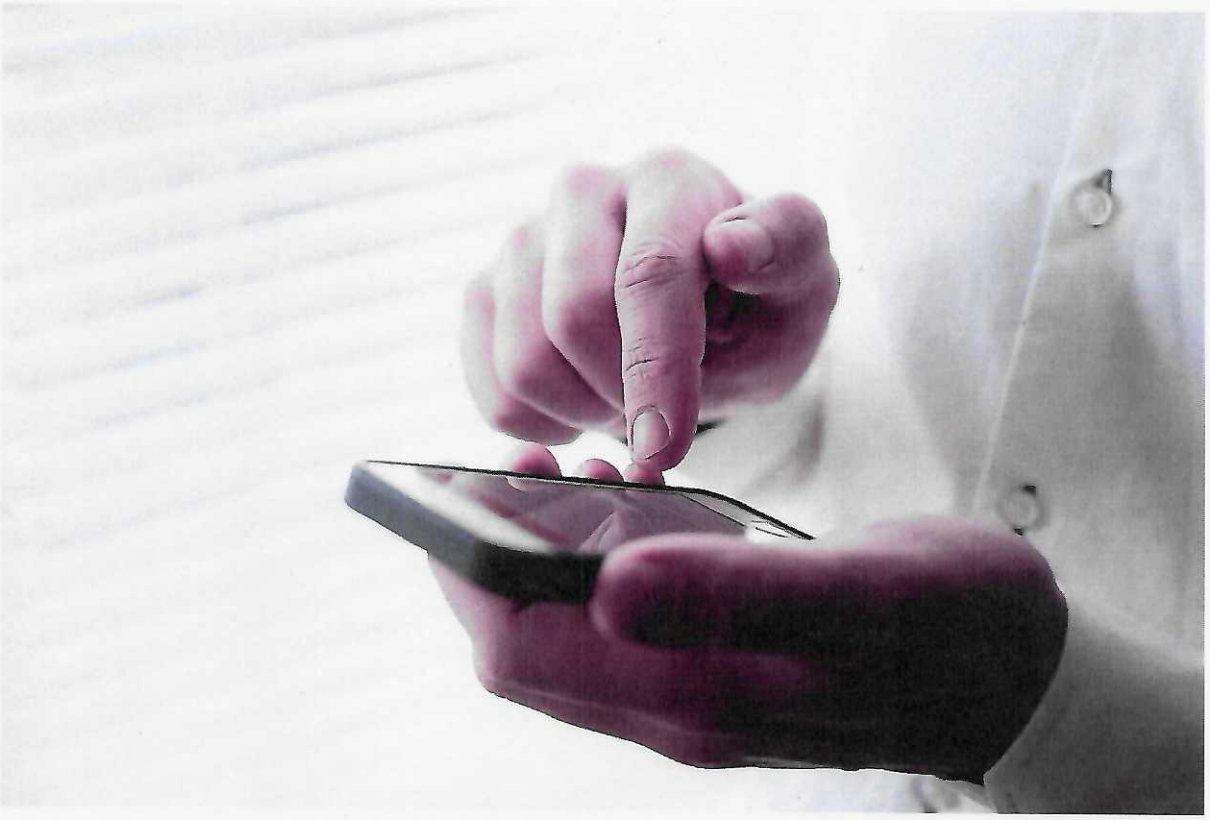
Syllabus for MD (Pharmacology) Programme



Guru Gobind Singh Indraprastha University

A State University established by the Govt. of NCT of Delhi

University School of Medicine and Allied Health Sciences

MD Pharmacology

Programme Objectives

A candidate upon successfully qualifying in the M.D. (Pharmacology) examinations should be able to-

1. Teach pharmacology and therapeutics to students of medical and allied disciplines.
2. Independently plan and undertake research related to drugs (basic as well as Clinical Pharmacology) and communicate the findings in conferences/journals.
3. Set up therapeutic drug monitoring, pharmacovigilance, therapeutic audit and drug information services.
4. Plan and conduct toxicity studies and clinical trials.
5. Educate the public about use and misuse of drugs.
6. Supervise breeding and upkeep of small laboratory animals.
7. Act as medical advisor in a pharmaceutical house.

