DEDICATED TO
THE SCIENCE OF LIFE.
COMMITTED TO
A HEALTHIER TOMORROW.

MALLA REDDY INSTITUTE OF
PHARMACEUTICAL SCIENCES

Maisammaguda, Hyderabad, Telangana

MRV PharmaNexus 24

KNOWLEDGE PRACTICE CARE

ANNUAL EDITION

2024-2025

- ACADEMIC INSIGHTS
- RESEARCH ADVANCEMENTS
- PHARMACY IN PRACTICE
- STUDENT ACHIEVEMENTS
- HEALTHCARE FOR ALL



"LEARN TODAY.
LEAD TOMORROW.
LEAVE A LASTING IMPACT.

OUR LEGACY OF EXCELLENCE

Shaping future healthcare professionals through education, research, and innovation.

ABOUT THE COLLEGE

The School of Pharmaceutical Sciences and Technology at Malla Reddy Vishwavidyapeeth is dedicated to transforming the future of Pharmaceutical Sciences and Management through digital innovation, emerging technologies, and research-driven education. In alignment with NEP 2020 and evolving global industry demands, we strive to develop highly skilled professionals with a multidisciplinary approach, fostering creativity, critical thinking, and problem-solving abilities to drive innovation and excellence in the pharmaceutical sector.

The college was started in the year 2005, to achieve excellence in the field of Pharmacy. The college has well qualified and dedicated faculty. The Departments have been organizing several national conferences, Faculty Development Programs for the benefit of the faculty and student community.

OUR VISION FOR THE FUTURE

- To be a globally recognized center of excellence in pharmaceutical sciences and technology, fostering innovation, digital transformation, and interdisciplinary research to advance healthcare, pharmaceutical management, and patient outcomes.
- Expand on Innovation & Technology – Mention emerging fields like AI-driven drug discovery, biotechnology, or personalized medicine.
- Strengthen Global Impact – Add aspects like partnerships with global institutions, international research collaborations, or policy influence.

OUR MISSION

- To provide high-quality, industry-relevant pharmaceutical education that equips students with the knowledge, skills, and ethical values to excel in academia, research, and industry.
- To foster a culture of innovation, research and entrepreneurship through state-of-the-art infrastructure, emerging technologies, and industry collaboration.
- To develop socially responsible healthcare professionals committed to improving patient care, public health and community well-being.
- To contribute to the advancement of pharmaceutical sciences by promoting sustainable practices, global collaborations, and evidence-based healthcare solutions.

OUR COMMITMENTS

- **Excellence in Education** – To provide high-quality, industry-relevant pharmaceutical education that equips students with the knowledge and skills to excel in academia, research, and industry.
- Industry Collaboration – To establish strong partnerships with pharmaceutical industries, research institutions, and healthcare organizations for experiential learning and innovation.
- Global Impact & Sustainability – To promote sustainable pharmaceutical practices and contribute to the development of cost-effective, accessible, and quality healthcare solutions.



Message from Founder Chairman

"Change does not necessarily assure progress, but progress implacably requires change. Education is essential to change, for education creates enchanting desires and the competence to satisfy them. Our motto is to enlighten, inspire young women to set their hearts on fire, give wings to their dreams and to craft our institution, a quintessential arena to hone their power of knowledge to acts as ambassadors of change and guiding angels of progress in the field of engineering."

- Ch.MallaReddy

Message from

DEAN'S DESK



Dr. H. Ramana

Dean

It gives me immense pleasure to present another edition of PHARMACON, the annual technical magazine of Malla Reddy Institute of Pharmaceutical Sciences. As we embark upon a new academic year, I am delighted to reflect upon the remarkable achievements and progress made by our institution in the pursuit of excellence in pharmaceutical education and research.

Malla Reddy Institute of Pharmaceutical Sciences has consistently upheld its commitment to providing quality education, fostering innovation, and nurturing future healthcare professionals. Guided by the visionary ideals of our Founder Chairman, Ch. Malla Reddy Garu, the institution continues to evolve as a center of academic distinction, professional development, and holistic growth.

The academic year has been marked by several noteworthy accomplishments. Our students have excelled in academics, research activities, co-curricular and extracurricular events, bringing laurels to the institution at various state and national platforms. Their dedication, hard work, and commitment to excellence are truly commendable. We are equally proud of our alumni who continue to contribute significantly to the healthcare and pharmaceutical sectors across the globe.

I am delighted to note that the Editorial Committee has successfully brought out this edition of PHARMACON. The magazine serves as a vibrant platform for students and faculty to express their ideas, showcase their talents, share research insights, and celebrate their achievements. It reflects the creativity, intellectual curiosity, and innovative spirit that characterize the MRIPS community.

I congratulateulate the Chief Editor, Editorial Board, faculty members, and students for their sincere efforts in bringing out this excellent publication. I am confident that this magazine will inspire readers and serve as a valuable record of the institution's accomplishments and aspirations.

I extend my best wishes to all our students for a successful and rewarding academic journey. May they continue to dream big, work hard, and achieve greater heights in their personal and professional endeavors.





Message from *Vice Principal*

The technical magazine has provided an opportunity to faculty and students, to express their ideas and share their topics of interests.

I feel extremely happy to speak to you through this magazine as our college MRIPS is releasing its annual college technical magazine—Pharmacon for the academic year 2021-2022. Publishing this is indeed a tedious and Herculean task. Though our students are involved in their regular academic activities, Pharmacon gives them an opportunity to show their technical skills which they have learnt and they are being encouraged and persuaded to exhibit their writing skills.

The response of the students in contributing articles to the magazine was really overwhelming. Their contribution has shown them an intellectual insight and helped them widen their knowledge beyond syllabus with their excellent command on language.

My message to all my dear students is to Aim always high, to be a good citizen and become a leader to save our country in one way or the other.

– Dr. J. Sangeetha,
Mpharm, Ph.D



Editorial Message



Mrs. B. Revathi

Associate Professor
Department of Pharmaceutical Chemistry

"Welcome to the edition of Pharmacon – Malla Reddy Institute of Pharmaceutical Sciences Technical Magazine.

While handling over this beautiful piece of creation to all readers, my journey in editorial has always been about learning new things. This task was indeed not an easy one but everyone's contribution and efforts made it possible. Our heartfelt gratitude goes to each one of them.

First and foremost, we are immensely thankful to our chairman, Chh. Malla Reddy Guru for having a great vision in making MRIPS a model institution in the field of Pharmacy and for being a pillar of strength by our side. We sincerely thank our honorable Dean Dr. H. Ramana for showing belief in us to shoulder this huge responsibility. The pursuit of compilation of this idea was only possible because of our Vice Principal Dr. J. Sangeetha. The support of right people and consistent working on things can make us achieve our destination. And this was rightly made by the editorial team of MRIPS. I thank and congratulate the entire team for the constant support and effort to achieve this milestone.

The magazine committee is glad to note that many of the teachers and students have evined interest in the magazine by contributing creatively and interesting articles. This issue is a treasure of case studies, review articles, research articles, and topics related to various branches of Pharmaceutical knowledge.

The Editorial team is looking forward to make this Pharmacon magazine, a vehicle for students to express their creative minds of our promising prodigies.

Thank You "



Staff coordinators for various events



DR.H.RAMANA
DEAN, MRIPS



DR. S. RAVINDRA BABU
PROFESSOR & HOD
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Narskith
B Pharm III Yr



Technical Assistant

The Oath of *Pharmacist*

I swear by the code of ethics of Pharmacy Council of India, in relation to the community and shall act as an integral part of health care team.

I shall uphold the laws and standards governing my profession.

I shall strive to perfect and enlarge my knowledge to contribute to the advancement of pharmacy and public health.

I shall follow the system which I consider best for Pharmaceutical care and counseling of patients.

I shall endeavor to discover and manufacture drugs of quality to alleviate sufferings of humanity.

I shall hold in confidence the knowledge gained about the patients in connection with my professional practice and never divulge unless compelled to do so by the law.

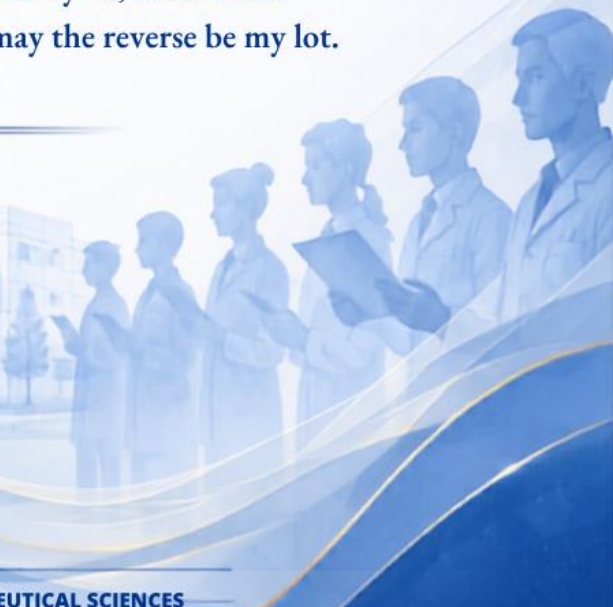
I shall associate with organizations having their objectives for betterment of the profession of Pharmacy and make contribution to carry out the work of those organizations.

While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of pharmacy respected by all, at all times!

Should I trespass and violate this oath, may the reverse be my lot.









Dr. G. Ashok

HOD, Professor
Department of Quality Assurance
Head, Training & Placement Cell



Mr. M. Suresh

Placement Coordinator

TRAINING AND PLACEMENT CELL

Training and Placement Officer, **mripsplacements@gmail.com**

Molla Reddy Institute of Pharmaceutical Sciences has been in the field of Pharmacy for the past 17 years with the intention of spearheading quality education among children from the school level itself. MRIPS has a well-established training and placement cell.

The Placement Cell plays a crucial role in locating job opportunities for Under Graduates passing out from the college by keeping in touch with reputed firms and industrial establishments. The Placement Cell operates round the year to facilitate contacts between companies and graduates. The number of students placed through the campus interviews is continuously rising. On invitation, many reputed industries visit the institute to conduct interviews.

We have been successful in maintaining our high placement statistics over the years and the fact that our students bear the recession blues with record breaking placements itself is a testimony to our quality. Our ingenious alumni have set new standards in the corporate world through their estimable contributions, and it is my firm conviction that we will continue that legacy in the years to come.

The Placement Cell organizes career guidance programmes for all the students starting from first year. The cell arranges training programmes like Mock Interviews, Group Discussions, Communication Skills Workshop etc and it also organizes Public Sector Exam Training for students who are interested to join Government Sectors.

It also invites HR Managers from different industries to conduct training programmes for final year students.

OBJECTIVES

- Developing the students to meet the Industries recruitment process.
- To motivate students to develop Technical knowledge and soft skills in terms of career planning, goal setting.
- To motivate students aspire for higher studies and guiding them to take competitive exams such as GATE, TOEFL, GRE, IES, UPSC, etc.
- Aiming to Place the maximum number of students through on-campus & off-campus interviews conducted by the top companies.

Dr. Ashok

Head, Training & Placement Cell

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MEMORIES
Wrapped Poetry

More than classrooms and corridors,
This place became a part of us,
A chapter we didn't just read,
But truly lived.

From the first nervous day in uniform
To friends who turned into family,
From endless practicals and late submissions
To laughter that made everything seem easy,

Here, we found a little bit of everything —
Dreams to chase, mistakes to learn from,
Teachers who guided, friends who stayed,
And moments that we'll always carry.

Between lectures, lab coats and library nights,
We discovered who we are,
Not just as pharmacy students,
But as better human beings.

This college gave us more than knowledge,
It gave us confidence, friendships, and a home.
And as we step into new beginnings,
These memories will always be a part of us —
Not just in photographs,
But in the people we've become.

- K. Shashank
Bpharm 2nd Year



Journal Article Categories

Knowing the various article categories that journals publish will be beneficial. The majority of articles published fall into one of the following categories: Original research, Review articles, Short reports or letters, Case studies, Methodologies, etc. Despite the fact that there appear to be many different types of articles published due to the wide range of names they are published under.

I. Original research

To publish comprehensive summaries on research findings, this is the most typical sort of journal manuscript. Depending on the journal, it may be referred to as an original article, a research article, or simply an article. Many different fields and types of studies can use the Original Research format.

II. Short reports or Letters

These papers communicate brief reports of data from original research that editors believe willbe interesting to many researchers, and that will likely stimulate further research in the field. Asthey are relatively short the format is useful for scientists with results that are time sensitive(for example, those in highly competitive or quickly-changing disciplines). This format often hasstrict length limits, so some experimental details may not be published until the authors write afull Original Research manuscript. These papers are also sometimes called Briefcommunications; Methods, Results, and Discussion are included.

III. Review Articles

Review Articles give a thorough overview of the research on a particular subject and offerinsight into the current state and future directions of the field. They are frequently authored byauthorities in a field upon invitation from journals editors. Reviews are frequently readwidely and frequently quoted (for instance, by scholars searching for a thorough introduction toa discipline). Reviews typically list 100 original research articles.

Tip: Check the journal website if you would like to write a review but have not received an invitation from the publication. Some publications do not accept unsolicited reviews. It is advisable to submit a pre-submission inquiry letter to the journal editor to offer your Review manuscript before you waste time writing it if the website does not specify whether Reviews are commissioned.

IV. Case Studies

These writings detail particular occurrences of intriguing phenomena. Making other Researchers aware of the potential for particular phenomena to occur is one of the objectives of case studies. In medicine, this kind of investigation is frequently used to describe the incidence of previously unidentified or newly emerging disorders.

V. Methods or Methodologies

These articles outline a novel experimental technique, experiment, or process. The approach provided can be an improved version of an existing method or it might be altogether new. The post should outline a concrete improvement above what is already accessible.

VI. Commentaries and letters to the editor:

Letters to the editor may contain anecdotes, brief observations on current public and political issues relevant to the journals field of study, or responses and reactions from readers to the material the journal has published. Commentaries are comparable to letters to the editor but differ slightly in that they may focus on a certain type of journal article that has been published by the journal and provide in-depth responses.

VII. Data notes

These are brief explanations of research data found in a repository. By describing why and howthe data were developed, data notes promote the reuse of research data. These data can beconnected to a study that has examined the supplied dataset and published its findings.

VIII. Data sets

Research data are published in data repositories as datasets. Datasets of numbers, data files or spreadsheets, pictures, and videos can all be included. Datasets let users cite the gathered information and give the author credit(s).

IX. Book review

A book review discusses recent publications and gives readers an overview of their content aswell as an analysis of the information found in scholarly works that have been published. The preferred length and structure for book reviews varies among the periodicals.

X. Clinical study report

A clinical study report typically has the same length and organization as an original research publication and describes the steps and results of a clinical experiment. The author must include their clinical trial numbers and registration dates in the clinical research report when submitting it.

Sai Vinusha Doddi
B-pharm 4A

2nd International Symposium on Advances in Chemical and Pharmaceutical Research 24th April 2026

The first day of the 2nd International Symposium on Advances in Chemical and Pharmaceutical Research (ISACPR 2026) was conducted successfully with enthusiastic participation from academicians, researchers, and students. The event served as a dynamic platform for knowledge exchange on emerging trends in pharmaceutical sciences.

Inaugural Session

The program commenced with registration, followed by a vibrant inaugural ceremony.

The session began with a welcome dance performed by Sahithi and Shivani, B. Pharm 1st year which added a cultural and celebratory tone to the event. This was followed by an inaugural prayer song rendered by Dr. Y. Kavya, Mrs. B. Indraja, and Mrs.A. Pranusha from MRIPS, invoking blessings for the success of the symposium.

The inaugural ceremony was graced by esteemed dignitaries:

Sri Ch. Malla Reddy, Founder Chairman – MRGI; MLA and Former Minister, Government of Telangana

Dr. Sudheer Kumar Dokuparthi, Co-founder, Biogenic Products Pvt. Ltd.

Dr. Chinnala Krishna Mohan, President, APTI, Telangana State Branch

Dr. H. Ramana, Dean, Malla Reddy Vishwavidyapeeth – MRIPS

Dr. Tejakumar Reddy, Organizing Secretary,ISACPR 2026

During his inaugural address, Sri Ch. Malla Reddy emphasized the growing importance of Artificial Intelligence (AI) in pharmaceutical education and research. He highlighted that integrating AI into the pharmacy curriculum is essential to equip students for future advancements in healthcare and drug discovery. He also noted that Malla Reddy Vishwavidyapeeth is among the first universities to incorporate AI across health sciences curricula, reflecting its commitment to innovative and forward-looking education.

The welcome address by Dr. H. Ramana





🔬 Dr. Challa Suresh, ICMR-NIN on rosmarinic acid for neuroprotection
⚗️ Dr. M. V. Narendra Kumar Talluri, Daicel Chiral Tech on chiral LC-MS in pharma & peptides
🌍 Global insights: Dr. Tamrat Balcha, Ethiopia & Dr. Arunkumar Subramanian, Malaysia on AI in drug development

Oral/poster sessions sparked rich scientific exchange. A cultural program kept the energy high.

