ALTAMASH INSTITUTE OF DENTAL MEDICINE
(JINNAH SINDH MEDICAL UNIVERSITY)

BDS Second Year
Pharmacology
Study Guide

Introduction:

Pharmacology is one of the essential basic science disciplines which dental students across Pakistan and outside study. This discipline helps students learn about details of various medications that practitioners administer in regular clinical practice.

This discipline will inform the students of the modes of actions, side effects, uses and contraindications of medications along with how they are metabolized and distributed in the body.

Outcomes:

By the end of the course, students will be able to:

- Describe the pharmacological actions with the adverse effects of different drugs and agents at system/sub cellular/ macromolecular levels of the body
- Explain the basic pharmacological knowledge in the prevention and treatment of various diseases.

Teaching and learning:

- Flipped Classroom (FC)
- Interactive lectures (IL)
- Tutorials
    a. Cased Based Learning (CBL)
    b. Small Group Discussion (SGD)

Assessment tools:

1. Multiple Choice Questions: (MCQs)
    - One Correct Type
    - One Best Type
2. Short Essay Questions (SEQs)
3. Observed structured practical examination (OSPE)

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s.no.	Topic	Course Objectives: By the end of the course, 1st year students will be able to:	Teaching method	Assessment Tool
1	General Pharmacology	• Define : Pharmacology, absorption, bioavailability, plasma half-life, drug distribution, volume of distribution, plasma protein binding, biotransformation, excretion of drugs, drug kinetics, half-life, drug elimination, steady-state concentration, receptor, agonists, antagonist, efficacy, potency • List the types of receptors • List the disadvantages of various routes of drug administration • Discuss the nomenclature of drugs. • Describe various branches and divisions of pharmacology • Discuss the development of the drugs. • Classify various sources of drugs with their examples. • Discuss various active principles of drugs • Describe various routes of drug administration. • Discuss the advantages of various routes of drug administration • Discuss various mechanisms by which drugs cross the biological membranes in the body • Discuss the factors affecting the process of drug absorption • Explain the factors affecting bioavailability • Explain the clinical importance of plasma • Discuss the mechanism of drug distribution and volume of distribution • Enumerate the factors affecting drug distribution • Discuss the clinical importance of drug	IL CBL SGD IL CBL IL CBL IL	MCQs SEQs MCQs SEQs MCQs

		distribution • Discuss the influence of plasma protein binding on drug distribution • Enumerate the phases of biotransformation • Discuss the principles of drug biotransformation • Discuss entero-hepatic circulation • Discuss the clinical significance of biotransformation • Discuss P450 enzyme induction and inhibition • Discuss the clinical significance of excretion of drugs • Explain the routes of drug excretion • Discuss the factors affecting drug excretion • Discuss the factors affecting half-life, drug elimination, and steady-state concentration • Discuss the relation of half-life with drug dosing • Explain drug dosing and achievement of steady-state concentration • Discuss the kinetics of drug elimination • Discuss the properties of receptors • Describe the clinical significance of receptors • Explain various mechanisms for obtaining the therapeutic effect of drugs • Explain types of agonists • Explain types of antagonists • Describe various types of mechanisms of drug • Explain the modes of action of different drugs at the molecular level • Describe dose-response relationship • Discuss the drug dose relationship to the drug effect and their graphic presentations • Enumerate therapeutic index • Discuss the clinical significance of the therapeutic index	SGD IL SGD IL CBL IL SGD	SEQs MCQs SEQs MCQs SEQs MCQs SEQs