Specific Learning Objectives

1. Demonstrate sound knowledge of general pharmacological principles, systemic pharmacology and rational use of drugs.
2. Plan and conduct lecture, demonstration, practical and tutorial classes for students of medical and allied disciplines.
3. Demonstrate the knowledge of the principles of essential drug concept and rational use of drugs including rational pharmacotherapy.
4. Carry out screening of drugs for pharmacological and toxicological profile.
5. Carry out drug related literature search, formulate a research project and undertake the same. Apply appropriate statistical methods for summarizing and analyzing data.
6. Present research findings in conferences (oral/poster sessions), Communicate research/educational papers in peer reviewed journals, critically review and comment on research papers.
7. Measure drug levels in blood and other biological fluids using suitable chemical assay methods and interpret the same in therapeutic/toxicological context.
8. Monitor adverse drug reactions. Carry out therapeutic audit and provide drug information service to doctors/public.
9. Use computer and IT tools for teaching, research and presentation/publication of data.

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10. Demonstrate Knowledge of National Health Policy, essential drug concept/lists and supervise drug management in a hospital.

11. Demonstrate knowledge of drug rules and regulations existing in the country.

COURSE CONTENT

Based on the available facilities, department can prepare a list of postgraduate experiments pertaining to basic and applied Pharmacology. Active learning should form the mainstay of postgraduate training there should be lectures for postgraduates (at least 20 per year). Along with seminars, symposia, group-discussions, Journal clubs should be the integral part of the training.

1. Theory:

The theory course content is to be included following:

Paper I: General Pharmacological Principles and Applied Sciences:

Theories and mechanism of drug action, Pharmacokinetic principles and parameters, Factors modifying drug action, pharmacogenetics, chronopharmacology, Adverse effect of drugs, Drug dependence, Toxicology, Dose-response relationships, structure-activity relationships, physiological and biochemical basis of drug action, etiopathogenesis of diseases relevant to therapeutic use of drugs, basic microbiology, immunology and molecular biology. History of pharmacology, sources of drug information and use of Information Technology.

Paper II: Systemic Pharmacology, Chemotherapy and Therapeutics:

Pharmacology of drugs acting on autonomic, peripheral and central nervous systems; cardiovascular, endocrine, respiratory, renal, gastrointestinal and haemopoietic systems and treatment of diseases affecting these systems; Pharmacology of anti-microbial and anti-parasitic drugs and treatment of infective diseases cancer chemotherapy, immunopharmacology, gene therapy and evidence based medicine.

Paper III: Experimental Pharmacology, Bioassay and Statistics:

Experimental methodologies involved in the discovery of drugs (in vivo, in vitro ex vivo). Animal handling and animal care. Methods of anaesthetizing animals and methods of euthanasia. Restraining and blood collection methods. Drug screening methods involved in the evaluation of anti-ulcer, antidepressant, anti-anginal, anti-hypertensive, anti-arrhythmic, anti-diabetic, anti-cataract, anti-platelet, anticancer, anti-inflammatory, anti-diarrheal, anti-epileptic, analgesic, anti-thyroid, antipyretic, anti-glaucoma, anti-hyperlipidemic anti-asthmatics drugs and cough suppressants. Drug screening methods used in screening anti-fungal, anthelmintic, antibacterial and antiviral agents. Drugs screening methods for heart failure, posterior pituitary, adrenal steroid (gluco & mineralo), testicular, parathyroid, ovarian, thyroid hormones, Methods involved in testing teratogenicity, carcinogenicity and organ toxicities in animals.