The valedictory celebrated every volunteer, organizer & staff. Valedictory Ceremony Chief guest was *Dr. Kantlam Chamakuri, APTI, Vice President,TG. Convenor, Dr. H. Ramana* lauded the team's dedication. Closing thanks by *Dr. J. Sangeetha*.

K.Shashank

A Review on Blood Coagulation Factors

When someone is injured, a procedure called blood coagulation is used to stop blood loss. In the area of the wound, the blood coagulates and forms a barrier that stops bleeding. One of the most significant and essential physiological functions in the human body, blood coagulation is influenced by a wide range of circumstances. According to Elyasi et al. (2018), a number of congenital and acquired deficiencies in each of these components might impact the coagulation process and result in several issues for people.

Coagulation factors are a family of highly glycosylated plasma proteins. And most of them except (FI and FII) are available in very small concentrations. These factors, except tissue factor (TF) are bound to plasma membrane proteins and require a proteolytic activation step (Naderi, & Naji Scientia. Technology, Science and Society ISSN 3083-5577 | Volume 2 | Number 9 | 2025 2 2017). Some of the coagulation factors are dependent on vitamin K and carboxylation occurs in their glutamic acid side chains by enzymatic reactions. Except for γ-carboxylation, other posttranslational changes such as phosphorylation, sulfation and addition of β-hydroxyaspartic acid are seen in other coagulation factors (Elyasi, et al., 2018).

Perhaps the most important and fundamental elements of hemostasis are clotting factors. The body's physiological reaction to vascular endothelial damage is called hemostasis, and it causes a number of procedures that try to keep blood in the vascular system by forming a clot (Barmore et al., 2023). Coagulation protein nomenclature is fairly complicated. The terms fibrinogen, prothrombin, tissue factor (TF), and calcium are the popular designations for the first four of the twelve factors that were initially identified (Barnoyev, 2023). Roman numbers have not been given to the more recently identified clotting factors, high-molecular-weight kininogen and prekallikrein. Because of their short-lived coagulant activity in preserved blood, factors V and VIII are sometimes known as the labile factors (Caldwell et al., 2006).

Symbol	Names	Cofactor(s)	Plasma half life(h)	Plasma Concentration (nM)	Vi.K Dependent
FI	Fibrinogen	Ca++	64-96	8800	_
FII	Prothrombin	Ca	48	1400	+
FV	Proaccelerin	Ca.PL	12	20	+
FVII	Procovertin	TF.Ca.PL	4-6	10	+
FVIII	Antihaemophilic globulin A	Ca.PL	15-20	0,7 (Blood group dependent)	_
FIX	Antihaemophilic Factor B Christmas Factor	Ca.F VIIIa.PL	24	90	+
FX	Stuart- Prower – Factor	Ca.Fva.PL	32	170	+
FXI	Plasma Thromboblastin anteceden	Ca.PL negatively charged surfaces	40-80	30	_
FXII	Hagemann Factor	negatively charged surfaces	50-70	400	_
FXIII	Fibrin stabilizing Factor,Plasma transglutaminase	Fibrin,CA	40-50	50	_
TF	Tissue Factor	PL,Ca membrane		_	_
PK	Prekallikrein	negatively charged surfaces		400	_
HMWK (orHK)	High Molecular Weight Kininogen	negatively charged surfaces		700	_

Coagulation Factor I or Fibrinogen

It is a plasma-soluble glycoprotein that is converted into fibrin strands in the coagulation cascade by thrombin (Barzian, & Rezvani, 2023). Also, by binding to GpIIb/IIIa receptors in platelets, it plays a role in connecting them together like a bridge. This 340 kilodalton protein is made in the liver and can be measured in plasma with a concentration of about 1.5 to 3 grams per liter. During the normal process of blood coagulation, the strands of this soluble protein are converted into the insoluble form of fibrin, which results in the formation of a network form due to the effect of factor XIII (Gobel, etal 2018).

Higher amounts of fibrinogen are seen in patients with cardiovascular diseases. An increase in fibrinogen can also be seen in inflammations such as gum disease. In pregnancy, the amount of fibrinogen increases up to 4.5 grams per liter. On the other hand, the decrease in the amount of fibrinogen can be an evidence of the increase in the function of the coagulation system, which is caused by the consumption of this factor more than its production, and this is the situation that is observed in cases of Disseminated Intravascular Coagulation (Mashayekhi & Shahbazi 2014).

Coagulation Factor II or Prothrombin

Prothrombin is one of the plasma proteins that is present in normal plasma with a concentration of about 15 mg/dL (Hall, & Guyton, 2010). Prothrombin is an unstable protein that can be easily broken down into smaller compounds, one of which is thrombin with a molecular weight of 36,000 daltons, which is almost half the molecular weight of prothrombin (Hall, & Guyton, 2010). Prothrombin is continuously formed by the liver and is continuously used throughout the body for blood clotting (Gobel, etal 2018).

When the liver cannot produce prothrombin, its concentration in the plasma decreases so much within one to several days that it is unable to cause normal blood coagulation. The liver needs vitamin K for the normal formation of prothrombin and four other coagulation factors.

Therefore, the lack of vitamin K or the presence of a liver disease that prevents the normal formation of prothrombin can reduce the concentration of prothrombin to such low levels that the tendency to bleed occurs (Hall, & Guyton, 2010). Activation of prothrombin to mature and transform into thrombin occurs by the activity of the prothrombinase proteolytic complex, which includes a serine proteinase factor Xa, factor V cofactors, Ca+2 ions, and phospholipids (Joseph, & Kini, 2004). Thrombin is a serine protease enzyme that is active in the blood coagulation process (Joseph, & Kini, 2004). Thrombin is the product of prothrombin protein (coagulation factor II) and active thrombin converts soluble fibrinogen into insoluble fibrin in the process of blood clotting (Nelson & Cox 2005).

Coagulation Factor III Tissue Thromboplastin

Tissue factor, which is the main initiator of the coagulation cascade, is found in the tissue under the endothelium of blood vessels and white blood cells. In the blood coagulation cycle, this protein is necessary for the formation of thrombin from prothrombin. As a result of vascular wall injuries, tissue factor enters the vascular system and in the presence of calcium ions, it activates factor VII, and finally the complex of these two factors activates factor X. Prothrombin time (PT) is the test to evaluate this stage and factors I, II, V, VII, X (Nelson, & Cox, 2005).

Coagulation Factor IV or Calcium Ions

Calcium ions are necessary for all reactions of the coagulation cascade except for the activation of factor XII and XI. In the absence of calcium ions, blood does not clot, so precipitating or dissolving calcium ions with ethylenediminetetraacetic acid (EDTA) is a way to keep blood outside the body without causing clots (Schenone, et al, 2004).

Coagulation Factor V or Proaccelerin

Factor V is a protein in the coagulation system that acts as a cofactor. Signs and symptoms of factor V deficiency can begin at any age, although in most severe cases symptoms appear in childhood. A deficiency in factor V usually causes epistaxis, subcutaneous bleeding, necrotizing blood, rapid bruising, bleeding gums, and heavy and prolonged bleeding after surgery, injury, or pregnancy**.** Women with factor V deficiency may have heavy and continuous menstrual bleeding. Factor V deficiency affects approximately one person in every one million people, in countries such as Iran, southern India, and the Jewish population of the world, due to the high number of consanguineous marriages, this rate is much higher than in Western countries (Dall'Osso, et al, 2008).

Coagulation Factor VI or Platelets

Platelets play a role in blood coagulation and in preventing blood vessel bleeding by forming a platelet mass and helping to repair the vessel wall. Factors that cause platelets to stick to each other and form a clot include: activation of platelets and release, which facilitates the formation of glycoprotein and phospholipoprotein complexes on the membrane of two adjacent platelets. Also, the production of TXA2, which originates from arachidic acid released from membrane phospholipids, causes clot formation. At the cut site, the clot formed by von Willebrand factor or fibronectins adheres to sub endothelial collagen fibers and prevents bleeding by forming a hemostasis stopper.

Platelets facilitate coagulation reactions by releasing some coagulation factors such as factors V, I, and VII, and for this reason, they are also called thrombocytes. The decrease in the number of platelets is called thrombocytopenia, which is associated with blood coagulation disorders. In this regard, the release of heparin-neutralizing proteins such as Platelet factor4 and TG intensifies clot formation at the incision site and finally participates in clot contraction. On the other hand, from the breaking of platelets, a substance called serotonin (5-hydroxytryptamine) is released into the blood, which has vasoconstriction properties (Homayounfar 1996).

Coagulation Factor VI or Proconvertin

Factor seven is a glycoprotein dependent on vitamin K, which has 406 amino acids and a molecular weight of 50 kilo Daltons. Factor seven circulates in plasma in two forms. Most of it is inactive single-chain zymogen and a small percentage is active double-chain with heavy and light chains. The conversion of factor seven into the active form (FVIIa) is done by breaking the peptide bond between amino acids isoleucine number 153 and Arginine number 152 (Perry, 2002).

Factor seven plays a central role in the initiation of coagulation, when blood vessels are damaged, factor seven binds to tissue factor (TF) on the surface of damaged cells and is activated. TF/FVIIa complex activates a small amount of factors X and IX, and active factor X (FXa) combined with FVa converts a limited amount of prothrombin to thrombin. Then thrombin platelets activate FV and FVIII. The final step that happens on the platelets, the complex including active FIX, active FVIII, calcium and acidic phospholipids convert more FX to Fxa, which leads to clot formation (Lau, 2003).

Coagulation Factor VIII or Ant Hemophilic Factor

Factor VIII is a plasma glycoprotein that acts as a cofactor for serine protease activity of active factor IX and in the conversion of inactive factor X to active factor X. a mutation or defect in coagulation factor FVIII is the most common form of blood disorder, occurring in one in 5,000 men and one in 10,000 women (Franchini & Mannucci, 2010).

Factor IX or Plasma Thromboplastin Component

Human factor IX is a blood coagulation factor the functional defect or hereditary absence causes hemophilia B (CHRISTMAS) disease. The mature factor IX is a single-chain glycoprotein with a length of 415 amino acids and a molecular weight of about 57 kilo Daltons (Biron, et al., 1999), which is obtained from the processing of the pro-factor IX protein with 461 amino acids. The factor IX is Like coagulation factors VII, X, prothrombin, protein Z, C, and S Vitamin Kdependent proteins (VKD) that require post-translational modifications, including gamma carboxylation, for their biological function. The propeptide in these proteins contains the recognition sequence of the gamma carboxylase enzyme (Roberts, 1993), and the gamma carboxylase, by binding to the 18-amino acid propeptide sequence on VKD proteins, converts specific glutamic acids into glutamic acid gamma carboxyl residues (Hassanabadi & Moghadam, 2018).

Coagulation Factor X Stuart-Prower Factor

Coagulation factor X is a vitamin K-dependent protein that belongs to the family of serine proteases and thus plays an essential role in blood coagulation. This factor is made in the liver as a single chain. In plasma, factor X is a double-chain glycoprotein. The light chain is separated from the heavy chain during or after secretion into the bloodstream. This factor contains 306 amino acid residues in the heavy chain and 139 amino acid residues in the light chain (Fatafta, et al., 2021), which are connected through a disulfide bond (Persson, et al 1989).

Activation of factor X by external complex includes TF-VIIa complex, phospholipid membrane and calcium ions. The internal complex of activation factorX includes the FVIIIa/FXa complex and phospholipid which converts prothrombin to thrombin. Deficiency of Factor X causes severe bleeding disorders (Kalantarian, et al 2015).

Coagulation Factor XI or Plasma Thromboplastin Antecedent

Coagulation factor eleven is a plasma glycoprotein that plays an important role in blood coagulation. Factor 11 is made in the liver and therefore the level of factor XI is lower in people with liver diseases. Deficiency of Coagulation factor 11 is an autosomal genetic defect that also Scientia. Technology, Science and Society ISSN 3083-5577 | Volume 2 | Number 9 | 2025 6 known as hemophilia C and Rosenthal syndrome, and it leads to mild to moderate bleeding in affected patients. This disease is seen in both males and females with the same ratio (Minnema et al1999). The prevalence deficiency of factor eleven among the non-Jewish population is reported to be about one in a million. Cases of bleeding that have been reported in deficiency of factor 11 patients in different parts of the body include joint bleeding and brain bleeding (Bolton-Maggs, 1998).

Coagulation Factor XII or Hageman Factor

Factor XII is made in the liver and has a half-life of 40-50 hours. This factor is activated by contact with the external surface. Factor XII plays a role in the internal pathway of coagulation and fibrinolysis system. Deficiency of factor XII is assessed by prolonging the relative time of activated thromboplastin. the Acquired deficiency of factor XII is related to liver disease, nephritic syndrome and chronic granulocytic leukemia. Full-term newborns and healthy premature babies have 15-20% factor XII of adults. However, in children over 3 months, the activity levels of factor XII reach the values of adults (Butenas & Mann, 2015).

Coagulation Factor XIII or Fibrin-Stabilizing Factor

Coagulation factor XIII is a proenzyme that has transglutaminase properties in its active state.

This factor acts in the last part of the coagulation cascade and the fibrin clot without covalent bonds turns into a stable fibrin clot by the action of this enzyme. With this action, fibrin becomes resistant to plasmin. Coagulation factor XIII is formed from two subunits A and B in the form of a tetrad (A2B2). These two subunits are coded by separate genes (Ichinose, et al 2005). Deficiency of factor XIII causes the fibrin clot to be unstable at the end of the coagulation process and is easily broken down by the fibrinolytic system, and it causes significant clinical symptoms such as cerebral hemorrhage, delayed bleeding, frequent miscarriages, and delay in healing and wound healing for the patient (Naderi, et al 2013).

Coagulation factor deficiency	Inheritance	Hemostatic level	laboratory disorder			Prevalence in the population	Treatment	Plasma half-life
			TT	PT	aPTT			
Fibrinogen	AR	mg/dl 100	+	+	+	1 in 1,000,000	Cryoprecipitate	2-4d
Prothrombin	AR	20-30%	-	+	+	1 in 2,000,000	FFP/PCCs	3-4d
Proaccelerin	AR	٪۲۰-۱۵	-	+/-	+/-	1 in 2,000,000	FFP	36h
Procovertin	AR	15-20%	-	+	-	1 in 5,000,00	FFP/PCCs	4-6h
Ant-hemophilic Factor A	dependent on X	30%	-	-	+	1 in 5,000	Concentrate	8-12h
Anti-hemophilic Factor B	dependent on X	30%	-	-	+	1 in 3,0000	Concentrate	8-24h
Stuart- Prower – Factor	AR	15-20%	-	+/-	+/-	1 in 1,000,000	FFP/PCCs	40-60h
Plasma Thromboplastin antecedent	AR	15-20%	-	-	+	1 in 1,000,000	FFP	40-70h
Hageman Factor	AR	B	-	-	+	ND	B	60h
HK	AR	B	-	-	+	ND	B	150h
Prekallikrein	AR	B	-	-	+	ND	B	35h
FXIII	AR	2-5%	+/-	-	-	1 in 2,000,000	Cryoprecipitate	11-14d

Conclusion

The creation of a suitable and scientific literature review on coagulation factors was one of the main objectives of this study. The majority of clotting factors are zymogens, which are inactive precursors of proteolytic enzymes (Barnoyev, 2023). Each zymogen's activation is represented by appending the letter "a" to the Roman numeral that corresponds to that specific zymogen (Barnoyev, 2023). With the exception of factors III, IV, and VIII, the liver produces the majority of procoagulants and anticoagulants. These proteins can bind calcium and other divalent cations and take part in the clotting cascade because of a post-translational change (vitamin K dependent ϒ carboxylation of glutamic acid residues). Anticoagulation results from either vitamin K deficiency or the use of vitamin K antagonists, such as warfarin (Barnoyev, 2023).

Finally, this study indicated that Nomenclature of coagulation proteins is rather complex. The terms fibrinogen, prothrombin, tissue factor (TF), and calcium are the popular designations for the first four of the twelve factors that were initially identified (Barnoyev, 2023). Roman numbers have not been given to the more recently identified clotting factors, high-molecular-weight kininogen and prekallikrein. Because of their short-lived coagulant action in preserved blood, factors V and VIII are also known as the labile factors (Barnoyev, 2023).

A new pancreatic cancer drug is changing survival rates for one of the deadliest cancers

A new pancreatic cancer drug is offering hope for patients with this deadly disease after clinical trial data showed that '**daraxonrasib nearly doubled survival rates**' for study volunteers.

Why is daraxonrasib, this new pancreatic cancer drug, getting so much attention?

This will be the first efficacious targeted therapy for the majority of pancreatic cancer patients.University of Colorado Hospital was among the sites of the daraxonrasib (pronounced da-RAX-on-RAS-ib) trial that ignited all the excitement. The patients involved all had advanced pancreatic cancer. The recently published study found that previously treated patients with advanced pancreatic cancer who took daraxonrasib pills once a day survived about 15 months; historically, these patients typically live less than half as long.

