2.3. Teaching Learning Process

2.3.1. Student centric methods such as experiential learning, participative learning and Problem-solving methodologies are used for enhancing learning experiences using ICT enabled tools.

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2.3.1. Student centric methods such as experiential learning, participative learning and Problem-solving methodologies are used for enhancing learning experiences and teachers use ICT enabled tools including online resources for effective teaching and learning process.

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2.3.1. Student centric methods such as experiential learning, participative learning and problem-solving methodologies are used for enhancing learning experiences and teachers use ICT enabled tools including online resources for effective teaching and learning process.

This method acknowledges that each learner is different and has a preferred method of learning. It places a strong emphasis on critical thinking, self-directed learning, and active engagement. Student-centric education, as opposed to a curriculum that is designed for all students, gives them the freedom to choose their own learning objectives, investigate subjects they are interested in, and take charge of their education. This method places a strong emphasis on pupils in an effort to develop a lifelong love of learning and equip them to succeed in a world that is always changing. The Avanthi Institute of Pharmaceutical Sciences offers students a productive environment in which to cultivate the most recent abilities, information, attitudes, and values to appropriately mold their behavior. Every department runs cutting-edge initiatives that foster students' creativity, give them a stage to develop their problem-solving abilities, and guarantee participative learning. Every year, the institute hosts a technical fair where students present their creative creations that demonstrate what they have learned. Students are also encouraged to compete at the national and intercollegiate levels.

1. Experiential Learning

2. Participation Learning

3. Problem-Solving Methodologies

1. EXPERIENTIAL LEARNING:

Experiential Learning is the process of learning by doing. By engaging students in hands-on experiences and reflection, they are better able to connect theories and knowledge learned in the classroom to real-world situations.

1.1. Open Ended Experiments

1.2. Working Models

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1.3. Simulation Software Experiments

1.4. Internships

1.1 Open Ended Experiment (OEE):

B. Pharmacy, PharmD & M. Pharmacy students gain knowledge in theory by taking part in the pragmatic learning in various laboratories located within the institute. Faculty has designed various experiments according to the syllabus assigned by the JNTUH. Students gain practical awareness through live activities and handling the instruments such as Pharmaceutical Analysis instruments operation UV – Visible Spectrophotometry, HPLC, Pharmacology laboratory experiments with animals, and Pharmaceutical Chemistry etc.,

Open Ended Experiments (OEE) improve learning results in research facility operations by encouraging self-reflection and solace while they develop experiments related to their field of study. Students will become self-directed, introspective, and capable thinkers who can organize data, collaborate with others, and think critically—all of which are incredibly beneficial in a highly competent and professional manner. Students get an opportunity to apply the theoretical prospects in the form of practical by following the syllabus framed by affiliating University JNTUH. Students are likely encouraged to understand the theoretical concepts in scientific manner through demonstrations and handling of instruments

Industrial Pharmacy lab performed by III. Pharmacy students

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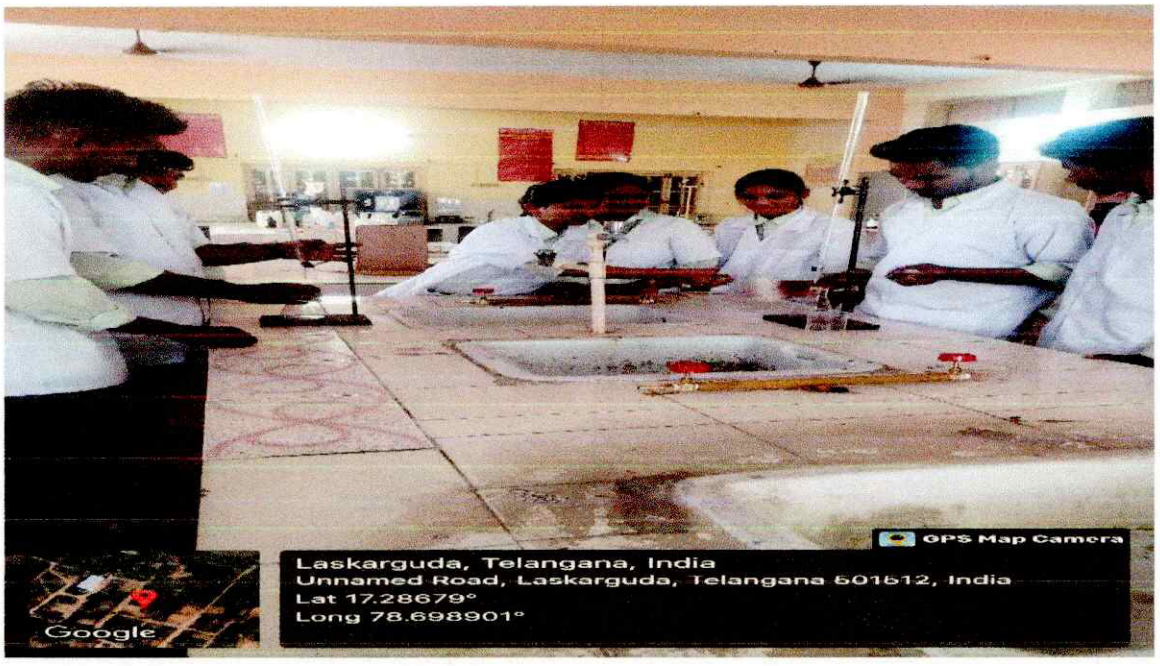

In-Organic chemistry lab performed by I. Pharmacy students

Pharmacognosy lab performed by II. Pharm D students

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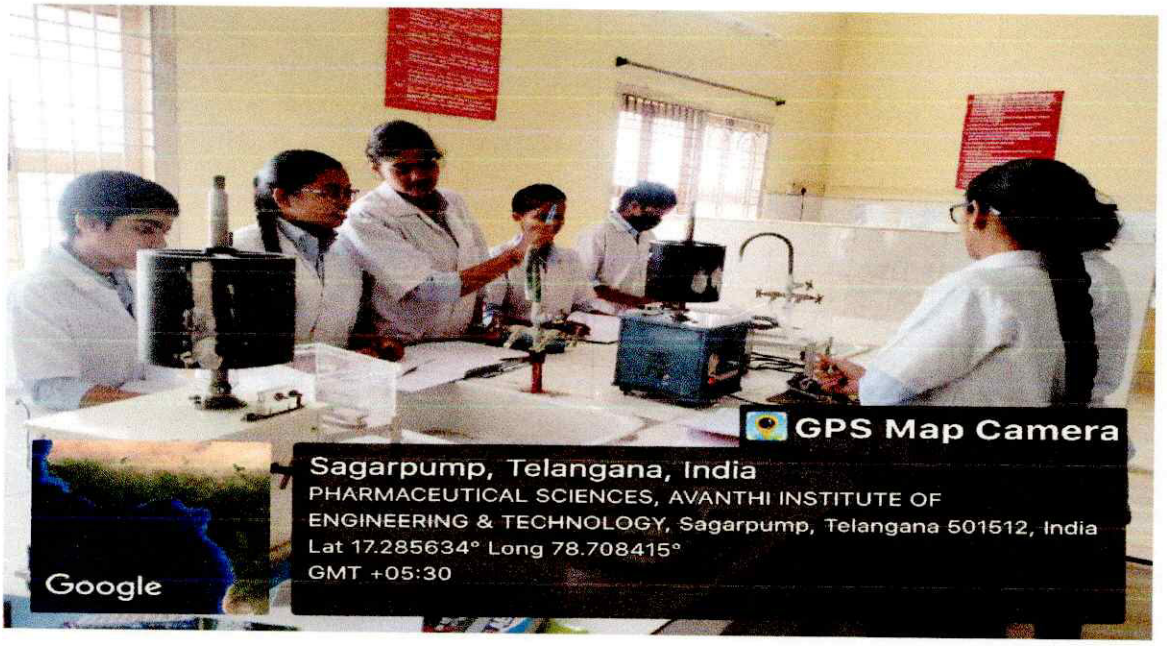

Pharmacology lab performed by III. B. Pharmacy students

Handling of UV Spectrophotometer by M. Pharmacy I year students

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1.2. Working Models:

The adage is to urge the students to plan and show working models of different ideas and concepts. Those models can likewise be shown in specialized occasions for clear vision of the subject. Presentation of working models by the students of Avanthi Institute of Pharmaceutical Sciences. Working models hold significant importance in pharmacy education as they serve as invaluable tools for bridging the gap between theory and practice. Pharmacy, being a field that demands precision and practical expertise, benefits immensely from hands-on learning experiences, Avanthi Institute of Pharmaceutical Sciences provides these models to students with a tangible representation of complex pharmaceutical processes, drug formulations, and equipment, allowing them to gain practical skills and a deeper understanding of the subject matter. Moreover, they create a safe environment for students to practice pharmaceutical procedures, reducing the potential for errors and ensuring they are well-prepared for their future roles in pharmacy practice. Through working models, pharmacy students can actively engage with the material, reinforce their "knowledge, and develop the essential skills necessary for success in their career as pharmacists

BIO ADHYAYAN MODELS PRESENTATION

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Working Models Prepared by II Pharma D Student

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Working Models Prepared by III Pharma D Student

Working Models Prepared by III B. Pharma Students

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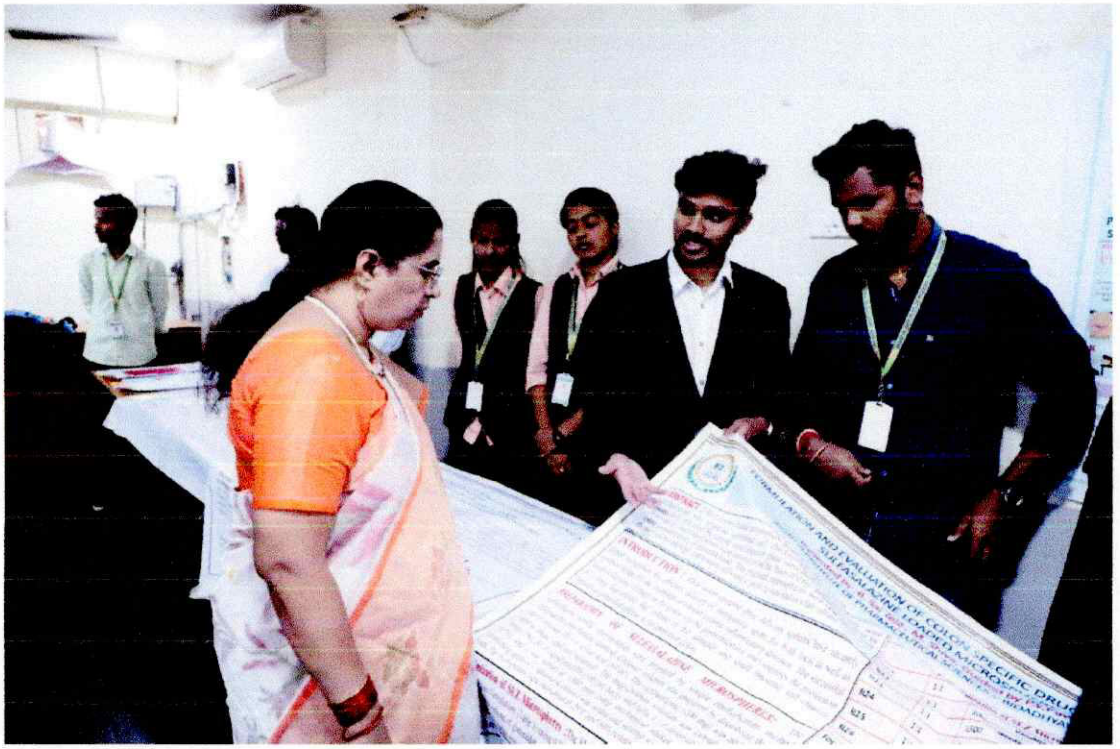

Poster Presentation by IV B. Pharm Students

1.3. Simulation Software Experiments:

Stimulation offers unique learning conditions with versatile and reasonable evaluation, which are valuable open doors. Avanthi Institute of Pharmaceutical Sciences procured various simulation software's, like Ex-pharma and CLINIREX software. Simulation software plays a vital role in pharmacy education, offering a host of benefits that enhance the learning experience. In the pharmacy field, where precision, safety, and real-world application of knowledge are paramount, simulation software provides students with a unique opportunity to practice a wide range of pharmaceutical tasks and scenarios in a controlled, risk-free environment. Whether it's simulating patient consultations. compounding medications, or conducting virtual clinical trials, these software tools allow students to develop essential skills, improve their decision-making abilities, and gain exposure to diverse pharmaceutical situations. Furthermore, they encourage active engagement, critical thinking, and problem-solving, all of which are essential competencies for future pharmacists. Simulation software

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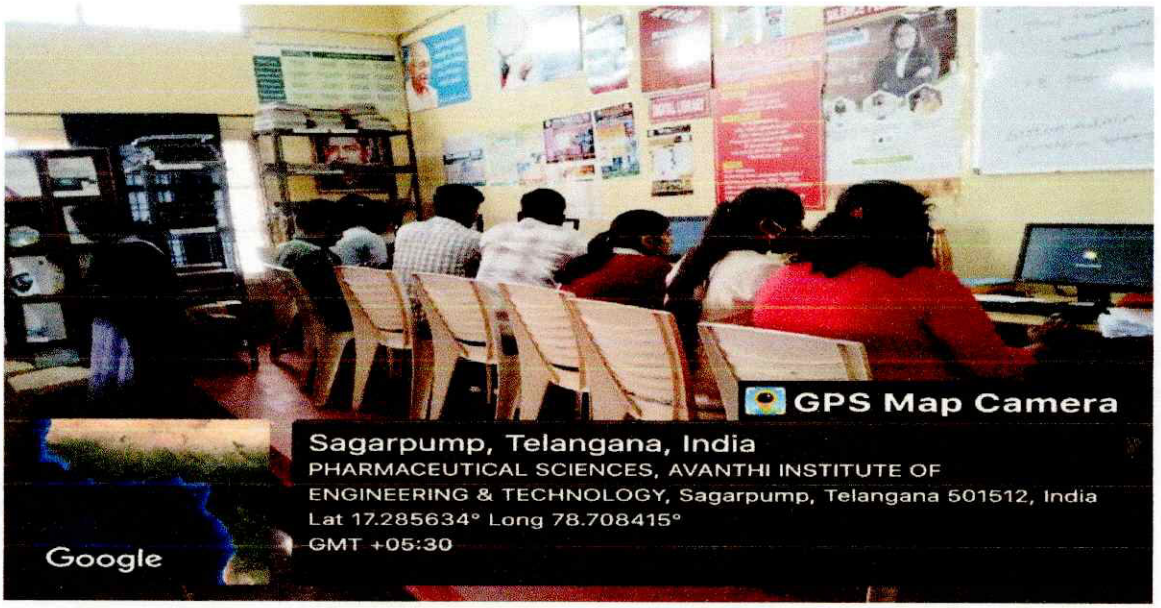
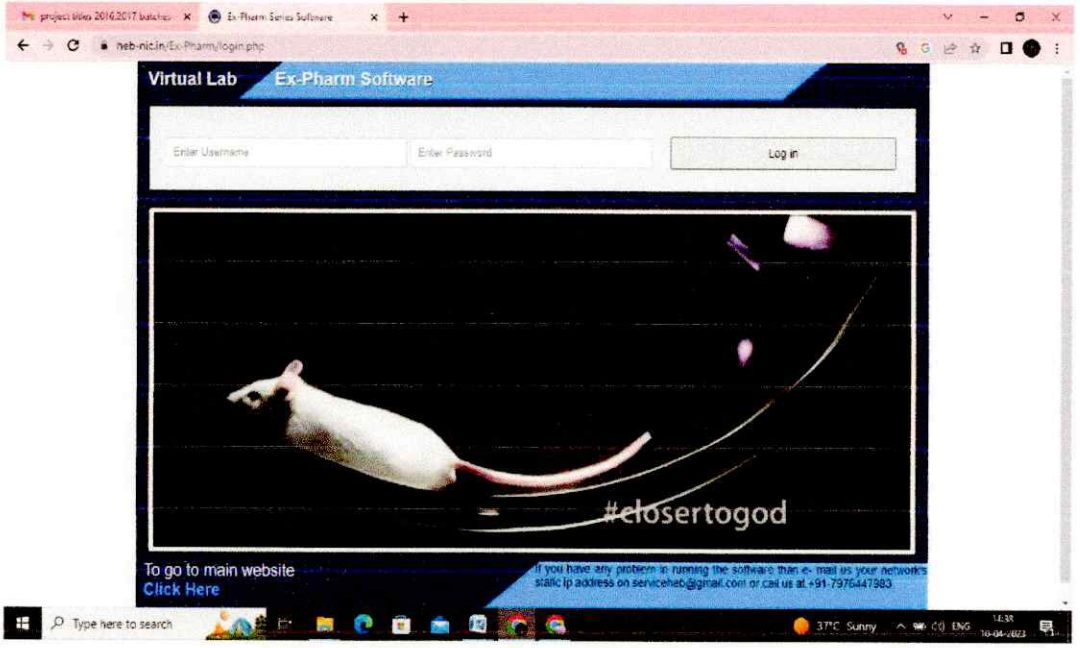
not only complements traditional classroom instruction but also prepares pharmacy and demands of the evolving healthcare landscape



Case study performed by IV Pharm D students through CLINIREX software



Animal Experiments demonstration Through EX-PHARMA Software (Virtual Labs)

