquired knowledge, skills, and a deep understanding of pharmaceutical sciences. Your dedication and commitment to this field are commendable.

Our association organized lot of seminars, workshops, big conferences like KPC-2023, preparation and action for establishing Pharma city, Students funding for 2022-23, publication of Pharmline in a more scientific and technical touch. Lot of new members were enrolled and acted in collaboration with industry experts, educational institutions, and regulatory bodies to ensure that our members are equipped with the latest knowledge and skills to excel in their respective fields.

I extend my gratitude to all the executive members, senior members, and mentors and all members who have contributed to the growth and success of our association. Your guidance and wisdom have been invaluable, and your continued support enabled the executive committee in leading this association to new heights.

In conclusion, let us forge ahead with a shared vision of excellence in pharmacy practice. Together, we can make a difference in the lives of our patients and the communities we serve. I am confident that the Kerala Pharmacy Graduates Association will continue to be a beacon of inspiration, innovation, and professionalism in the field of pharmacy. Remember that the path to success in pharmacy is not just about personal achievements but also about giving back to the community. I encourage each one of you to actively engage in initiatives that promote health awareness, provide access to affordable medicines, and support the underprivileged sections of society. Let compassion and empathy guide your professional journey.

Thank you, and I wish you all a fulfilling and rewarding journey in your pharmacy careers. Thank you for your unwavering support, General Secretary, members of executive committee, Women's Wing, Student wing, NRI wing, and Pharmline Editorial Committee.

Sincerely,

Dr. PK Sreekumar
President-KPGA

"UNVEILING THE MYSTERIES OF THE BRAIN-EATING AMOEBIA: UNDERSTANDING NAEGLERIA FOWLERI AND ITS IMPACT"

Sowparnika Treasa Sabu

Senior Research Associate, Division of Basic Medical Sciences, ICMR Headquarters, New Delhi

* Corresponding author Email: sowparnikatreasasabu19@gmail.com

Article Received: July 12, 2023

Accepted: July 15, 2023

Published: July 28, 2023

ABSTRACT

It is significant to note that diagnosis and treatment must begin as soon as possible due to PAM's rapid progression. Clinical suspicion may be used by healthcare professionals to begin PAM treatment before confirmatory test results are available. Due to the rarity and severity of PAM, it is essential that medical professionals consult with experts skilled in handling such cases and promptly notify local health authorities for the purpose of receiving the necessary advice and assistance.

Keywords: Naegleria fowleri, PAM, encephalitis, meningoencephalitis.

Introduction

Brain-eating amoeba, scientifically known as *Naegleria fowleri*, is a rare but highly concerning organism that can cause a severe brain infection called primary amebic meningoencephalitis (PAM). *Naegleria fowleri* is typically found in warm freshwater environments, such as lakes, hot springs, and poorly maintained swimming pools. It is important to note that brain-eating amoeba infections are extremely rare, with only a few cases reported each year worldwide. The amoeba typically infects individuals when contaminated water enters the body through the nose, such as during activities like swimming or diving. Recently we came across a news regarding the death of a Kerala boy due to PAM.

Once the amoeba enters the nasal passages, it can travel to the brain and cause inflammation and destruction of brain tissue, leading to PAM. Initial symptoms may resemble those of bacterial meningitis, including severe headache, fever, nausea, and vomiting. As the infection progresses, it can cause seizures, hallucinations, coma, and ultimately, death. Prompt medical attention is crucial if someone suspects they have been exposed to *Naegleria fowleri*-contaminated water and experiences symptoms associated with PAM. However, it's important to remember that the infection is still very rare, and the vast majority of individuals exposed to contaminated water do not develop the disease.

The brain-eating amoeba, is considered dangerous due to several reasons:

1. Infection of the Central Nervous System: *Naegleria fowleri* has the ability to infect the Central Nervous System by invading it including the brain,

spinal cord, and surrounding tissues. Once the amoeba enters the CNS, it causes severe and often fatal brain infections, such as primary amebic meningoencephalitis (PAM).

2. Rapid Progression: Brain-eating amoeba infections progress rapidly. From the initial exposure, the amoeba can quickly travel through the nasal passages to the brain, where it starts to destroy brain tissue. The rapid progression of the infection can lead to significant neurological damage and complications within a matter of days.

3. Destruction of Brain Tissue: *Naegleria fowleri* causes inflammation and destruction of brain tissue. As it multiplies and feeds on brain cells, it triggers an intense immune response, leading to further damage. The destruction of brain tissue affects vital functions and can result in severe neurological symptoms and potentially fatal consequences.

4. High Fatality Rate: Brain-eating amoeba infections, particularly PAM, have a high fatality rate. Due to the rapid progression of the infection and limited treatment options, the chances of survival are low.

5. Rarity and Lack of Immunity: Although brain-eating amoeba infections are rare, they can occur in various geographic locations, primarily in warm freshwater environments. The general population does not possess immunity or natural resistance against *Naegleria fowleri*, making individuals susceptible to infection when exposed to contaminated water.

6. Limited Treatment Options: Currently, treatment options for PAM are limited, and the available treatments have shown limited effectiveness. The effectiveness of drugs against *Naegleria fowleri* is

limited due to the challenges in crossing the blood-brain barrier to reach the site of infection. Additionally, the rapid progression of the disease often means that treatment is initiated when the infection is already advanced.

7. Delayed Diagnosis: Diagnosing PAM can be challenging due to its rarity and non-specific early symptoms. By the time PAM is suspected and diagnosed, the infection has often already progressed significantly, making it more difficult to treat effectively.

The brain-eating amoeba, *Naegleria fowleri*, is distinct from other amoeba species in several ways:

1. *Pathogenicity:* *Naegleria fowleri* is the only known amoeba species that can cause a severe and often fatal brain infection in humans. It is the specific pathogenicity of *Naegleria fowleri* to invade the central nervous system, particularly the brain, that sets it apart from other amoeba species.

2. *Mode of Transmission:* Unlike many other amoeba species, *Naegleria fowleri* primarily infects humans through the nasal route. It enters the body when contaminated water enters the nasal passages, usually during activities like swimming or diving. From the nose, it migrates to the brain and causes the infection. In contrast, other amoeba species generally do not exhibit this preference for the nasal route of infection.

3. *Geographic Distribution:* While *Naegleria fowleri* infections have been reported worldwide, they are more commonly associated with warm freshwater environments. The geographic distribution of *Naegleria fowleri* is influenced by factors such as water temperature and quality. In contrast, other amoeba species may have different ecological niches and distribution patterns.