How daraxonrasib works against pancreatic cancer:

The root cause of many cancers has to do with a malfunctioning on-off switch for cell growth. In healthy cells, the RAS cellular-growth pathway knows when to turn off. But with many cancers, a mutation occurs and the switch gets stuck in the "on" position, leading to uncontrolled, malignant cell growth. With pancreatic cancers, one RAS-associated protein in particular — KRAS — leads to that sticky switch in more than 90% of cases. Scientists have known about KRAS for years, but finding a good spot for a drug to bind and block its effects has proven difficult.

The scientists who developed daraxonrasib found a different target. The drug binds RAS to a chaperone protein that then impacts KRAS proteins with any of the seven known cancer-causing mutations. That makes daraxonrasib pan-RAS inhibitor — not only a new drug, but the first of a new class of drugs.

Jagadeeswari.K
Pharm.D 4th year

Dr. James D. Watson, Nobel prize winning DNA pioneer, dies at 97

In Memory of Dr. James D. Watson (1928 – 2025)

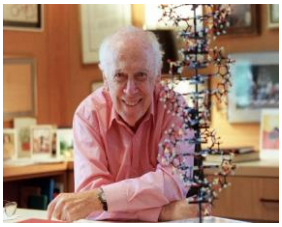
Co-discoverer of the DNA Double Helix Structure.

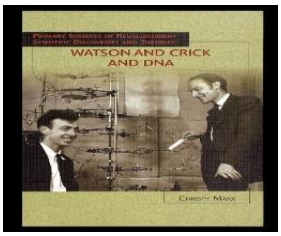
We deeply mourn the passing of Dr. James Dewey Watson, one of the most brilliant scientists of the 20th and 21st century, who passed away on November 7, 2025.

Dr. Watson, along with Francis Crick, discovered the double helix structure of DNA in 1953 — a breakthrough that transformed modern biology and medicine. His work helped us understand how genetic information is stored, replicated, and passed from one generation to the next.

James Dewey Watson was born on April 6, 1928, in Chicago, Illinois, USA. From a young age, he showed immense curiosity about the natural world and an exceptional academic ability. He attended the University of Chicago, where he earned his bachelor's degree in zoology at just 19 years old.

Later, he pursued his Ph.D. in zoology at Indiana University, where he studied under the guidance of Herman Muller, a Nobel laureate known for his work on the effects of radiation on genes. These formative years shaped Watson's passion for genetics and molecular biology.





The Discovery of the DNA Double Helix:

In the early 1950s, the scientific community was in a race to understand the structure of DNA — the molecule believed to carry genetic information. Working at the Cavendish Laboratory at the University of Cambridge, Watson met Francis Crick, a British physicist. Combining data from X-ray diffraction images produced by Rosalind Franklin and Maurice Wilkins, Watson and Crick built a model of DNA that revealed its double helix structure — two strands wound around each other, resembling a twisted ladder.

Each strand consisted of a backbone of sugar and phosphate molecules, with pairs of nitrogenous bases (adenine-thymine and guanine-cytosine) forming the rungs of the ladder. This model explained how DNA could replicate itself and carry genetic information, solving one of biology's greatest mysteries.



Nobel Prize and Recognition:

In 1962, Dr. Watson, along with Francis Crick and Maurice Wilkins, was awarded the Nobel Prize in Physiology or Medicine for the discovery of the molecular structure of nucleic acids. This honor recognized the profound impact of their work on science and humanity.

Their discovery laid the foundation for modern genetics, genetic engineering, DNA fingerprinting, biotechnology, and even forensic science. It has enabled the diagnosis of genetic disorders, development of new medicines, and advancements in personalized medicine.

Following the Nobel Prize, Dr. Watson continued to make significant contributions to science and education. He became a professor at Harvard University, where he taught molecular biology and trained many future scientists. In 1968, he published the famous book "The Double Helix," which gave a personal and engaging account of the discovery of DNA. The book became one of the most widely read scientific memoirs of all time.

Later, Watson served as the Director and President of Cold Spring Harbor Laboratory in New York, transforming it into one of the world's leading centers for molecular biology and cancer research. He also played a major role in the Human Genome Project, which aimed to map the entire human DNA sequence — a landmark achievement completed in 2003.



Legacy and Influence:

Dr. Watson's work revolutionized our understanding of life at the molecular level. His discovery of the DNA double helix is often compared to the discovery of the atom or the theory of evolution in its importance. Through his scientific vision and leadership, Watson inspired generations of researchers to explore the secrets of heredity, evolution, and human disease.

His contributions have paved the way for modern developments such as gene therapy, cloning, genetic testing, and CRISPR gene editing.

P.Mounavya

Pharm D 4th year

3-Day Pharmacovigilance Training Program 16th to 18th April 2026

MRIPS Successfully Conducts 3-Day Pharmacovigilance Training Program in Collaboration with TASK, Govt. of Telangana*

Malla Reddy Institute of Pharmaceutical Sciences (MRIPS) initiated a *Pharmacovigilance Certificate Course* for *B. Pharmacy and Pharm D III Year and IV Year* students in collaboration with *TASK, Government of Telangana*.

The *3-day intensive training program*, held from *16th to 18th April 2026*, was coordinated by *Mrs. B. Revathi*, TASK In-charge at MRIPS, under the convenership of *Dr. H. Ramana*, Dean, MRIPS. The sessions were expertly delivered by trainers *Ms. Uma Priya*...

Key Learnings from the 3-Day Session:

Day 1: Introduction to Pharmacovigilance, History & Evolution, Global Regulatory Authorities, Classification of ADRs and Different Forms of ADRs.

Day 2: Case Studies, ADR Reporting Forms, CIOMS Types and Regulatory Documentation.

Day 3: Career Guidance in Pharmacovigilance, Interview Tips, Industry Scope, Assessment Methods, and Introduction to MedDRA.
As a gesture of gratitude, *MRIPS presented a token of appreciation to Ms. Uma Priya* for her valuable training and insights.

During the feedback session, *Dr. H. Ramana, Dean*, appreciated the successful conduct of the program. Listening to the positive feedback from both trainers and students, he congratulated all participants and extended special thanks to *Coordinator Mrs. B. Revathi* and *AO Mr. V. Shukla* for organizing the session smoothly and efficiently.

This program marks another step by MRIPS towards industry-oriented skill development and enhancing employability of pharmacy graduates.*MRIPS Successfully Conducts 3-Day Pharmacovigilance Training Program in Collaboration with TASK, Govt. of Telangana*

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Plasma Volume Expanders: A Review Article

Intravascular volume depletion due to trauma, surgery, sepsis, or burns necessitates rapid and effective fluid resuscitation. Plasma volume expanders are administered to restore hemodynamic stability. The choice between different types of expanders has long been debated, especially regarding safety, cost-effectiveness, and impact on patient outcomes.

2. Classification of Plasma Volume Expanders

2.1 Crystalloids

Crystalloids, such as normal saline (0.9% NaCl) and lactated Ringer's solution, are aqueous solutions of mineral salts or other water-soluble molecules. They are widely used due to their low cost and availability. However, they quickly distribute into the extracellular space, requiring larger volumes for effective plasma expansion.

Advantages: Cheap, readily available, low allergenic potential.
Disadvantages: Risk of edema due to extravasation.

2.2 Colloids

Colloids contain larger molecules (e.g., gelatin, dextran, hydroxyethyl starch [HES], albumin) that remain in the vascular compartment longer, theoretically providing more sustained volume expansion.

Common colloids include:

- **Human Albumin**: A natural plasma protein; expensive but safe in most contexts
- **Hydroxyethyl Starch (HES)**: Synthetic; associated with renal impairment in some studies.
- **Dextrans**: Polysaccharide-based; can interfere with blood typing.
- **Gelatins**: Derived from bovine collagen; lower molecular weight.

3. Mechanism of Action

Colloids exert oncotic pressure, pulling fluid into the intravascular space, while crystalloids expand plasma volume primarily through diffusion and hydrostatic pressure. The degree of expansion depends on the type and volume administered.

4. Clinical Indications

- Hypovolemic shock
- Burns
- Trauma
- Perioperative fluid management
- Sepsis (controversially)

5. Risks and Controversies

Recent large-scale trials have questioned the safety of synthetic colloids, particularly HES, in critically ill patients. The **CHEST trial** and **6S trial** both linked HES to increased risk of kidney injury and mortality, leading to regulatory restrictions in several countries.

Adverse effects may include:

- Coagulopathy (especially with dextrans, HES)
- Anaphylactic reactions (particularly with gelatins)
- Renal dysfunction (mainly with HES)

6. Current Guidelines and Recommendations

Recent **Surviving Sepsis Campaign** guidelines discourage the routine use of synthetic colloids (e.g., HES) in septic patients and recommend crystalloids as the first-line therapy for fluid resuscitation.

7. Conclusion

While plasma volume expanders are vital in resuscitative medicine, the selection must be tailored to individual patient needs, weighing the benefits against potential risks. Crystalloids remain the cornerstone of initial therapy, with colloids reserved for specific indications.

The Inflammation Cascade: A Review article

1. Introduction

Inflammation is a fundamental component of innate immunity, acting as the body's immediate response to harmful stimuli. It is typically classified as acute or chronic, based on its duration and physiological impact. The inflammation cascade is initiated through the recognition of danger signals, followed by the release of pro-inflammatory mediators, recruitment of immune cells, and eventual resolution or progression to chronic pathology.

2. Phases of the Inflammatory Response

2.1 Initiation

The cascade begins with the detection of pathogens or damage-associated molecular patterns (PAMPs and DAMPs) by pattern recognition receptors (PRRs) such as Toll-like receptors (TLRs) on sentinel immune cells (e.g., macrophages, dendritic cells).

Key mediators: Histamine, prostaglandins, cytokines (e.g., TNF-α, IL-1β, IL-6), complement proteins.

Vascular changes: Vasodilation, increased permeability, and leukocyte adhesion molecule expression.

2.2 Amplification

Pro-inflammatory cytokines promote further recruitment of neutrophils, monocytes, and other immune cells to the site of injury.

Cellular components: Neutrophils (early responders), monocytes/macrophages (later responders), mast cells, basophils.

Key pathways: NF-κB, JAK/STAT, MAPK.

2.3 Effector Phase

Phagocytes engulf pathogens and apoptotic cells. Reactive oxygen species (ROS) and lysosomal enzymes are released to neutralize threats, which can also damage host tissue.

Outcome: Pathogen clearance or transition to chronic inflammation if resolution fails.

Anti-inflammatory mediators such as IL-10, TGF-β, and specialized pro-resolving mediators (SPMs) like lipoxins, resolvins, and protectins promote healing.

Cellular shifts: Macrophages switch to an M2 phenotype, promoting tissue repair and debris clearance.

Apoptosis: Neutrophils undergo apoptosis and are cleared by efferocytosis.

3. Chronic Inflammation

Failure to resolve acute inflammation can lead to chronic inflammation, characterized by the presence of lymphocytes, plasma cells, and macrophages, along with tissue remodeling and fibrosis. Chronic inflammation underlies diseases such as:

1. Atherosclerosis
2. Type 2 diabetes
3. Rheumatoid arthritis
4. Neurodegenerative diseases (e.g., Alzheimer's)
5. Cancer

4. Therapeutic Targets in the Inflammation Cascade

Understanding the molecular players in the inflammation cascade has led to the development of targeted therapies:

- Cytokine inhibitors: Anti-TNF (infliximab), IL-6 inhibitors (tocilizumab)
- NSAIDs: Inhibit cyclooxygenase (COX) enzymes, reducing prostaglandin synthesis
- Corticosteroids: Broad immunosuppressive effects via NF-κB inhibition
- Biologics and small molecules: Target specific receptors or signaling pathways (e.g., JAK inhibitors)

5. Conclusion

The inflammation cascade is an essential biological response with both protective and pathological roles. Its complexity provides numerous targets for therapeutic intervention. Ongoing research is focused on enhancing resolution pathways and developing precision medicine approaches to modulate inflammation without compromising host defense.

Physiological Salt Solutions: Composition, Function, and Biomedical Applications

1. Introduction

The human body maintains a tightly regulated extracellular ionic environment crucial for cell survival and function. Physiological salt solutions (PSS) are aqueous solutions that replicate this ionic environment to support cells and tissues outside the body. Since their development in the 19th and 20th centuries, these solutions have been widely used in biomedical research and clinical practice.

2. Composition of Physiological Salt Solutions

Most PSS formulations contain key electrolytes, including:

- **Sodium chloride (NaCl)** – Maintains osmotic balance.
- **Potassium chloride (KCl)** – Supports membrane potential and cellular function.
- **Calcium chloride ($CaCl_2$)** – Crucial for muscle contraction and neurotransmission.
- **Magnesium chloride ($MgCl_2$)** – Cofactor for enzymatic reactions.
- **Sodium bicarbonate ($NaHCO_3$)** – Buffers pH.
- **Phosphate and glucose** – Sometimes included to mimic specific physiological conditions.

3. Physiological Role and Importance

PSS maintain:

- **Osmotic balance:** Prevents cellular lysis or crenation.
- **Ionic composition:** Supports proper enzyme function and cell signaling.
- **Tissue viability:** Essential for ex vivo tissue maintenance.

4. Applications

4.1 In Vitro Research

PSS are used in cell culture, electrophysiology, pharmacology, and physiology to simulate extracellular conditions and enable real-time functional studies of isolated cells or tissues.

4.2 Clinical Use

IV Therapy: Solutions like normal saline and lactated Ringer's are standard resuscitation fluids.

Surgical Irrigation: Used during procedures to prevent tissue desiccation and maintain ionic balance.

Wound Care: Supports moist healing environments.

4.3 Drug Testing and Toxicology

Salt solutions provide a neutral background for studying drug effects on isolated organs or cultured cells, minimizing confounding variables.

5. Advances and Modifications

Modern research tailors PSS compositions to specific tissues or experimental goals. For example:

- Modified Krebs solution for vascular reactivity studies.
- High-glucose or high-potassium buffers to mimic diabetic or ischemic conditions.

6. Challenges and Considerations

- **Stability:** Some salts precipitate or degrade over time, especially in bicarbonate-containing solutions.
- **Sterility:** Essential in both research and clinical applications to prevent contamination.
- **Osmolarity and pH:** Must be carefully adjusted to avoid cytotoxicity.

. 7. Conclusion

Physiological salt solutions remain indispensable in both experimental and clinical settings. While simple in composition, their design requires careful balance to accurately replicate the extracellular environment. As biomedical research advances, new variations of these solutions continue to be developed for specialized applications.

Oral Dental Health Camp a Hit on World Health Day! 7th April 2026

A free dental check-up camp was conducted for *150 students*, focusing on oral hygiene awareness. Faculty members also participated in the health check-up. *Dr. Vishnupriya* and *Dr. Prasanth* along with their team from MRWDC (Mallareddy Women's Dental College) came down and performed check-ups for the students. Necessary facilities were provided for the camp.

A big thank you to ***Dr. Chittaranjan Sir*, Dean of MRWDC, and *Dr. Vijay Kumar***, NSS Nodal Officer of MRV, for granting permission to conduct the camp in MRIPS. Also, thanks to *Dean Sir, Dr. H Ramana*, Convenor of the programme, and to *Shukla Sir* (Administration Officer) for arranging food and other necessary facilities for the MRWDC camp members. A huge thank you to all the students and faculty members for making this event a success!

Conducted by: **Mallareddy Women's Dental College (MRWDC)**
Organized by: **N. Indraja, NSS PO, MRIPS.**









Harshith
Bpharm 4th Year

Review Article: The Volume of Distribution of Drugs – A Comprehensive Overview

Introduction:

The volume of distribution (Vd) is a key pharmacokinetic parameter used to describe the distribution of a drug throughout the body in relation to its plasma concentration. It is an essential concept for pharmacologists, clinicians, and researchers, offering valuable insight into how a drug disperses from the bloodstream into various tissues, organs, and compartments. By understanding Vd, clinicians can better predict the pharmacokinetic behavior of a drug, adjust dosing regimens, and manage potential therapeutic or toxic effects.

This review provides a comprehensive examination of the volume of distribution, its determinants, methods of calculation, and its clinical relevance, alongside the limitations of its application in drug therapy.

Definition and Significance of Volume of Distribution

Volume of distribution is defined as the apparent volume in which a drug is distributed in the body, assuming it is uniformly distributed. Mathematically, it can be expressed as:

$$Vd = \frac{A}{C_0}$$

Vd is a theoretical volume, not a physical compartment, and it varies based on the drug's physicochemical properties and physiological conditions. A higher Vd suggests that the drug is extensively distributed throughout the body, whereas a lower Vd indicates that the drug remains largely in the bloodstream or plasma. Clinically, Vd is critical for determining drug dosing and predicting drug clearance.