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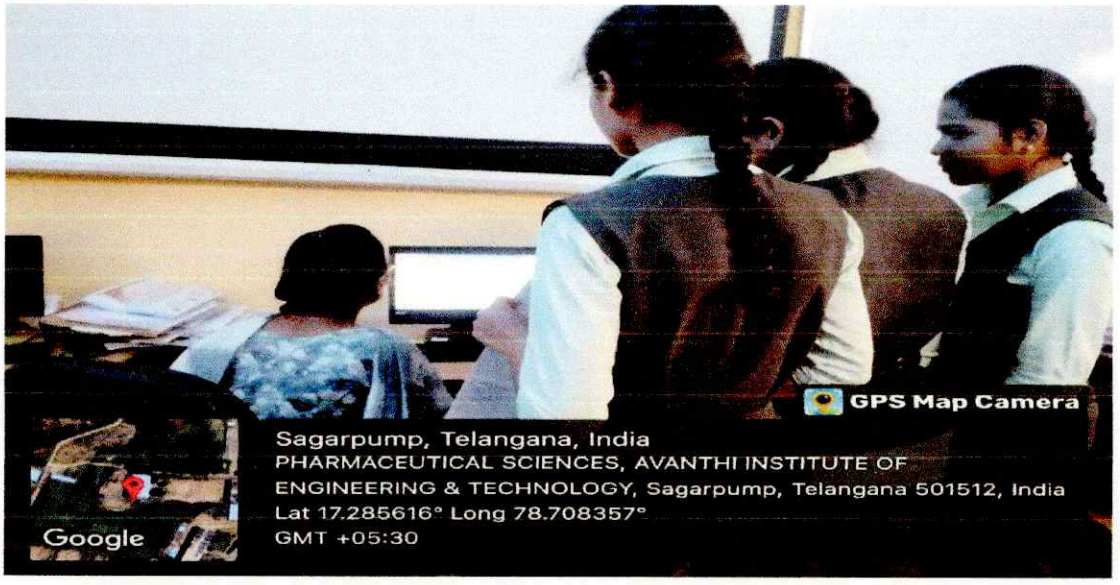
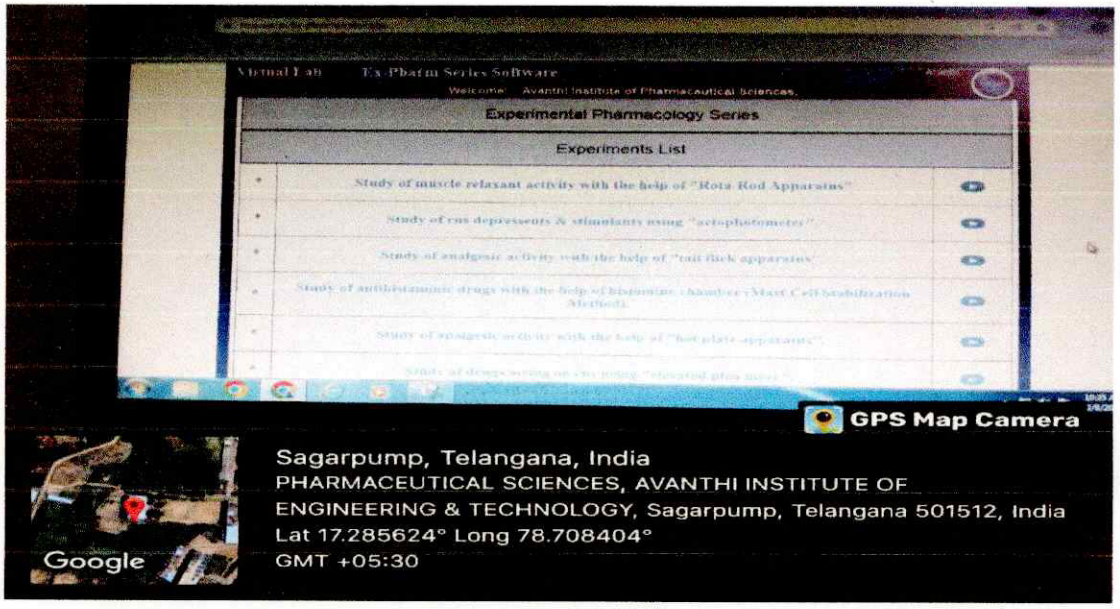


Case study performed by III Pharm D students through CLINIREX software



Index of EX-Pharma software

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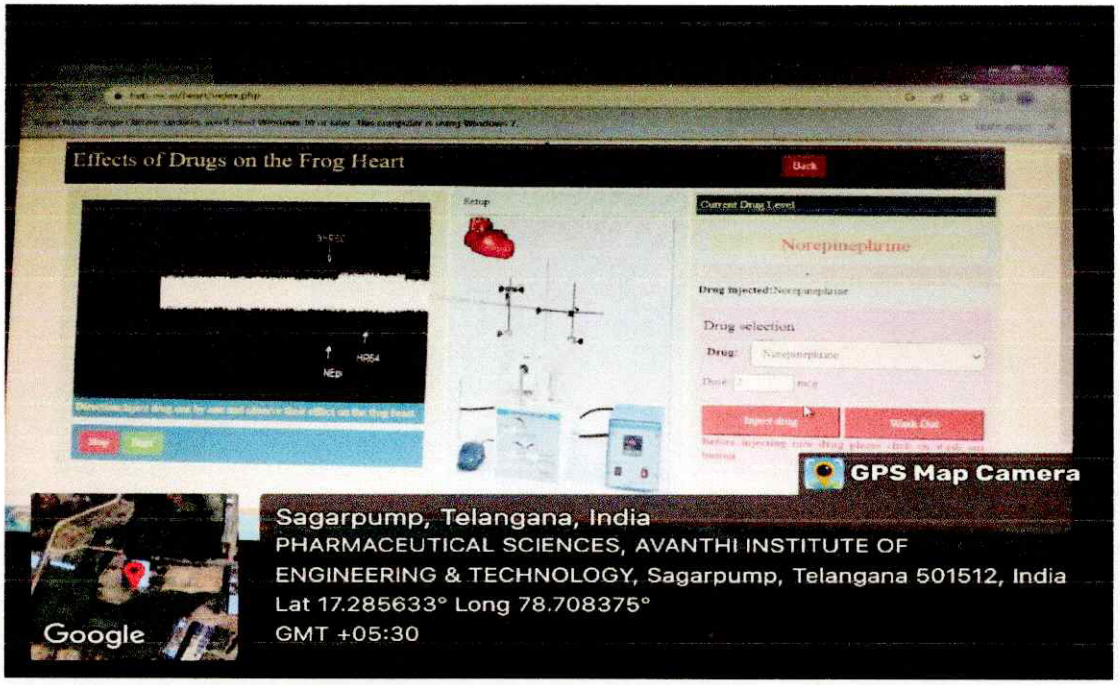
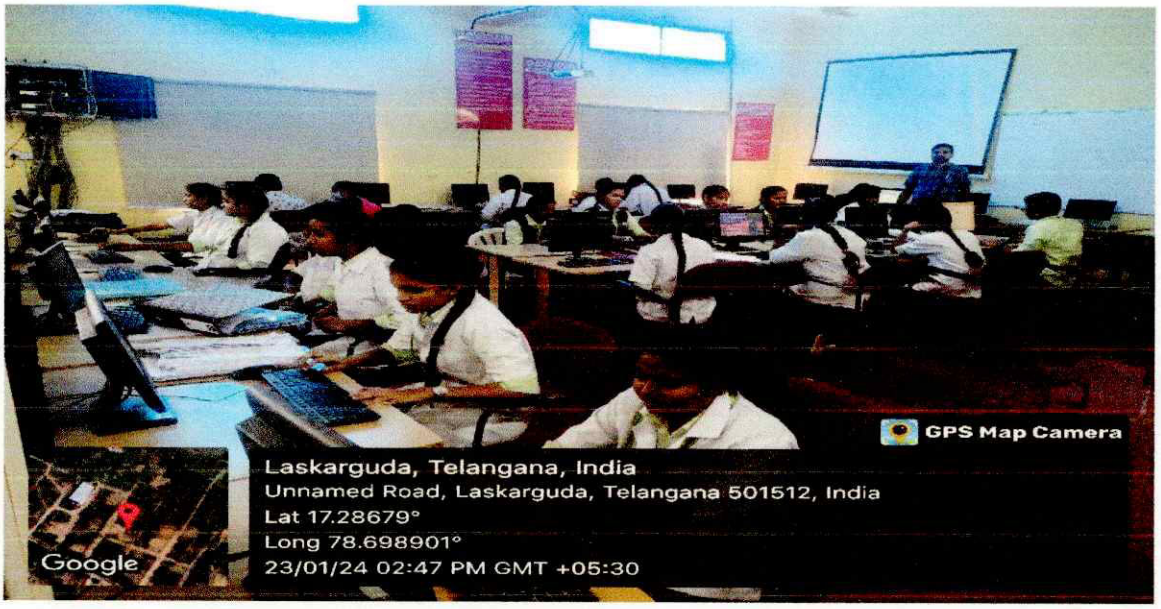


Effect of Drugs on the Frog heart-experiment demonstration by III BP students



Experiments Performed by III B. Pharm Students Through Virtual Labs

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1.4. Internships:

An internship is a professional learning experience that offers meaningful, practical work related to a student's field of study or career interest. An internship gives a student the opportunity for career exploration and development, and to learn new skills. It causes the students to traverse information on advanced procedures available in the industries, global organizations and hospitals. Internships hold immense significance in Pharm-D education as they serve as a bridge between classroom learning and real-world pharmacy practice. These hands-on experiences offer Pharm-D students a unique opportunity to apply the knowledge and skills they have acquired in academic settings to clinical and pharmaceutical settings. Internships provide exposure to various facets of pharmacy, including hospital pharmacy, community pharmacy, clinical rotations, and specialized areas like infectious diseases or pediatrics. They enable students to interact with patients, healthcare teams, and diverse pharmaceutical professionals, helping them develop essential clinical and interpersonal skills.

Internships also emphasize the importance of ethical and professional conduct, ensuring that future pharmacists are well-prepared to provide safe and effective patient care. Furthermore. they enable students to explore potential career paths and build a professional network, laying a strong foundation for their future roles as competent and compassionate healthcare providers. Overall, internships are an integral part of Pharm D education, contributing significantly to the development of well-rounded, clinically competent pharmacists.

Hospital Postings by Pharm D Internships Students

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Gunthapally(V), Abdullapurmet(M),Ranga Reddy Dist.501512

CERTIFICATE OF INTERNSHIP

This is to certify that

AJMERA SRUJANA

Reg.No- 17GNIT0002

of Avanthi Institute of Pharmaceutical Sciences , Gunthapally, Abdullapurmet ,R.R. Dist

has successfully completed the Internship at

Aware Global Hospital, L.B.Nagar

in the following units/departments as prescribed under regulation 16 and

Appendix C of Pharm D Regulations 2008.

Department	Date		Total duration [in months]
	From	To	
GENERAL MEDICINE	04-07-2022	03-01-2023	Six Months
NEPHROLOGY	05-01-2023	04-03-2023	Two Months
NEUROLOGY	07-03-2023	06-05-2023	Two Months
CARDIOLOGY	09-05-2023	08-07-2023	Two Months

Preceptor

Head of the Institution
Avanthi Institute of Pharmaceutical Sciences

PRINCIPAL
Avanthi's Institute of Pharmaceutical Sciences
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Ranga Reddy Dist

Dr.Anand Raghu Mudili
Medical Superintendent
GMERF,
Aware Global Hospital

Medical Superintendent
Gleneagles Global Hospital
Lakdi-ka-pool, Hyderabad.

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CERTIFICATE OF INTERNSHIP

This is to certify that

BENDURI NIKITHA GOUD

Reg.No- 17GN1T0003

of Avanthi Institute of Pharmaceutical Sciences , Gunthapally, Abdullapurmet ,R.R. Dist has successfully completed the Internship at Aware Global Hospital, L.B.Nagar in the following units/departments as prescribed under regulation 16 and Appendix C of Pharm D Regulations 2008.

Department	Date		Total duration [in months]
	From	To	
GENERAL MEDICINE	04-07-2022	03-01-2023	Six Months
NEUROLOGY	05-01-2023	04-03-2023	Two Months
CARDIOLOGY	07-03-2023	06-05-2023	Two Months
NEPHROLOGY	09-05-2023	08-07-2023	Two Months

Preceptor

Head of the Institution
Avanthi Institute of Pharmaceutical Sciences

PRINCIPAL
Avanthi's Institute of Pharmaceutical Sciences
Gunthapally (V), Hayath Nagar (M),
Ranga Reddy Dist.

Dr.Anand Raghu Mudili
Medical Superintendent
GMERF,
Aware Global Hospital

Medical Superintendent
Gleneagles Global Hospital
Lakdi-ka-pool, Hyderabad.

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CERTIFICATE OF INTERNSHIP

This is to certify that

KANCHANA RAJAVAMSHI GOUD

Reg.No- 17GN1T0007

of Avanthi Institute of Pharmaceutical Sciences , Gunthapally, Abdullapurmet ,R.R. Dist

has successfully completed the Internship at

Aware Global Hospital, L.B.Nagar

in the following units/departments as prescribed under regulation 16 and

Appendix C of Pharm D Regulations 2008.

Department	Date		Total duration [in months]
	From	To	
GENERAL MEDICINE	04-07-2022	03-01-2023	Six Months
PULMONOLOGY	05-01-2023	04-03-2023	Two Months
ORTHOPAEDICS	07-03-2023	06-05-2023	Two Months
ICU	09-05-2023	08-07-2023	Two Months

Preceptor

Head of the Institution
Avanthi Institute of Pharmaceutical Sciences

- PRINCIPAL
Avanthi's Institute of Pharmaceutical Sciences
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Dr.Anand Raghu Mudili
Medical Superintendent
GMERF,
Aware Global Hospital
Lakdi-ka-pool, Hyderabad.

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CERTIFICATE OF INTERNSHIP

This is to certify that

THAKOOR REVANTH

Reg.No- 17GNIT0017

of Avanthi Institute of Pharmaceutical Sciences , Gunthapally, Abdullapurmet ,R.R. Dist

has successfully completed the Internship at

Aware Global Hospital, L.B.Nagar

in the following units/departments as prescribed under regulation 16 and

Appendix C of Pharm D Regulations 2008.

Department	Date		Total duration [in months]
	From	To	
GENERAL MEDICINE	04-07-2022	03-01-2023	Six Months
CARDIOLOGY	05-01-2023	04-03-2023	Two Months
ICU	07-03-2023	06-05-2023	Two Months
NEUROLOGY	09-05-2023	08-07-2023	Two Months

Preceptor

Head of the Institution
PRINCIPAL
Avanthi Institute of Pharmaceutical Sciences
Avanthi's Institute of Pharmaceutical Sciences
Gunthapally (V), Hayath Nagar (M),
Ranga Reddy Dist.

Dr.Anand Raghu Mudili
Medical Superintendent
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Aware Global Hospital

Medical Superintendent
Gleneagles Global Hospital
Lakdi-ka-pool, Hyderabad.

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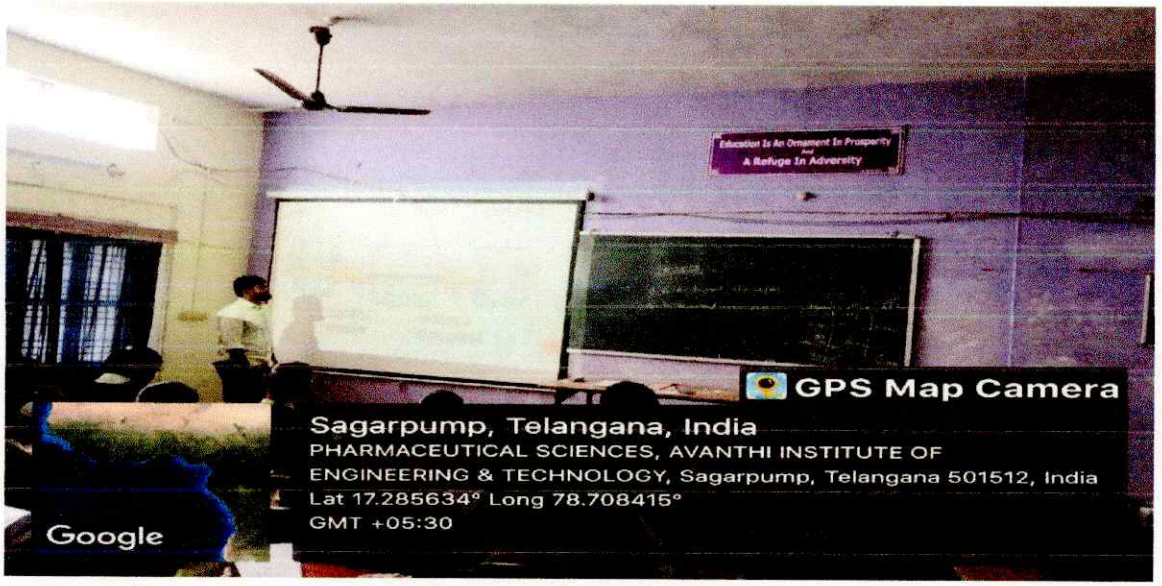
2. PARTICIPATIVE LEARNING:

An approach to teaching and learning that focuses on the learner. It encourages learning by doing, using small groups, concrete materials, open questioning, and peer teaching. For example, learners use practical activities to understand mathematical concepts or work together to solve problems and ask and answer questions. Participatory learning is contrasted with teacher-focused methodologies, which are characterized by learners passively sitting at desks, answering closed questions, and copying from a blackboard. Participatory learning may also be used with teachers and education authorities to support them in analyzing their needs, identifying solutions, and developing and implementing a plan of action. In these contexts, it may include community participation, coordination, and analysis.