Paper IV: Clinical Pharmacology and Recent advances:

Development of new drugs, protocol designing, phases, methodology and ethics of clinical trials, Clinical Pharmacokinetics and Pharmacodynamic studies post marketing surveillance, Therapeutic drug monitoring. Pharmacovigilance, ADR monitoring, Drug information service, drug utilization studies, therapeutic audit, essential drug concept and rational prescribing, GLP and GMP. Recent advances in understanding of mechanism of drug action and treatment of disease; New drugs and new uses of old drugs.

2. Practical Training:

A. Screening and evaluation of drug activities including animal models for study of following actions:

1. Analgesic
2. Antinflammatory
3. Antipyretic; pyrogen testing
4. Anticonvulsant
5. Antisanxiety
6. Antipsychotic
7. Antidepressant
8. Antiparkinsanian
9. Sedative, hyponotics
10. Antihypertensive
11. Antianginal
12. Antiarrhythmic
13. Skeletal muscle relaxant
14. Local aneasthetic
15. Antihistaminics, antiallergic
16. Drugs for peptic ulcer
17. Antiemtic
18. Hypoglycameic
19. Antifertility
20. Anticancer
21. Diuretic
22. Antimalarial
23. Antibercular
24. Antidiabetic
25. Antiathersclerotic
26. Bronchodilator & anti-Asthmatic drugs

B. Biopsay of: Bioassay of:

1. Acetylcholine
2. Adrenaline/noradrenaline
3. Histamine
4. 5-hydroxytryptamine
5. Insulin
6. Antibiotics
7. Digoxin
8. Glucocorticoids

C. Methods for studying absorption, biotransformation and excretion of drugs.

D. Limitations of animal experiments in drug evaluation.

E. Quantitative study of agonists and antagonists on isolated tissues.

F. Measurement of blood pressure in conscious and anaesthetized animals.

G. Extraction, purification and characterization of active principles from plant sources/crude Products.

3. Thesis:

The candidate has to undertake a research project and the same to submitted in the form of thesis

EVALUATION

1. Thesis

The work on a research topic, to be submitted by each candidate at least 6 months before the date of commencement of the theory examination.

2. Theory

The theory examination would consist of 4 theory papers of 3 hours duration of each. Each theory paper will be of 100 maximum marks (100 X 4 = **400marks**).

Paper I- General pharmacological principals and applied sciences

Paper II- Systemic pharmacology, chemotherapy and therapeutics

Paper III- Experimental pharmacology, bioassay and statistics

Paper IV- Clinical Pharmacology and Recent Advances

3. Practical

The practical examination should consist of the following exercises: **(total 400 marks)**

1. One experimental pharmacology exercise on intact animal -100 marks
2. One experimental pharmacology exercise on isolated organ -50 marks
3. One minor procedure exercise -50 marks
4. one clinical pharmacology exercise from the list - 50 marks
    a) Drug related problem solving
    b) Comment on a paper reporting a clinical trial
    c) Comment on a drug advertisement
    d) Writing a protocol for a clinical trial
    e) Statistical evaluation of a given data

- Viva on dissertation and research methodology including micro teaching -50 marks
- General Viva-Voce - 100marks
- All practical exercises are to be evaluated jointly by all the examiners.
- An oral question-answer session should be conducted at the end of each exercise

List of Experimental Pharmacology Exercises:

1. Frog's rectus abdominis muscle: dose response curve (DRC) and cumulative DRC of acetylcholine; potentiation of Ach by physostigmine and antagonism by tubocurarinpancuronimu.
2. Study of drug action on perfused frog's heart.
3. Study of drug action on isolated rabbit ileum.
4. Dose-response curve of histamine on isolated guineapig ileum, cumulative dose response curve of histamine in isolated guinea pig tracheal chain.
5. Bioassay of histamine on guineapig ileum by matching method, 3 point method and 4 point (latin square design) method.
6. Bioassay of Ach on frog's rectus abdominis muscle.
7. Determination of EC 50 and pA2 values of histamine and Ach on guineapig ileum and frog rectus abdominis muscles.
8. Determination of ED50 and pA2 values of chlorpheniramine, pancuronium
9. Bio-assay of adrenaline on rabbit duodenum.
10. Bio-assay of adrenaline on rat B.P.
11. Bio-assay of 5-HT on estrogen primed rat uterus.
12. Demonstration of muscarinic and nicotinic actions of Ach and carbachol on the B.P. and respiration of anaesthetised dog/cat.
13. Demonstration of cholinesterase activity in blood and anti-cholinesterase activity of physostigmine using B.P. and respiration of anaesthetized dog/cat.
14. Demonstration of tachyphylaxis with ephedrine and vasomotor reversal phenomenon on B.P. and respiration of anaesthetized dog/cat.
15. Identification of the nature of unknown drug using B.P. and nictitating membrane contractions of anaesthetized cat.
16. Identification of the nature of unknown drug using B.P. and spleen volume of anaesthetized dog.
17. Identification of the nature of unknown drug using B.P. and intestine in situ of anaesthetized dog.
18. Study of drug action on isolated perfused rabbit heart (Langendorff's technique).
19. Study of drug action on isolated rabbit auricles.
20. Demonstration of rabbit head drop with d-tubocurarine and its reversal by neostigmine.
21. Study of neuromuscular blocking agents using Phrenic nerve-diaphragm preparation of rat.
22. Study of local anaesthetics by rabbit cornea, guineapig intradermal wheal, frog lumbar plexus.
23. Study of anti-convulsant activity of drugs on maximal electroshock seizures and drug induced convulsions in rats.
24. Study of analgesic activity of drugs using rat tail-hotwire methods, hot plate method, and acetic acid induced writhing.
25. Study of anti-inflammatory activity of drugs against carrageenin induced rat paw oedema.
26. Antagonism of histamine aerosol induced bronchospasm by anti-histaminics.
27. Effect of psychopharmacological drugs on conditioned avoidance response (Cook's pole climbing).
28. Effect of psychopharmacological agents on foot shock induced aggression in rats.
29. Effect of psychopharmacological agents on elevated plus maze.
30. Effect of drugs on spontaneous motor activity of mice, photoactometer.
31. Study of anorectic activity of amphetamine in mice.
32. Potentiation of barbiturate hypnosis by chlorpromazine.

33. Study of miotics and mydriatics on rabbit's eye.
34. Minor procedures:
    a) Mouse tail vein injection.
    b) Administration of drugs to rats by gastric cannula
    c) Collection of blood from rat tail
    d) Collection of blood by Cardiac puncture in rat.
    e) Injection of drugs through marginal ear vein of rabbits.
    f) Intraperitoneal and subcutaneous injection to rats and mice.
    g) Intracerebroventricular injection in rat.

***List of Clinical Pharmacology Exercises*:**

1. Estimation of drug levels using colorimetry, spectrophotometry, fluorimetry, flame photometry, high performance liquid chromatography (HPLC), enzyme linked immunoassay.
2. Recording B.P. in human volunteers.
3. Recording of ECG and measurement of heart rate, PR interval, QT interval, ST segment depression etc. in human volunteers.
4. Study of effect of sublingual nitroglycerine tablet on B.P. and heart rate.
5. Study of effect of Beta-blockers on exercise tolerance in volunteers
6. Spirometry and respiratory function tests and effect of bronchodilators.
7. Psychomotor testing in volunteers
8. Assessment of analgesic activity in volunteers
9. Mydriatic, miotic and cycloplegic effect of drugs in human subjects.
10. Effect of anticholinergic drugs on salivation, pupillary size, heart rate and memory.
11. Molarity calculations and preparations of reagents.
12. Estimation of serum salicylate levels using spectrofluorimetric method.
13. Estimation of plasma phenobarbitone concentration using spectrophotometer.

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