Disease Manifestation: The infection caused by *Naegleria fowleri*, known as primary amebic meningoencephalitis (PAM), is a rapidly progressing and often fatal brain infection. It leads to severe inflammation and destruction of brain tissue. On the other hand, infections caused by other amoeba species, such as *Acanthamoeba* or *Balamuthia mandrillaris* can result in different diseases like *Acanthamoeba keratitis* (eye infection) or granulomatous amoebic encephalitis (brain infection).

To prevent infections, it is advised to take precautions when engaging in water-related activities in warm freshwater environments. These precautions include:

- Avoiding water-related activities in warm fresh water bodies with poor water circulation or high

temperatures.

- Using nose clips or keeping your head above water when swimming, diving, or engaging in water sports.
- Proper maintenance and disinfection of swimming pools and hot tubs.
- Using only properly treated and filtered water for activities like nasal irrigation or sinus rinsing.
- Not disturbing sediment in warm fresh water areas, as the amoeba can be present in the sediment.

Public health authorities and organizations continuously monitor and study brain-eating amoeba infections to enhance prevention strategies and raise awareness. It's essential to stay informed about the latest guidelines and recommendations provided by health authorities in your region. The symptoms of PAM usually begin within a few days of exposure and may include severe headache, fever, nausea, vomiting, stiff neck, seizures, confusion, and hallucinations. As the infection progresses, individuals may experience neurological symptoms such as coma and eventually death, typically within one to 18 days. It is important to note that PAM is a rare infection, with only a few cases reported globally each year. However, it is a severe condition with a high fatality rate. Prompt medical attention is crucial for improving the chances of survival, although treatment options are limited. Diagnosing primary amebic meningoencephalitis (PAM) can be challenging due to its rarity and rapid progression. However, early diagnosis is crucial for initiating appropriate treatment and improving outcomes. Here are the steps involved in diagnosing PAM:

Clinical Evaluation: A healthcare professional will conduct a thorough medical history and physical examination. They will pay close attention to symptoms such as severe headache, fever, and neurological abnormalities like stiff neck, seizures, or altered mental status.

Lumbar Puncture (Spinal Tap): This procedure involves the removal of a sample of cerebrospinal fluid (CSF) from the spinal canal. The CSF is then analyzed for signs of infection, such as an increased white blood cell count and elevated protein levels. In PAM cases, the CSF may show an initial neutrophilic pleocytosis (increased neutrophils) followed by lymphocytic predominance.

Microscopic Examination: The collected CSF sample is examined under a microscope to look for the presence of *Naegleria fowleri* trophozoites, which are the active form of the amoeba. Identification of the

amoeba in the CSF is a crucial diagnostic indicator for PAM.

Polymerase Chain Reaction (PCR) Testing: PCR testing can be performed on the CSF sample to detect the genetic material (DNA) of *Naegleria fowleri*. This method provides a more sensitive and specific identification of the amoeba.

Imaging Studies: Neuroimaging, such as computed tomography (CT) or magnetic resonance imaging (MRI), may be conducted to evaluate the brain for any characteristic findings associated with PAM, such as edema or inflammation.

It is important to note that due to the rapid progression of PAM, diagnosis and treatment need to be initiated as quickly as possible. Healthcare providers may start treatment for PAM based on clinical suspicion before confirmatory test results are available. Given the rarity and urgency of PAM, it is crucial for healthcare professionals to consult with specialists experienced in managing such cases and to promptly notify local health authorities for appropriate guidance and assistance.

References

1. Cope, J.R., Conrad, D.A., Cohen, N. et al. Use of the novel therapeutic agent miltefosine for the treatment of primary amebic meningoencephalitis: report of 1 fatal and 1 surviving case. *Clin Infect Dis.* 2016; 62(6):774-776. doi: 10.1093/cid/civ1265
2. Siddiqui, R., Khan, N.A. Primary amoebic meningoencephalitis caused by *Naegleria fowleri*: an old enemy presenting new challenges. *PLoS Negl Trop Dis.* 2014; 8(8): e3017. doi: 10.1371/journal.pntd.0003017
3. Visvesvara, G.S., Moura, H., Schuster, F.L. Pathogenic and opportunistic free-living amoebae: *Acanthamoeba* spp., *Balamuthia mandrillaris*, *Naegleria fowleri*, and *Sappinia diploidea*. *FEMS Immunol Med Microbiol.* 2007; 50(1): 1-26. doi: 10.1111/j.1574-695X.2007.00232.x
4. Yoder, J.S., Straif-Bourgeois, S., Roy, S.L. et al. Primary amebic meningoencephalitis deaths associated with sinus irrigation using contaminated tap water. *Clin Infect Dis.* 2012; 55(9): e79-e85. doi: 10.1093/cid/cis615

5. Sriram, R., Shoff, M., Booton, G., Fuerst, P., Visvesvara, G.S. Survival of *Acanthamoeba* cysts after desiccation for more than 20 years. *J Clin Microbiol.* 2008; 46(7): 2538-2540. doi: 10.1128/JCM.00354-08



Cite this article: Pharmline 2023;22(2): 7-9; Sowparnika Treasa Sabu
Unveiling the Mysteries of the Brain-Eating Amoeba: Understanding *Naegleria fowleri* and Its Impact

EMBRACING PERSON-CENTEREDNESS IN PHARMACEUTICAL CARE: A PARADIGM SHIFT FOR BETTER HEALTHCARE IN INDIA

Rajesh Thalapparambath

Senior Manager- Pharmacy Operations , Meitra Hospital, Calicut, Kerala, India

* Corresponding author Email: vineetharajesh@gmail.com

Article Received: July 12, 2023

Accepted: July 15, 2023

Published: July 28, 2023

ABSTRACT

In the Indian context, the significance of prioritizing person-centeredness in pharmaceutical care cannot be overstated. This is due to the wide array of cultural, socioeconomic, and individual aspects that impact patient outcomes. Adopting this approach empowers healthcare providers to customize medication therapies in order to address the distinct requirements and preferences of each patient. As a result, patient adherence improves, leading to enhanced outcomes and greater satisfaction. Embracing person-centered pharmaceutical care holds immense potential to revolutionize the healthcare landscape in India. It guarantees that patients receive personalized, culturally aware, and efficient medication management, ultimately contributing to improved health outcomes for all individuals.