2.1 Student Seminars:

A group of advanced students studying under a professor with each doing original research and all exchanging results through reports and discussions; a course of study pursued by a seminar, an advanced or graduate course often featuring informality and discussion a scheduled meeting of a seminar or a room for such meetings



Presentation Given by IV B. Pharm Student

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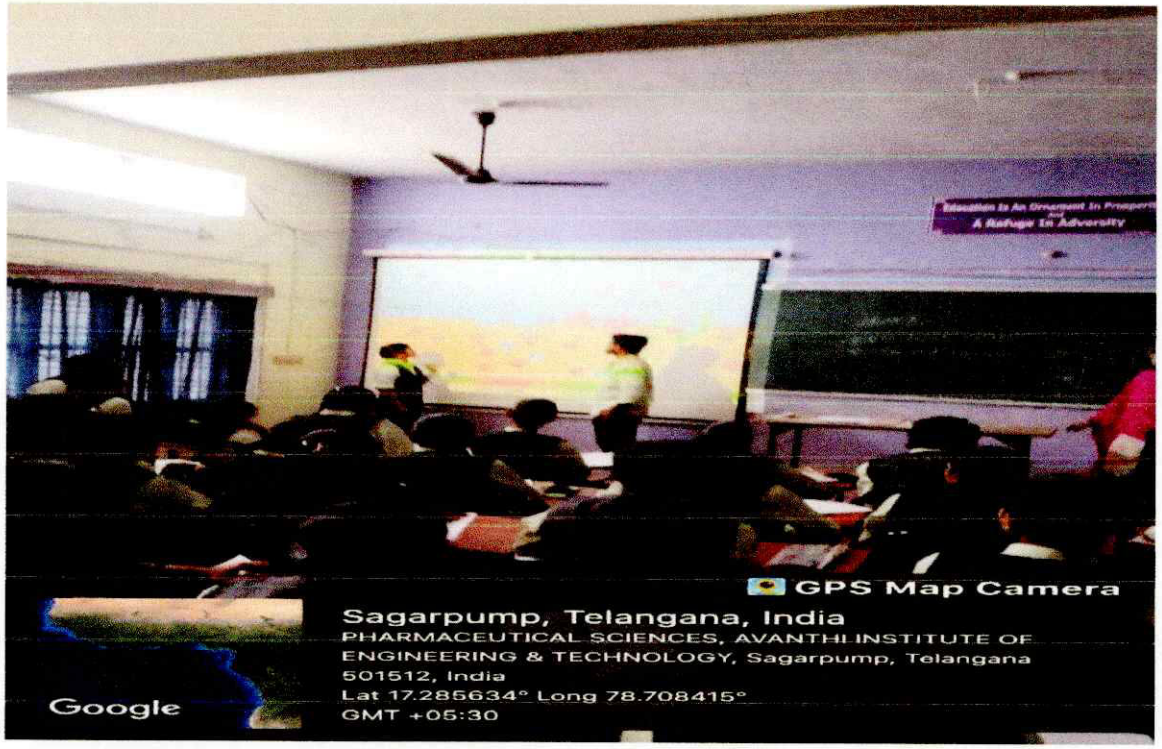
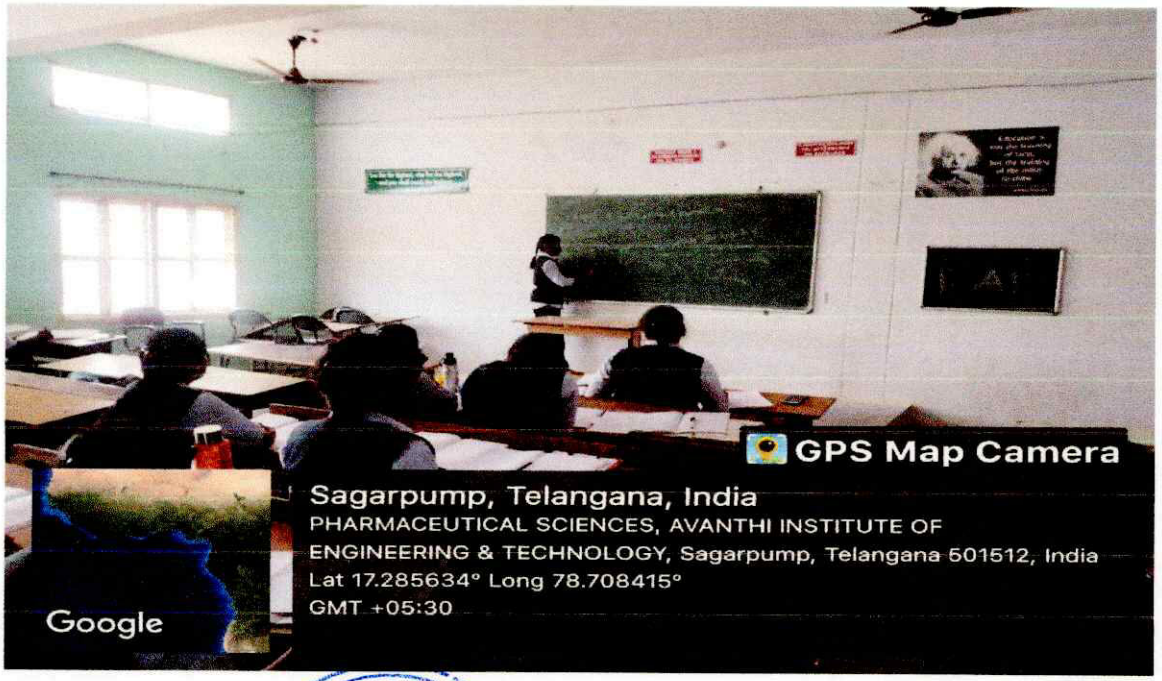


Presentation Given by IV Pharm D Students



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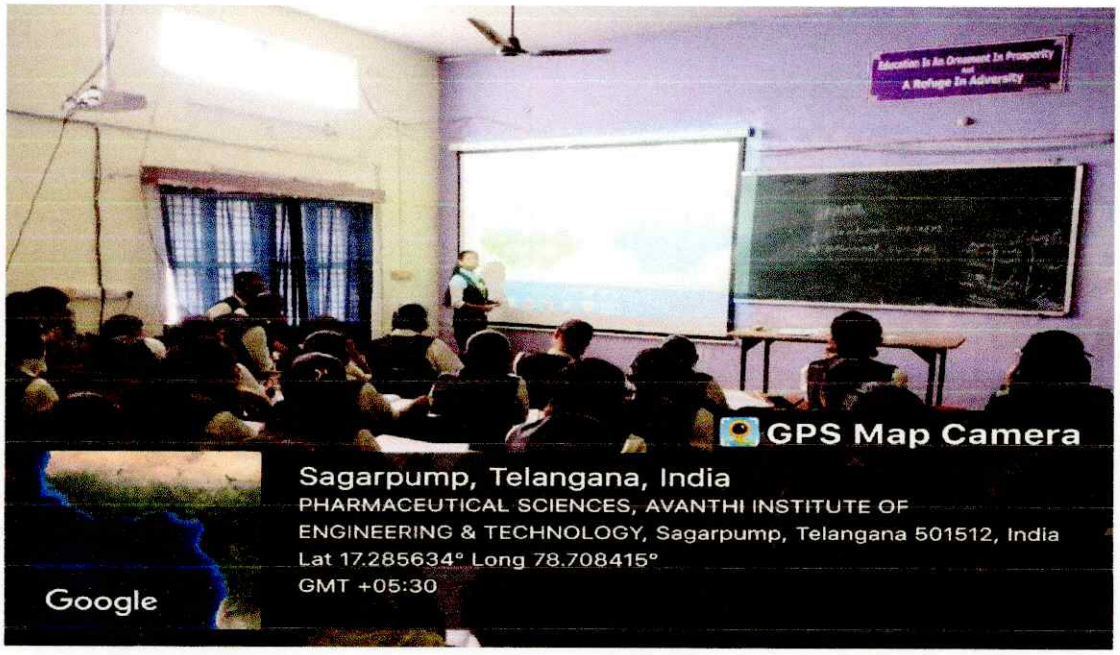

Presentation Given by V Pharm-D Student

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2.2 Hospital posting:

During Hospital posting, every student shall be posted in constituent hospital for a period of not less than fifty hours to be covered in not less than 200 working days in each of second, third- & fourth-year course. Each student shall submit report duly certified by the preceptor and duly attested by the Head of the Department or Institution as prescribed. In the fifth year, every student shall spend half a day in the morning hours attending ward rounds on daily basis as a part of clerkship. Theory teaching scheduled in the afternoon.

Cardio Pulmonary Rescue Performed by IV Pharm D Student

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Collection of case files byPharm D V year students and physical examination of patient by Internship students

Physical examination of patient by Internship students and ward rounds by pharma D VI year students

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Cardio Pulmonary Rescue Explained by Dr Mahammad Ali

Hospital Visit to Pharm D Students

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2.3 Industrial Visit & Training:

Industrial training (Desirable) Every candidate shall be required to work for at least 80 hours spread over four weeks in a Pharmaceutical Industry/Hospital. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Chemical manufacturing unit, Pharmaceutical R&D, Hospital (Clinical Pharmacy), Clinical Research Organization, Community Pharmacy, etc. After the Semester VI and before the commencement of Semester - VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

Industrial Training by Iv B. Pharm Students At CCMB, Hyderabad

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Industrial Visit By IV B. Pharm Students At CCMB,Hyderabad

Industrial Visit by IV B. Pharm Students at Sun Pharma, Hyderabad

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Industrial Visit by IV B. Pharm Students at Niper, Hyderabad

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INCEPTION SOURCE PVT. LTD.
DRUGS & PHARMACEUTICALS

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr/Miss. AMBEERI SATHWIKA** is a bonafide student of **AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES.** And he/she has undergone industrial training in our organization from 11/10/2022 **to** 19/10/2022, as per of partial fulfillment of his/her **B.Pharmacy** course bearing Hall Ticket no- 20GN1R0002.

During the training period he/she had interacted with Quality control, Quality Assurance & Production departments and acquired basic knowledge in these areas.

During this aforesaid period, we found him/her hardworking, sincere and learning attitude.

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Manufactured Of : PHARMACEUTICAL FORMULATIONS

ISO 9001:2008 Drug Mfg. Lic No. 22/RR/AP/2007/F/G TIN No. : 36050816868

Date : 19/10/2022

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr/Miss. **MOTE DEEPTHI** is a bonafide student of **AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES.** And he/she has undergone industrial training in our organization from 11/10/2022 **to** 19/10/2022, as per of partial fulfillment of his/her **B.Pharmacy** course bearing Hall Ticket no- 20GN1R0035.

During the training period he/she had interacted with Quality control, Quality Assurance & Production departments and acquired basic knowledge in these areas.

During this aforesaid period, we found him/her hardworking, sincere and learning attitude.

FOR PHARMADEEP REMEDIES

Manager operations

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2.4. Group discussion

The main purpose of a group discussion is to measure group communication skills. Group communication skills deal with how a person in a group is able to communicate with other persons and influence his/her idea on others. Group discussions promote a deeper understanding of a topic and increase long-term retention. Group discussions can also help increase participants attention and help maintain their focus by involving them in the learning process. Group discussion can also provide feedback to instructors on participant comprehension.

Avanthi Institute of Pharmacy accepts that friend learning is one of the most outstanding techniques for students to carry out group tasks, group discussions and so forth.

Group discussion helps students to

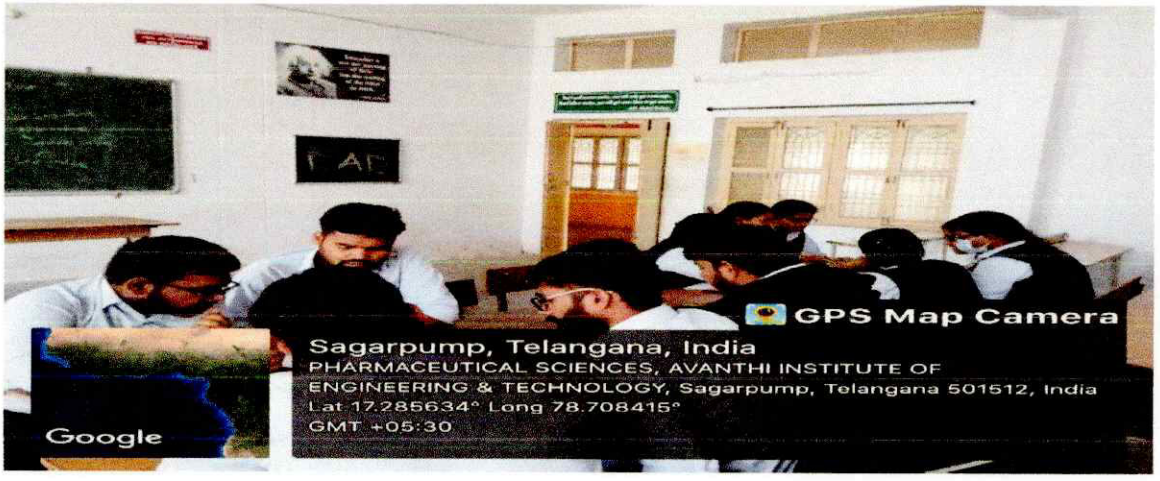
Increase concentration

Develop net works

Enhance communication

Encourage learning

Images and details of Peer learning:



Collaborative Learning with Group Discussion by IV Pharma D Students

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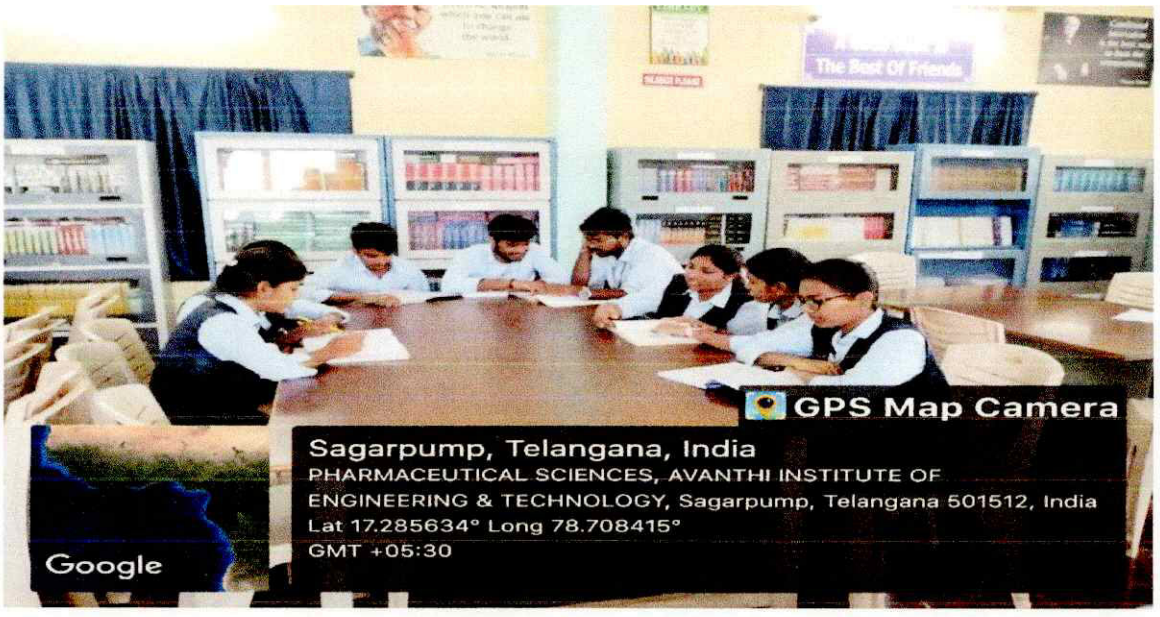
Collaborative Learning with Group Discussion By IV B. Pharm students



Collaborative Learning with Group Discussion by II Pharma D Students

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2.5 E- Resources:

List of open source and authorized software support for advanced learning

S No	Name of the Software	Online Accessibility
1	DELNET	450
2	J-GATE	80
3	SOUTH ASIAN	35
4	NDLI (National digital library of India)	30

Books list

Pharmacy Books

S No	Name of the subject	Number of volumes
1	Anatomy	22
2	Physiology	28
3	Internal mercenary	14
4	Pharmacology	12
5	Immunology	30
6	Psychiatry	33
7	Physician & patient	11
8	Military medicine	16
9	Nutrition	33
10	Medical genetics	24

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Access E-Journals

S.NO	Name of the journal
1	Actachi mica and pharmaceutical India
2	Acta Pharmaceutica
3	Advances in Pharmacological Sciences
4	Advances in Preventive Medicine
5	Addiction Science and Clinical Practice
6	African Journal of emergency Medicine
7	Adolescent health, Medicine and therapeutics
8	African Journal of Pharmacy
9	Advanced Techniques in Biology and medicine
10	Aids Research and treatment
11	Advances in medicine
12	Advances in Pharmaco epidemiology and drug safety

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2.6 Community Services:

Community service is of significant importance in pharmacy education as it instills a sense of social responsibility and underscores the pharmacist's role as a healthcare provider deeply connected to the community. Engaging in community service allows pharmacy students to apply their knowledge and skills in practical, real-world settings while addressing the healthcare needs of underserved population.

Medical Camp Conducted on the occasion Of National Pharmacy Week

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Awareness Program Conducted on The occasion Of World Heart Day

Blood Donation Camp Conducted By III B.Pharm Students

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Campus Clean and Green Programmed Conducted On The occasion Of Swachh Bharath

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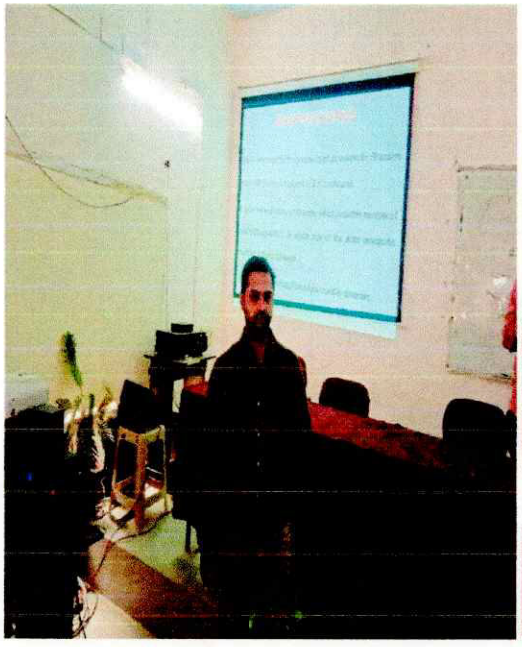
2.7. Guest Lectures:

Guest Lecture is a concept that helps the students to enhance their knowledge. Many students love the concept of guest lecturers as it is an interesting way of learning and interacting with new people at the same time. Such events and lectures help in enhancing the communication skills and many other skills of the students.