Factors Influencing Volume of Distribution

Several factors determine the volume of distribution of a drug. These factors can be broadly classified into drug-related and patient-related factors:

- **Lipophilicity:** Lipid-soluble (lipophilic) drugs tend to have a larger Vd as they are able to cross cellular membranes and accumulate in fatty tissues, whereas hydrophilic drugs have a smaller Vd and are more likely to remain within the extracellular fluid or plasma.
- **Molecular Size and Charge:** Larger molecules and those with significant charge tend to be restricted to the blood plasma or extracellular space, resulting in a smaller Vd. Conversely, smaller and uncharged molecules can diffuse more easily into tissues.
- **Ionization:** The ionization of a drug affects its ability to cross cellular membranes, influencing its distribution. Non-ionized forms of drugs are generally more readily absorbed and distributed than their ionized counterparts.

2. Plasma Protein Binding:

- Drugs that bind extensively to plasma proteins (e.g., albumin) tend to have a smaller Vd since only the free (unbound) drug can cross cellular barriers to enter tissues. The degree of plasma protein binding can be influenced by the patient's nutritional status, disease conditions (e.g., liver or kidney disease), and the presence of other competing drugs.

3. Body Composition:

- Variations in body fat, muscle mass, and water content can significantly affect the Vd. Drugs with a high affinity for fat may accumulate in adipose tissue, leading to a higher Vd in obese individuals. Similarly, drugs that distribute into water compartments will have a larger Vd in lean individuals with higher muscle mass and lower fat content.

4. Perfusion and Tissue Permeability:

- The blood flow to various tissues plays a key role in drug distribution. Highly perfused organs such as the liver, kidneys, and brain

5. Age and Disease States:

- Aging and pathological conditions can alter body composition and drug metabolism. Older adults often have a higher percentage of body fat and lower muscle mass, which can influence the Vd of lipophilic and hydrophilic drugs. Conditions such as hepatic or renal impairment can also affect drug binding and metabolism, thus modifying Vd.

6. Genetic Factors:

- Genetic variations in drug-metabolizing enzymes or drug transporters can alter the distribution and elimination of drugs. Pharmacogenetic profiling is increasingly used to predict how an individual may respond to certain drugs, including their distribution characteristics.

Methods of Determining Volume of Distribution

The volume of distribution can be determined through several approaches, depending on the drug's pharmacokinetic profile and the available clinical data:

1. Single-Dose Studies:

- Following the administration of a single dose, blood samples are collected at various intervals. Plasma drug concentrations are then plotted against time, and the Vd is estimated by the initial plasma concentration and the total drug amount.

2. Steady-State Concentration:

- For drugs administered continuously or repeatedly, steady-state concentrations are reached once the rate of drug administration equals the rate of elimination. Vd can be estimated based on the steady-state plasma concentration and the dose administered.

3. Population Pharmacokinetics:

- In complex cases involving drugs with variable pharmacokinetic parameters across different populations (e.g., children, the elderly, or patients with liver or kidney dysfunction), population pharmacokinetic modeling can be used to predict the Vd for a group of patients

Clinical Relevance and Applications of Volume of Distribution

The volume of distribution plays a critical role in several aspects of clinical pharmacology:

1. Dosing and Loading Doses:

- A drug with a large Vd requires a larger loading dose to achieve therapeutic plasma concentrations. Conversely, a drug with a small Vd may require a smaller dose or may be administered at a more frequent interval.

2. Half-Life and Drug Clearance:

- Vd influences the drug's half-life. Drugs with a large Vd have a prolonged half-life, while those with a smaller Vd are cleared more rapidly. This is essential for determining appropriate dosing schedules and the duration of therapy.

3. Therapeutic Drug Monitoring (TDM):

- For drugs with narrow therapeutic windows, understanding Vd allows clinicians to monitor drug levels in the plasma to ensure they stay within the therapeutic range, minimizing toxicity while ensuring efficacy.

4. Toxicology and Drug Toxicity:

- Drugs with a high Vd may accumulate in certain tissues (e.g., liver, brain), leading to potential toxicity. Understanding the distribution characteristics can help clinicians anticipate and manage adverse effects.

5. Personalized Medicine:

- With advancements in pharmacogenomics, the role of Vd in individualized drug therapy is becoming more prominent. Variability in Vd between patients based on genetic, physiological, and pathological factors necessitates personalized dosing adjustments.

Limitations of Volume of Distribution

Despite its widespread use, the concept of Vd has limitations:

1. Oversimplification:

- The assumption that the body behaves as a single, uniform compartment is an oversimplification. In reality, the body consists of multiple compartments (e.g., plasma, extracellular fluid, fat, muscle), and drug distribution may not always follow a simple linear model.

2. Interindividual Variability:

- Vd can vary significantly between individuals due to factors such as age, sex, body composition, and comorbidities, making it challenging to apply a single value universally.

3. Nonlinear Pharmacokinetics:

- For drugs that exhibit nonlinear pharmacokinetics at higher doses, Vd may change with drug concentration, complicating the use of Vd for accurate dosing predictions.

Conclusion

The volume of distribution is a critical parameter in pharmacokinetics that helps healthcare providers predict the distribution of drugs within the body. It is influenced by a variety of factors, including drug properties, body composition, and disease states, and plays a vital role in drug dosing, clearance, and therapeutic monitoring. Despite its usefulness, Vd should be interpreted with caution due to its limitations in representing the complexities of drug distribution across various populations. A thorough understanding of Vd is essential for optimizing drug therapy, ensuring therapeutic efficacy, and minimizing toxicity

P.VIJAY KUMAR*

K.RAHUL

REVIEW ARTICLE ON IMMUNOSUPPRESSION

Introduction

The introduction sets the stage by elucidating the fundamental role of the immune system in maintaining homeostasis and defending against pathogens. It highlights the scenarios where immune responses, though vital, can become deleterious, necessitating the need for immunosuppression. The historical evolution of immunosuppressive strategies is explored, from early experimental approaches to the sophisticated interventions of modern medicine.The rise of organ transplantation as a life-saving medical procedure underscores the importance of effective immunosuppression. The introduction outlines the challenges posed by immune rejection and the pivotal role immunosuppressive drugs play in promoting graft acceptance. Furthermore, it touches upon the delicate balance required in achieving immunosuppression suppressing immune responses sufficiently to prevent rejection while maintaining enough functionality to ward off infections.Immunosuppression stands at the forefront of medical advancements, playing a pivotal role in managing a spectrum of conditions from organ transplantation to autoimmune diseases. This comprehensive review seeks to unravel the intricate mechanisms, explore the diverse clinical applications, and gaze into the future perspectives of immunosuppression. In an era marked by breakthroughs in targeted therapies and personalized medicine, understanding the nuanced landscape of immunosuppression becomes imperative. This introduction sets the stage for an in-depth exploration, aiming to provide valuable insights into the evolution, current state, and promising trajectories of immunosuppressive strategies in modern medical practice.

Autoimmune diseases, characterized by an overactive immune system targeting the body's own tissues, represent another crucial arena for immunosuppressive interventions. The introduction provides an overview of how immunosuppression can mitigate autoimmune responses, offering relief to patients with conditions such as rheumatoid arthritis, lupus, and inflammatory bowel diseases.As the field advances, novel immunosuppressive agents and therapeutic approaches are explored. The introduction introduces the concept of targeted immunosuppression, aiming to minimize adverse effects by selectively modulating specific components of the immune system. Additionally, the emerging role of personalized medicine in tailoring immunosuppressive regimens based on individual patient profiles is discussed.

Mechanisms of Immunosuppression

The review delves into the diverse mechanisms of immunosuppression, encompassing both cellular and molecular pathways. It discusses the role of immunosuppressive drugs, such as corticosteroids, calcineurin inhibitors, and mTOR inhibitors, in modulating immune cell activity. The impact on T cells, B cells, andother components of the immune system is explored, providing a comprehensive understanding of the mechanisms at play.

Discussion

Challenges and Complications

The review critically evaluates the challenges associated with immunosuppressive therapies, including the risk of infections, malignancies, and drug-related toxicities. It highlights the ongoing efforts to strike a balance between achieving therapeutic immunosuppression and minimizing adverse effects, providing a realistic appraisal of the limitations of current approaches..Emerging Trends and Future PerspectivesThe abstract concludes by discussing emerging trends and future directions in immunosuppression. It touches upon advancements in precision medicine, the exploration of novel drug targets, and the potential for personalized immunosuppressive regimens. This section underscores the dynamic nature of the field and the continuous efforts to enhance therapeutic outcomes while minimizing side effects.

Organ Transplantation

The review delves into the realm of organ transplantation, elucidating the challenges and successes of immunosuppression in ensuring graft acceptance. Notable discussions include the optimization of immunosuppressive protocols, the on-going quest for targeted approaches, and the potential implications of emerging therapies on long-term graft survival.

Autoimmune Diseases

Immunosuppression's role in autoimmune disease management is thoroughly examined, providing a nuanced understanding of its efficacy in mitigating symptoms. The discussion extends to the on-going considerations of long-term treatment consequences, balancing benefits against risks, and the evolving landscape of autoimmune interventions.

Targeted and Personalized Approaches:

Insights into the paradigm shift towards targeted immunosuppression are explored, highlighting the potential for minimizing side effects while maximizing therapeutic benefits. The burgeoning concept of personalized medicine in immunosuppression takes center stage, with a focus on identifying biomarkers and adapting treatments based on individual patient profiles.

Challenges and Future Directions

The review critically analyses challenges inherent in immunosuppression, including drug resistance and opportunistic infections. Future directions encompass innovative therapeutics, the impact of the micro biome on immune resilience, and the development of strategies fostering immune tolerance. Ethical considerations surrounding informed consent, long-term consequences, and shared decision-making are also thoughtfully examined.

Conclusion

This comprehensive review of abstracts provides a nuanced understanding of the multifaceted landscape of immunosuppression. Insights gained from recent research underscore the importance of continually refining therapeutic approaches to achieve a delicate balance between immune suppression and preserving necessary immune functions. The review also emphasizes the need for on-going research to address challenges,minimize complications, and pave the way for innovative, personalized immunosuppressive strategies in the future.

PENICILLIN ALLERGIES

INTRODUCTION :

Penicillin belongs to an important group of antibiotics called beta (ß)-lactam antibiotics which are generally effective at eradicating common bacterial infections and are relatively inexpensive and therefore widely used to treat skin, ear, sinus and upper respiratory tract Treatment for acute IgE mediated reaction to penicillin depends on severity. Patients presenting in acute anaphylaxis need to have immediate treatment with IM epinephrine (1 mg/ml) 0.3 mg to 0.5 mg every 5 to 15 minutes until resolution of symptoms. Adjunctive therapies include H1 and H2 antihistamines including diphenhydramine 25 mg to 50 mg intravenously (IV) and ranitidine 50 mg IV, respectively. Glucocorticoids should also be administered such as 125 mg methylprednisone. Patients with refractory symptoms should be treated with an infusion of epinephrine at 0.1 mcg/kg/minute. All patients presenting with acute anaphylaxis should be immediately placed on telemetry monitoring with large-bore IV for IVF resuscitation at 1 L to 2 L NS bolus. If patients are experiencing bronchospasm, albuterol 2.5 mg to 5 mg can also be considered. These patients require admission to the hospital. Patients with a resolution of symptoms after a period of observation are safe for discharge. infections. This class of antibiotics includes penicillin and penicillin derivatives such as ampicillin and amoxicillin as well as cephalosporins, monobactams, carbapenems and ß-lactamase inhibitors. As with most drugs, penicillin exhibits common side effects and adverse reactions.

All forms of natural and semisynthetic penicillins can cause allergy, but it is more commonly seen after parenteral than oral administration. Penicillin G is the most common drug implicated in drug allergy. Incidence is probably highest with procaine penicillin, as procaine itself is allergenic. The course of penicillin hypersensitivity is unpredictable i.e. an individual who tolerated penicillin earlier may show allergy on subsequent administration.

Penicillin Skin Sensitivity Testing : Penicillin skin sensitivity testing can help to confirm the safety of the drug and qualm fears of a dangerous drug reaction. A positive skin test indicates the presence of IgE antibodies to penicillin and immediately excludes the use of it and related ß-lactam antibiotics. For non-penicillin ß-lactams, the immunogenic determinants that are produced by degradation are unknown, and diagnostic skin testing is of limited value . Persons with a history of penicillin “allergy” in whom skin testing yields a negative result have no greater risk of rashes associated with penicillin antibiotics than they do of rashes associated with any other class of antibiotics and are as much at risk of an allergic reaction as the general population.

Ideally, penicillin skin testing should be done in all persons with a history of penicillin allergy. Unfortunately, because of the lack of commercial penicillin skin test reagents, this is not possible.

It should be noted that any skin sensitivity testing should be done by specially trained professionals with access to a complete panel of penicillin skin test materials. There are times when doctors try to weaken and eventually overcome a patient's sensitivity to the penicillin allergen through desensitization. They do this by administering small but gradually increasing doses of penicillin orally or intravenously.

Treatment/Management.

Treatment for acute IgE mediated reaction to penicillin depends on severity. Patients presenting in acute anaphylaxis need to have immediate treatment with IM epinephrine (1 mg/ml) 0.3 mg to 0.5 mg every 5 to 15 minutes until resolution of symptoms. Adjunctive therapies include H1 and H2 antihistamines including diphenhydramine 25 mg to 50 mg intravenously (IV) and ranitidine 50 mg IV, respectively. Glucocorticoids should also be administered such as 125 mg methylprednisone. Patients with refractory symptoms should be treated with an infusion of epinephrine at 0.1 mcg/kg/minute.

patients presenting with acute anaphylaxis should be immediately placed on telemetry monitoring with large-bore IV for IVF resuscitation at 1 L to 2 L NS bolus. If patients are experiencing bronchospasm, albuterol 2.5 mg to 5 mg can also be considered. These patients require admission to the hospital. Patients with a resolution of symptoms after a period of observation are safe for discharge .

For patients with a true Type 1 IgE mediated penicillin allergy, another antibiotic should be used for treatment. If there is not another equally as efficacious antibiotic, patient's should undergo drug desensitization. The process of desensitization involves subcutaneous, intravenous, or oral administration of incrementally higher doses of the drug every 15 to 30 minutes until the patient tolerates the entire dose. For patients with histories of severe IgE mediated reactions, initial doses should be between 1/1,000,000 and 1/10,000 of the full therapeutic dose.

Conclusion:-

Penicillin allergies are among the most commonly reported drug allergies, yet many are inaccurately diagnosed. This can lead to the use of less effective or more harmful alternative antibiotics, contributing to antibiotic resistance, increased healthcare costs, and adverse patient outcomes. Accurate diagnosis through detailed patient history, skin testing, and oral challenge when appropriate is crucial to identifying true penicillin allergies.. Continued education and awareness among healthcare providers and patients are essential for proper management and prevention of misdiagnosed penicillin allergies.

Strengthening Drug Quality After Cough Syrup Crisis: Health Ministry Directs Strict Compliance with Revised Schedule M Norms

The Health Ministry has directed strict compliance with the revised Schedule M norms to strengthen drug quality following a recent cough syrup crisis. The Ministry has issued a stern warning that the licenses of non-compliant manufacturing units would be cancelled.

This direction came after an emergency meeting with all States and Union Territories on Sunday (October 5, 2025) evening. The meeting was necessitated by a report from the Tamil Nadu Drugs Control Department. This report indicated that samples of the cough syrup brand **Coldrif** were found to contain levels of **diethylene glycol (DEG)** that exceeded the permissible limits.



Testing of cough syrup brands had been initiated following the tragic deaths of more than 10 children in Rajasthan and Madhya Pradesh recently. Nineteen medicine samples consumed by the affected children were collected from private medical practitioners and nearby retail stores. Subsequent regulatory action was taken by the Tamil Nadu Food and Drugs , and the Central Drugs Standard Control Organisation (CDSCO) recommended the cancellation of the manufacturing license based on its inspection findings.

Tamil Nadu's Drugs Control Department issued an immediate stop production order to the manufacturer of the Coldrif brand of cough syrup following an analysis by a government drug testing laboratory, which found a batch to be "not of standard quality" and "adulterated with diethylene glycol".

The updated revised Schedule M mandates enhanced quality systems, including a **Pharmaceutical Quality System** and **Quality Risk Management**. The deadline for compliance with these updated norms is set for **December 31, 2025**. Additionally, States have been asked to ensure the **rational use of cough syrups**, particularly among children. This is because most coughs are self-limiting and do not require pharmacological treatment.

Summary:

Coldrif cough syrup was banned after tests found extremely high levels of the toxic chemical Diethylene Glycol (DEG) in a specific batch. The contamination was linked to child deaths in several states. Following this, multiple states banned its sale, issued public warnings, and ordered immediate withdrawal of stocks.

The manufacturer's license was cancelled, the facility was shut down, and legal action was Initiated against the company.