Keywords: Person centered pharmaceutical care, medication adherence, patient satisfaction, telemedicine

Introduction

In India, the healthcare landscape is evolving rapidly, with a growing emphasis on patient-centered care. As the nation grapples with a diverse population and varied healthcare needs, the concept of person-centeredness in pharmaceutical care becomes crucial. Recognizing the unique cultural, socioeconomic, and individual factors that influence patients' health outcomes is essential to providing effective and tailored medication therapies. This article explores the significance of person-centeredness in pharmaceutical care within the Indian context, highlighting its potential to revolutionize healthcare delivery and improve patient outcomes.

Understanding Person-Centeredness in Pharmaceutical Care in India

1. Cultural Sensitivity

India is a diverse country with rich cultural traditions and beliefs. Person-centered pharmaceutical care acknowledges and respects the cultural background of patients, considering their cultural practices, dietary preferences, and traditional healing systems alongside evidence-based medicine. Healthcare providers strive to develop a deep understanding of the patient's cultural context to effectively communicate treatment options and build trust.

2. Patient Empowerment

Person-centered pharmaceutical care in India promotes patient education and empowerment. It involves providing patients with information about their medications, including their purpose, dosage instructions, potential side effects, and any necessary precautions. By empowering patients with knowledge,

they can actively participate in decision-making, adhere to treatment regimens, and engage in self-care practices.

3. Collaborative Decision-Making

Person-centered pharmaceutical care encourages shared decision-making between healthcare providers and patients. This involves open and honest communication, where patients are encouraged to express their concerns, preferences, and goals.

Healthcare providers listen attentively, provide information, and consider the patient's input when designing medication therapy plans. The aim is to ensure that treatment aligns with the patient's values, lifestyle, and aspirations.

4. Accessibility and Affordability

In the Indian context, person-centered pharmaceutical care recognizes the importance of making medications accessible and affordable to all segments of society. It considers the socioeconomic factors that influence a patient's ability to adhere to treatment, such as medication cost, availability, and health infrastructure. Healthcare providers collaborate with patients to identify affordable options and explore government assistance programs, ensuring that medication therapies are within reach for all.

Benefits of Person-Centered Pharmaceutical Care in India

1. Improved Medication Adherence

Person-centered pharmaceutical care promotes better medication adherence among patients in India. By considering cultural beliefs, socioeconomic factors, and personal preferences, healthcare providers can address barriers to adherence and tailor treatment.

plans accordingly. Increased adherence leads to better health outcomes, reduced disease progression, and minimized healthcare costs.

2. *Enhanced Patient Outcomes*

The individualized approach of person-centered pharmaceutical care contributes to improved patient outcomes in the Indian context. By considering patients' unique circumstances, such as comorbidities, lifestyle, and socioeconomic factors, healthcare providers can optimize medication regimens, reduce adverse effects, and maximize treatment effectiveness. This results in better disease management and improved quality of life.

3. *Increased Patient Satisfaction*

Person-centered pharmaceutical care fosters a positive patient experience and enhances patient satisfaction in India. By involving patients in decision-making, respecting their cultural values, and providing personalized care, healthcare providers create a supportive and trusting environment. Patients feel valued, heard, and understood, leading to increased satisfaction with their healthcare interactions.

4. *Addressing Health Inequalities*

Person-centered pharmaceutical care in the Indian context addresses health inequalities by considering the social determinants of health. Healthcare providers strive to understand the socioeconomic challenges faced by patients and develop strategies to mitigate them. This includes exploring affordable treatment options, facilitating access to healthcare services, and providing appropriate support for patients from marginalized communities.

Challenges and Future Directions

Implementing person-centered pharmaceutical care in India poses certain challenges. It requires healthcare providers to undergo cultural competency training and develop a deeper understanding of the diverse population they serve. Additionally, addressing issues related to healthcare infrastructure, medication affordability, and patient education will be crucial in ensuring widespread adoption of person-centeredness in pharmaceutical care.

In the future, advancements in technology, such as telemedicine and mobile health applications, can play a pivotal role in facilitating person-centered pharmaceutical care in India. These tools can improve

access to health care information, enable remote consultations, and enhance patient - provider communication, particularly in rural areas.

Conclusion

Person-centeredness in pharmaceutical care is of paramount importance in the Indian context, considering the diverse cultural, socioeconomic, and individual factors that influence patient outcomes. By embracing this approach, healthcare providers can tailor medication therapies to meet the unique needs and preferences of patients, resulting in improved adherence, enhanced patient outcomes, and increased satisfaction. Person-centered pharmaceutical care has the potential to transform the healthcare experience in India, ensuring that patients receive personalized, culturally sensitive, and effective medication management, ultimately leading to better health for all.



REVOLUTIONIZING CLINICAL PHARMACY THROUGH ARTIFICIAL INTELLIGENCE

Remya Gayathri S
Assistant Professor, Dept. of Pharmacy Practice
Chemists College of Pharmaceutical Sciences and Research, Ernakulam

* Corresponding author Email: remyags@gmail.com

Article Received: July 21, 2023

Accepted: July 25, 2023

Published: July 30, 2023

ABSTRACT

The integration of Artificial Intelligence (AI) in clinical pharmacy holds tremendous promise for transforming the field. It has the capacity to revolutionize medication management, enhance clinical decision-making, and facilitate personalized medicine. AI technologies, utilizing machine learning, natural language processing, and data analytics, empower clinical pharmacists to optimize medication regimens, identify potential drug interactions, and elevate patient outcomes. By relying on AI-powered tools and decision support systems, pharmacists can confidently provide evidence-based recommendations, prioritize patient safety, and deliver tailored care. As AI continues to progress, its application in clinical pharmacy is poised to greatly improve healthcare outcomes and revolutionize patient-centered care.

Keywords: AI, Medication management, personalized medicine, interactions.

Introduction

The integration of artificial intelligence (AI) in clinical pharmacy represents a paradigm shift in healthcare, empowering pharmacists with advanced tools and technologies to enhance patient care, optimize medication management, and improve clinical outcomes. AI encompasses a wide range of applications, including machine learning, natural language processing, and data analytics, which can be utilized to streamline medication reviews, support clinical decision-making, identify drug interactions, and facilitate personalized medicine. This article explores the transformative potential of AI in clinical pharmacy, highlighting its impact on patient care and providing insights into the future of this rapidly evolving field.