Guest Lecture On Pharmacology In Anti Psychotics By DR.P.VEERESH BABU ,GRCP,HYDRABAD

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Guest Lecture Was Conducted For Pharmacovigilance In India-Current Scenario-Iii Pharm D Students By Mr. Srihari Assoc.Professor In GPRCP, Hyderabad

Guest Lecture on Pharmacology in Study on Drugs Acting on Endocrinology-by DR. NAGARJUNA, ESIC

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Guest Lecture On Pharmacovigilance In India-Current Scenario-By Dr.C.Anantha Lakshmi

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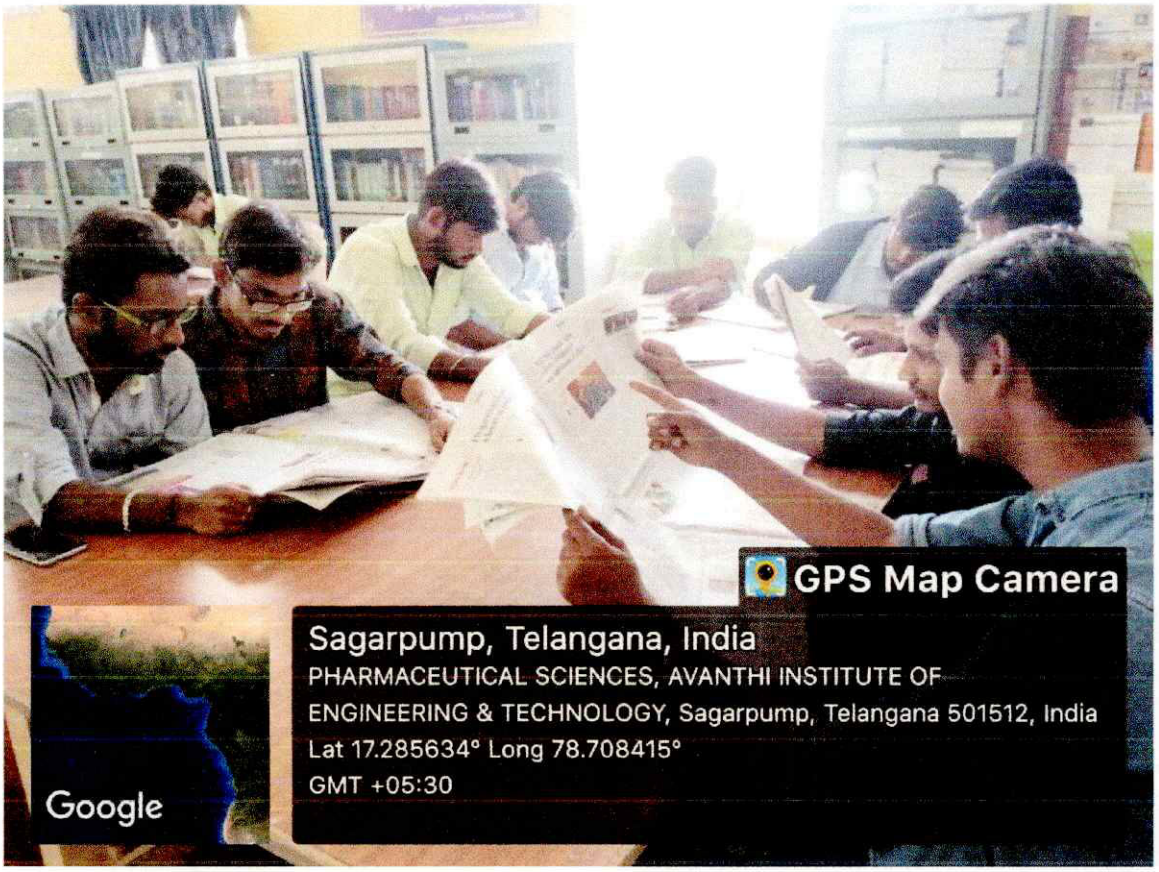
2.8. Students Club Activities

Student Club Activities help students develop sense of unity and teamwork, learning how to work with others in reaching the same goals. These clubs helps the students to learn new activities from experts and peers.



Students Participation in Collaborative Learning Activities-Read and Share

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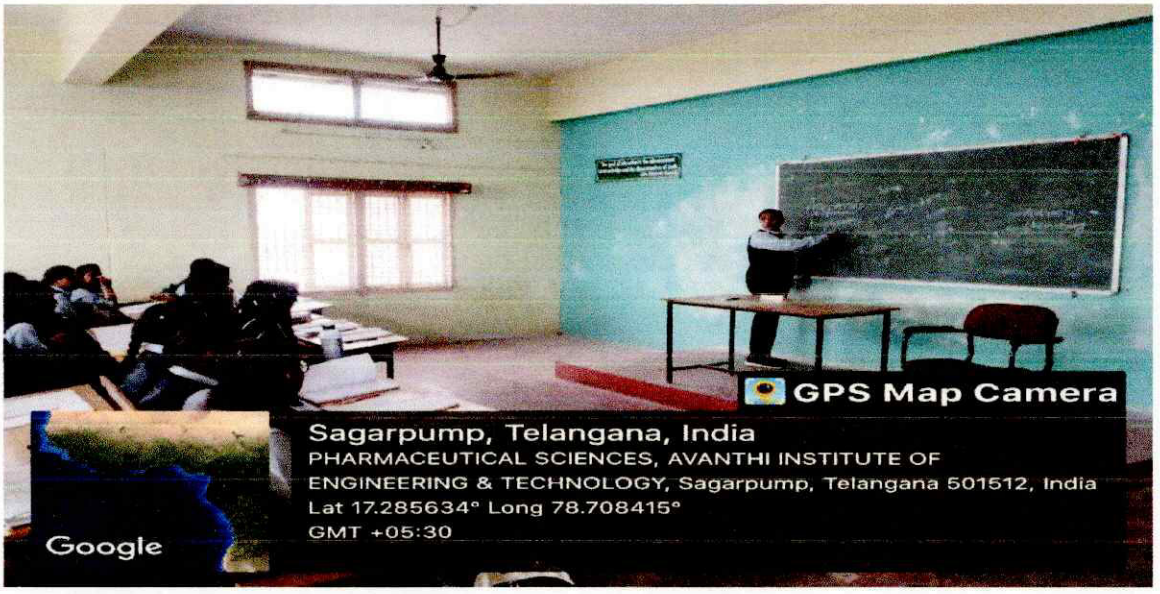
Students Participation in Offline Quiz and Flipped Class Room Activity



Students Participation in Inquiry Based Learning Flipped Class Room Activity

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3.PROBLEM SOLVING METHOD:

Problem-based learning (PBL) is a student-centered approach in which students learn about a subject by working in groups to solve an open-ended problem.

3.1 Assignment

3.2 Project Work

3.3 Case study

3.1 Assignment

Assignments are the part of the internal examination evaluation process, in which would be immense value as additional learning instruments. Many types of assignments can be given to students of all such as essays, literature reviews, critical reviews, reflective journals, annotated bibliographies and case studies, depends upon the need and learning situations. It implies a task for students to accomplish the aim of learning particular contents, concepts or relationships etc., in this text, learning assignments involve students' independent information seeking and use of a wide range of information resources which are available for them. So, every semester/year students are assigned with 2 or 3 topics per each subject regarding to their syllabus and asked to gather more relevant information. Allotment of marks to students is given according to their task completion. Through this student are enriched with knowledge regarding of topic, proof reading of and presentation techniques.

A task or piece of work allocated to someone as part of a job or course of study. The allocation of someone or something as belonging to a particular group or category. It is a specified task or amount of work assigned or undertaken as if assigned by authority.

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'Assignment'

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Name : B. Laxmi Prasanna

Course : B. pharmacy III year

Roll No : 20GIN1R0009

Subject : Industrial pharmacy-1

Topics : Introduction of Hard gelatin Capsule, Extraction of Gelatin, Production of Gelatin

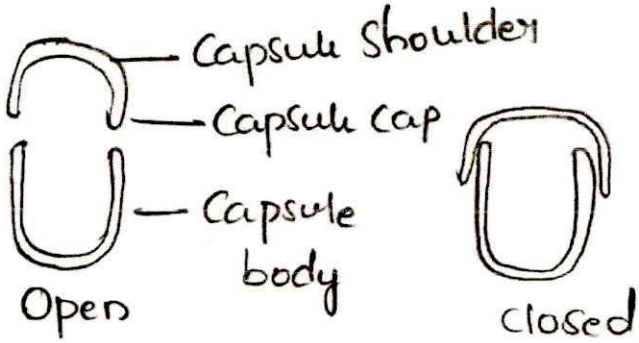
Submitted to:- Pavan Sir

Department :- Industrial Pharmacy

Hard Gelatin Capsule:

The hard gelatin capsule consists of two pieces in the form of cylinders closed at one end. The shorter piece is called the cap. This cap fits over the open end of longer piece called body

- Hard gelatin capsules are also known as dry-filled capsules or two piece capsules. Hard gelatin capsules consists of two parts known as capsule body (longer part) and the capsule cap (the shorter part) The drug substance placed in the body and the caps are slided over it, hence enclosing the drug substance



- Hard gelatin capsules are also known as hard-shell gelatin capsules or two-piece capsules.
- Hard gelatin capsules are solid dosage forms in which one or more medical agents and or

powdered materials are enclosed within a small shell
- A hard gelatin capsule shell consists of two prefabricated cylindrical sections
- (a cap and a body) each of which has one rounded closed end and one open end. The body has a slightly lower diameter than the cap and fits inside the cap
- Hard gelatin capsule shells are fabricated and supplied empty to the pharmaceutical industry by shell suppliers and are then filled in a separate operation. During the capsule filling unit operation the body is filled with the drug substance and the shell is closed by bringing the body and the cap together.

- Hard gelatin capsule shell is composed largely of gelatin. Other than gelatin, it contains materials such as plasticizers, colorants, opacifying agents and preservatives which either enable capsule formation or improve their performance. Hard gelatin capsules also contain 13-16% moisture content, but the moisture content can vary, depending on the storage conditions.

→ Benefits of Hard Gelatin Capsule

- Easy to fill
- Cost-effective
- Easy to dis

- Minimum Maintenance
- Longer shelf life

* Gelatin:

It is a heterogenous product obtained by hydrolytic extraction of animal collagen. The Sources of gelatin include, Animal bone, Hide portions and frozen pork skin and white connective tissue

* Two types of Gelatin

- Type A: Obtained by acid hydrolysis of pork skin. Iso electric point is near PH-9
- Type B: Obtained by Alkaline hydrolysis of bones. Iso-electric point is between 4-7.

* Ideal properties of Gelatin

- It is non-toxic
- It is readily soluble in biological fluids at body temperature and is digested by proteolytic enzymes
- It produces a strong flexible film
- The wall thickness of hard gelatin capsule is about 100 um
- It has gelling power forming thermo-reversible gel.

⇒ Extraction of Gelatin

- Some of the steps involved in Extraction of

Gelatin are

* ACIDULATION:

- Produce Ossein by removing the mineral content of the bone
- Initiate the hydrolysis of Collagen
- Remove non Collagen impurities

* WASHING:

- Rinse up to 24 hours to remove acid salts, fat and Other impurities

* LIMING:

- Continue to hydrolyze Collagen
- Continue to remove non Collagen impurities
- Convert asparagine and glutamine to their respective acids

* WASHING:

- Remove and neutralize excess lime
- Remove non Collagen impurites
- Adjust pH of the Ossein

* GELATIN EXTRACTION:

- Solubilize hydrolyzed Collagen (gelatin) From the Ossein

* FINAL FILTRATION:

- Clarify Concentration gelatin Solution

- Remove additional coagulation protein and particulate
- plate and flame pressure filters

* PH ADJUSTMENT:

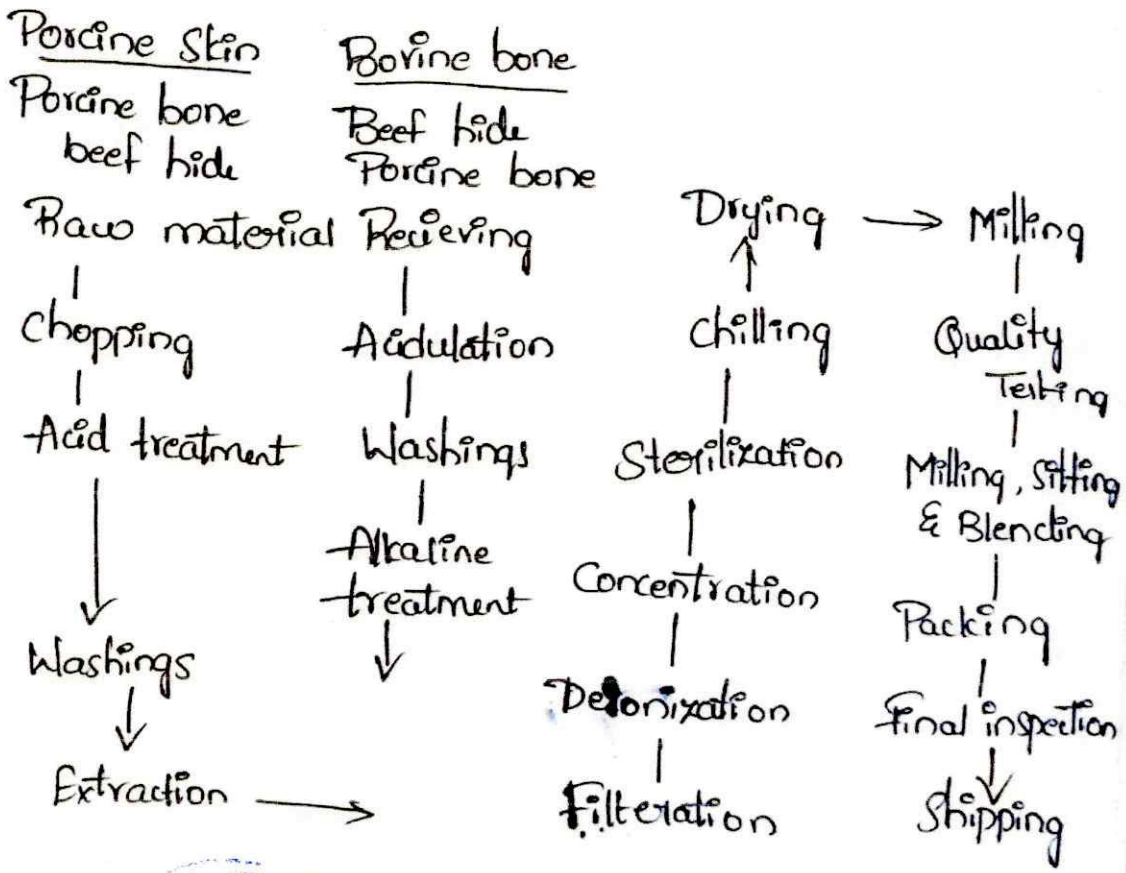
- Adjustment of the product PH (5-7)

* FINAL CONCENTRATION:

- Concentrate the thick gelatin liquor (25 to 50% Viscosity)

* STERILIZATION:

- Ensure microbiological purity product hygiene



Production of Hard Gelatin Capsule:

1) Preparation of the gelatin Solution (dipping Solution):

- A Concentrated Solution of gelatin is prepared by dissolving the gelatin in demineralized water which has been heated to 60-70°C in jacketed Pressure Vessels. This Solution Contains 30-40% w/w of gelatin and is highly viscous
- Capsule shells are manufactured under strict climate Conditions by dipping pairs (body and cap) of Standardized Steel pins arranged in rows on metal bars in to an aqueous gelatin Solution (25-30%) maintained at about 50°C in a jacketed heating pan.

2) Spinning: of the dip-Coated pins: After ad sorption of the gelatin Solution on the Surface of the pins, the bar Containing the pins is rotated more times to evenly distribute the gelatin Solution Around the pins, as uniform gelatin distribution being Critical for correct and precise Capsule wall thickness.

3) Drying of the Gelatin-Coated pins:
Once the gelatin is evenly distributed on the mould a blast of Cool air is used to set the gelatin on the mould. At this point, the gelatin is dried and the pins are then passed through Several drying Stages to achieve the target moisture Content

4) Stripping & Trimming:

After the gelatin is dried, the capsule is stripped off the mould and trimmed to the proper length

5) Joining of the trimmed capsule shell:

Once trimmed, the two halves (the cap and body) are joined to the pre-closed position using a Pre lock mechanism. At this point, printing is done if needed before packing in cartons for shipping

6) Printing:

- After formation, the capsule shells can be printed to improve identification. Printing can be achieved using one or two colours, containing information such as product name or code number, manufacturer's name or logo and dosage details
- Printing reduces the risk of product confusion by the numerous handlers and users of the Product including manufacturers, pharmacists, nurses, doctors, caregivers and patients.

3.2 Project Work:

Project based learning is a teaching method were students gain knowledge and skill by working for an extended period of time to investigate and respond to an authentic, engaging and complex questions, problems or challenges. It is not only providing opportunities for students to collaborate with or drive their own learning, but also teaches those skills such as problem solving and helps to develop additional skills integral to their future such as critical thinking and time management. So, every year IV B. Pharmacy, V year Pharm.D and II year M. Pharmacy students are allotted with a project under the supervision/guidance of faculty to be completed within an academic year. Marks are allotted to projects according to their performance, project results, presentation and viva-voice. Research and review articles of their projects are published by students in various national and international journals.