Bindu shajan Perappadan

Drug-Induced Liver Injury: Mechanisms, Risk Factors, Clinical Evaluation and Management

INTRODUCTION:

The drug induced liver injury is a significant clinical and public health problem that occurs when drugs, herbal remedies, or other chemicals harm the liver, it can lead to drug-induced liver injury (DILI), a serious clinical and public health issue. Because it is essential to drug metabolism and detoxification, the liver is especially susceptible to harm from therapeutic agents. When taken as prescribed, many drugs are safe, but some can cause dose-dependent or unpredictable liver toxicity. Dili classified as predictable or unpredictable (idiosyncratic). The vast majority of Dili, however, is idiosyncratic or unpredictable; it is unexpected based on the pharmacological actions of the drug and in most cases routine animal toxicology fails to identify the risk of subsequent clinical toxicity.

1.1 DEFINITION OF DRUG INDUCED LIVER INJURY

Drug induced liver injury refers to Liver damage brought on by prescription pharmaceuticals, over-the-counter medications, herbal products, or nutritional supplements known as drug-induced liver injury (DILI). Because of its unpredictable nature, variable presentation, and potential to proceed to acute liver failure, it is one of the most difficult adverse medication reactions that clinicians confront. The severity of DILI can vary from modest; asymptomatic liver enzyme increases fulminant hepatic failure, cholestasis, chronic liver disease, or severe hepatocellular necrosis. The two main categories of DILI are idiosyncratic (unpredictable) and intrinsic (predictable). Idiosyncratic DILI happens randomly in susceptible people and is frequently dose-independent, whereas intrinsic DILI is dose-dependent and repeatable.

1.2 EPIDEMIOLOGY AND INCIDENCE

Due to underreporting and incorrect diagnoses, it is challenging to ascertain the actual incidence of DILI. The annual incidence is estimated by population-based studies to be between 10 and 20 cases per 100,000 people. Acetaminophen poisoning is the most frequent cause of acute liver failure resulting from DILI, which accounts for around 50% of cases in Western countries. Due to the high prevalence of tuberculosis in underdeveloped nations, especially India, antitubercular medications are a primary cause of DILI. Traditional and herbal remedies are also becoming more involved. DILI is of regulatory importance because it is a primary cause of drug withdrawals from the market and clinical trial failures.

Increasing use of multiple medications, herbal supplements, and polypharmacy, the incidence of DILI is rising. Understanding its mechanisms, risk factors, diagnostic challenges, and management strategies is essential for healthcare professionals

Iceland	American DILIN	Spanish registry	UK
Amoxicillin-clavulanate	Amoxicillin-clavulanate	Amoxicillin-clavulanate	Amoxicillin-clavulanate
Diclofenac	Isoniazid	Isoniazid	Diclofenac
Azathioprine	Nitrofurantoin	Combined anti-tuberculous therapy	Tricyclic antidepressants
Infliximab	Trimethoprim-sulfamethoxazole	Flutamide	Macrolides
Nitrofurantoin	Minocycline	Ibuprofen	Chlorpromazine

DILIN = drug-induced liver injury network

1.3 Types of DILI

Idiosyncratic DILI can be classified according to the pattern of liver tests observed – hepatocellular, cholestatic, or mixed. This classification was first established by the Council for International Organizations of Medical Sciences (CIOMS). And then modified by US Food and Drug Administration (FDA), Hepatocellular DILI is characterized by an alanine aminotransferase (ALT) ≥3 times the upper limit of normal (ULN) and ALT/alkaline phosphatase (ALP) ratio ≥5 times ULN; cholestatic DILI by an ALP ≥2 times ULN and ALT/ALP ratio of ≤2 times ULN; and mixed DILI with ALT ≥3 times ULN, ALP ≥2 times ULN and ALT/ALP ratio <5 but >2 times ULN. Individual drugs have dispositions toward a characteristic clinical signature; however, exceptions do occur. For example, amoxicillin-clavulanate usually results in a cholestatic injury, but less frequently has also been associated with ALF.

Another way to classify idiosyncratic DILI is immune-mediated (allergic) or non-immune mediated (non-allergic) If immune-mediated, the latency is shorter (1–6 weeks) compared with non-immune mediated reactions (1 month to 1 year). However, exceptions do occur with immune reactions appearing after a very long latency with drugs such as nitrofurantoin or even after drug cessation (eg: sulfonamides, erythromycin and amoxicillin-clavulanate). Immune-mediated idiosyncratic reactions can be characterized by the presence of fever, rash, eosinophilia, autoantibodies (such as antinuclear and anti-smooth muscle antibodies) and Stevens-Johnson syndrome. Non-immune mediated reactions lack the characteristics and importantly, as described, tend to have a long latency period (1 month to 1 year).

Other forms of DILI include steatohepatitis (amiodarone, tamoxifen, methotrexate), neoplasms (hepatic adenomas due to androgenic, anabolic steroids, and vascular (nodular regenerating hyperplasia due to azathioprine).

1.4 Mechanism

The mechanism of DILI can be classified into intrinsic and idiosyncratic types. Intrinsic DILI is predictable, dose-dependent, and occurs shortly after exposure to a toxic dose of a drug. A common example is paracetamol overdose, which causes direct hepatocellular damage through the formation of toxic metabolites. Idiosyncratic DILI is unpredictable, not clearly dose-dependent, and occurs only in susceptible individuals. It may result from immune-mediated reactions, genetic predisposition, oxidative stress, mitochondrial dysfunction, or the formation of reactive metabolites that damage liver cells.

1.5 Risk Factors

Several factors increase the risk of developing DILI. Patient-related risk factors include advanced age, female sex, pregnancy, obesity, malnutrition, alcohol consumption, pre-existing liver disease, and genetic susceptibility. Drug-related risk factors include high daily doses, prolonged duration of therapy, extensive hepatic metabolism, drug-drug interactions, and the use of multiple hepatotoxic medications simultaneously.

1.6 Clinical evaluation

The evaluation of suspected DILI begins with a detailed medical and medication history, including the use of prescription drugs, over-the-counter medications, herbal remedies, and alcohol consumption. Patients may present with symptoms such as fatigue, nausea, vomiting, anorexia, abdominal pain, dark urine, jaundice, and pruritus. Laboratory investigations include liver function tests such as alanine aminotransferase (ALT), aspartate amino transferase (AST), alkaline phosphatase (ALP), total bilirubin, serum albumin, and prothrombin time/international normalized ratio (PT/INR). Imaging studies such as abdominal ultrasonography, computed tomography (CT), or magnetic resonance imaging (MRI) may be performed to exclude other causes of liver disease. A diagnosis of DILI is suspected when ALT levels are five times the upper limit of normal, ALP levels are two times the upper limit of normal, or when ALT levels are three times the upper limit of normal accompanied by bilirubin levels greater than two times the upper limit of normal.

1.7 Management

The primary management of DILI involves the immediate discontinuation of the suspected offending drug. Patients should be closely monitored with serial liver function tests to assess the progression or resolution of liver injury. Supportive care, including adequate hydration, nutritional support, and symptomatic treatment, should be provided as needed. Specific antidotes may be used in certain situations, such as N - acetylcysteine for paracetamol-induced hepatotoxicity. Corticosteroids may be considered in selected immune-mediated cases. Severe cases of DILI associated with acute liver failure may require hospitalization, intensive care monitoring, and, in some instances, liver transplantation. Preventive strategies include careful drug selection, regular monitoring of liver function during long-term therapy, and patient education regarding the early signs and symptoms of liver injury.

1.8 Conclusion

Drug-induced liver injury (DILI) is an important cause of liver-related morbidity and mortality worldwide. It can occur due to a wide range of prescription drugs, over-the-counter medications, and herbal products. The pathogenesis of DILI involves complex mechanisms including direct hepatotoxicity, immune-mediated reactions, oxidative stress, and mitochondrial dysfunction. Several patient-related and drug-related factors increase the risk of developing liver injury. Early recognition through careful clinical evaluation, laboratory investigations, and causality assessment is essential for timely diagnosis. The immediate withdrawal of the offending drug remains the cornerstone of management. Improved awareness among healthcare professionals, regular monitoring of liver function, and patient education can significantly reduce the incidence and severity of DILI. Continued research into the mechanisms and predictive biomarkers of DILI will help improve prevention, diagnosis, and treatment strategies in the future.

Vootkuri Siri.

BEYOND THE HORIZON- GLP1 AGONISTS

INTRODUCTION

Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) were first introduced for the management of type 2 diabetes mellitus, but their clinical relevance has expanded far beyond glucose lowering. These agents mimic endogenous GLP-1 and act on pancreatic, gastrointestinal, and central nervous system pathways to increase insulin secretion in a glucose-dependent manner, suppress glucagon release, slow gastric emptying, and reduce appetite. Because of these actions, GLP-1 RAs are now recognized as drugs with important metabolic, cardiovascular, and weight-related benefits. The burden of metabolic disease is rising worldwide, especially type 2 diabetes, obesity, dyslipidemia, and polycystic ovary syndrome (PCOS). Many of these conditions overlap and intensify one another through insulin resistance and chronic low-grade inflammation. In this context, GLP-1 RAs have become highly relevant because they may improve not only blood glucose, but also body weight, central obesity, lipid profile, liver-related metabolic markers, and vascular outcomes .

RATIONALE FOR REVIEW

The purpose of this review is to summarize the extra metabolic effects of GLP-1 receptor agonists beyond glycemic control. Special attention is given to stroke prevention in type 2 diabetes, obesity-related metabolic improvement, and PCOS-related weight and hormonal benefits. The topic is clinically important because evidence increasingly supports GLP-1 RAs as multi-system metabolic agents rather than simple antidiabetic drugs .

METHODS AND EVIDENCE BASE

This review is based on published clinical evidence, including cohort studies, randomized controlled trials, and meta-analyses evaluating GLP-1 receptor agonists in type 2 diabetes, stroke risk, obesity, and PCOS. The stroke section is informed by a nationwide Danish comparative effectiveness study that used a new-user active-comparator design. This method reduces bias by comparing patients newly starting one drug class with patients newly starting another active drug class, rather than with non-users. The PCOS section is supported by a 2024 meta-analysis of randomized controlled trials involving 176 women with PCOS. The trials evaluated liraglutide and semaglutide versus placebo and measured anthropometric, metabolic, hormonal, and safety outcomes. Additional background was taken from recent reviews on GLP-1 agonists in weight management and cardiometabolic disease.

EXTRA METABOLIC EFFECTS OF GLP-1 Ras

One of the strongest extra metabolic effects of GLP-1 RAs is weight loss. These drugs reduce appetite, increase satiety, and lower energy intake, which together produce clinically meaningful weight reduction. In obese individuals and patients with insulin resistance, this effect is especially valuable because weight loss improves blood pressure, glycemia, lipid profile, and overall cardiometabolic risk . In PCOS, this weight-reducing effect is particularly important because obesity worsens both reproductive and metabolic abnormalities. The 2024 metaanalysis showed significant reductions in waist circumference and BMI, demonstrating that GLP-1 RAs improve central obesity as well as total body weight .

GLP-1 RAs also influence lipid metabolism. In the PCOS meta-analysis, triglycerides were significantly reduced, while total cholesterol did not show a significant change. This suggests that the drugs may selectively improve atherogenic lipid abnormalities, especially in patients with metabolic syndrome features. Improved lipid metabolism is clinically meaningful because hypertriglyceridemia and central adiposity are closely linked with vascular disease. Even when cholesterol changes are modest, reductions in triglycerides and visceral adiposity may still translate into improved cardiometabolic risk.

- Glycemic and Insulin Effects

Although GLP-1 RAs are best known for glucose lowering, their metabolic value extends beyond HbA1c reduction. They improve postprandial glycemia through glucose-dependent insulin secretion and glucagon suppression, while also reducing the glycemic burden after meals. This contributes to better longtaerm metabolic control in type 2 diabetes. In PCOS, however, the effects on insulin resistance have been less consistent. The 2024 meta-analysis found no significant change in HOMA-IR, even though body composition and androgen markers improved. This indicates that some benefits may occur independently of measurable insulin resistance indices, or that longer treatment duration is needed to show stronger insulinsensitizing effects.

- Hormonal Effects in PCOS

A clinically important extra metabolic effect in PCOS is improvement in hyperandrogenism. The 2024 meta-analysis showed a significant reduction in total testosterone levels, indicating a favorable hormonal effect. This matters because elevated androgen levels are central to PCOS pathophysiology and contribute to menstrual dysfunction, hirsutism, and infertility.

By reducing weight and improving metabolic balance, GLP-1 RAs may indirectly and directly improve the endocrine environment in PCOS. This supports their emerging role as adjunctive therapy in obese women with PCOS, particularly those with difficulty losing weight using lifestyle measures alone.

- Hepatic and Inflammatory Effects

Recent reviews describe favorable trends in liver enzymes and metabolic markers linked to fatty liver disease, suggesting that GLP-1 RAs may help in metabolic dysfunction-associated steatotic liver disease. These effects may arise through weight loss, improved insulin sensitivity, and reduced lipotoxicity. There is also growing interest in anti-inflammatory and vascular effects. GLP1 RAs may improve endothelial function and reduce atherosclerotic risk through combined actions on glucose, body weight, lipids, and inflammation. This broader profile helps explain why they may provide benefits beyond traditional antidiabetic therapy

- STROKE RISK AND CARDIOVASCULAR OUTCOMES

Type 2 diabetes is associated with a substantially increased risk of stroke, and stroke outcomes are often worse in people with diabetes. The clinical need for therapies that reduce cerebrovascular risk is therefore high. In this context, GLP-1 RAs have emerged as one of the most relevant glucose-lowering drug classes for patients at elevated vascular risk.

The Danish nationwide comparative effectiveness study found that new users of GLP-1 RAs had a significantly lower risk of stroke compared with new users of DPP-4 inhibitors, with about a 31% risk reduction. New users of SGLT2 inhibitors showed a trend toward lower stroke risk compared with DPP-4 inhibitors, but this did not reach statistical significance.

The same study also found lower mortality in GLP-1 RA users than in DPP-4 inhibitor users. No significant difference was seen in myocardial infarction risk between GLP-1 RA, SGLT2 inhibitor, and DPP-4 inhibitor users. These findings strengthen the view that GLP-1 RAs may be particularly useful in people with type 2 diabetes who have high cerebrovascular risk or previous ischemic stroke .

- GLP-1 RAs IN OBESITY AND PCOS

PCOS is a complex endocrine disorder affecting reproductive-age women and is commonly associated with obesity, insulin resistance, and hyperandrogenism. Because obesity worsens the reproductive and metabolic features of PCOS, effective weight reduction is a central therapeutic target.

The 2024 meta-analysis of randomized controlled trials found that GLP-1 receptor agonists significantly reduced waist circumference by 5.16 cm and BMI by 2.42 kg/m2. These are clinically meaningful changes because central obesity is strongly associated with cardiometabolic risk. The same metaanalysis also found significant reduction in triglycerides and total testosterone.

Although total cholesterol and HOMA-IR did not change significantly, the overall pattern still supports a beneficial role for GLP-1 RAs in obese women with PCOS. These drugs may be especially helpful when weight loss is difficult to achieve with metformin or lifestyle therapy alone

CLINICAL IMPLICATIONS

The evidence suggests that GLP-1 receptor agonists should be viewed as broad metabolic agents rather than narrow antidiabetic medications. In patients with type 2 diabetes and vascular disease, they may reduce stroke risk and mortality . In patients with obesity and PCOS, they may improve weight, waist circumference, triglycerides, and testosterone levels.

This expanded clinical utility means treatment decisions should consider body weight, cardiovascular risk, and endocrine comorbidities, not only HbA1c. For many patients, GLP-1 RAs may offer a more comprehensive approach to metabolic disease than older glucose-lowering agents.

CONCLUSION

GLP-1 receptor agonists have evolved from antidiabetic drugs into important metabolic therapies with benefits beyond glucose control. Their effects include weight reduction, central adiposity improvement, triglyceride lowering, testosterone reduction in PCOS, and lower stroke risk in type 2 diabetes. These findings support their growing role in cardiometabolic and endocrine practice.

The current evidence suggests that GLP-1 RAs are especially valuable in patients with obesity, PCOS, and high vascular risk. As research continues, their place in the treatment of complex metabolic disease is likely to expand further.

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The effect of Probiotics on Human Health

Introduction:

Probiotics are live microorganisms—primarily bacteria and yeasts—that provide health benefits when consumed in adequate amounts. Often referred to as "good" or "friendly" bacteria, they help maintain a healthy balance in the gut microbiota, the community of microorganisms living in our digestive system. 1 Probiotics are found naturally in fermented foods such as yogurt, kefir, sauerkraut, kimchi, and kombucha, and are also available as dietary supplements. The most common probiotic genera include Lactobacillus, Bifidobacterium, and Saccharomyces (a type of yeast). These health-beneficial bacteria could compete with pathogens and modulate the gut microbiota, and exhibit immunomodulatory, anti-obesity, anti-diabetic, and anti-cancer activities which are discussed in this review. Moreover, recent studies showed that probiotics could neutralize COVID-19 infections. Hence, probiotics have become an alternative to several drugs including antibiotics.