		• Discuss adverse drug reactions with examples. • Discuss various types of drug interactions. • Describe the terminologies related to drug interaction such as summation, potentiation, synergism, additive effects and antagonism with examples	FC SGD	MCQs SEQs
	Drugs Acting On Autonomic Nervous System (ANS)	• List effects & contra-indications of sympathomimetic drugs • List the clinical uses & side effects of Parasympathomimetic drugs • List the side effects & contra-indications of antimuscarinic drugs • Classify sympathomimetic & Sympatholytic drugs • Classify Parasympathomimetic & parasympatholytic drugs • Classify anti-muscarinic drugs • Classify skeletal muscle relaxants • Discuss the organization of the autonomic nervous system • Explain sympathetic and parasympathetic nervous with innervations • Discuss the neurotransmitters of sympathetic and parasympathetic nervous systems • Describe adrenergic receptor types and subtypes • Discuss the clinical uses of sympathomimetic drugs • Describe adrenoceptor antagonists. • Explain the pharmacokinetics of adrenergic antagonists. • Discuss pharmacodynamics of adrenergic antagonists. • Explain modes of action of parasympathomimetic drugs.	IL	MCQs

		• Discuss the pharmacokinetics and pharmacodynamics of these drugs • Explain the clinical uses of antimuscarinics • Describe the basic and clinical pharmacology of skeletal muscle relaxants.	CBL	SEQS
	Cardio-vascular Drugs	• Define diuresis • Classify diuretics, anti- angina drugs, drugs used in cardiac failure, anti-arrhythmic drugs, anti-hypertensive drugs • List the side effects of anti-anginal drugs. • Define hypertension and its types, arrhythmia and its types, cardiac failure • Describe the clinical role of diuretics • Discuss clinical pharmacology of diuretics • Describe the basic and clinical pharmacology of the drug from different groups • Discuss angina and its types. • Discuss the mode of action of anti-angina drugs • Describe the clinical approach in the treatment of Ischemic Heart Disease • Discuss the basic and clinical pharmacology of drugs used to treat cardiac failure • Discuss side effects of anti-arrhythmic drugs	IL CBL IL	MCQs SEQs MCQs
	Blood	• Classify hematopoietic agents, anticoagulant drugs, thrombolytic drugs, anti-hyperlipidemic drugs • Discuss various types of anemia • Describe drugs used to treat anemia • Explain the clinical pharmacology of different anemic drugs • Describe coagulation process • Discuss the clinical pharmacology of anticoagulants • Describe thrombolysis	IL CBL	MCQs SEQs

		• Explain the pharmacokinetics of thrombolytics. • Discuss pharmacodynamics of drugs from different groups • Describe hyperlipidemia. • Explain the pharmacokinetics of anti-hyperlipidemic drugs. • Explain the mode of action of anti-hyperlipidemics. • Discuss the importance of various types of vitamins used for iron deficiency anemia • Explain the clinical pharmacology of main vitamin preparations used for iron deficiency anemia • Discuss clinical pharmacology of various drugs used for megaloblastic anemia		
	Analgesics	• Classify NSAIDs, opioids and drugs used for arthritis • List the side effects of DMARDS • List the side effect of drugs used for the treatment of gout • Discuss the general properties of NSAIDs • Describe the clinical pharmacology of NSAIDs • Discuss the mechanism of action and • Describe the clinical significance of Opioids • Discuss the adverse effects of opioids • Discuss the pharmacokinetics of opioids • Explain the mode of action of DMARDs • Discuss the treatment of acute and chronic gout the mode of action of drugs • Describe the used for the treatment of gout	IL CBL IL	MCQs SEQs MCQs
	Drugs Acting On Gastrointestinal	• Define Peptic ulcer disease, emesis, • Classify various drugs used to treat PUDs • Discuss the clinical significance of drugs used to treat PUDs	IL CBL	MCQs SEQs