Optimizing Medication Management

AI technologies have the potential to revolutionize medication management practices in clinical pharmacy. By leveraging machine learning algorithms, AI can analyze large volumes of patient data, including medical records, lab results, and medication histories, to identify patterns and trends. This enables pharmacists to optimize medication regimens, detect potential medication errors, and improve patient adherence to prescribed treatments. AI-powered medication management systems can also provide real-time alerts and reminders, ensuring timely administration of medications and reducing the risk of adverse events.

Supporting Clinical Decision-Making

AI-based decision support systems have the ability to enhance clinical decision-making processes in

in pharmacy practice. These systems can provide evidence-based recommendations and guidelines to pharmacists, taking into account patient-specific factors such as age, weight, comorbidities, and drug-drug interactions. By integrating patient data with up-to-date medical literature and guidelines, AI-powered tools can assist pharmacists in selecting appropriate medications, dosages, and treatment plans. This ensures that clinical decisions are based on the most current and relevant information, leading to improved patient safety and better treatment outcomes.

Identifying Drug Interactions and Adverse Effects

One of the critical roles of clinical pharmacists is to identify and mitigate potential drug interactions and adverse effects. AI algorithms can analyze large databases of drug-drug interactions, pharmacokinetic data, and adverse drug reaction reports to identify previously unrecognized interactions or predict the likelihood of adverse events. This proactive approach helps pharmacists identify high-risk combinations, implement necessary precautions, and make informed recommendations to healthcare providers. By leveraging AI, clinical pharmacists can enhance patient safety, prevent medication-related harm, and improve medication therapy management.

Facilitating Personalized Medicine

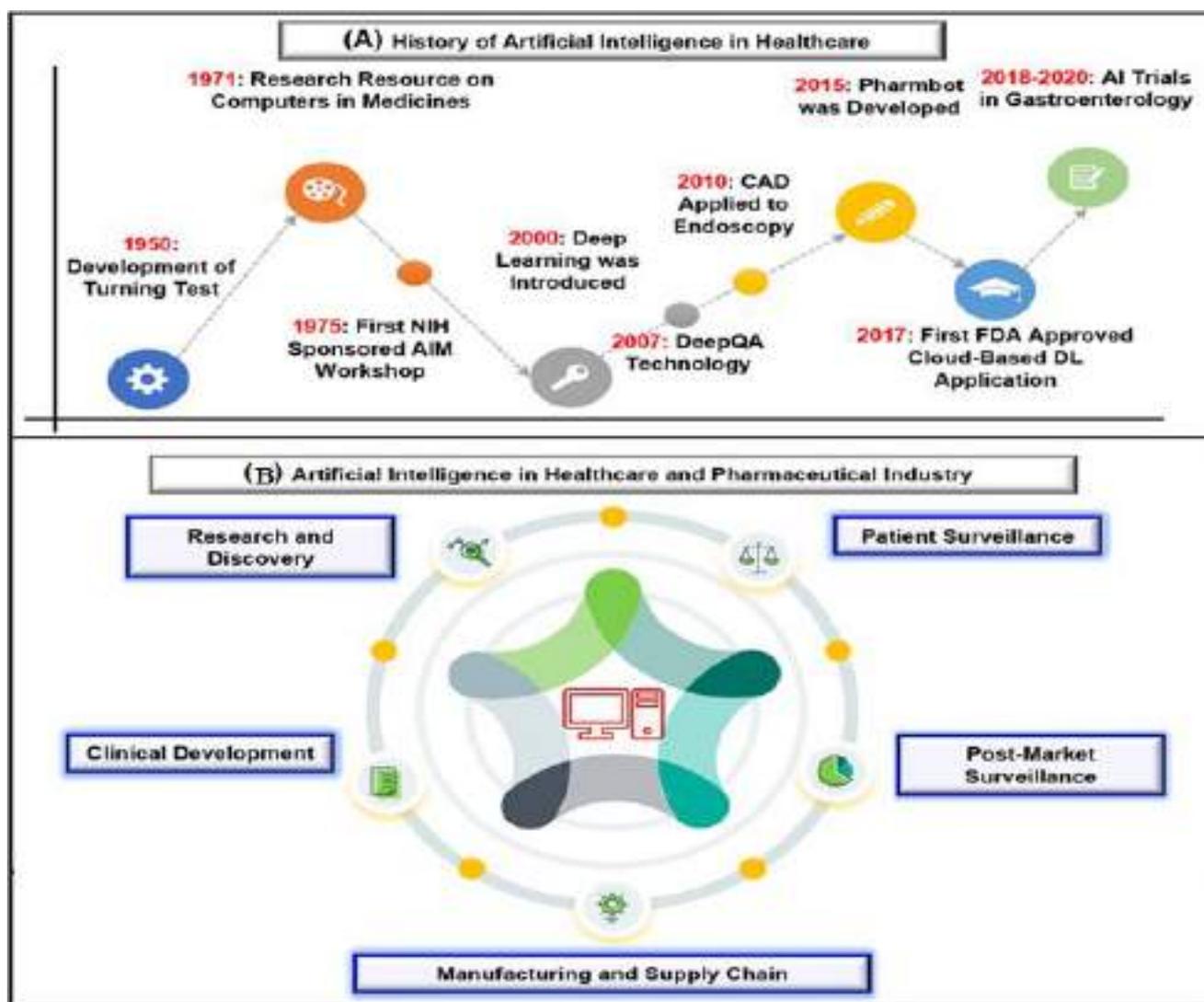
Personalized medicine aims to tailor medical treatments to individual patient characteristics, including genetics, lifestyle factors, and disease progression. AI plays a crucial role in facilitating personalized medicine by integrating patient data, genetic information, and clinical guidelines to provide tailored treatment recommendations. Pharmacists

armed with AI tools can analyze complex data sets and identify patient-specific factors that may influence medication response. This enables the optimization of medication regimens, identification of appropriate drug alternatives, and minimization of adverse effects. By leveraging AI, clinical pharmacy can contribute to the advancement of precision medicine, leading to improved patient outcomes and more effective healthcare interventions.

The below diagram depicts, some of the other different application of AI for the pharmaceutical industry.



Another figure below shows the history of AI in healthcare (A) and (B) How AI can be used in both health care and pharmaceutical industry.



Conclusion

Artificial intelligence (AI) has the potential to revolutionize clinical pharmacy, enhancing medication management, supporting clinical decision-making, and facilitating personalized medicine. By leveraging machine learning, natural language processing, and data analytics, AI technologies empower clinical pharmacists to optimize medication regimens, detect potential drug interactions, and improve patient outcomes. With AI-powered tools and decision support systems, pharmacists can make evidence-based recommendations, ensure patient safety, and deliver personalized care. As AI continues to advance, the integration of this technology in clinical pharmacy holds great promise for improving healthcare outcomes and revolutionizing patient-centered care.