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IV B. PHARMACY PROJECT LIST

Academic Year: 2022-2023

Admitted batch-2019

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B.Pharmacy IV-II SEM (2022-23)
PROJECT GUIDE ALLOTMENT

S.NO	STUDENT NAME	Hall Ticket No	Name of the Guide
1	A DHARMATEJA	19GN1R0001	RAJKUMAR
2	A VENKATESH	19GN1R0002	
3	ATHARI PAVANI	19GN1R0004	
4	B HARISH KUMAR	19GN1R0006	
5	BIRADAR BINDU	19GN1R0007	Dr.B.MANJULA
6	BOLLA SAI TEJA	19GN1R0008	
7	CHENNALA VAISHNAVI REDDY	19GN1R0010	
8	L.HARIKA	19GN1R0031	
9	CHINNA BEERA PRATHYUSHA	19GN1R0011	
10	K.KALYAN	19GN1R0027	
11	N.INDRAJA	19GN1R0039	
12	CHOWHAN SEETHA RAM	19GN1R0012	G.SWAPNA
13	D AAKARSHA	19GN1R0013	
14	D RAMYA SANJANI	19GN1R0014	
15	ERROJULA AVINASH	19GN1R0016	
16	GARLAPATI SRAVANI	19GN1R0018	P.LAVANYA
17	GURINDAPALLI SUPRIYA	19GN1R0020	
18	JADHAV RAMESH	19GN1R0021	
19	JOGA MADHU	19GN1R0022	

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20	KAMITIKARI ARJUN	19GN1R0025	Dr.K.BALAJI
21	KANNA MADHU	19GN1R0026	
22	KURMA NAVYASRI	19GN1R0030	
23	P.NIKITHA	19GN1R0066	
24	I.SUPRIYA	19GN1R0084	
25	ABBANABOINA SRAVYA SRI	19GN1R0032	
26	V.UMADEVI	19GN1R0057	
27	N.RUCHA	19GN1R0040	
28	PALAKURI NIKHILA	19GN1R0042	P.PAVAN KUMAR
29	PANUGULLA SINDHU	19GN1R0043	
30	PATHURI PRANAY	19GN1R0044	
31	RIZWANA BEGUM	19GN1R0047	
32	SAPIDI SHIVANI	19GN1R0051	SANGEETHA
33	SHAIK KHAJABABA	19GN1R0052	
34	SURYAVANSHI PRIYA	19GN1R0054	
35	THAVITI ARCHANA	19GN1R0055	
36	VENKANNAGARI SANGEETHA	19GN1R0059	ANIL KUMAR
37	VINDAKOTI PRATHYUSHA	19GN1R0061	
38	YALA MADHU	19GN1R0062	
39	GUTTI MAHESH	19GN1R0063	
40	MUKURALA SWATHI	19GN1R0064	VARALAXMI
41	MUTHYALA SHIREESHA	19GN1R0065	
42	RAJAMGARI KEERTHI	19GN1R0068	
43	SRILOJU ANILCHARY	19GN1R0070	
44	AEDLA HARISH	19GN1R0071	Dr.M.RAMAKRISHNA
45	ANJALI SINGH	19GN1R0072	
46	SUKKA HARI RAGHAVA PRASAD-9440130018	19GN1R0073	

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47	BADDAM PRATHYUSHA	19GN1R0074	
48	S.CHINNARI	19GN1R0048	
49	N.MANASA	19GN1R0033	
50	S.ABHIRAM	19GN1R0096	
51	CHENNOJU SHASHANK	19GN1R0077	Dr.NIHAR RANJAN DAS
52	DASAM BHAGYALAKSHMI	19GN1R0078	
53	DHAVLURI SRUTHI	19GN1R0079	
54	DONAKONDA MAHENDER	19GN1R0080	
55	M.SHIVA	19GN1R0037	
56	S.MAHALAXMI	19GN1R0050	
57	M.KEERTHI	19GN1R0038	
58	K. RAHUL	19GN1R0085	SARIKA
59	KANDADA SAI KIRAN	19GN1R0086	
60	KARNAT MANASA	19GN1R0087	
61	NAKKA SUPRIYA	19GN1R0089	
62	NALLA AKHIL KUMAR	19GN1R0090	P.NAGARAJU
63	NARAVARAOPET SHARANYA	19GN1R0091	
64	VALLABHUDAS SHIVAGANESH	19GN1R0099	
65	K.GAYTHRI	19GNIR0029	
66	M.VENNALA	19GN1R0060	T.MAHENDER
67	D.DEEPIKA	19GN1R0015	
68	B.AKSHYKUMAR	19GN1R0005	
69	B.RAMU	19GN1R0075	
70	M.SHIVANI	19GN1R0035	A.SRUTHI
71	T.SINDHUJA	19GN1R0056	
72	B.NIHARIKA	19GN1R0076	
73	K.RAKESH	19GN1R0028	

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74	K.VIJYALAXMI	19GN1R0024	V.KAVITHA
75	N.AKHILA	19GN1R0[illegible]3	
76	A.ARUNA	19GN1R0003	
77	S.VINAYCHARY	19GN1R0094	
78	G.SHIRANYA	19GN1R0017	BHANU PRASAD
79	M.MANOJKUMAR	19GN1R0088	
80	SHARANBABU	19GN1R0069	
81	S.VISHWAJITVARMA	19GN1R0049	
82	G.SNEHA	19GN1R0046	SAJID ALI ZUBERI
83	S.GOPICHAND	19GN1R0053	
84	UMESHKUMAR JOSHI	19GN1R0098	
85	M.SOUMYA	19GN1R0034	

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FORMULATION AND EVALUATION OF HERBAL FACE CREAM

Dissertation submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

in partial fulfillment for the award of the degree of

BACHELOR OF PHARMACY

Submitted by

KAMITIKARI ARJUN
(Reg. No. 19GN1R0025)

KANNA MADHU
(Reg. No. 19GN1R0026)

KURMA NAVYASRI
(Reg. No. 19GN1R0030)

ABBANABOINA SRAVYA SRI
(Reg. No. 19GN1R0032)

Under the guidance of

Dr.K. BALAJI, M.Pharm,Ph.d
Professor
Department of pharmacognsy

Avanthi Institute of Pharmaceutical Sciences
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June-2023

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Gunthapally (V), Hayath Nagar (M),
Ranga Reddy Dist.

SYNTHESIS AND BIOLOGICAL ACTIVITIES OF SOME IMIDAZOLE DERIVATIVES

Dissertation Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

In Partial Fulfillment of the Requirements
for The Award of Degree of

BACHELOR OF PHARMACY

Submitted by

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DASAM BHAGYALAXSHMI
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(Reg.No:19GN1R0080)

Under The Guidance Of

Dr. NIHAR RANJAN DAS,
M. Pharm,Ph.D
Professor

Department of Pharmaceutical Chemistry
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JUNE-2023

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FORMULATION AND EVALUATION OF MICROEMULSION OF ANTIHYPERTENSIVE DRUG FELODIPINE

Dissertation submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

in partial fulfillment for the award of the degree of

BACHELOR OF PHARMACY

Submitted by

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(Reg no.19GN1R0005)

DYAGALA DEEPIKA
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MADAGANI VENNELA
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Under the guidance of

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M.Pharm.,(Ph. D)

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June-2023

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EXTRACTION AND EVALUATION OF ANTI-MICROBIAL ACTIVITY OF MITRAGYNA PARVIFOLIA (ROXB).

Dissertation submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

in partial fulfillment for the award of the degree of

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Submitted by

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PATHURI.PRANAY.
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JUNE 2023.

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Gunthapally (V), Hayathnagar (M) R. R. Dist. V Year Pharm.D(2022-2023)

S.NO	NAME	ROLL NUMBER	GUIDE NAME	TITLE
1	AAKULA ANUSHA	18GN1T0001	Dr. K.Balaji	AN OBSERVATIONAL STUDY ON CLINICAL SAFETY AND EFFICACY OF ANTIVIRAL MEDICATIONS USED IN CHRONIC HEPATITIS-B VIRUS INFECTION
2	ASAWAR SAI CHANDANA	18GN1T0002		
3	BANDARIPALLY NAVYASRI	18GN1T0003		
4	AKULA SINDHUJA	18GN1T0004	Dr. Nihar Ranjan Das	A PROSPECTIVE OBSERVATIONAL STUDY ON PRESCRIBING PATTERN OF ANTIMICROBIAL AGENTS IN PATIENTS WITH INFECTIOUS DISEASES IN TERTIARY CARE HOSPITAL
5	DODDE ANUSHA	18GN1T0005		
6	G PRAVEEN KUMAR YADAV	18GN1T0006		
7	GUNNALA PAVAN SAI GOUD	18GN1T0007		
8	HIMANGINI MANDAL	18GN1T0008	Dr B.Manjula	AN OBSERVATIONAL COHORT STUDY ON CLINICAL SAFETY & EFFICACY OF TICAGRELOR WITH LOW DOSE ASPIRIN FOR THE PREVENTION OF MAJOR ADVERSE CARDIOVASCULAR EVENTS
9	KAKKIRENI SAI MANASA	18GN1T0009		
10	YELKUR MEGHANA	18GN1T0010		
11	TAHMINA BEGUM	18GN1T0011		
12	MALLETHULA SHIRISHA	18GN1T0012	Dr M .Rama Krishna	A PROSPECTIVE AND OBSERVATIONAL STUDY ON PRESCRIBING PATTERN IN LIVER TRANSPLANT RECIPIENTS.
13	MD ABDUL NAFEY	18GN1T0013		
14	MEKALA SAMHITHA	18GN1T0014		
15	PODILI VAISHNAVI	18GN1T0015	Dr V Anudeep	A PROSPECTIVE OBSERVATIONAL STUDY ON CLINICAL SAFETY AND EFFICACY OF ANALGESICS USED IN THE TREATMENT OF NEUROPATHIC PAIN.
16	PUTTA SAITEJA	18GN1T0017		
17	J SUSHMA SWARAJ	18GN1T0018		
18	KASARAMONI SWETHA	18GN1T0019		
19	JANNU UMESH KUMAR	18GN1T0020	Dr B.Evangileen	IMPACT OF HEMODIALYSIS ON HEALTH-RELATED QUALITY OF LIFE OF THE PATIENT
20	GUNDLA MEENAKSHI	18GN1T0021		
21	VEMULA PRIYANKA	18GN1T0022		

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22	JUMALA YOGITHA	18GN1T0023	Dr.Ayesha &	A PROSPECTIVE OBSERVATIONAL STUDY ON THE ASSESSMENT OF ANTIMICROBIALS IN LOWER RESPIRATORY TRACT INFECTIONS
23	V SAI PRASANNA	18GN1T0025		
24	K. SAI ALEKHYA	18GN1T0026		
25	K.NANDINI	17GN1T0020		

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AN OBSERVATIONAL COHORT STUDY ON CLINICAL SAFETY AND EFFICACY OF TICAGRELOR WITH LOW DOSE ASPIRIN FOR THE PREVENTION OF MAJOR ADVERSE CARDIOVASCULAR EVENTS

PROJECT REPORT

Dissertation work submitted to
Jawaharlal Nehru Technological University Hyderabad
in partial fulfilment of the requirement for the award of degree of
Doctor of Pharmacy (Pharm D)

Submitted By

HIMANGINI MANDAL (18GN1T0008)
KAKKIRENI SAI MANASA (18GN1T0009)
YELKUR MEGHANA (18GN1T0010)
TAHMINA BEGUM (18GN1T0011)

UNDER THE GUIDANCE OF

Academic Guide	Hospital Guide
DR. B. MANJULA **M Pharm, Ph.D** **Associate Professor,** **Department of Pharmaceutics,** **Avanthi Institute of Pharmaceutical Sciences**	**Dr. J. RAJENDRA KUMAR** **MBBS, MD (Medicine), DrNB (Cardiology)** **Consultant and Interventional Cardiologist** **Gleneagles Global Hospital, Lakdikapul, Hyderabad.**

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TELANGANA- 501512

APRIL 2023

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Gunthapally (V), Hayath Nagar (M),
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AN OBSERVATIONAL STUDY ON CLINICAL SAFETY AND EFFICACY OF ANTIVIRAL MEDICATIONS USED IN CHRONIC HEPATITIS-B VIRUS INFECTION

PROJECT REPORT

Dissertation work submitted to
Jawaharlal Nehru Technological University Hyderabad
in partial fulfilment of the requirement for the award of degree of
Doctor of Pharmacy

Submitted By

AAKULA ANUSHA (18GN1T0001)
ASAWAR SAI CHANDANA (18GN1T0002)
BANDARIPALLI NAVYA SRI (18GN1T0003)

UNDER THE GUIDANCE OF

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3.3 CASE STUDY BY PHARM D STUDENTS

Case studies are a written description of a real-life problem or situation. Only the facts are provided, usually in chronologic sequence similar to what would be encountered in a patient care setting. The use of cases actively involves the students in the analysis of facts and details of the case in the traditional format called SOAP analysis, by selection of a solution to the problem and defense of his or her solution through discussion of the case details. In the case-based learning students use their recall of previously learned information to solve clinical case. The case method is used primarily to develop the skills of self-learning, critical thinking, problem identification, and decision making. Working on subsequent cases with similar problems reinforces information recall. Case studies in the health sciences provides the personal history of an individual patient and information about 1 or more health problems that must be solved. The students work through the facts of the case, analyze the available data, gather more information, develop hypotheses, consider possible solutions, arrive at the optimal solution and consider the consequences of the learner's decisions. The use of the case studies and other active learning strategies will enhance the development of essential skills necessary to practice pharmacy in any setting, including community, ambulatory care, primary care, health systems. Long term care. Home health care, managed care and the pharmaceutical industry.

Pharmacy Case Studies helps students understand the application of therapeutics in clinical practice. It tests knowledge gained within the individual areas of law and ethics, pharmaceutics, pharmacology and pathology by examples, bringing together various areas taught on the degree course. Case studies of increasing complexity in strands of learning from across the pharmacy curriculum. Scenarios include both community and hospital pharmacy situations, as suited to the disease and pharmaceutical care provision. Each chapter contains five case studies with questions and answers increasing in complexity from those for first year students through to cases designed for fourth year/pre-registration level.

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CLERKSHIP REPORT

Pharm D 5th Year

Submitted to

Faculty of Pharmacy

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

HYDERABAD, TELANGANA

In partial fulfillment of the requirements for the Degree of

the award of the degree of

DOCTOR OF PHARMACY

In

PHARMACY PRACTICE

By

G.SAI PRAGNA (Regd. No. – 17GN1T0024)

Under the guidance of Preceptor

Dr. RAVI NAYAK, Pharm.D

Assistant Professor

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Gunthapally, Abdullapurmet, Near Ramoji Film City,

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AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

Gunthapally, Near Ramoji Film City, Hayathnagar
Hyderabad - 501512

AWARE GLOBAL HOSPITALS more to life

CERTIFICATE

THIS IS TO CERTIFY THAT G. Sai pragna HAS SATISFACTORILY COMPLETED THE COURSE OF REQUIREMENT IN clerkship PRACTICAL PRESCRIBED BY PHARMACY COUNCIL OF INDIA FOR PHARM.D. COURSE AT AWARE GLENEAGLES GLOBAL HOSPITAL FOR THE YEAR 2021 TO 2022.

SIGNATURE OF

TEACHER INCHARGE

13/12/22
LAB EXTERNAL EXAMINER

Manjula-B
HEAD OF THE DEPARTMENT

PRINCIPAL

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Gunthapally, Near Ramoji Film City, Hayathnagar, Hyderabad –501512

GLOBAL HOSPITALS

DEPARTMENT OF PHARMACY PRACTICE
PATIENT PROFILE FORM

PT. DETAILS	NAME	AGE	GENDER	Ht	Wt	BMI	IP/OP No	Department	DOA	DOD
	XYZ	51yrs	Male				71067	Oncology	14/12/21	16/12/21

Consultant : Dr. Ravi Kumar	Unit Semi private ward
PATIENT MARTIAL STATUS Married ☑ Unmarried ☐	Social History Smoker packs/day ☐ Others ☐ Alcoholic Drinks/week ☐ Tobacco ☐

CHIEF COMPLAINTS:

c/o - admitted for chemotherapy treatment. Carcinoma of pancreas, post OP, DM/APD.

PAST MEDICAL HISTORY: Diabetes mellitus

PAST MEDICATION HISTORY:

FAMILY HISTORY: Nil

KNOWN ALLERGIES: NKDA

	PHYSICAL EXAMINATION				
	Normal Range	Day - 1	Day - 2	Day	Day
Blood pressure(BP)	120/80 mm/Hg	110/80	120/80		
Pulse rate (PR)	<100 bpm	88	98		
Respiratory rate (RR)	16 – 20 breaths per minute	18	18		
Heart rate (HR)	60-100 bpm	98	98		
Temperature (T)	98.6°F	98.6°F	98.6°F		
O_2 saturation	94-99%	95%	95%		
CVS					
CNS					
RS					
P/A	soft	soft	soft		

PROVISIONAL DIAGNOSIS:

Carcinoma pancreas.

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LABORATORY INVESTIGATIONS:

	NORMAL RANGE	DAY-1	DAY-2	DAY
COMPLETE BLOOD PICTURE (CBP)				
Hemoglobin	F:12-16 M: 13-18%	16	16	
RBC Count	3.7-5.2 Million cells/cumm	4.8	4.8	
WBC Count	4000-11,000 cells/cumm	6,000	6,000	
Platelet Count	1.5-4 lakhs cells/cumm	2.5	2.5	
Lymphocytes	20-50%			
Monocytes	1-6%			
Eosinophils	40-75%			
Neutrophils	40-70%			
Basophils	1-8%			
Reticulocytes				
Erythrocyte sedimentation rate (ESR)	M: <10mm F:<20mm/hour			
CRP	CRP >6 : +ve			
Clotting Time				
Activated Partial thromboplastin Time (APTT)				
Prothrombin Time (PT)				
PCV	36-46%			
MCV	80-100fl			
MCH	27-32pg			
MCHC	31.5-34.5g/dl			
Reticulocytes				
Vit B12				
Iron				
Ferritin				
TIBC				
UBIC				
TIBC				
BLOOD SUGAR				
Fasting blood sugar (FBS)	70-100mg/dl	120	120.	
Post prandial blood sugar (PPBS)	110-140mg/dl			
Random blood sugar (RBS)	70-140mg/dl	160	160	
HbA1C				
LIVER FUNCTION TESTS				
Total bilirubin	0.2-1mg/dl			
Direct bilirubin	0.02mg/dl			
Indirect bilirubin				
SGPT (ALT)	5- 48U/L			
SGOT (AST)	5-45U/L			
Total Protein	6.4-8.2g/dl			
Albumin	3.4-5g/dl			
Globulin	2.3-3.6g/dl			
A/G ratio				
ALK Phosphatase				

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RADIOLOGY			
X-Ray			
CT-Scan			
MRI			
Endoscopy			
Biopsy			
COMPLETE URINE EXAMINATION (CUE)			
Colour			
Appearance			
Reaction			
Specific gravity			
Sugar			
Protein			
Ketone bodies			
Bile salts			
Bile Pigments			
Urobilinogen			
Blood			
Epithelial cells			
Pus cells			
RBC			
WBC			
Casts			
Crystals			
Others			
ELECTROLYTES			
Sodium	**135-145meq/L**	140	140
Potassium	**3.5-5.2 meq/L**	4.8	4.8
Chloride	**95-105 meq/L**	100	100
Calcium	**1.15-1.45 ~~meq/L~~**	1.16	1.16
Phosphorous			
Bicarbonates			
RENAL FUNCTION TESTS			
Urea	**15-40mg/dl**	20	20
Uric acid	**2.5-7.5mg/dl**		
Serum creatinine	**0.6-1.3mg/dl**	0.8	0.8
Glomerular Filtration Rate (GFR)	**120ml/minute**	120	120

OTHER INVESTIGATIONS:

FINAL DIAGNOSIS Carcinoma pancreas.