These beneficial microbes support various aspects of health, including:

Digestive health – Helping with conditions like diarrhea, irritable bowel syndrome (IBS), and inflammatory bowel disease (IBD).

Immune function – Enhancing the body's immune response and reducing the risk of certain infections.

Mental well-being – Emerging research suggests a link between gut health and mood, often referred to as the gut-brain axis. Not all probiotics are the same; different strains have different effects. Therefore, choosing the right strain for a specific health need is important. While generally considered safe for most people, probiotics may not be suitable for individuals with weakened immune systems or serious illnesses. It's always advisable to consult a healthcare provider before starting any probiotic supplement.

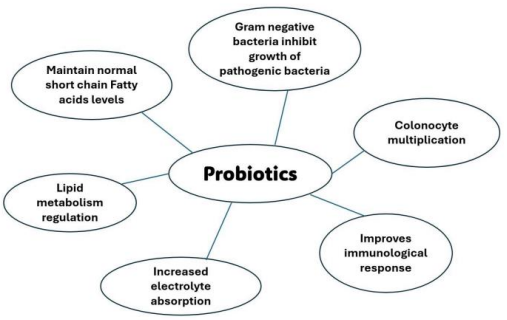
Microorganisms considered as Probiotics

Lactobacillus species:

- Lactobacillus plantarum
- Lactobacillus casei
- Lactobacillus reuteri
- Lactobacillus salivarius
- Lactobacillus gasseri

Bifidobacterium species:

- Bifidobacterium infantis
- Bifidobacterium adolescentis
- Bifidobacteriumanimalis
- Bifidobacterium bifidum
- 2 Bifidobacterium breve



Probiotics and Human Health

The effect of probiotics on human health has been studied in wide range of conditions, and many studies focused on gi conditions, a topic eczema, allergies, respiratory tract infections, obesity, metabolic diseases/ Type 2 Diabetes, cardiovascular, cognitive, and mental diseases, bone health, non alcoholic fatty liver disease (NAFLD) and hepatic encephalopathy, tumor necrosis factor, autism, burn wounds, and gynecological diseases. Regarding the administration of probiotics, the guidelines specify the following rules:

- Probiotics must be administered on an empty stomach.
- Heat dried formulations must be kept in the refrigerator (4°C) and lyophilized forms can be kept at room temperature
- A probiotic is administered one to two times a day because the dosage varies from 1 to 10 billion (10^8-10^9) CFUs.
- For patients who take antibiotics, the dozing time must be separated with an interval of 2 hours between them.

Probiotics and treatment of infectious burn wounds

- The first barrier against microorganisms is the Skin, but if it is removed, the lesions are continuously exposed to pathogens.
- The benefits of probiotics in preventing and treating skin infections are various. As an effective treatment for wounds, they are recognised as topical probiotics because they secrete antimicrobial substances (i.e. hydrogen peroxide and bacteriose bacteriocins) which inhibit the growth of pathogenic microorganisms and prevent wound infection.

Immune system support

Probiotics enhance innate and adaptive immune responses by:

- Increasing the activity of natural killer (NK) cells
- Promoting the production of anti-inflammatory cytokines
- Reducing the duration and severity of respiratory tract infections

Clinical trials have shown that children and elderly individuals taking probiotics experienced fewer colds and influenza-like symptoms.

Antibiotic-Associated Diarrhea

Antibiotic-Associated Diarrhea (AAD) is a common complication resulting from antibiotic therapy, characterized by a disruption in the normal gut microbiota that leads to increased gastrointestinal motility and diarrhea. It can range from mild, self-limiting episodes to severe conditions such as Clostridioides difficile infection.

Probiotics have emerged as a promising preventive and therapeutic strategy for AAD due to their ability to restore microbial balance, inhibit pathogenic bacteria, and enhance mucosal immunity. Clinical studies have shown that specific probiotic strains, including Lactobacillus rhamnosus GG and Saccharomyces boulardii, significantly reduce the incidence and severity of AAD in both adults and children. These strains exert their beneficial effects by colonizing the gut, competing with harmful microbes, and producing antimicrobial substances.

While probiotics are generally safe, their use should be tailored to individual risk profiles, especially in immunocompromised patients. Overall, incorporating probiotics alongside antibiotic therapy offers a safe and effective approach to mitigating the adverse effects on gut health.

The Gut- brain axis

The gut-brain axis (GBA) is a complex bidirectional communication network linking the central nervous system with the enteric nervous system, involving neural, hormonal, and immunological pathways. Recent evidence suggests that the gut microbiota plays a pivotal role in modulating brain function and behavior, leading to the emergence of psychobiotics—a class of probiotics with potential mental health benefits. Certain strains, such as Lactobacillus helveticus, Bifidobacterium longum, and Lactobacillus rhamnosus, have demonstrated anxiolytic and antidepressant effects in preclinical and human studies, potentially by influencing neurotransmitter production (e.g., serotonin, GABA), reducing systemic inflammation, and modulating the hypothalamic-pituitary-adrenal (HPA) axis.

Current research is promising but still in early stages; while small-scale clinical trials report improvements in mood, cognition, and stress resilience, larger, well-controlled studies are needed to establish efficacy, optimal strains, and dosage. As of now, probiotics represent a compelling, adjunctive strategy for supporting mental health through gut microbiome modulation, although personalized approaches and more mechanistic understanding are necessary before broad clinical recommendations can be made.

Probiotics and Food Products

The range of food products containing probiotic strains is wide and still growing. The main products existing in the market are dairy-based ones including fermented milks, cheese, ice cream, buttermilk, milk powder, and yogurts, the latter accounting for the largest share of sales.

Non Dairy food applications include soy based products, nutrition bars, cereals, and a variety of juices as appropriate means of probiotic delivery to the consumer. The factors that must be addressed in evaluating the effectiveness of the incorporation of the probiotic strains into such products are, besides safety, the compatibility of the product with the microorganism and the maintenance of its viability through food processing, packaging, and storage conditions.

The product's pH for instance is a significant factor determining the incorporated probiotic's survival and growth, and this is one of the reasons why soft cheeses seem to have a number of advantages over yoghurt as delivery systems for viable probiotics to the gastrointestinal tract. Current technological innovations provide ways to overcome probiotic stability and viability issues offering new options for their incorporation in new media and subsequent satisfaction of the increasing consumer demand. Microencapsulation technologies have been developed to protect the bacteria from damage caused by the external environment.

By the introduction of a straw delivery system containing a dry form of the probiotic bacterium beverage manufacturers can now provide it to the consumer. In addition, viable spores of a spore forming probiotic are available in the market offering advantages during processing. At the same time, the potential of lantibiotics'—substances with antimicrobial properties—production by bifidobacteria is being explored in order to be applied in the food area.

Lactose intolerance

Lactose intolerance is a genetically determined beta-gal-actosidase deficiency resulting in the inability to hydrolyse lactose into the monosaccharides glucose and 6 galactose. Upon reaching the large bowel the undigested lactose is degraded by bacterial enzymes leading to osmotic diarrhoea. Acquired, usually reversible, causes of beta-galactosidase deficiency include pelvic radiotherapy which damages the mucosa, as well as infection with rotavirus which infects lactase producing cells, and short bowel syndrome. Lactose intolerant individuals develop diarrhoea, abdominal discomfort, and flatulence after consumption of milk or milk products.

Although conventional yoghurt preparations, using S.thermophilus and L. delbrueckii ssp. Bulgaricus, are even more effective in this direction, partly because of higher beta-galactosidase activity, improvement of lactose metabolism is a claimed health benefit attributed to probiotics and seems to involve certain strains more than others and in specific concentrations. Therefore and as certain individuals have responded positively to probiotic supplementation, clinicians should consider it as a therapeutic alternative.

Conclusion Probiotics have emerged as a promising and versatile tool in promoting human health across a wide range of physiological systems. From maintaining gut microbial balance and preventing gastrointestinal disorders to modulating

immune responses, supporting metabolic health, and even influencing brain function through the gut-brain axis, probiotics demonstrate considerable therapeutic potential. Scientific evidence supports their role in preventing antibiotic-associated diarrhea, alleviating symptoms of irritable bowel syndrome, enhancing immunity, and potentially improving mood and cognitive function. However, the efficacy of probiotics is highly strain-specific and may vary based on dose, duration, and individual host factors such as age, health status, and microbiome composition. While current research underscores their safety and benefits in many contexts, further large-scale, randomized controlled trials and mechanistic studies are necessary to refine strain selection, understand long-term effects, and establish clinical guidelines. As our understanding of the human microbiome deepens, probiotics are likely to play an increasingly important role in personalized medicine and preventive health strategies.

Harika .D
PharmD

Cogon Grass As an Alternative Fibre for Pulp and Paper-Based Industry: On Chemical and Surface Morphological Properties

Introduction

The worldwide consumption of pulp and paper products has tremendously increased due to the population growth, development of communication and industrialization in many developing countries [1]. Conventional pulp and paper production utilizes fiber from wood has inevitably resulted in the depletion of wood resources. Therefore, it is of the main concern and interest to seek for alternative fiber resources derived from non-wood plants. Non-wood fibres offer several advantages including its abundance volume, a short cycle growth, cheaper cost of production and environmentally friendly

Cogon grass (Imperata cylindrical L.), belongs to the Poaceae (Gramineae) grass Family and also name as jap grass, blady grass, spear grass, alang-alang and lalang. This grass is known as a disruptive grass species found throughout the tropical and subtropical areas of the world . In addition, cogon grass ability to spread and replaced desirable vegetation outweighed any soil erosion considerations . Moreover, the rough edges of mature cogon grass leaves and silica bodies throughout the leaves cause mammals to avoid chewing the foliage [6] and make it unsuitable for grazing animals. In Malaysia, cogon grass is abundant along roadside and open areas where it shows aggressive growth. This is due to its ability to survive in dry, unproductive areas where other plants have difficulties because of the good root systems that are able to extract water and minerals from the soil. Normally, cogon grass plants are about 1 meter tall and the leaf margins are translucent and rough. Due to the short growth cycle, unsuitability for grazing animal and lack of applications of the cogon grass, hence it could be proposed to be used as an alternative pulp for paper making to replace the origin resource of wood. In the long run, it also could reduce deforestation and other environmental problems related with processing of wood pulps.

Therefore, this study is investigating the suitability of cogon grass as an alternative fibre for pulp and paper production based on the analyses of its chemical and surface morphological properties.

Material and Methods

Materials

Cogon grass samples were collected from Taman Universiti, Parit Raja. Prior to air-dried, these plants were cut into 2 - 5 cm in length and were thoroughly washed to eliminate sand and other contaminants. For the chemical analyses, the air-dried samples were ground to 0.40 - 0.45 mm and stored in an air tight container for further analyses.

Methods

Chemical compositions characterization. Chemical compositions of cogon grass were performed according to Technical Association of the Pulp and Paper Industry (TAPPI) Test Method. The samples were first submitted to soxhlet extraction for 6 hours according to method T 264 om-88

The evaluation of extractive substances was carried out in different liquids according to experimental parameters: hot water (T 207 cm-08) and 1% NaOH solution (T 212 om-07). The ash content (T 211 om-07) also was determined. The amount of lignin, hemicelluloses and cellulose were assessed by using the following respective standard methods: T 222 om-06, Chlorite Method and Kurschner-Hoffner approach. All experiments were conducted in triplicates.

Surface morphology characterization. The surface morphology of cogon grass was visualized in a JEOL JSM-6380LA analytical Scanning Electron Microscopy (SEM). The materials were treated with 8% NaOH to remove impurities and placed in a vacuum dry oven at 60oC overnight. A small piece of specimen (0.5 cm2) was placed onto a double-sided tape of the specimen stub. The specimen was lightly pressed by a release paper and coated with a thin layer of gold-palladium film before it was submitted to SEM for visualization of the fibre surface morphology characteristic.

Results and discussions

Chemical compositions characterization. Table 1 shows the overall mean of the chemical compositions of cogon grass fibre. However, the cellulose content in cogon grass is 37.13%, higher than the vine stems, which has proven to be a successful alternative fibre for pulp and paper-based . In pulp and paper industry, cellulose is an important constituent in paper making because the higher content of cellulose produces a higher quality and stronger paper. The high cellulose content in cogon grass is advantageous as higher pulp yield will be

The cogon grass is characterized by relatively low hemicellulose content compared to non-wood resources and relatively close to wood resource (Eucalyptus globulus) as shown in Table 1. This amount could contribute to the strength of pulp and paper product . Moreover, the lignin content in cogon grass (5.67%) was the lowest than the published non-woods (20 - 28%) as well as woods fibre (19.9 - 26.2%). Lignin is considered to be an undesirable polymer that is removed during pulping process . Lower lignin content indicate lesser chemicals needed during the Applied

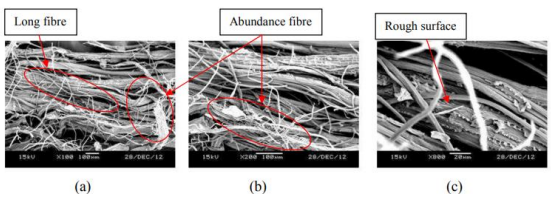
Mechanics and Materials Vols. 773-774 1243 pulping and bleaching processes and ultimately reducing both the energy needed for processing and the hazardous chemical wastes released to the environment.

The 1% NaOH solubility content is the lowest in cogon grass (19.64%) compared to vine stems (37.8%). Low solubility indicates less fibre degradation during the chemical pulping process and thus the pulp yield would be high. Moreover, the hot water solubility content in cogon grass (3.83 %) is slightly higher than wood plants (2.0 - 2.8%) but very much lower compares to other the non-wood vine stems (13.9%). Lower hot water solubility content will also yield higher pulp content after the pulping process. Finally, the ash content obtained in cogon grass (8.24%) is higher than other non-woods (3.9 - 6.7%) and wood (0.5 - 0.6%). High content of ash could contribute to low pulp yield [13], however, to analyse the suitability of cogon grass as an alternative fibre, overall parameters of chemical and physical compositions of the fibre and handsheet produced have to be taken under consideration.

Chemical properties (% w/w)	Raw materials					
	Non-wood fibre				Wood fibre	
	Cogon grass [This study]	Vine stems [7]	*Cynara Cardunclus* L. [8]	Canola straws [9]	*Eucalyptus* globulus [10]	Pine pinaster [10]
Cellulose	37.13	35.00	40.50	48.50	53.00	55.90
Hemicellulose	27.13	30.40	32.00	29.00	27.50	14.10
Lignin	5.67	28.10	25.40	20.00	19.90	26.20
1% NaOH solubility	19.64	37.80	n.a	n.a	12.40	7.90
Hot water solubility	3.83	13.90	11.50	n.a	2.80	2.00
Ash	8.24	3.90	6.70	6.60	0.60	0.50

n.a: non-available

Surface morphology characterization. The surface morphology analysis was carried out by Scanning Electron Microscopy (SEM). Figure 1 displays the SEM images of cogon grass observed under different magnification levels. The study on surface morphology was significant in understanding the distribution and arrangement of the plant fibre.



The fibre morphology of cogon grass consists of abundance and long fibres (more than 1.2 mm) as seen in Fig. 1(a) and (b). The long fibres in cogon grass will produce high strength of handsheet due to the compact interfibre link during the paper-based process Fig. 1 (c) shows that Long fibre Rough surface Abundance fibre 1244 International Integrated Engineering Summit 2014 the fibre consists of rough of surfaces that protect the lignocellulosic content in this fibre. As previously explain, cogon grass has high content lignocellulosic that are shown in Fig. 1 (a) and (b) with linear fibrillar arrangements.

Conclusions

This study revealed that the cellulose and hemicellulose content of cogon grass are comparable to other published non-wood and wood fibre resources that have been successfully used in pulp and paper-based processes. The lignin content indicates that cogon grass fibre presented the lowest than all other non-wood and wood resources whereas the 1 % NaOH and hot water solubilities are considered low and comparable to other published wood plants. Finally, the SEM images of cogon grass fibre indicate that it has compact, abundance and long fibre that will provide high strength of the handsheet produced. Based on the chemical compositions and surface morphological studies, cogon grass fibre is a suitable candidate as a non-wood alternative fibre for pulp and paper making.

Bindu
B-Pharm 4th year

Antibacterial efficiency of carbon dots against Gram-positive and Gram-negative bacteria

Introduction

Bacterial infections have become a significant threat to humanity by bringing various challenges such as the emergence of multiple diseases, decomposition of industrial supplies, foods, and pharmaceuticals. Currently, antibiotics play a significant role in combating infectious diseases caused by pathogenic bacteria. Since the discovery of penicillin in 1928, the invention of novel antibiotics revolutionized the medical field by saving billions of lives from the threat of bacterial infections. However, the poor solubility and low bioavailability of many antibiotics demand their frequent use in high doses . Consequently, the extensive and imprudent use of antibiotics results in the emergence of drug-resistant bacteria that develop antimicrobial resistance (AMR).