References

- 1.Khoja S, Patel D, Abdelsadig I, Kopecky B, Hancock E, Kowalsky RJ, et al. Use of Artificial Intelligence in Medication Management: A Scoping Review. *J Med Internet Res*. 2020 Nov 26;22(11):e18675. doi: 10.2196/18675. PMID: 33242310; PMCID: PMC7729067.
- 2.Glauser W. Artificial Intelligence in Clinical Pharmacy: The Future is Now. *Can J Hosp Pharm*. 2019 Nov-Dec;72(6):412-413. PMID: 31780460; PMCID: PMC6877896.
- 3.Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. *Nat Med*. 2019 Jan;25(1):44-56. doi: 10.1038/s41591-018-0300-7. PMID: 30617339.
- 4.Baker A, Ussher MH. Artificial intelligence in clinical decision-making. *Br J Gen Pract*. 2019 Jul;69(684):323-324. doi: 10.3399/bjgp19X704285. PMID: 31292140; PMCID: PMC6597774.
- 5.https://www.researchgate.net/publication/350830745_Artificial_intelligence_to_deep_learning_machine_intelligence_approach_for_drug_discovery
- 6.<https://aiworldschool.com/research/this-is-how-artificial-intelligence-is-revolutionizing-the-pharmaceutical-industry/>



Cite this article: *Pharmline* 2023;22(3): 12-14 Remya Gayathri S
Revolutionizing clinical pharmacy through artificial intelligence

THE CO-EXTENSIVE WARRIORS IN HEALTH - ALLOPATHY AND ETHNOPHARMACOLOGY

Roshitha K R

Ph. D Scholar, NIPER, Hyderabad, India

Corresponding author Email: roshithakr0@gmail.com

Article Received: July 23, 2023

Accepted: July 25, 2023

Published: July 30, 2023

ABSTRACT

Ethnopharmacology and allopathy represent two distinct medical approaches that have developed over centuries. Allopathy, commonly referred to as Western or conventional medicine, centers around evidence-based treatments, employing pharmaceuticals and surgical interventions. In contrast, ethnopharmacology draws upon indigenous knowledge and traditional practices in its study of drugs, with "ethno" referring to culture and "pharmacology" denoting the exploration of medicinal substances. Allopathy, being grounded in scientific research and clinical trials, focuses on combating diseases through drug-based therapies and surgical procedures.

Keywords: Ethnopharmacology, allopathy, evidence based practice, interdisciplinary approach

Introduction

Every time, when the human race goes through disasters caused by diseases ailments, and treatments, there exists a never-ending debate for the determination of the right system of treatment and medicine in health care. As we believe in and promote the science-based modern medicine system or allopathy are also unable to be blind against the time-proven ethnopharmacological medicine system

Being grown up in a land with a culture of depending on traditional medicines and home remedies for the minute sickness at the beginning itself, does not allow us to deny its benefits completely. Even then, we are the people who are working in the treatment with modern medicine system where we play with many chemicals, which can do wonders in many disease situations. Thus, it is decided to make an overview study and knowledge on the same topic. This will let my conscious to be able to answer to common people the boundaries and skies both the systems share.

Origin and definition

Ethnopharmacology and allopathy are two distinct approaches to medicine that have evolved over the centuries. While allopathy, also known as Western or conventional medicine, focuses on evidence-based treatments, ethnopharmacology draws from indigenous knowledge and traditional practices. Ethnopharmacology is derived from ethno (culture) and pharmacology (study of drugs) Allopathy: Also known as conventional or Western medicine, allopathy is a system of medicine that focuses on treating diseases with drugs or surgeries. It is based on the principles of scientific research and clinical trials.

Basis of Treatment

Ethnopharmacology: Traditional medicine often utilizes plants, herbs, animal products, minerals, and various natural remedies as treatment options. It emphasizes using holistic approaches and balancing the body, mind, and spirit.

Allopathy: Modern medicine heavily relies on synthetic drugs, surgical interventions, and advanced medical technologies. It approaches diseases from a reductionist perspective, targeting specific symptoms or causes.

Research and Evidence

Ethnopharmacology: Traditional medicine is often rooted in centuries-old practices passed down through generations. However, the scientific validation and standardization of these remedies are still evolving. Research in ethnopharmacology generally involves ethnobotanical surveys, laboratory studies, and clinical trials.

Allopathy: Western medicine places a strong emphasis on evidence-based practices. Treatments and medications are rigorously tested through clinical trials and experiments to ensure their efficacy and safety



Cultural Context and Diversity

Ethnopharmacology: Traditional medicine reflects the cultural beliefs, customs, and practices of specific populations or indigenous communities. It acknowledges the significance of cultural diversity and values the role of traditional healers or shamans.

Allopathy: Conventional medicine is more standardized and globally practiced, often disregarding cultural perspectives. It prioritizes scientific principles and universal treatment guidelines.

Integration and Collaboration

Ethnopharmacology: In recent years, there has been a growing interest in integrating traditional medicine into mainstream healthcare systems. Some countries have established regulatory frameworks and research initiatives that promote collaboration between traditional healers and modern healthcare providers.

Allopathy: While allopathic medicine has historically been dominant, there is an increasing recognition of the benefits of the same during times of major pandemics.

As both disciplines study the use of drugs and their effects on the human body, there are also several similarities in their principles and pharmacology.

Drug Discovery and Development

Both ethnopharmacology and allopathy involve the process of discovering and developing new drugs. Ethnopharmacology often relies on traditional knowledge of medicinal plants and indigenous practices to identify potential therapeutic compounds, while allopathy uses a range of scientific methods, including lab research and clinical trials, to develop new drugs.

Pharmacological Actions

Both disciplines aim to understand how drugs interact with the body and produce therapeutic effects. They study the pharmacological actions of drugs, such as their mechanisms of action, absorption, distribution, metabolism, and elimination.

Treatment of Diseases:

Both ethnopharmacology and allopathy are focused on treating diseases and improving health outcomes. They aim to identify drugs that can alleviate symptoms, cure diseases, or provide relief from health conditions.

Evidence-Based Practices:

Both disciplines strive to base their practices on scientific evidence and empirical data. They rely on

rigorous research, clinical trials, and systematic review of the literature to evaluate the safety and efficacy of drugs.