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DRUG CHART

S.No	Drug Name	Generic Name	Category	Dose, Freq	ROA	Days of treatment 1 2 3 4	Progress
1)	Fosalon	Fosaprepitant Dimeglumine	Antiemetic	150mg over 1hr	IV	✓	
2)	Gemcitabine	Gemzar	Anti-metabolites	1.2gm over 1hr	IV	✓ ✓	
3)	Eldervit-12	Eldervit-12	vitamin supplement	NS 300ml	IV	✓ ✓	
4)	Carboplatin	Carboplatin	Alkylating agent	450mg over 2hrs	IV	✓ ✓ ✓ ✓	
5)	Palonosetron	Palonosetron HCl	5HT3 receptor Antagonists	0.25mg-qpash	IV	✓ ✓ ✓ ✓	

Discharge Medications:

Inj. Leufil - SC Due on 15/12/21
Tab. Ondem - 8mg - (TID)
Tab. Ultracet - semi thrice daily
Tab. Shelcal - 500mg - (OD)
Tab. Reneive - plus - (OD)
Tab. Rekool - D (BID).
Inj. Human. Mixtard as Before
Syp. Aristozyme (2TSP) (TID)
Cap. Bifilac - HP (BID).

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PHARMACEUTICAL CARE PLAN

SUBJECTIVE EVIDENCE

c/o - Carcinoma of pancreas, post OP, DM, APD.

OBJECTIVE EVIDENCE

* Elevated Blood pressure.
* Normalize the oxygen Saturation.

ASSESSMENT

From the subjective & objective evidence the Patient is diagnosed with carcinoma pancreas.

Definition:- Pancreatic cancer begins when cells in the pancreas start to grow uncontrollably.

PLANNING:

THERAPEUTIC GOALS:

* Normalize the Blood pressure.
* Normalize the oxygen Saturation.

ASSESSMENT OF CURRENT THERAPY:

Fosalon- used to prevent nausea and vomiting.

Gemcitabine- used to treat of lung cancer.

Eldervit-12 - used in the treatment of nutritional deficiencies.

Carboplastin - used to treat cancer of the ovaries.

palonosetron - used to prevent nausea & vomiting.

MONITORING PARAMETERS

THERAPEUTIC PARAMETERS:

* Normalize the Blood pressure.
* Normalize the oxygen saturation.

TOXICITY PARAMETERS:

palonosetron - Blurred vision, chest pain, difficult breath
FoSalon - Headache, Hiccup, Indigestion, Fatigue.
Eldervit-12 - Flushing, GI disturbance, Used WBC count.
Carboplastin - Nausea, vomiting, diarrhea, Constipation.

DRUG INTERACTIONS Drug-Drug Interactions:-

Carboplatin <> gemcitabine

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PHARMACIST INTERVENTION:

PATIENT COUNSELLING:

* Eat lean meats, beans and lentils, clear soups.
* DO exercises regularly.
* Avoid coffee intake.
* Eat fruits, vegetables, whole grains, legumes.
* Take Eggs, Dairy products.
* Avoid fried, fatty meats, high-fat diary products.
* Eat Brown Rice & oat meal, cabbage & broccoli, Reishi Mushroom.

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3.4 Practice School For B-Pharm

Practice School is an innovative concept in undergraduate pharmacy education, which creates a bridge between conventional classroom learning and gaining valuable real-life experience in an industry or research organization.

In the VII semester, every candidate shall undergo practice school for a period of 150 hours evenly distributed throughout the semester. The student shall opt any one of the domains for practice school declared by the program committee from time to time. At the end of the practice school, every student shall submit a printed report (in triplicate) on the practice school he/she attended (not more than 25 pages). Along with the exams of semester VII, the report submitted by the student, knowledge and skills acquired by the student through practice school shall be evaluated by the subject experts at college level and grade point shall be awarded.

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A REVIEW ON ANTIMICROBIAL ACTIVITY OF INDIAN TRADITIONAL MEDICINAL PLANTS

Practice school Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

In Partial Fulfillment of the Requirements For The Award of Degree of

BACHELOR OF PHARMACY

Submitted By

K JHANSI

(Reg NO.19GN1R0023)

Under The Guidance Of
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ASSOCIATE PROFESSOR

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DECEMBER-2020

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CONTENTS

A REVIEW ON ANTIMICROBIAL ACTIVITY OF INDIAN TRADITIONAL MEDICINAL PLANTS

ABSTRACT

This study was undertaken to identify anti-microbial activity of Indian traditional medicinal plants and their description, morphological characteristics, chemical constituents, and their uses such as antibacterial activity, antiviral activity, antifungal activity, antioxidant characteristics and that are effective against multiple human pathogens and to partially purify the active component through thin layer chromatography.

Antibacterial activity of selected plant extracts were assayed by agar cup diffusion. Minimum inhibitory concentrations were determined against all the pathogens. Sensitivity of the pathogens was also checked with four standard antibiotics. In addition, the stabilities of the active compounds were checked at different temperature and pH conditions.

Extracts were separated using TLC and relative mobilities of bioactive components were determined by contact bioautography. Ethanolic extracts of Amla (Emblica officinalis) fruit, Neem (Azadirachta indica) leaves, Aloe (Aloevera) leaves, Assam Tea (Camellia sinensis assamica) leaves and Clove (Syzygium aromaticum) buds were found to inhibit the growth of methicillin resistant Staphylococcus aureus, Vibrio cholerae and Pseudomonas aeruginosa. Bioactive components were stable over a range of pH values and temperatures.

Key words:

- Azadirachta indica,
- Aloe vera,
- Camellia sinensis assamica,
- Syzygium aromaticum,
- Staphylococcus aureus,
- Vibrio cholerae,
- Pseudomonas aeruginosa

INTRODUCTION

Since ancient time, naturally occurring plants have played an important role in the discovery of new therapeutic agents. Herbal medicines are becoming more and more popular. Among the entire flora 35,000 to 70,000 species have been used for medicinal purposes. Even today the WHO estimated that up to 80% of people still rely mainly on traditional medicines such as herbs for their remedies. Infectious diseases represent a critical problem to health and they are one of the main causes of morbidity and mortality worldwide. For the treatment of infectious diseases, search of substitutes from the nature to the antibiotics is becoming the prime need of the society in the present and the future. The progressive increase in the antibacterial resistance among the entire pathogen is critical concern for the people of developing world.

Antibacterial agents are among the drugs most commonly misused by physicians. Although these agents are universally recognized as, having no antiviral activity, 50% or more patients diagnosed with a viral respiratory tract infections are prescribed a course of antibacterial therapy.

Ayurveda, the traditional Indian medicine (TIM) and traditional Chinese medicine (TCM) remain the most ancient yet living traditions. These are the two 'great traditions' with sound philosophical, experiential and experimental basis. Increased side effects, lack of curative treatment for several chronic diseases, high cost of new drugs, bacterial resistance and emerging diseases are some reasons for renewed public interest in complementary and alternative medicines.

Infection: Bacteria are one-celled organisms that do not have membranes binding their nuclear material (prokaryotes). This feature distinguishes them from protozoa which have a more complex cellular structure and a distinct nucleus (eukaryotes). Not all bacteria cause diseases. Bacteria are present in some fermented foods. Yogurt, for example, has Lactobacillus bulgaricus and Streptococcus thermophiles bacteria. The human mouth and intestines harbor over 400 different types of bacteria that produce some vitamins and ferment fiber to produce short-chain fatty acids.

List of common bacteria and some of their attributes

- *Staphylococcus* - normally found on the skin, but can cause boils and pimples.
- Methicillin-resistant *Staphylococcus aureus* (MRSA) is responsible for many

- *scherichia coli* - normal inhabitant of the colon, hence called "coliform" bacteria
- *E. coli* O157:H7 is a virulent strain that produces toxins thatcan cause diarrhoea, abdominal pain, and even kidney failure. Chlamydia - a sexually transmitted disease (STD) caused by the bacterium *Chlamydia trachomatis.*
- *Salmonella* - frequent cause of food poisoning *Vibrio cholerae* - causes cholera, an infection of the small intestine characterized by watery diarrhoea
- *Treponema pallidum* - a spiral-shaped (spirochete) bacteria that causes syphilis
- *Neisseria gonorrhoeae* - a Gram-negative coccus that causes gonorrhea, one of the most common sexually transmitted diseases
- *Borrelia* - a spirochete transmitted by ticks that causes Lyme disease (borreliosis).
- *Mycobacterium tuberculosis*- cause of tuberculosis
- *Yersinia pestis* - causes bubonic plague, transferred by flea bites
- *Bacillus anthracis* - the organism that causes anthrax, characterized by black lesions.
- *Rickettsia* - a motile, Gram-negative bacterium that replicates only within the cytoplasm of cells and causes diseases such as typhus, rickettsialpox, and Rocky Mountain spotted fever. It is transmitted by the bites of insects such as ticks, fleas, and lice.

Infections: Infection involves interaction between the animal body(host) and the infecting microorganism. Infection and infectious disease having distinguish. The Lodgement and multiplication of a parasite in or on the tissues of a constitute infection. Infectious disease is a rare consequence of infection, which is a common natural event.

Infections are classified in various ways.

A) **Primary infection:** Initial infection with a parasite in a host.
B) **Re-infections:** Subsequent infections by the same parasite in the host.
C) **Secondary infections:** Infection caused due to new parasite in host whose resistance is lowered by a preexisting infectious disease.
D) **Focal infection:** Infection or sepsis at localized sites like appendix or tonsils. Generalized effects are produced.
E) **Cross-infection**: Host already suffering from a disease a new infection is set up from another host or another external source.
F) **Endogenous infection:** Source of infection is from the host's own body.
G) **Exogenous infections:** Source of infection is from the external sources.

Sources of Infection: Infection causing sources are various types and it includeshumans, animals, insects, soil, water, and food.

Allopathic treatment: Allopathic treatment involves the use of antibiotics. Antibiotics are small molecules that kill or stop the growth of bacteria by blocking essential functions within the bacteria cell. Ranging from topical over-the-counter antibiotic ointments (such as the ever-popular Neosporin) to intravenously injected antibiotic solutions, these drugs have proven effectiveness in eliminating bacterial infections that arise from minor cuts and scrapes as well as life-threatening system-wide infections.

Early antibiotics were discovered and isolated from fungal molds which produced them as natural defence mechanisms against bacterial infection. More recently, newer classes of antibiotics have been created synthetically in laboratories. Because the targets of antibiotics are specific to bacterial rather than human cells, they generally have few side effects and are considered safe for the vast majority of people.

Side Effects

While antibiotics are safe for most people, a small percentage of individuals are prone to having allergic reactions to antibiotics such as

- Resistance of organisms to antibiotics.
- Penicillin and others. Symptoms include rash, respiratory problems, low blood pressure, and swelling in the throat.
- Use of antibiotics may interfere with birth control, although these effects may not occur in all women

Commonly used Antibiotics

Pencillins : Amoxicillin, Ampicillin, Benzylpenicillin, Phenoxymethylpenicillin.

Macrolides : Clarithromycin, Erythromycin.

Cephalosporins: Cefaclor, Cefalexin, Cefataxime.

Tetracyclines :Doxycyclin, Oxytetracycline, Tetracycline.

Aminoglycosides: Gentamicin, Neomycin.

Quinolines: Ciprofloxacin, Oflaxacin, Norfloxacin.

Resistance: Antibiotic resistance is the ability of a microorganism to withstand the effects of

natural selection acting upon random mutation, but it could also be engineered by applying an evolutionary stress on a population. Once such a gene is generated, bacteria can then transfer the genetic information in a horizontal fashion (between individuals) by plasmid exchange. If a bacterium carries several resistance genes, it is called multiresistant or, informally, a superbug. The term antibacterial resistance is sometimes use to explicitly encompass organisms of bacteria.

Reasons to develop Resistance: The common reasons to develop antibiotic resistance in organisms are repeated using of antibiotics, differential dose, repeated infections, and environmental changes.

Antibacterial Resistance in India:

Antibacterial resistance is a natural biological phenomenon of response of bacteria to the selective pressure of an antibiotic. In recent years, emergence of macrolide-resistant *S. pyogenes* was reported in some areas of the world. Currently, the majority (80-90%) of *Staphylococcus aureus* strains in the community is beta-lactamase producers and thus is resistant to penicillin and ampicillin. However, these strains are susceptible to beta-lactamase resistant beta-lactam antibiotics such as nafcillin, methicillin or oxacillin. Recently more than 90% *Staphylococcus aureus* isolates from South Maharashtra have been found resistant to ampicillin, tobramycin, penicillin, erythromycin, kanamycin and gentamicin; whereas, only 39.1% strains are resistant to methicillin.

Herbal treatment:

Nature has served as a rich repository of medicinal plants for thousands of years and aninpressive number of modern drugs have been isolated from natural sources, notably ofplant origin. Herbal medicine, based on their traditional uses in the form of powders, liquids or mixtures, has been the basis of treatment for various ailments in India since ancient times. emergence of multiple drug resistant strains of microorganisms due to indiscriminate use of antibiotics to treat infectious diseases has generated a renewed interest in herbal medicine The various medicinal plants and their phytoconstituents used in treating bacterial infections are listed below

Table: List of medicinal plants and their phytoconstituents having Antibacterial activity

Sl.no	Plant name	Phytoconstituent
10.	*Pimenta dioica*	Eugenol
11.	*Malus sylvestris*	Phloretin

12.	*Withaniasomniferum*	Withafarin A
13.	*Berberis vulgaris*	Berberine
14.	*Piper betel*	Catechols, eugenol
15.	*Piper nigrum*	Piperine
16.	*Vaccinium spp.*	Fructose
17.	*Schinus terebinthifolius*	Terebinthone
18.	*Ranunculus bulbosus*	Protoanemonin
19.	*Anacardium pulsatilla*	Salicylic acids
20.	*Rhamnus purshiana*	Tannins
21.	*Matricaria chamomilla*	Anthemic acid
22.	*Larrea tridentate*	Nordihydroguaiaretic acid
23.	*Capsicum annuum*	Capsaicin
24.	*Syzygiumaromaticum*	Eugenol
25.	*Erythroxylum coca*	Cocaine
26.	*Eucalyptus globules*	Tannin
27.	*Vicia faba*	Fabatin
28.	*Allium sativum*	Allicin, ajoene
29.	*Gloriosa superb*	Colchicine
30.	*Centella asiatica*	Asiatocoside
31.	*Camellia sinensis*	Catechin
32.	*Cannabis sativa*	β-Resercyclic acid
33.	*Lawsoniainermis*	Gallic acid
34.	*Humulus lupulus*	Lupulone, humulone
35.	*Rabdosiatrichocarpa*	Trichorabdal A
36.	*Lawsonia*	Lawsone
37.	*Millettiathonningii*	Alpinumisoflavone
38.	*Melissa officinalis*	Tannins
39.	*Glycyrrhiza glabra*	Glabrol
40.	*Arnica Montana*	Helanins
41.	*Quercus rubra*	Tannins
42.	*Olea europaea*	Hexanal
43.	*Allium cepa*	Allicin
44.	*Mahonia aquifolia*	Berberine
45.	*Anemone pulsatilla*	Anemonins

46.	*Mentha piperita*	Menthol
47.	*Vinca minor*	Reserpine
48.	*Lophophora williamsii*	Mescaline
49.	*Papaver somniferum*	Opium
50.	*Petalostemum*	Petalostemumol
51.	*Cinchona sp.*	Quinine

Sterilization:

Sterilization is a process by which an article, surface or medium is freed of all living microorganisms either in the vegetative or spore state.

Micro-organisms are ubiquitous, since they cause contamination, infection and decay. It becomes necessary to remove or destroy them from materials or from areas. For achieving sterilization, disinfectants are using which destructs or removal of all pathogenic organisms or organisms capable or giving rise to infection. The term Anti sepsis is used to indicate the prevention of infection, usually by inhibiting the growth of bacteria in wounds or tissues.
The various agents used in sterilization are two types.

Physical agents:

Sunlight, drying, dryheat-flaming, incineration, hot air, moist heat - pasteurisation, boiling, steam under pressure, filtration candles, asbestos pods, membranes, radiation and ultrasonic vibrations.

Chemicals agents:

Alcohols: Ethyl, Isopropyl, Trichlorobutanol.

Aldehydes: Formaldehyde, Glutaraldehyde.

Dyes, Halogens, Phenols, Surface active agents, Metallic salts

Gases: Ethylene oxide, Formaldehyde.

i) Dry heat sterilization: Hot air oven.

ii) Moist hat sterilization: Autoclave.

AMOXICILLIN

Drug description:

Amoxicillin, a semisynthetic antibiotic, an analog of ampicillin, with a broad spectrum of bactericidal activity against many gram-positive and gram-negative microorganisms.

SYSTEMATIC (IUPAC) NAME:

Chemically, it is (2*S*,5*R*,6*R*)-6-[(*R*)-(-)-2-amino-2-(*p*hydroxyphenyl)acetamido]-3,3-dimethyl-7-oxo-4-thia-1-azabicyclo[3.2.0]heptane-2-carboxylic acid trihydrate. It may be represented structurally as:

The amoxicillin molecular formula is $C_{16}H_{19}N_3O_5S\cdot 3H_2O$, and the molecular weight is 419.45.Capsules, tablets, and powder for oral suspension of AMOXIL are intended for oral administration.

Mode of action: Amoxicillin acts by inhibiting the synthesis of bacterial cell walls. It inhibits cross-linkage between the linear peptidoglycan polymer chains that make up a major component of the **cell wall** of **Gram-positive** bacteria.