Nowadays, remarkable interest has been given to the inherent antibacterial properties of nanoparticles (NPs), and several research reports support their bacteriostatic and bactericidal efficiency against both Gram-positive and Gram-negative types of bacteria . NPs can directly act on the bacterial cell wall as they have a comparable size with the microbial system. Since they rely on different antibacterial mechanisms, NPs are less likely to promote bacterial resistance than antibiotics . However, for the extensive bactericidal application of NPs, their limitations such as toxic effects, complex and expensive synthesis routes, agglomeration, etc. have to be resolved.

Nanomaterials as antimicrobial agents

Nanomaterials (NMs) have gained a noticeable impact on diverse applications owing to their outstanding properties benefiting from their relatively larger surface area and quantum confinement effect . Various organic and inorganic nanomaterials such as lipid-based nanostructures , chitosans and their derivatives cellulosic nanostructures , several other polymeric nanomaterials , metal-based NPs

Carbon dots: potential antibacterial agents

At the edge of the continuous development of AMR, the global community is in urgent need of less toxic and efficient antibiotic-independent antibacterial agents to treat infectious diseases. Among the various approaches to inactivate pathogenic bacteria, CDs have arisen as a competent bactericidal agent. The photodynamic inactivation of bacteria using CDs is a safe process with minimal side effects. This method is suitable for rapid and repeated application and it has negligible invasiveness

Gram-negative and Gram-positive bacteria

Bacteria are single-celled prokaryotic organisms that lack a few organelles and a well-defined nucleus. The cell envelope of bacteria consists of a plasma membrane and cell wall. The primary function of the cell wall is to protect the bacteria from internal pressure. Based on their structure and cell wall characteristics, bacteria are classified as Gram-positive or negative type . The Gram-positive bacteria have thick but, porous peptidoglycan cell wall (20–80 nm) compared to it.

Antibiotic resistance

Antibiotics are chemical compounds that can either inhibit bacterial growth or kill the bacteria by attacking the vital functions in the bacterial cell. The invention of antibiotics has brought notable developments in the treatment of infectious diseases. Natural antibiotics are chemicals produced by one microbe to inhibit the growth of another. Synthetic antibiotics are designed with similar chemistry to natural antibiotics to treat bacterial diseases. The antibiotics may act on bacteria in…

Mechanisms of antibacterial activity of CDs

Over the past few years, CDs are among the most widely studied antibiotic-independent bactericidal materials . The nontoxicity, photostability, ease of surface functionalization that can be useful for better bacterial interactions, abundance of low cost and nontoxic precursors that helps inexpensive and safe synthesis are the advantages of CDs over other antibacterial agents . The antibacterial mechanism followed by CDs is a complex and different process from that of conventional

Major concerns

The possible impacts of CDs on the host are a major concern in their bactericidal applications. Improved toxicity towards bacterial cells but, reduced toxic effect on the human body is preferred. The possible photodegradation cytotoxic effects of CDs remain unknown.

Conclusion

With their negligible cytotoxicity and excellent biocompatibility, CDs are potential antibacterial agents that can effectively alter conventional antibiotics at the edge of increasing antibacterial resistance. Present review summarizes the antibacterial capability of CDs against Gram-positive and Gram- negative bacteria. Multiple mechanisms of bacterial resistance, the photo induced antibacterial potency of CDs, various bactericidal mechanisms involved and factors that influence

Srikavya

Pharm D

Long Covid patients find relief with Alternative therapy

Christie Stabile, 56, was first diagnosed with COVID in May 2020. While she initially recovered, within a few weeks she started experiencing extreme fatigue, dizziness, and a rapid, irregular heartbeat. Eight months later, she was diagnosed with long COVID, as well as mast cell activation syndrome and postural orthostatic tachycardia syndrome, two conditions often tied to long COVID.

"I came down with COVID four more times, which didn't help the situation," said Stabile, who lives in Clifton, New Jersey. "Each time, I'd develop an inflammatory response that led to rashes; swollen, blue feet; and a heartrate that went through the roof for no reason at all."

While her long COVID is managed by a team of specialists that include a cardiologist, hematologist, and gastroenterologist, she's also turned to complementary therapies. These include everything from red light therapy, over-the-counter supplements such as BPC-157, vitamin B infusions and apheresis, or "blood washing." Much of the time, these therapies haven't been covered by insurance, so she has spent thousands of dollars out of pocket.

Stabile is among the 6% of people infected with the SARS-CoV-2 virus who go on to develop long COVID, according to the World Health Organization. While researchers have made many advances when it comes to understanding and treating the condition, finding relief may still prove elusive to many, noted long COVID specialist David Putrino, PhD, professor in the Department of Rehabilitation and Human Performance at the Icahn School of Medicine at Mount Sinai, New York City.

As a result of the lack of standard treatments, many patients with long COVID — more than 4 in 10, according to one study — are turning to alternative medicine approaches that some find effective in treating their symptoms.

A 2025 study published in the *Journal of Integrative and Complementary Medicine* found that about 45% of people with long COVID turn to complementary and integrative health approaches to treat their condition.

"Five and a half years after the pandemic began, there are still no Food and Drug Administration-approved treatments for long COVID," said Purina. "When a vacuum like this exists, the unscrupulous take advantage. There's a lot of snake oil out there."

But there are also some complementary treatments that do work and may be worth trying, he noted. In fact, the most common treatments used by patients with long COVID in the *Journal of Integrative and Complementary Medicine* survey were massage, yoga, and meditation — all of which have been found to be effective in some cases, researchers said.

Here's a closer look at what studies show may be worth trying and not:

Supplements. Certain supplements, such as coenzyme Q10 and alpha lipoic acid, anecdotally seem to help to improve symptoms of long COVID, said Putrino. One small 2022 study published in the journal *Clinical & Experimental Medicine* found that a combination of the two (100 mg of coenzyme Q10 and 100 mg of alpha lipoic acid) helped to improve fatigue in patients with long COVID, with over half reporting a complete resolution of this symptom after 2 months.

"Both help to repair mitochondrial function, which is impaired in people with long COVID," explained Purina. Other useful supplements include vitamin C and NAD plus for fatigue and proteolytic enzymes to treat micro clots. "If we see signs of endothelial dysfunction during a workup, we'll often recommend all of these," he said.

Certain whole foods also contain nutrients that may be beneficial to patients with long COVID, he added. "They not only provide these nutrients but also have bioactive compounds, fibre, and antioxidants to improve their absorption," he said. Alpha lipoic acid, for example, is found in spinach, broccoli, and tomatoes,

Because supplements are much more loosely regulated by the FDA, it's also important to guide patients toward a third-party tested product (look for labels on the supplement, like United States Pharmacopeia or US National Science Foundation verified), added Andrew Schemes, MD, lead physician of the Post-COVID Recovery Program at The Ohio State University Wexler Medical Centre, Columbus, Ohio.

Patients should avoid peptide supplements, which are often sold at longevity clinics and touted to help treat long COVID. "There's no evidence to show they can help with symptoms, and they can have potentially serious side effects like nausea, vomiting and blood pressure fluctuations," said Purina.

Mindfulness-based therapies. Several mindfulness-based techniques, such as breath training, have been consistently shown to help with symptoms of long COVID. "Our research has shown that people with long COVID often have low levels of carbon dioxide, despite normal respiratory rates," said Purina. "Certain techniques, such as resonant breathing, increases CO_2 levels, and they also activate the parasympathetic nervous system to regulate heart rate and blood pressure."

One small 2025 study of 13 patients with long COVID published in *Advances in Rehabilitation Science and Practice* found that patients who did this technique — which consists of a 4 second inhale and 6 second exhale through the nose — for 10 minutes, twice daily for 4 weeks, had a significant reduction in long COVID symptoms like fatigue, breathlessness, palpitations, dizziness, pain, and brain fog.

One easy activity patients can do on their own is hum. "Humming increases nitric oxide levels, which makes it easier for your body to carry oxygen," explained Putrino. "Here at Mount Sinai, we've partnered up with a few music therapists who hum with patients, and in the very short term, it seems to help."

Other mindfulness-based practices, like yoga and meditation, may also be helpful. One 2024 study published in the journal *Frontiers in Psychology* found that people with long COVID who participated in a 16-week tele-yoga program reported significant reductions in perceived levels of stress, anxiety, and insomnia.

"These are relatively simple, inexpensive techniques patients can easily do on their own, that also carry other health benefits," said Schemes.

Massage. Stephanie Fowler, 44, who has been living with long COVID since 2020, said that massage has been one of the most helpful therapies she's tried for symptoms such as joint pain and headache.

"Over the years, I've tried everything from supplements to diet changes to breathing therapy to cupping and acupuncture," said Fowler, a Chicago psychotherapist. "Massage is the one complementary treatment I've found to be consistently effective." She pays $170 for a 90-minute massage once a month.

Research suggests massage may be effective. A 2024 review of 17 studies published in the *International Journal of Therapeutic Massage & Bodywork* concluded that patients who experience symptoms associated with long COVID, like muscular and joint pain, fatigue, dyspnea, sleep disturbances, and cognitive impairment, may benefit from massage therapy. "It may also have more of an indirect effect, by helping to relieve some of the anxiety and stress that go along with long COVID," said Schamess.

Red light therapy. Stabile, who experiences frequent headaches because of her long COVID, finds that a red-light therapy collar helps to relieve her symptoms. Red light therapy, where low levels of red light are directed at your skin, is often touted as a long COVID treatment, to help with everything from cognitive impairment to joint pain. There is research to back up its use.

"Red light stimulates mitochondrial function, and improves cellular energy production," says Putrino. A 2023 study found that it did relieve symptoms associated with long COVID such as "brain fog" and fatigue.

While more studies need to be conducted on its effectiveness, patients can purchase a red-light lamp on sites such as Amazon for a couple hundred dollars, noted Putrino. They should look for one that is between 600-900 nm. "Some patients who use it daily for three to four weeks report that it really helps," he said. "It's reasonable to try, to see if it works."

Hyperbaric oxygen. Hyperbaric oxygen has been touted as a potentially effective treatment for long COVID. This therapy has traditionally been usėd to treat divers with decompression sickness. A 2025 study published in the journal *Scientific Reports* found mixed results: while up to 63% of patients saw improvement in their long COVID symptoms after using hyperbaric oxygen daily for 3 months, a significant number — 13%-19% — saw their symptoms worsen. But the cost and time commitment make it an unreasonable option for most people, said Shames.

While other treatments, such as stem cell therapy or blood washing, are still marketed by some clinics to treat long-COVID symptoms, “these are pure snake oil,” said Schemes’. “They are unproven, and potentially dangerous, which is why it’s so important that every patient talk to their medical provider before they try any complementary or integrative treatment.”

Fowler agreed. As a psychotherapist, she says that she’s counselled many other patients with long COVID who are desperate for relief — and answers.

“I’ve always been someone who has one foot in traditional treatments, and one foot in complementary ones,” she explained. “But it’s important to remember that there are no FDA-approved complementary or integrative treatments for long COVID. But I always warn my clients to be cognizant that there are many practitioners who are banking on making a lot of money on people’s desperation to get relief. They always need to run them by their long COVID physician, or if they don’t have one, their primary care provider, before they spend previous time and money on these therapies.

T. Santhu
PharmD 4 th year

INNOVATIONS TO IMPROVE MANAGEMENT IN RARE DISEASES

Patients with rare diseases characteristically experience prolonged diagnostic journeys, commonly termed the "diagnostic odyssey," marked by delayed diagnosis, multiple specialist consultations, and substantial financial burden [2]. Key characteristics of this phenomenon include:

Delayed Diagnosis: The average diagnostic delay spans 4–6 years between symptom onset and definitive diagnosis, with patients averaging 17 physician visits before diagnostic confirmation [2][3]. Primary care physicians demonstrate particular reluctance to pursue rare disease investigations, with only 19% reporting good or excellent knowledge of rare diseases compared to 59% of specialists [5].

Misdiagnosis: The clinical heterogeneity and rarity of symptom presentations frequently result in initial misdiagnosis as psychiatric disorders, functional disorders, or more common medical conditions. Notably, some rare disease patients have been historically misdiagnosed with hysteria due to the presence of profound paralysis concurrent with minimal objective sensory findings [9].

Economic Consequences: Diagnostic delays generate substantial economic burden, with delayed diagnosis resulting in approximately $17,000–$517,000 in avoidable costs per patient, coupled with productivity losses averaging 231 days of work annually

Barriers to Accurate Diagnosis

Multiple systemic and individual-level factors contribute to diagnostic delays in rare diseases:

Limited Healthcare Provider Awareness: Many medical graduates receive insufficient training in rare disease recognition. Studies demonstrate that 57% of primary care physicians rate their rare disease training as neutral, ineffective, or very ineffective [2].

Clinical Complexity and Phenotypic Heterogeneity: The diverse and overlapping clinical presentations of rare diseases necessitate specialized diagnostic approaches. Clinical manifestations can vary substantially among patients with identical genetic mutations, reflecting variable penetrance and expressivity [1][2].

Absence of Validated Diagnostic Endpoints: Many rare diseases lack established natural history data and validated clinical endpoints,

Absence of Validated Diagnostic Endpoints: Many rare diseases lack established natural history data and validated clinical endpoints, complicating accurate diagnosis and disease progression assessment [10].

Resource Constraints: In low- and middle-income countries (LMICs), limited access to advanced diagnostic technologies, specialized expertise, and diagnostic infrastructure substantially prolongs diagnostic timelines [5].

Genomic Technologies and Diagnostic Advancement

Next-Generation Sequencing and Whole-Exome Sequencing

Genomic technologies, particularly NGS and WES, have revolutionized rare disease diagnosis by enabling rapid and cost-effective identification of disease-causing genetic mutations [6]. These technologies provide several advantages:

Enhanced Diagnostic Accuracy: NGS and WES significantly accelerate the identification of genetic mutations in rare metabolic and neurodevelopmental disorders, which often present with nonspecific clinical features [6]. Application of these technologies has substantially increased detection rates of disease-causing genes in pediatric neurology, providing improved prognostic clarity [6].

Reanalysis and Emerging Insights: Ongoing reanalysis of previously collected genomic data yields new diagnoses in previously unresolved cases, as advances in bioinformatics continuously expand our understanding of gene-disease relationships [6].

Clinical Utility: Early and accurate genetic identification facilitates targeted treatment approaches, provides essential information for genetic counseling, and enables access to clinical trials and emerging therapies [6].

Pharmacogenomics and Precision Medicine

Pharmacogenomic approaches increasingly support rare disease management by utilizing genomic data to guide drug selection, dosage optimization, and prediction of adverse reactions [1]. Large-scale genetic mapping resources, such as gnomAD and GenomeAsia, provide variant frequency data that improve diagnostic mutation identification accuracy and enable development of more precise diagnostic tools [1].

Artificial Intelligence and Machine Learning in Rare Disease Diagnosis

Overview of AI and ML Applications

Artificial intelligence and machine learning represent transformative technologies for rare disease diagnosis, capable of analyzing vast datasets comprising clinical, genetic, and imaging information to identify diagnostic patterns and predict diagnoses with greater accuracy and speed [1][7]. The applications of AI in rare disease diagnosis include:

Clinical Decision Support Systems: Differential diagnostic tools such as Isabel Healthcare DDx companion integrate patient symptoms, clinical findings, and laboratory markers to generate prioritized diagnostic suggestions ranked as "more likely," "likely," and "less likely"[11]. These systems encompass thousands of possible diagnostic categories, enabling rapid consideration of rare disease diagnoses that might otherwise be overlooked [11].

Pattern Recognition: Machine learning algorithms can identify subtle patterns in clinical, genetic, and imaging datasets that human clinicians might miss, particularly valuable for rare diseases with atypical presentations [1][7].

Personalized Treatment Planning: AI and ML technologies enable analysis of individual patient characteristics to customize treatment plans and predict therapeutic responses [1].

Performance of AI Diagnostic Tools

Contemporary research examining AI diagnostic tools in rare disease settings provides valuable insights into their clinical utility and limitations:

Isabel Healthcare Validation Study: A prospective study of 100 patients with undiagnosed rare disease presentations revealed that among the top ten diagnoses suggested by Isabel Healthcare, 28% matched at least one diagnosis identified by interdisciplinary case conferences [11]. The study demonstrated a positive correlation between Isabel Healthcare's categorization of diagnoses as "more likely" and matching with expert clinical decisions, suggesting potential alignment in clinical reasoning [11]. However, 66% of cases demonstrated no matching diagnoses between the top ten suggestions and expert assessments [11].