Pharmacokinetics and Pharmacodynamics

Both ethnopharmacology and allopathy study the pharmacokinetics (how the body affects the drug) and pharmacodynamics (how the drug affects the body) of drugs. They investigate drug absorption, distribution, metabolism, and elimination, as well as the drug's specific effects on the body's systems and processes.

Safety and Adverse Reactions

Both disciplines consider the safety of drugs and the potential for adverse reactions. They investigate the side effects, toxicity, drug interactions, and risks involved in the use of certain drugs.

Interdisciplinary Approach

Both ethnopharmacology and allopathy involve interdisciplinary collaboration. They combine knowledge from various fields, such as biochemistry, physiology, pharmacology, and clinical medicine, to understand the mechanisms of action, therapeutic effects, and potential risks associated with drug use.

It is worth noting that while there are similarities between ethnopharmacology and allopathy, they also have distinct approaches and perspectives. Ethnopharmacology often focuses on traditional healing practices, maintaining a lifestyle to avoid disease situations, and the use of natural compounds, while allopathy relies heavily on synthetic drugs.

So when there is a thought to compare and collaborate both the methods, it should be from the understanding that the minor act of making similarity in the dosage forms used or bringing common standardization rules will not tie the bell to the cat.

Ethnopharmacology goes for the treatment of a condition through a combination of multiple chemicals from single or multiple natural sources, physical exercises, and usage of everything in a limited supply and affords a longer treatment time. At the same time, allopathic treatments go for immediate solutions at high concentrations of one or more drugs comparatively or by surgical interventions. Both have benefits and drawbacks. Thus, it is better that do not try to tie both the elephants in a single rope. However, allow them to co-exist at a safe distance with connections of interdisciplinary evidence-based collaborations like two rails of a single track. And while keeping these in mind let's not lose the courage to say no to the profit-seeking traitors in the health sector who act by blaming both systems by comparing them

them to each other and spreading misinformation.

References

1. Sneader, W. (1996). *Drug Prototypes and Their Exploitation*. United Kingdom: Wiley. [Google Scholar]
2. Butler, M.S. (2008). Natural products to drugs: natural product-derived compounds in clinical trials. *Natural Product Reports*, 25, 475–516. [PubMed] [Google Scholar]
3. Baker, D.D., Chu, M., Oza, U., & Rajgarhia, V. (2007). The value of natural products to future pharmaceutical discovery. *Natural Product Reports*, 24, 1225–1244. [PubMed] [Google Scholar]
4. Harvey, A. (2000). Strategies for discovering drugs from previously unexplored natural products. *Drug Discovery Today*, 5, 294–300. [PubMed] [Google Scholar]
5. Mukherjee, P.K. (2002). *Quality Control of Herbal Drugs An Approach to Evaluation of Botanicals* (1st ed.). New Delhi, India: Business Horizons. [Google Scholar]
6. King, S. (1992). Medicines that changed the world. *Pacific Discovery*, 45, 23. [Google Scholar]
7. Cordell, G.A., & Colvard, M.D. (2005). Some thoughts on the future of ethnopharmacology. *Journal of Ethnopharmacology*, 100, 5–12



Cite this article: *Pharmline* 2023;22(3): 15-17 Roshitha K R
The co-extensive warriors in health - Allopathy and ethnopharmacology


New Drug
DOSTARLIMAB- A MIRACLE DRUG

Grita Maria Paul, Riya Ann Joyson
Pharm.D Intern, St. Joseph's College of Pharmacy, Cherthala

Dostarlimab is a PD1 monoclonal antibody for the treatment of adult patients with mismatch repair deficient (dMMR) recurrent or advanced solid tumours as well as dMMR- recurrent or advanced in endometrium and it is considered as the miracle drug for the treatment of colorectal cancer as it reported 100% remission rate in a clinical trial conducted in 18 patients. The main focus of this article is to synopsise the existing knowledge regarding dostarlimab and to explore further possibilities regarding the same.

Category

Immunotherapy, Immune check point inhibitor

Drug manufacturer

Galxo SmithKline

Pharmacology
Mechanism of action

- Humanised IgG4 antibody that binds to the PD-1 receptor which is expressed on T cells and inhibit the interaction between the PD-L1 and PD- L2 ligands, releasing PD-1 pathway mediated inhibition of the immune response including anti-tumour immune response
- Binding of PD-L1 and PD- L2 to PD-1 receptor found on P cells; inhibits T cell proliferation and cytokine production.

Dosage range and administration

Dose 1-4 ; 500mg IV every 3 weeks

Subsequent dosing beginning 3 weeks after dose 4 (Dose 5 onwards); 1000mg every 6 weeks

500mg – Withdraw 10ml of drug from vial and dilute into IV infusion bag containing 0.9% NaCl or D5W to a final concentration of 2 to 10mg /ml

1000mg - Withdraw 20ml of drug from vial and dilute into IV infusion bag containing 0.9% NaCl or D5W to a final concentration of 4 to 10mg /ml

Administer as an intravenous infusion over 30 minutes

The drug must not be administered as an intravenous push or bolus injection.

Adverse reactions

Immune-mediated reactions

- Pneumonitis
- Colitis
- HepatitisEndocrinopathies – adrenal insufficiency,

thyroid disorders, type 1 DM, nephritis with renal dysfunction

- Myocarditis dermatologic adverse reactions – Steven Johnson syndrome, toxic epidermal necrolysis and drug rash with eosinophilia and systemic symptoms

Infusion related reaction

- Complications of allogenic SHCT
- Embryo foetal toxicity

Common Adverse Effects – Fatigue, anaemia, diarrhoea, Nausea (>20%)

The results of dostarlimab trial created a buzz in the medical field which encouraged more studies on the drug. Further studies should be promoted to assess the antitumour activity and safety profile of dostarlimab in patients with approved indications. Effects of drug can vary upon population and ethnicity, but still reliable studies can provide us an idea regarding the general population.

Once sufficient proper research studies have been conducted, we will be able to know whether the drug can be safely used in the required population or not.

References

- 1.Singh V, Sheikh A, Abourehab MA, Kesharwani P. Dostarlimab as a miracle drug: rising hope against cancer treatment. Biosensors. 2022 Aug 8;12(8):617.
- 2.Physicians' cancer chemotherapy drug manual-2022 Edward Chu, Vincent T. DeVita
- 3.Shuvo PA, Tahsin A, Rahman MM, Emran TB. Dostarlimab: the miracle drug for the treatment of colorectal cancer. Annals of Medicine and surgery.2022 Sep 1;81:104493.