Susceptible gram positive organisms:

- *Streptococcus* spp.
- Penicillin-susceptible *Streptococcus pneumoniae*
- Non β-lactamase-producing *Staphylococcus* spp.
- *Enterococcus faecalis.*

Susceptible gram negative organisms:

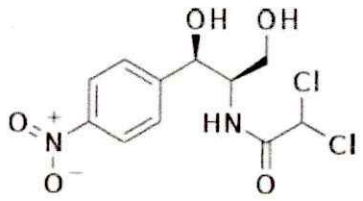
- *Haemophilus influenzae*
- *Neisseria gonorrhoeae*
- *Neisseria meningitidis*
- *Escherichia coli*

Side effects:

Side effects are as those for other beta-lactam antibiotics. Side effects include nausea, vomiting, and easy fatigue. Loose bowel movements (diarrhea) also may occur. The onset of an allergic reaction to amoxicillin can be very sudden and intense - emergency medical attention must be sought as quickly as possible.

1.11Chloramphenicol

Chloramphenicol



Clinical data	
Trade names	Pentamycetin, Chloromycetin, others[71]
AHFS/Drugs.com	Monograph
MedlinePlus	a608008
License data	• US FDA: Chloramphenicol
Pregnancy category	• AU: A • US: C (Risk not ruled out)
Route of administration	Topical (eye drops), by mouth, IV, IM
Pharmacokinetic data	
Bioavailability	75–90%
Protein binding	60%
Metabolism	Liver
Biological half-life	1.6-3.3 hours
Excretion	Kidney (5-15%), faeces (4%)
Identifiers	

IUPAC name[show]

CAS Number • 56-75-7

Chemical and physical data	
Formula	$C_{11}H_{12}Cl_2N_2O_5$
Molar mass	323.1320 g/mol

Chloramphenicol is an antibiotic useful for the treatment of a number of bacterial infections. This includes as an eye ointment to treat conjunctivitis. By mouth or by injection into a vein it is used to treat meningitis, plague, cholera, and typhoid fever. Its use by mouth or by injection is only recommended when safer antibiotics cannot be used and if used monitoring both blood levels of the medication and blood cell levels every two days is recommended during treatment.

Medical uses

The original indication of chloramphenicol was in the treatment of typhoid, but the now almost universal presence of multiple drug-resistant *Salmonella typhi* has meant it is seldom used for this indication except when the organism is known to be sensitive. Chloramphenicol may be used as a second-line agent in the treatment of tetracycline-resistant cholera.

Adverse effects

- Aplastic anemia
- Bone marrow suppression
- Leukemia
- Gray baby syndrome
- Hypersensitivity reactions

INDIAN ORIGIN MEDICINAL PLANTS:

NEEM

SCIENTIFIC NAME: Azadirachtaindica

TELUGU NAME: Vepa

SYNONYM: Margosa

BIOLOGICAL SOURCE: Azadirachtaindica

FAMILY: Meliaceae

CHEMICAL CONSTITUENTS: azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.

DESCRIPTION: The plant product or natural products show an important role in diseases prevention and treatment through the enhancement of antioxidant activity, inhibition of

bacterial growth, and modulation of genetic pathways. The therapeutics role of number of plants in diseases management is still being enthusiastically researched due to their less side effect and affordable properties. It has been accepted that drugs based on allopathy are expensive and also exhibit toxic effect on normal tissues and on various biological activities.

MEDICINAL USES: immunomodulatory, anti-inflammatory, antihyperglycaemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic properties.

Antibacterial activity

Recent research shows the isolation and identification of the antibacterial active compound from petroleum ether extract of neem oil. The study of Zhong *et al.* showed an antibacterial activity of 9-octadecanoic acid-hexadecanoic acid-tetrahydrofuran-3,4-diyl ester from neem oil. Elavarasu *et al.* studied *in vitro* anti-plaque microbial activity of neem oil.

Antiviral

Galhardi *et al.* studied the *in vitro* antiviral property of *Azadirachta indica* polysaccharides for poliovirus. The study of Saha *et al.* showed water extracted polysaccharides from *A. indica* leaves with anti-bovine herpes virus type 1 (BoHV-1) activity. The research of Xu *et al.* showed the *in vitro* antiviral activity of neem seed kernel extracts against duck plague virus. Tiwari *et al.* showed the *in vitro* antiviral activity of neem (*A. indica* L.) bark extract against herpes simplex virus type-1 infection.

Sexually transmitted disease

Few researchers have focused on neem efficacy in treating sexually transmitted diseases. The

reports that have been completed are overwhelmingly positive. Recent research of Shokeen *et al.* showed the evaluation of the activity of 16 medicinal plants against *Neisseria gonorrhoeae.*

Neem and the immune system

Thoh *et al.* studied that azadirachtin interacts with the tumor necrosis factor (TNF) binding domain of its receptors and inhibits TNF induced biological responses.

Anti-inflammatory activity

The study of Alam *et al.* showed the anti-inflammatory activity of epoxyazadiradione against macrophage migration inhibitory factor. Thoh *et al.* found that azadirachtin interacts with retinoic acid receptors and inhibits retinoic acid-mediated biological responses.

Antioxidant effect

Manikandan *et al.* researched that antioxidant and protective effects of active neem leaf fractions against hydrogen peroxide induced oxidative damage to pBR322 DNA and red blood cells.

Anticarcinogenic activity

Chatterjee *et al.* showed that identification of a sulfonoquinovosyldiacylglyceride from *A. indica* and studies on its cytotoxic activity and DNA binding properties. Perumal *et al.* studied ethanolic neem (*A. indica* A. Juss) leaf extract induced apoptosis and inhibits the IGF signaling pathway in breast cancer cell lines. Aravindan *et al.* showed that molecular basis of 'hypoxic' breast cancer cell radio-sensitization with phytochemicals. Induction of apoptosis in human breast cancer cells by nimbolide were carried out by Elumalai *et al.* Srivastava *et al.* showed that neem oil limonoids induces p53-independent apoptosis and autophagy. A review of the anticancer biology of *Azadirachta indica* was carried out by Paul *et al.* Research of Veeraraghavan *et al.* showed the effect of neem leaf extract on rel protein-regulated cell death/radiosensitization in pancreatic cancer cells. Mahapatra *et al.* showed novel molecular targets of *Azadirachta indica* associated with inhibition of tumor growth in prostate cancer .

Skin diseases

Neem has a remarkable effect on chronic skin conditions. Acne, psoriasis, eczema, ringworm and even stubborn warts are among the conditions that can clear up easily when high quality, organic neem oil is used. Neem oil and leaves has been used in Siddha medicine for the treatment of skin diseases. In addition, neem oil can be used as an excellent component of cosmetics to help clear, beautify and rejuvenate the skin.

Digestive disorders

Neem is generally accepted in the ayurvedic medical tradition as a therapy for ulcers and other types of gastric discomfort. Neem promotes a healthy digestive system by protecting the stomach, aiding in elimination and removing toxins and harmful bacteria. Bandyopadhyay *et al.* studied the neem bark extract of gastroprotective effect.

Parasitic diseases

Historically, neem has been used to rid the body of all forms of parasites. Neem quickly kills external and internal parasites. Neem extracts have hormone mimics that interfere with the life cycle of parasites, inhibit their ability to feed and prevent the eggs from hatching. Abdel *et al.* studied the efficacy of a single treatment of head lice with a neem seed extract. Luong *et al.* found that neem leaf slurry is a sustainable, natural product and anopheline larvicide in west African Villages.

ALOE VERA

SCIENTIFIC NAME: Aloe barbadensis miller.

TELUGU NAME: aloe

SYNONYM: Aloe

BIOLOGICAL SOURCE: Aloe vera

FAMILY: Liliaceae

CHEMICAL CONSTITUENTS:*Aloe vera* plant extract are chromone and anthraquinone and its glycoside derivatives, alongside others such as phenylpyrone derivatives, flavonoids, phenylpropanoids, coumarins, phytosterols, naphthalene analogs, lipids, and vitamins.

Description

Traditionalmedicineisinpracticeformanycenturiesbyasubstantialproportionofthepopulationo fmanycenturies.It is recognized that in some developing countries, plantsare the main medicinal source to treat various infectiousdiseases. Plant extracts represent a continuous effort. The name is derived from the Arabic word 'alloeh' which means 'bitter', referring to the taste of the liquid contained in theleaves.Aloe that is believed to have originated in the Sudan. *Aloe vera* grows in arid climates and is widely distributedin Africa, India and other arid areas. The species is frequently cited as being used in herbal medicine. *Aloe vera* is aperennial, drought resisting, succulent plant. It has stiff green, lance-shaped leaves containing clear gel in a centralmucilaginous pulp. *Aloe* gel can help to stimulate the body's immune system (Davis, 1997). The use of plant product forpharmaceutical purpose has been graduallyincreased.

ntibacterial activity

The antibacterial studies were carried out by disc diffusion technique .The sterile nutrient agar plates and potato dextrose agar plates were prepared. The bacterial test organisms like *Staphylococcus aureus*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, and *Escherichia coli* were spread over the nutrient agar plates using separate sterile cotton buds. After the microbial lawn preparation, three different extracts (20 grams of powdered plant materials mixed with 100 ml of various solvents (distilled water, ethanol, and acetone solution)) of plant disc were placed on the organism-inoculated plates with equal distance; control discs were also prepared. All bacterial plates were incubated at 27°C for 24 h. The diameter of the minimum zone of inhibition was measured in millimeter. For each test, three replicates were performed.

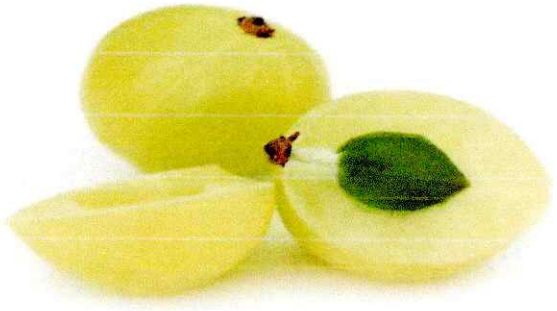
Antioxidant activity

The antioxidant activities of the extracts was determined using 1,1-diphenyl-2picrylhydrazyl (DPPH) assay. The DPPH radical scavenging activity test was determined following Cheung *et al*.and Shang *et al*. The reduction of DPPH radicals was estimated by measuring the absorption at 517 nm. The percentage of DPPH scavenging activity (AA%), was calculated using the equation:$AA\% = 100\ [(A_{sample} - A_{blank})/A_{control}]$, where $A_{control}$ is the initial absorbance of the methanolic DPPH solution, and A_{sample} is the reaction mixture at 515 nm (DPPH + sample).

antiviral activity

Anthraquinone derivatives like aloe-emodin, emodin and chrysophanol, reportedly exhibit antiviral activity. Previous findings[46] have recorded the inhibitory effect of 0.2–5% Aloe vera gel (extracted in 2% dimethyl sulfoxide (DMSO)) on herpes simplex virus in Vero cell line.

AMLA



SCIENTIFIC NAME: Phyllanthus emblica

TELUGU NAME: Amla

SYNONYM: Emblica officinalis

BIOLOGICAL SOURCE: fruits

FAMILY: Phyllanthaceae.

CHEMICAL CONSTITUENTS: vitamin C (ascorbic acid) and contains several bioactive phytochemicals, of which majority are of polyphenols like ellagic acid, chebulinic acid, gallic acid, chebulagic acid, apeigenin, quercetin, corilagin, leutolin.

Description

Emblica officinalis Gaertn or *Phyllanthus emblica* Linn ,belonging to the family Euphorbiaceae, is a plant originally native to India but is today also found growing in Pakistan, Uzbekistan, Sri Lanka, Southeast Asia, China, and Malaysia.[1] In colloquial terms, they are known as Indian gooseberry tree and emblic myrobalans, Malacca tree in English, and amla in Hindi. The fruits are yellowish green in color, globular in shape, fleshy, and smooth striated with an obovate obtusely triangular six-celled nut. The fruits are of culinary use and are widely used to make pickles, chutneys, and as a vegetable in various dishes. They are also used to prepare a sweet delicacy by name murabbah, where the ripe fruits are soaked

in concentrated sugar syrup for extended period till the aroma of the fruits exudates into the sugar syrup. The ripe fruits are also used to prepare fresh juice and are useful during summer.[1]

Antimicrobial activity

The crude extract of seed was tested for antibacterial and antifungal activity. Drugs like gentamycin (10µg) and DMSO used as control. Antibacterial activity of crude samples in different solvents were tested by disc diffusion technique against pathogenic organisms such as E.Coli, Staphylococus aureus, Pseudomonas aeroginosa and Klebsella pneumonia. The nutrient agar plates were inoculated with 0.1 ml of pathogenic microbes by spread plate method. The whatmann filter paper disc were sterilized and inoculated with the samples and DMSO was kept as negative control. All the plates were incubated at 30◦C for 24 hours to measure the zone of inhibition.

Antibacterial activity

The antibacterial action of EO is higher for Gram-positive bacteria, while its effectiveness is limited for countering fungi. The extracts of EO exhibited high zone of inhibition (ZOI) when tested for *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylcoccus aureus*, *Bacillus cereus*, *Vibrio cholerae* and *Candida albicans*. Antimicrobial effectiveness for Gram-positive, Gram-negative bacteria along with fungal agents reflects usage of fruit of *P. emblica* as a remedy for different microbial diseases.

Antifungal activity

The *P. emblica* extract analyzed for *in vitro* potential against *Fusarium solani*, a fungal agent causing dry potato tuber rot revealed inhibition of mycelial growth at a 100% concentration. The aqueous extract of EO reported significant antifungal activity against eight species of *Aspergillus* fungi (*Aspergillus candidus, A. columnaris, A. flavipes, A. flavus, A. fumigatus, A. niger, A. ochraceus*, and *A. tamari*). In this study, different solvents employed for the extraction process included Petroleum ether, Chloroform, Methanol, Benzene, and Ethanol. Plant methanolic extract of EO was not having antifungal activity for phytopathogenic fungus *A. niger* F2723. The aqueous extracts of EO revealed a diverse degree of antimicrobial action for the pathogenic microbes viz., *S. aureus*, *E. coli* and *Candida* species.

Antiviral activity

P. emblica contains different class of secondary metabolites. Phyllaemblicin B extracted from plant roots showed inhibitory potential for Coxsackie virus while phenolic content revealed effectiveness for herpes simplex viruses (HSV) 1 and 2. 1, 2, 4, 6-tetra-O-galloyl-ג-D-glucose from *P. emblica* showed antiviral activity for HSV *in vitro*.

Pentagalloylglucose inhibits influenza A virus replication by prevention of adsorption of the virus and suppressing release of virus .

Several plant extracts possess potential to act against HIV via inhibition of viral enzymes. *P. emblica* plant extracts may have anti-HIV property by inhibiting reverse transcriptase enzyme of the virus.

Immunomodulatory Effect: Laboratory experiment in mice showed that an aqueous P. emblica extract natural killer cell activity and antibody-dependent cellular cytotoxicity in mice

Antitussive Effect: The antitussive activity of E. officinalis was tested in conscious cats by mechanical stimulation of the laryngopharyngeal and tracheobronchial mucous areas of airways. The ethanol extract of the fruits of E. officinalis seems to have a good ability to inhibit mechanically-provoked cough.

CLOVE

SCIENTIFIC NAME: Syzygiumaromaticum

TELUGU NAME: Lavangaalu

SYNONYM: Clove

BIOLOGICAL SOURCE: Dried flower buds of plant

FAMILY: Myrtaceae

CHEMICAL CONSTITUENTS: At least 30 compounds have been identified eugenol is the major compound, accounting for at least 50%. The remaining 10–40% is made up of eugenyl acetate, β-caryophyllene, and α-humulene . Less than 10% correspond to minor or trace components such as diethyl phthalate, caryophyllene oxide, cadinene, α-copaene, 4-(2-propenyl)-phenol, chavicol, and α-cubebene.

Description

Syzygiumaromaticum L. belong to the *Myrtaceae* family, which has more than 3000 species and 130–150 genera, such as the myrtle, eucalyptus, clove, and guava families. Clove is an aromatic flower cultivated in Madagascar, Sri Lanka, Indonesia, and China. Several reports suggest that *S. aromaticum* L. contains approximately 15–20% wt. of EO. CEO contains a high amount of phenolic compounds with several biological activities, including antibacterial, antifungal, insecticidal, and antioxidant properties. The FDA classifies CEO as generally recognized as safe (GRAS); for this reason, it is used in perfumes, cosmetics, sanitary products, medicines, and foods.

Antimicrobial

The antibacterial mechanism has been related to the -OH groups located at the meta and ortho positions, respectively, in the main chemical composition. These functional groups can interact with the cytoplasmic membrane of microbial cells. CEO can permeate through the cell membrane due to its lipophilic properties. The interaction of CEO with polysaccharides, fatty acids, and phospholipids causes loss of cellular membrane integrity, leakage of cellular contents, and interference with proton pump activity, leading to cell death. CEO can inhibit Gram-negative bacteria (*E. coli*, *Salmonella*, *Klebsiella pneumoniae*, *Erwinia carotovora*, *Agrobacterium*, and *Pseudomonas aeruginosa*) and Gram-positive bacteria (*S. aureus*, *Streptococcus*, and *L. monocytogenes*), *Aspergillus* (*A. flavus*, *A. parasiticus*, and *A. ochraceus*), *Penicillium*, *C. albicans*, and yeast.

Antioxidant

It has the antioxidant compounds eugenol, eugenyl acetate, β-caryophyllene, and α-humulene, which protect cells from free radical oxidation. Diseases such as cancer, arteriosclerosis, Alzheimer's disease, and Parkinson's disease are related to the presence of ROS compounds. CEO has shown scavenging activity on radicals and inhibition of lipid peroxidation . The hydroxyl group available in eugenol on the aromatic ring is responsible for the antioxidant activity . The phenolic compounds transfer electrons or hydrogen atoms and neutralize them to free radicals, resulting in a blocked oxidative process.

Antiviral

CEO has shown antiviral activity against Ebola, influenza A virus, and herpes simplex virus types 1 and 2. Recent studies by de Oliveira et al. showed that eugenol derivatives could inhibit the activity of the West Nile Virus, providing a promising compound against flaviviruses such as dengue, Zika, and yellow fever. Eugenol has also been studied as a possible inhibitor of the initial stage of HIV-1 infection because it can reduce virus replication. Likewise, eugenol can increase lymphocyte production; therefore, the lymphocyte proliferation capacity of eugenol may be responsible for its anti-HIV-1 activity.Ithas demonstrated antiviral activity against feline calicivirus, which is used as a substitute for human norovirus.