Rare Disease Education and Healthcare Professional Training

Current State of Rare Disease Education

Medical education regarding rare diseases remains inadequate globally. A systematic scoping review of 11 studies examining rare disease education in medical schools revealed diverse pedagogical approaches with variable implementation at international institutions [5]. Educational interventions employed included:

- Lectures (63.6% of programs)
- Case studies (54.5%)
- Simulation-based training (36.4%)
- Small group discussions (36.4%)
- Technology-based interventions (27.3%)
- Workshops (18.2%)
- Mentorship programs (9.1%) [5]

Patient-Centered Educational Approaches

Integrating patient and caregiver perspectives into rare disease education demonstrates substantial positive impact on medical student attitudes, knowledge, and clinical confidence [5]. An interactive rare disease patient panel at Georgetown University School of Medicine, involving first-year medical students, revealed significant improvements in:

- Correct identification of rare disease prevalence: 10.3% → 38.5% ($p < 0.001$) [5]
- Recognition of rare diseases as public health concern: 34.8% → 88.2% ($p < 0.001$) [5]
- Correct identification of average diagnostic delay: 23.7% → 68.2% ($p < 0.001$) [5]
- Student confidence in caring for rare disease patients: 62.4% rated "very unconfident" pre-panel → 55.0% rated "somewhat confident" post-panel ($p < 0.001$) [5]

These findings underscore the effectiveness of experiential learning and direct patient engagement in improving medical student understanding and clinical preparedness [5].

Technology-Enhanced Learning

Technology integration in rare disease education, including artificial intelligence decision support systems, virtual laboratories, and simulation-based training, shows promise in enhancing student engagement and diagnostic accuracy [5]. AI-based decision support systems for diagnosing specific rare conditions such as Hirschsprung disease have demonstrated improved diagnostic accuracy and reduced reliance on expert consultation, although vulnerability to false positives warrants caution [5].

Future Directions and Recommendations

10.1 AI-Enhanced Diagnostic Systems

Future development should prioritize AI diagnostic systems integrating filtered clinical expertise with machine learning capabilities, rather than pursuing autonomous AI diagnosis without expert clinical input [11]. Implementation of standardized clinical data entry protocols and structured clinical documentation would substantially improve AI tool accuracy and clinical utility [11].

10.2 Telemedicine and Digital Health Integration

Telemedicine and digital health solutions hold substantial potential for transforming rare disease care by improving access to specialized expertise, facilitating remote monitoring, and enhancing patient engagement, particularly benefiting patients in geographically remote or resource-limited settings [1].

10.3 Strengthened Research Infrastructure

Increased government and private funding supporting rare disease research, coupled with public-private partnerships involving NIH, academic institutions, and patient advocacy groups, can accelerate innovation in diagnostics and therapeutics [1]. Strategic funding mechanisms should prioritize areas addressing unmet diagnostic and therapeutic needs while fostering international collaboration [1].

10.4 Policy and Equity Initiatives

Policy reforms streamlining regulatory pathways for orphan drug approval, ensuring equitable access to treatments across socioeconomic strata, and harmonizing rare disease definitions internationally remain essential for advancing rare disease care [1]. Addressing healthcare infrastructure disparities in LMICs through targeted interventions and supporting clinical trial diversity remains critical [1].

10.5 Patient-Centered Care and Advocacy

Integrating patient perspectives into medical decision-making, ensuring comprehensive patient education about conditions and treatment options, and empowering patient advocacy groups to drive research priorities and policy development strengthens rare disease care quality and outcomes [1][5].

11. Conclusion

Rare diseases represent a complex, multifaceted global health challenge affecting hundreds of millions of individuals and encompassing thousands of distinct conditions. Despite recent technological advances, diagnostic delays persisting 4–6 years remain unacceptably prolonged, resulting in substantial morbidity, mortality, and economic burden. The integration of genomic technologies, particularly NGS and WES, has substantially improved diagnostic accuracy for genetic rare diseases. Simultaneously, artificial intelligence and machine learning applications show promise in supporting clinical decision-making through differential diagnostic tools that analyze complex datasets to identify rare disease diagnoses potentially overlooked by isolated clinician assessment.

However, critical limitations remain in the autonomous application of AI diagnostic systems; optimal performance requires integration of clinician expertise in filtering, contextualizing, and interpreting clinical information. Patient education initiatives and technology-enhanced learning demonstrate substantial potential in improving medical student knowledge, attitudes, and clinical preparedness for rare disease care.

Future progress mandates coordinated efforts across researchers, healthcare professionals, policymakers, and patient advocacy groups. Essential priorities include strengthening international collaboration and data-sharing networks, reducing healthcare infrastructure disparities affecting LMICs, integrating mental health support into comprehensive rare disease care pathways, harmonizing rare disease definitions across geographic regions, and continuing development of cost-effective diagnostic and therapeutic innovations. By leveraging emerging technologies, prioritizing patient-centered approaches, and addressing systemic healthcare disparities, the medical community can substantially reduce diagnostic odysseys and improve outcomes for individuals and families affected by rare diseases globally.

HARSHIT OZA
Pharm D 4th Year

National Pharmacy Education Day – Pharma Anveshan 2026

The National Pharmacy Education Day, *Pharma Anveshan – 2026*, was celebrated on *6th March 2026* from *10:00 am to 12:00 pm* at the *MRIPS Auditorium*, Malla Reddy Institute of Pharmaceutical Sciences (MRIPS), Maisammaguda, Dhulapally, Secunderabad.

Theme: “Future Pharma Ecosystem: Fostering Synergy among Academia, Industry, Regulatory and Practice”.

Organizing Team:
- *Convenor*: Dr. H. Ramana, Dean & Professor, MRIPS-MRV.
- *Co-Convenor*: Dr. J. Sangeetha, Vice Principal & Professor, MRIPS-MRV.
- *Organizing Secretary*: Mrs. Sunanda Sabbithi, Associate Professor, MRIPS-MRV.
- *Organizing Coordinator*: Mrs. B. Revathi, Associate Professor, MRIPS-MRV.

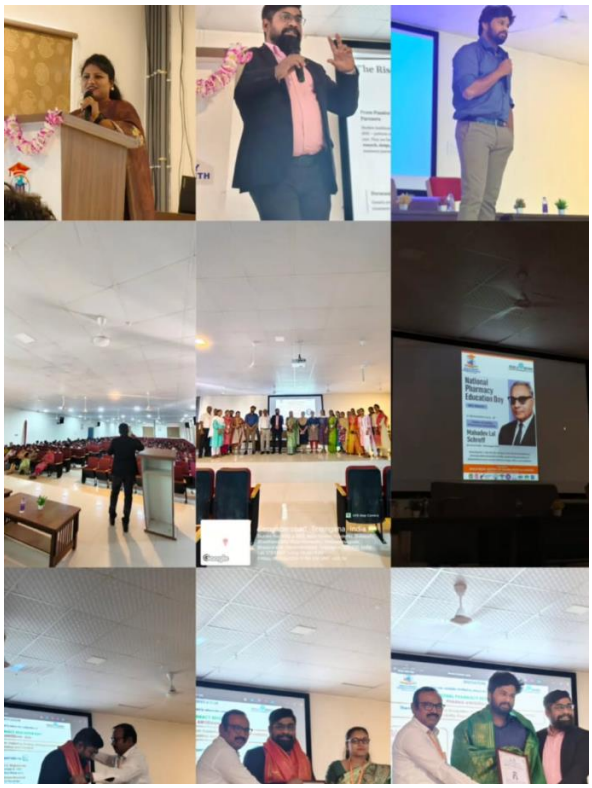
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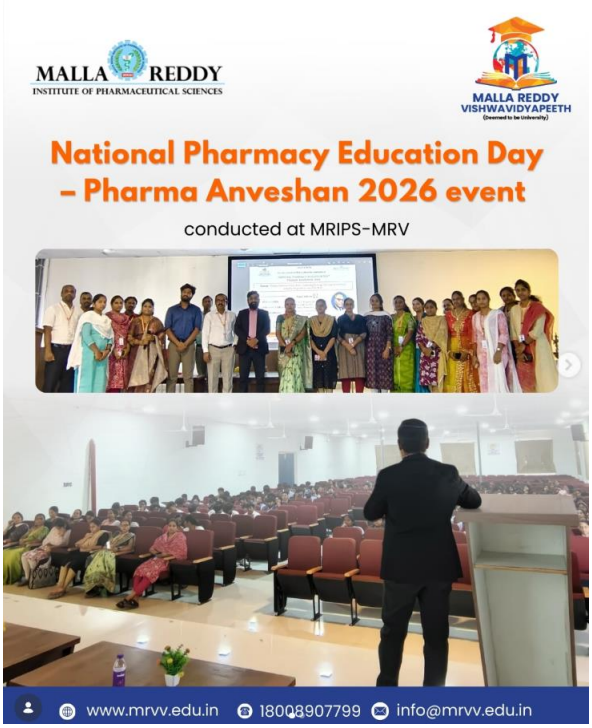
Expert Sessions:
1. *Prof. C.S. Mujeebudin*, Founder & CEO, Clinisol Research, delivered a talk on *“Fostering Synergy among Academia, Industry, Research, Regulatory and Practice”*. The session was engaging, interactive, and insightful.
2. *Mr. Kurma Manohar*, Co-Founder, Xiaonics Pvt Ltd and an alumnus of MRIPS, spoke on *“Accelerator and Incubation Centres”*. He highlighted the role of such centres in bridging industry-academia gaps and thanked the institution for giving him the opportunity to return to his alma mater as a speaker.

Special Highlights:
- The Dean of MRIPS felicitated both speakers, Prof. C.S. Mujeebudin and Mr. Kurma Manohar, recognizing their contributions.
- The event commemorated the *124th birth anniversary of Prof. M.L. Schroff (1902–1971)*.
- Sessions were highly interactive, fostering meaningful discussions on the future pharma ecosystem.

The program was organized by *Malla Reddy Institute of Pharmaceutical Sciences*, Maisammaguda, Dhulapally, Secunderabad – 500100.

specialized expertise, facilitating remote monitoring, and enhancing patient engagement, particularly benefiting patients in geographically remote or resource-limited settings [1].





MohanaLaxmi
Pharm.D 4th Year

My Class: A Mini World of Many Personalities

A journey filled with friendship, laughter, memories, talent, and beautiful madness.My class is not just a classroom; it is a complete package of drama, comedy, friendship, talent, and unlimited entertainment. Every day feels like a new episode of a reality show where nobody knows what is going to happen next.Our class has all types of people. We have toppers who get nervous even after studying everything, and we have brave souls who start searching for notes a few hours before the exam. We have first-bench students who answer every question and last-bench legends who somehow know all the college gossip before anyone else.Some students come to college to learn, some come to meet friends, and some seem to come mainly for attendance and canteen visits. There is always a group discussing assignments, another group sharing stories, and one special group planning whether to attend the next class or magically disappear before it starts.The word "silence" does not exist in our classroom dictionary. If a teacher is even a few minutes late, our classroom immediately transforms into a marketplace. Some are laughing, some are singing, some are eating snacks, some are taking photos, and some are busy creating memories that will be remembered long after college ends.One thing that perfectly describes our class is that we are always in a hurry. We rush to complete assignments before deadlines, run to class before attendance is taken, and somehow prepare for exams at the last moment. Looking at us, anyone would think we are completely unorganized, but somehow everything gets done on time.Our class is full of naughty moments, funny arguments, endless jokes, and unforgettable memories. We tease each other, laugh at each other, and sometimes even irritate our teachers, but these are the moments that make our class special. No matter how many small fights or misunderstandings happen, we always come back together like a family.The best thing about our class is the variety of personalities. We have singers, dancers, comedians, photographers, foodies, sleepers, overthinkers, leaders, and future professionals all under one roof. Every person adds a different flavor, making our class unique and lively.And yes, when it comes to our class, we have a little ego—and we are proud of it. Not the kind of ego that looks down on others, but the confidence that comes from knowing what we are capable of. Whenever there is a competition, seminar, cultural event, sports activity, or academic challenge, our class never backs down. We always step forward and prove ourselves. Behind all the fun, noise, and mischief lies a group of talented and hardworking students who know how to shine when given an opportunity.People may see us as noisy, naughty, and always laughing, but they also know that our class is one of the most talented and worthy classes in the college. We celebrate together, support one another, and push each other to do better. That is why our class is not just a group of students—it is a team.We may forget some lectures, some assignments, and even some exam questions, but we will never forget the laughter, the friendships, the inside jokes, the last-minute rushes, and the memories we created together.My class may be a little noisy, a little naughty, always in a hurry, and sometimes completely chaotic—but it is also full of talent, confidence, friendship, and heart. And that is exactly what makes it the best class in the college.

Sangeetha Raj Ranabhat
B.Pharm 3rd year

Artificial Inteligence in Drug Discovery and Drug Development

Introduction

Artificial Intelligence (AI) is transforming the pharmaceutical industry by making drug discovery and development faster, more efficient, and cost-effective. Traditional drug development often takes 10–15 years and costs billions of dollars, while AI technologies such as Machine Learning (ML), Deep Learning (DL), Natural Language Processing (NLP), and Reinforcement Learning (RL) help analyze vast biological and chemical datasets to accelerate decision-making. AI has become an essential tool for identifying drug targets, predicting molecular behavior, and improving the overall success rate of pharmaceutical research.

AI plays a critical role in the early stages of drug discovery by assisting in target identification, molecular modeling, virtual screening, and lead optimization. Advanced systems such as AlphaFold accurately predict protein structures, helping researchers understand disease mechanisms and design targeted therapies. Machine learning models can evaluate millions of chemical compounds, predict their biological activities, and identify promising drug candidates with greater speed and accuracy than traditional methods. Generative AI further enhances innovation by creating novel molecules with desired therapeutic properties, significantly reducing the time required for drug design and optimization.

Beyond drug discovery, AI supports preclinical and clinical development through toxicity prediction, pharmacokinetic modeling, dose optimization, and clinical trial design. AI-driven tools can detect potential adverse effects such as liver or heart toxicity before human testing, improving drug safety. In clinical trials, AI helps identify suitable patient populations, predict treatment responses, and optimize study protocols, leading to higher success rates and personalized treatment approaches. Real-world examples, including AI-designed drug candidates and advances in protein structure prediction, demonstrate the practical value of AI in accelerating pharmaceutical innovation.

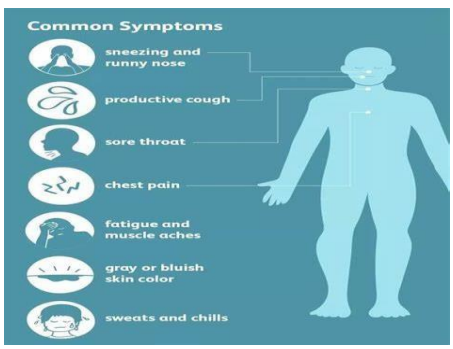
Conclusion:

Despite its significant advantages, AI adoption in drug development faces challenges related to data quality, regulatory approval, model transparency, and algorithmic bias. However, emerging technologies such as quantum computing, generative AI, and multi-omics integration are expected to further expand AI's capabilities. As pharmaceutical companies, researchers, and regulatory agencies continue to collaborate and improve AI frameworks, artificial intelligence is poised to become a cornerstone of future drug discovery, enabling the development of safer, more effective therapies while reducing costs and development timelines.

K.Shashank
B.Pharm 2nd year

Patient Counselling On Pneumonia

Pneumonia is a form of acute respiratory infection that affects the lungs. When an individual has pneumonia, the alveoli are filled with pus and fluid which makes breathing painful and limits oxygen intake.



Patient Counseling

- Breathing warm, moist air helps loosen the sticky mucus that may make
- you feel like you are choking. Other things

that may also help include:

- Placing a warm, wet wash cloth loosely near your nose and mouth.
- Filling a humidifier with warm water and breathing in the warm mist.
- Coughing helps clear your airways. Take a couple of deep breaths, 2 to 3
- times every hour. Deep breaths help open up your lungs.
- While lying down, tap your chest gently a few times a day. This helps
- bring up mucus from the lungs.
- If you smoke, now is the time to quit. Do not allow smoking in your home.
- Drink plenty of liquids, as long as your provider says it is OK.
- Drink water, juice, or weak tea.
- Do not drink alcohol.
- Drinking plenty of fluids is highly recommended if you are suffering from pneumonia.

Diet:

Foods To Be Included In Diet

- Orange is loaded with vitamin C which acts an antioxidant for the body.
- Foods such as eggs, tofu, cheese, legumes, and nuts are high in protein content.
- Include yogurt in your diet as it helps in strengthening the of pneumonia.

Foods To Be Avoid In Your Diet

- Dairy products should be avoided as it worsen the symptoms.
- Frozen foods are dangerous to health.
- Fried foods should be avoided as it increases the pressure of lungs.

Anil

Bpharm 2nd Year

THANK YOU

As we turn the final page of this edition, we reflect on the knowledge shared, ideas exchanged, and milestones achieved together. This magazine has been a celebration of innovation, research, and the endless possibilities that pharmacy brings to healthcare.

We extend our heartfelt gratitude to all the authors, faculty members, students, and contributors who made this journey possible.

Let's continue to learn, innovate and inspire for a healthier tomorrow.

Together, we make a difference.

Editorial Committee

Malla Reddy Institute of Pharmaceutical Sciences

See you in the next edition!