New Drug

SOTAGLIFLOZIN: A NOVEL DRUG FOR HEART FAILURE

Ann Rose Jose,
Pharm.D Intern, St. Joseph's College of Pharmacy, Cherthala

A new drug received marketing approval from the US Food and Drug Administration (FDA) on May 26 for reducing the risk for cardiovascular death, hospitalization for heart failure, and urgent heart failure visits in patients with heart failure, and also for preventing these same events in patients with type 2 diabetes, chronic kidney disease (CKD) and other cardiovascular disease risk factors.

This put sotagliflozin in direct competition with other two SGLT2 inhibitors, dapagliflozin and empagliflozin, that already have indications for preventing heart failure hospitalization in patients with heart failure as well as approvals for type 2 diabetes and prevention of renal function. Sodium–glucose cotransporter 2 (SGLT2) inhibitors represent a major therapeutic advance. They were initially developed to treat hyperglycemia in patients with diabetes mellitus. Subsequently, several SGLT2 inhibitors were shown to lower the risk of hospitalization for heart failure among patients with type 2 diabetes, who are at substantial risk for this complication. In addition, some SGLT2 inhibitors have been shown to reduce the risk of death from cardiovascular causes or hospitalization for heart failure in patients with heart failure (with or without diabetes) and a reduced ejection fraction.

Category: Dual SGLT1/2 Inhibitors

Drug manufacturer: Lexicon Pharmaceuticals

Mechanism of action

- Dual inhibitor of selective sodium-glucose transporters 1 and 2.
- Inhibition of SGLT2 and Na⁺/H⁺ exchanger 3 in the kidney promotes glycosuria, osmotic diuresis and natriuresis, whereas SGLT1 inhibition reduces the postprandial glucose level by delaying intestinal glucose absorption.

The safety and potential efficacy of initiating SGLT2 inhibition soon after an episode of decompensated heart failure and the benefits of SGLT2 inhibition extend to patients with heart failure with preserved ejection fraction also remained unknown.

These considerations led to the design of the Effect of Sotagliflozin on Cardiovascular Events in Patients with Type 2 Diabetes Post Worsening Heart Failure (SOLOIST-WHF) trial. Sotagliflozin is an SGLT2 inhibitor that also provides some gastrointestinal

SGLT1 inhibition. SGLT2 inhibition increases glucose excretion in the urine, whereas SGLT1 inhibition reduces the postprandial glucose level by delaying intestinal glucose absorption.

Differently from dapagliflozin and empagliflozin, sotagliflozin is a non-selective SGLT inhibitor. Inhibition of both SGLT2 and 1 receptor may increase glycosuria, especially in diabetic patients. In addition, unlike SGLT2, SGLT1 is also expressed in other organs, including the gut, with less sodium absorption, and the heart. Sotagliflozin may protect cardiac tissue by interfering with glucose uptake and decreasing the production of reactive oxygen species. Thus, there is uncertainty whether benefits of sotagliflozin are comparable to those of SGLT2 inhibitors and whether this drug could be of incremental therapeutic value in patients with T2DM.

SGLT2 inhibitors are safe and well tolerated, supporting their priority in HFrEF treatment. Hypotension, renal dysfunction and electrolyte disturbances are frequent causes of underuse of evidence-based treatment and withholding of neurohormonal therapy.

Sotagliflozin has also been demonstrated to provide beneficial effects on blood pressure and body weight, partially due to the glucosuria as well as the increase in the secretion of glucagon like peptide-1 (GLP-1) due to the delayed glucose intestinal absorption.

References

1. Vallianou NG, Christodoulatos GS, Kounatidis D, Dalamaga M. Sotagliflozin, a dual SGLT1 and SGLT2 inhibitor: In the heart of the problem. *Metabol Open*. 2021 Jun;10: 100089. doi: 10.1016/j. metop. 2021.100089. Epub 2021 Mar 24. PMID: 33782668; PMCID: PMC7989208.
2. Bhatt DL, Szarek M, Steg PG, Cannon CP, Leiter LA, McGuire DK, Lewis JB, Riddle MC, Voors AA, Metra M, Lund LH. Sotagliflozin in patients with diabetes and recent worsening heart failure. *New England Journal of Medicine*. 2021 Jan 14;384(2):117-28.
3. Kim I, Cho HJ, Lim S, Seok SH, Lee HY. Comparison of the effects of empagliflozin and sotagliflozin on a zebrafish model of diabetic heart failure with reduced ejection fraction. *Experimental & Molecular Medicine*. 2023 Jun 1:1-8.

ACTIVITIES & NEWS

Inspire-2K23: Seminar at Caritas College of Pharmacy, Ettumanoor, Kottayam

The Inspire-2K23 Seminar Jointly organized by the College and Kerala Pharmacy Graduates' Association held at Caritas College of Pharmacy, Kottayam, on 24th June, 2023 commenced with great enthusiasm and promising insights into the field of pharmacy. The event brought together esteemed professionals, students and scholars to discuss the potential advancements and opportunities in clinical pharmacy.

The program commenced at 9:30 AM with a soulful prayer song, setting the tone for an inspiring day ahead. Dr. Sajjan Jose, the Academic Director of Caritas Eudicity, extended a warm welcome to all participants and attendees through his opening speech.

Rev. Fr. Jinu Kavil, the Joint Director of Administration at Caritas Hospital & Institute of Health Sciences, Kottayam delivered the presidential address, emphasizing the significance of such seminars in fostering growth and knowledge sharing in pharmaceutical field.

Dr. P.K. Sreekumar, President of Kerala Pharmacy Graduates Association (KPGA), graced the event with his inaugural address, officially inaugurating the seminar and symbolizing the beginning of a new chapter in pharmacy education and practice.

The event proceeded with a special honour and recognition award ceremony where distinguished personality Sri. K.N. Narayanan, former faculty at Caritas College of Pharmacy was honoured, for his exceptional contributions to the field of pharmacy education. He conveyed his gratitude and reflections on the occasion through a reply speech at, reminiscing about his journey and experiences.

Mr. Abdul Nazeer, the General Secretary of Kerala Pharmacy Graduates Association (KPGA), then introduced the audience to the association at, shedding light on its mission and objectives.