Anti-Inflammatory and Wound Healing

Oxidative stress and inflammation are near-related processes in many pathophysiological conditions such as diabetes, hypertension, and cardiovascular and neurodegenerative diseases . The anti-inflammatory properties of CEO and eugenol are comparable to diclofenac gel, reducing inflammation by 60 to 20% after 3 h. Likewise, induced wounds in rats treated with CEO showed a significant contraction of more than 95% in the first 15 days. These results demonstrate that animals treated with CEO underwent similar healing to those treated with neomycin, which is currently used to control inflammation and heal wounds. Therefore, the chronic and acute side effects of synthetic antibiotics can be avoided.

TEA

SCIENTIFIC NAME: Camellia sinensis

TELUGU NAME: Chai

SYNONYM: Decoction.

BIOLOGICAL SOURCE: Leaves and leaf buds

FAMILY: Theaceae

CHEMICAL CONSTITUENTS: The leaves of tea consist of thease which is an enzymatic mixture containing an oxidase, which partly converts the phlobatannin into phlobaphene, as chemical constituent.

• Other chemical constituent present in tea leaves are tannins, caffeine.

• It contain 1-5% of tannin and 10-24% of caffeine.In tea leaves theobromine is also present

in small amount.Tea leaves also consist of theophylline and volatile oil.Alkaloid content also present in tea leaves but its amount only depend on season and age of tea leaves.

• Physically, tea has both qualities of solution and suspension. Caffeine is about 3% of tea's dry weight.Black tea contain dietary mineral manganese about 0.5 miligram. Fluoride is also present in tea in small amount. Polyphenols are most abundant chemical constituents present in tea.(30-40%).

Antifungal Activity

Wang et al. tested the inhibitive effects of different TP concentrations on three species of plant pathogenic fungi, *Bipolaris maydis*, *Colletotrichum musae* and *Fusarium oxysporum* . The results showed that TP significantly inhibited hyphal growth and spore germination of the three fungi, and the inhibitive effects were directly proportional to the concentration of TP solutions.

Antibacterial Activity

In addition to antifungal activity, TP showed inhibitory effect on various phytopathogenic bacterial infections. Fukai et al. reported the antibacterial activity of TP measured as minimum inhibitory concentration (MIC) against phytopathogenic bacteria, including eight strains of *Erwinia*, 10 strains of *Pseudomonas*, and one strain each of *Clavibacter*, *Xanthomonas* and *Agarobacterium* . These bacteria tend to infect commonly cultivated vegetables such as lettuce, tomatoes, eggplants, cabbage, radish, Irish potatoes, onions, and grapes. After three days incubation of the bacterial agar plates containing different concentrations of individual TPs, EGC and EGCG showed more inhibitory effect than EC and ECG against the test bacteria, and MICs were mostly below 100 ppm.

Antiviral Activity

Having noticed the antiviral effect of tea infusion on tobacco mosaic virus (TMV) ,Okada and Furuya tested the inhibitory effect of each TP component and its own mix against TMV and cucumber mosaic virus (CMV) on tobacco leaves. The aqueous solutions of TPs were injected into the soil around the base of the plants systemically infected with TMV and CMV.

COMPARATIVE STUDIES OF ANTIMICROBIAL ACTIVITIES OF NEEM, AMLA, ALOE, ASSAM TEA AND CLOVE EXTRACTS AGAINST VIBRIO CHOLERAE,

STAPHYLOCOCCUS AUREUS AND PSEUDOMONAS AERUGINOSA

MATERIALS AND METHODS

Collection and pre-extraction of plant materials Neem and Aloe leaves were collected from the Amity Institute of Organic Agriculture Farm, Noida, UP, India. Amla fruits were collected from Bharmar village, district Kangra in Himachal Pradesh. Assam Tea leaves were collected from a local tea farm in Assam, India. Clove buds were purchased from a local market in Noida, UP, India.

PREPARATION OF PLANT EXTRACTS

Ethanolic extracts were prepared as described previously (Ghoshal et al., 1996) with the following modifications. Ten grams of the plant materials were pounded manually with mortar and pestle and soaked in 40 ml absolute ethanol in 250 ml sterile conical flasks incubated at 37 °C incubator with shaking at 120 rpm for 24 h.

PATHOGENS

V. cholerae strain was obtained from National Institute of Cholera and Enteric Diseases, Kolkata, India. Methicillin resistant, S. aureus and P. aeruginosa were procured from Nu Life Consultants and Distributors Pvt. Ltd., Lajpat Nagar, New Delhi. Strains of bacteria were maintained at 4°C on LB plates and were sub-cultured (24 h, 37 °C) prior to use. Purity of the cultures was checked at regular intervals as described by Acheampong et al. (1988).

DETERMINATION OF ANTIMICROBIAL ACTIVITY OF EXTRACTS

Standardized inoculum (100 µl) of 0.5 McFarland turbidity standard, that is, equivalent to 5 x 10 8 cfu/ml (Lopez-Brea et al., 2008) of each test bacterial strains was spread using a sterile glass spreader onto sterile LB solid media plates so as to achieve even growth. The plates were allowed to dry and then a sterile cork borer (8.0 mm diameter) was used to bore wells in the agar plates. The extracts (50 µl/well) were loaded in the wells and absolute ethanol (50 µl/well) was taken as negative control. The plates were then incubated at 37°C for 24 h. Antimicrobial activity of the extracts was determined by measuring the diameter of inhibition zone in milli-meter produced against the pathogens. The experiment was done three times and the mean values were calculated. To determine the minimum inhibitory concentration (MIC), serial dilutions of the extracts were done and assayed by agar well diffusion. The extracts were made out of 10 g dry weight sample and dissolved in the final volume of 5 ml ethanol leading to the concentration of plant extract as 2 µg/µl and calculations were made accordingly after observing hairline inhibition in the plates.

ANTIBIOTIC DISC ASSAY

The plates were prepared as mentioned above. The antibiotic discs of tetracycline, ampicillin, vancomycin and kanamycin each of 7.0 mm diameter (Hi- media) were placed using sterile

forceps on the agar plates. The plates were then incubated at 37°C for 24 h. Susceptibility of the antibiotics against the test strains was determined by measuring the diameter of zone of inhibition (mm) produced against the test strains. The experiment was performed three times and the mean values were calculated.

TLC SEPARATION, CONTACT BIOAUTOGRAPHY AND PH STABILITY

Plant extracts were separated using pre-coated silica plates (Merck 60F-254) and running buffer composition as mentioned with the results. The TLC plates were cut into thin strips and placed with silica side down on the bacterial plate and growth inhibition was monitored. For pH stability assay, the TLC strips were treated with 100 mM of citrate buffer (100 µl) having pH 2.0, pH 7.0 and pH 8.0 separately for 1 h, after which bioautography was performed. Rf values were measured as the ratio of mobility for bioactive zone to the total length of the run.

RESULTS AND DISCUSSION

Antibiotic activity of plant extracts

In the present study, we identified five plants such as Azadirachta indica (Neem), Aloe vera (Aloe), Emblica officinalis (Amla), Camellia sinensis assamica (Assam tea) and Syzygium aromaticum (Clove) that are effective against all the three target pathogens S. aureus, V. cholerae and P. aeruginosa. Ethanolic extracts of these plants were serially diluted and the MIC values were determined (Table 1). As shown, all these five plants have the potential to control the growth of all the three pathogens. Extracts of Amla pulp and Clove buds were found to be highly efficient in controlling the growth of all tested pathogens with MIC values of 0.025 µg/µl; whereas, MIC of Neem, Aloe and Assam tea extracts ranged from 0.1 to 0.5 µg/µl (Table 1). In terms of sensitivity against standard antibiotics, as shown in Table 1, S. aureus and V. cholerae strains were resistant to 30 µg of ampicillin, but were sensitive to 30 µg of kanamycin, vancomycin and tetracycline. The P. aeruginosa pathogen showed sensitive response to all of the antibiotics tested.

Table 1. MIC of plant extracts and antibiotic sensitivity assay.

	MIC (µg/µl)		
Plant extracts	**Pseudo**	**SMR**	**Vibrio**
Neem	0.25	0.1	0.3

Aloe vera	0.35	0.1	0.3
Amla pulp	0.025	0.025	0.025
Assam tea	0.5	0.1	0.25
Clove bud	0.025	0.025	0.025
Kanamycin (30 µg)	Sensiti ve	Sensitiv e	Sensitiv e
Vancomycin (30 µg)	Sensiti ve	Sensitiv e	Sensitiv e
Tetracycline (30 µg)	Sensiti ve	Sensitiv e	Sensitiv e
Ampicillin (30 µg)	Sensiti ve	Resista nt	Resista nt

Table: MIC OF PLANT EXTRACTS OBTAINED BY AGAR CUP DIFFUSION ASSAY

Table 2. Stability of plant extracts at different temperatures.

Plant extract	**Neem**				**Aloe**				**Amla**			
Temperature (°C)	4	25	60	100	4	25	60	100	4	25	60	100
Pseudo	15	15	15	15	16	13	16	15	17	17	16	16
SMR	24	24	23	24	14	14	16	14	30	31	29	29
Vibrio	15	15	15	15	14	14	15	15	22	21	21	20

Plant Extract	**Assam tea**				**Clove**			
Temperature (°C)	4	25	60	100	4	25	60	100
Pseudo	19	18	17	17	13	13	12	12
SMR	20	15	15	15	28	27	26	27
Vibrio	15	15	15	15	23	24	26	24

Table legend: Heat stability of plant extracts was determined by treating the plants extracts for one hour in the indicated temperature followed by measuring zone of inhibition by agar cup diffusion assay. Pseudo -*P. aeruginosa*, SMR – *S. aureus*, Vibrio – *V. cholerae*.

Extreme temperature stability of plant extracts

The plant extracts were placed in a thermal cycler at 4, 25, 60 and 100°C temperature for one h and antibiotic assay was performed by agar well diffusion. The zone of inhibition with 50 µl extracts (Table 2) indicates that the bioactive components were very stable over the wide

range of temperatures. The experiment was repeated three times with similar results and a representative oneis taken for generating Table 2. Zone of inhibition of *V. cholerae* with Amla extract treated at various temperatures is shown in Figure 1.

TLC separation of bioactive components

Plant extracts were separated by TLC after spot loading of 100 µl in pre-coated silica plates (25 x 10 cm Mark 60F-254).

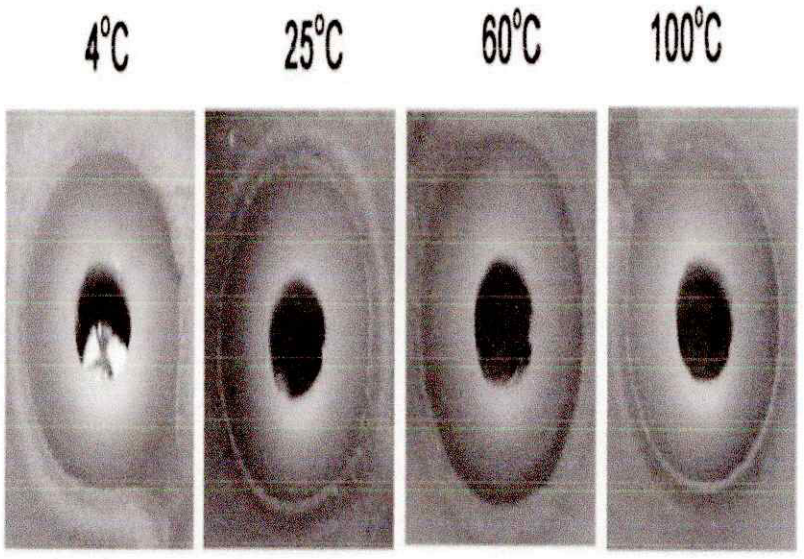


Figure 1. Zone of inhibition of *V. cholerae* with Amla extract after different temperature treatment. Amla extracts were treated at indicated temperature in a thermal cycler for one hour before placing theextract in agar well. Photograph was taken after.

Table 3. Rf values of bioactive components in TLC strip.

TLC solvent	Toluene : chloroform : acetone: (40:25:35) (TCA)			Methanol : formic acid : (1:1) (MF)		
Pathogen	Pseudo	SMR	Vibrio	Pseudo	SMR	Vibrio
Neem	-	0.8	0.3, 0.8	0.8	0.16, 0.8	-
Aloe vera	-	-	-	0.8	0.7	0.8
Amla	0.13, 0.8	0.13	0.13	-	-	-
Assam tea	-	-	-	0.8	0.7	0.8
Clove	-	0.2, 0.8	0.8	0.8	-	-

Table legend: Rf values of bioactive spots as obtained in TLC under different solvent systems. Pseudo - *P. aeruginosa*; SMR – *S. aureus*; Vibrio – *V. cholerae*.

Amongst different solvent systems tried, toluene: chloroform: acetone (45:25:15, TCA) and methanol : formic acid (1:1, MF) were found to be differentially suitable (Table 3). TLC plates were cut along the run (Figure 2A) and bioactivity of the TLC separated plant extracts were performed by contact autobiography as shown for Clove extract against S. aureus (Figure 2B). The TLC strip was cut into pieces so that it can be accommodated in the 100 mm diameter Petri dish and placed silica side down over the culture plates. Plant extracts showed one or more bioactive components against the test pathogens. As shown for Clove extract (Figure 2B), there are at least two different bioactive component present in the sample, one resistant to movement in the TLC (>) and retained close to the loaded region and the other one moved faster .

Stability of TLC separated components in different pH range

By keeping in mind the potential use of these plant extracts as oral consumption to treat pathogen infection, stability of the plant extracts were studied in acidic and alkaline pH ranges. TLC strips were drenched with citrate buffer solution of pH 2.0, 7.0 and 8.0, respectively and incubated for one hour before testing the antibiotic activity assay through contact autobiography. It was observed that the slower moving zone of inhibition was reduced after treatment with pH 2.0 and 8.0 buffers, whereas the faster moving bioactive component retained activity (Figures 2C and D). This study identified several novel roles of plant extracts and efficacies in controlling the growth of very challenging human pathogens. For example, Aloe vera is being used for decades as a medicinal plant (Lorenzetti et al., 1964; t Hart et al., 1990) against bacterial infection, but to our knowledge, this is the first ever report of its efficacy in controlling growth of V. cholerae. Similarly, the role of Amla extract in V. cholerae is also a novel finding of this study. However, the most important finding of this study is the identification of bioactive components present in multiple plants having similar mobility in

TLC indicating the similar kind of component to be effective against multiple pathogens.

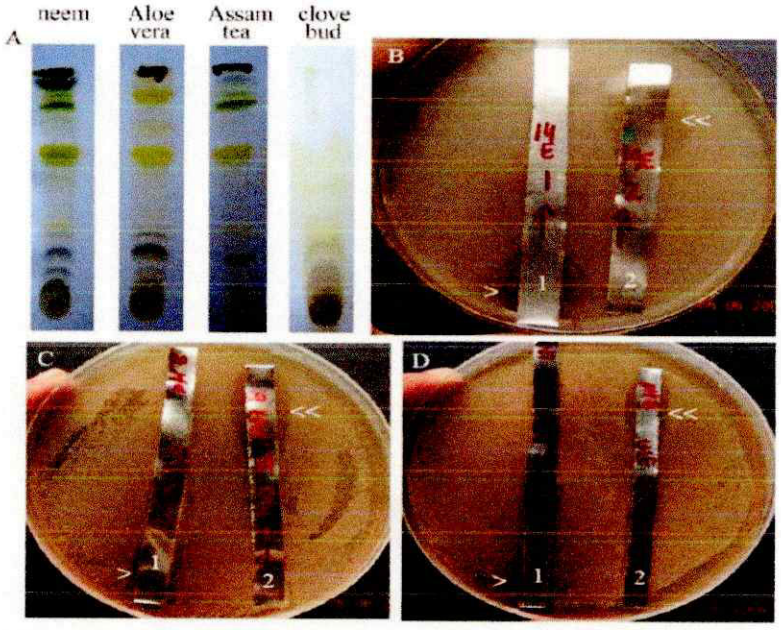


Figure 2. TLC separation of plant extracts and contact autobiography. (A) TLC strips of indicated plant extracts. Photographs were taken without staining. The bands are of natural pigments present. (B) Antibiotic zones detected from TLC strip of Clove bud against *S.aureus*. (C and D) pH stability study after treating the strips with buffers of pH 8.0.

Conclusion

Extracts of Neem, Amla, Aloe, Assam tea and Clove showed that they are effective against all the tested human pathogens P. arugenosa, S. aereus, and V. cholerae in controlling their growth in vitro in culture condition. Bioactive component present therein is highly stable over extreme range of temperature and pH and can be separated out in TLC plate. The slower moving band from Amla extract in TCA solvent is very potent in inhibiting growth of all the pathogens tested. Similarly, faster moving band from Assam tea with MF solvent is effective against all the pathogens tested. Further research may be carried out to purify these components leading towards developing effective measure against bacterial infections.

BBREVATIONS:

TLC-THIN LAYER CHROMATOGRAPHY

WHO-WORLD HEALTH ORGANISATION

TIM-TRADITIONAL INDIAN MEDICINE

TCM-TRADITIONAL CHINESE MEDICINE

MRSA-METHICILLIN RESISTANT STEPHYLOCOCUS AUREUS

E.COLI-ESCHERCHIA COLI

STD-SEXUALLY TRANSMITTED DISEASE

TNF-TUMOR NECROSIS FACTOR

DPPH-1,1-DIPHENYL2-PICRYLHYDROXYL

EO-ESSENTIAL OIL

GRAS-GENERALLY RECOGNISED AS SAFE

MIC-MINIMUM INHIBITORY CONCENTRATION

EGC-EXPERIMENT GROUND COMPUTE

CMV-CUMUBER MOSAIC VIRUS

TMV-TOBACCO MOSAIC VIRUS

EGCG-EPI-GALLOCATECHIN 3-GALLATE

RF-RETENTION FACTOR

TCA-TRICHOLOROACETICACID

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