A series of informative sessions followed, starting with a discussion on student wing activities and declaration of project funding of KPGA by Dr. Boby Johns G, Professor & Head, Department of Pharmaceutics, St. Joseph's College of Pharmacy, Cherthala. This session provided valuable insights into the avenues for student support and funding within the association.

Dr. Kala D., Principal of Sree Gokulam SNGM Pharmacy College, talked about the KPGA Women's Wing, highlighting the contributions of women pharmacists and their pivotal role in the profession.

The seminar continued with felicitation speeches by esteemed guests. Dr. Subash Philip, Vice Principal of Dr. Joseph Mar Thoma Institute of Pharmaceutical Sciences and Research, Kattanam, and Mr. Paul Jacob, senior faculty member of University College of Pharmacy, Kottayam.

An invited talk on 'Alcohol Dependence Syndrome' was delivered by Dr. Jeny Samuel, Associate Professor, Department of Pharmacy Practice, St. Joseph's College of Pharmacy, Cherthala, enlightening the audience about a critical aspect of the issues involved in alcohol addiction and its therapy.

The event resumed after tea break with a captivating motivational talk by Mr. Aslam Thenhipalam, an international trainer and motivational speaker, inspiring the students and other delegates to strive for excellence in their professional and personal lives.

The seminar concluded with a vote of thanks by Dr. Jeny Samuel on behalf of KPGA, expressing gratitude to all the speakers, guests, and participants who contributed to the success of the event. The program culminated with the national anthem. Overall, the Inspire-2023 Seminar proved to be an enlightening and empowering experience, offering valuable insights into the ever-evolving landscape of pharmacy.



GALLERY

Caritas College of Pharmacy, Kottayam





GALLERY



Honouring veteran academician Sri. K.N. Narayanan, former faculty of Caritas College of Pharmacy at Inspire-2K23



Students Project Fund-2023

The Kerala Pharmacy Graduates Association has taken a notable step to provide Student project funds for the year 2023 to B. Pharm, M. Pharm, and Pharm.D students of Kerala. The details of fund allotted are as follows.

KPGA STUDENT PROJECT FUND - 2023			
No.	College	File Number	PI / Co- Investigators
1	St. Joseph's College of Pharmacy, Cherthala	0001 ; B. Pharm INR 3000/-	Dr. Jeny Samuel, Sona George, Sona Jose, Thejalekshmi P
2	St. Joseph's College of Pharmacy, Cherthala	0002 ; B. Pharm INR 3000/-	Dr. Jeny Samuel, Neha Joshi, Anagha Babu, R Sagariga Kamath
3	St. Joseph's College of Pharmacy, Cherthala	0003 ; Pharm.D INR 5000/-	Dr. Jeny Samuel, Shinto Sen, Glaisty Paul, Jisa Anna Chacko, Ansia Mol
4	St. James College of Pharm.Sciences, Chalakudy	0005 ; Pharm.D INR 5000/-	Glen Loui Raphy, Bincy T Abraham, Riya Parveen
5	Dr. Joseph Marthoma Institute of Pharm. Sc. & Research, Kattanam	0007 ; B. Pharm INR 3000/-	Dr. Ansa Mathew, Abhishek B Joseph, Deepthi Dileep, Fathima N, Julia Johnson, Shana Checha Alexander
6	Dr. Joseph Marthoma Institute of Pharm. Sc. & Research, Kattanam	0008 ; B. Pharm INR 3000/-	Dr. Ansa Mathew, Anfi J Daniel, Aswathy L, Minu Susan Thampan, Riya Raj, Sjna Varghese
7	Dale View College of Pharmacy & Research Centre, Tvm	0009 ; B. Pharm INR 3000/-	Dr. Seena H, Aswathy SJ, Arya Chandran, Lekshmi Satheesh
8	Dale View College of Pharmacy & Research Centre, Tvm	0012 ; Pharm.D INR 5000/-	Dr. Shiji Kumar PS, S Salma
9	Dale View College of Pharmacy & Research Centre, Tvm	0014 ; B. Pharm INR 3000/-	Reshma KJ, Ardra Arundathy, Devika Suresh
10	National College of Pharmacy, Kozhikode	0015 ; M.Pharm INR 5000/-	Dr. Sujith Varma, Aparna George
11	Nirmala College of Pharmacy, Muvatupuzha	0017 ; B. Pharm INR 3000/-	Saranya TS, Ann Maria Davis, Anjali K, Anjana Antony
12	College of Pharm. Sciences, Govt. Medical College, Kozhikode	0018 ; M.Pharm INR 5000/-	Manju CS, Kavya Jose, Hasnath P K
13	Mar Diascorus College of Pharmacy, Tvm	0019 ; B. Pharm INR 3000/-	Dr. Preeja G Pillai, Aishwarya Lekshmi S P
14	Elims College of Pharmacy, Thrissur	0020 ; B. Pharm INR 3000/-	Nagalekshmi R, Jesna KA, Hana Ashraf, Muzammil
15	Dale View College of Pharmacy & Research Centre, Tvm	0021 ; B. Pharm INR 3000/-	Dr. Anooopa John L, Annie John

**Kerala
Pharmacy
Graduates'
Association**



**PHARMLINE -The Official Publication of
Kerala Pharmacy Graduates' Association**

PHARMLINE is the official publication of KPGA and is published since 1981. Pharmline is a tri annual publication. The main aim of the publication is to keep pharmacists informed on current issues and best practices, as well as serving as a platform for the exchange of ideas, knowledge and opinion among pharmacists and related disciplines. The publishers' welcome contributions of pharmaceutical relevance. Original articles are considered for publication on the condition that they have not been published, accepted or submitted for publication elsewhere. The editor reserves the right to edit manuscripts to fit articles with in space available and to ensure conciseness, clarity and stylistic consistency. All scientific articles submitted for publication are subject to a double-blind review procedure.

Please send your articles to kpgapharmline@gmail.com

Contact us

KERALA PHARMACY GRADUATES' ASSOCIATION

Reg. No. 329/85

GRA 589, Gowreeshapattom, Pattom P.O.

Thiruvananthapuram – 695004

Email ID: keralapga@gmail.com

Phone: +91 9745016772

The journal utilizes AI algorithms, includes images, and respects copyright laws. While efforts are made to ensure accuracy in this aspect by the editorial board, the journal assumes no liability for AI errors, unauthorized image use, or copyright infringement claims. Furthermore, please note that the Journal is intended for circulation only among pharmacy professionals in India.

Published by Dr. PK Sreekumar on behalf of the Kerala Pharmacy Graduates' Association
(For Private circulation only)