	Tract	• Enumerate the mode of action of PUDs • List the side effects of peptic ulcer disease. • Discuss the effects of given drugs on the intestine of rabbit (Acetylcholine, epinephrine, histamine) • Describe the anti-emetic agents • Discuss the clinical significance of anti-emetics • Explain clinical pharmacology of antiemetics • Discuss the use of prokinetic drugs • Classify laxatives/purgatives • Explain the kinetics of laxatives • Discuss the dynamics of laxative drugs • Classify anti-diarrheal drugs • Discuss the mode of action of the anti-diarrheal drugs • List the side effects of anti-diarrheal drugs • Discuss the clinical significance of anti-diarrheal drugs	IL CBL	MCQs SEQs
	Respiratory System	• Classify the drugs used for the management of asthma and COPD, anti-tuberculosis drugs • List the side effects of anti-tuberculosis drugs. • Discuss the pharmacokinetics of the drugs used for the treatment of asthma • Enumerate the dynamic properties of drugs used for the treatment of asthma and COPD • Discuss the pathophysiology of Asthma. • Discuss the approach used in the treatment of bronchial asthma • Explain the clinical importance of nebulizers and inhalers • Explain the mode of action of important drugs used in the treatment of tuberculosis • Explain the clinical significance of anti-tuberculosis drugs.	IL CBL	MCQs SEQs

	Autacoids	• Define autacoids • Classify Anti-Histamines, Serotonin Agonists, Serotonin Antagonists • Explain the Pharmacodynamics of anti-histamines • Discuss the clinical pharmacology of anti-histamines • Describe the mode of action of serotonin agonist and antagonist • Discuss the clinical pharmacology of serotonin agonists and antagonists • Explain the Pharmacodynamics of prostaglandins • Discuss the clinical pharmacology of prostaglandins • Explain the Pharmacodynamics of leukotrienes • Discuss the clinical pharmacology of leukotrienes	IL CBL	MCQs SEQs
	Drugs Acting On Central Nervous System	• Define epilepsy and its types, anesthesia with its types, psychosis • Classify anti-epileptic drugs, anti-Parkinson drugs, general anesthetics, sedative-hypnotic drugs, local anesthetics, alcohols, CNS stimulants, anti-psychotic drugs, antidepressant drugs, anti-migraine drugs • List the side effects of sedative and hypnotics drugs, side effects of anti-epileptic drug, contraindications of antiepileptic drugs, side effects of anti-Parkinson drugs, side effects of general anesthetics • Discuss the mode of action & clinical pharmacology of sedative and hypnotics • Describe the mode of action & clinical significance of antiepileptic drugs • Discuss the pathophysiology of Parkinson's	IL CBL	MCQs SEQs

		disease • Describe the mode of action of Anti-Parkinson drugs • Describe the properties of general anesthesia. • Discuss the clinical pharmacology of inhalational and I/V anesthetic drugs • Discuss the pharmacokinetics & pharmacodynamics of local anesthetics. • Discuss the pharmacodynamics of alcohols • Discuss the pathophysiology of migraine • Discuss the clinical pharmacology of anti-migraine drugs • Describe the modes of action & clinical aspects of CNS stimulants • Describe the mode of action & clinical pharmacology of Anti-Psychotics. • Describe depression and its types of depression • Explain the clinical aspects of the use of main Anti-Depressant drugs		
	Drugs Acting On Endocrine System	• List the types of different adrenocorticoids • Define hypoglycemia • Classify glucocorticoids, anti-thyroid drugs, drugs used for the treatment of hypothyroidism, insulin preparations, Oral hypoglycemic agents, Gonadal hormones agonists and antagonist drugs • Describe pituitary hormones • Discuss the release of pituitary hormones under the influence of the hypothalamus • Discuss the importance of hormone supplementation related to the pituitary gland • Discuss the drug therapy of hormonal disorders related to pituitary gland • Describe adrenocorticoids • Enumerate the mode of action of steroids in the	IL	MCQs

		body at the cellular level • Discuss the uses of corticosteroids • Enumerate the uses of mineralocorticoids Discuss the pharmacodynamics of agonists of adrenocortical hormones • Discuss the pharmacodynamics of antagonists of adrenocortical hormones • Describe thyroid disorders • Enumerate the mode of action of anti-thyroid drugs • Explain the clinical pharmacology of different anti-thyroid drugs • Describe hypothyroidism • Explain the kinetics and dynamics of the main drugs used for the treatment of hypothyroidism • Discuss the pharmacology of drugs used for the treatment of parathyroid disorders • Discuss the mode of action & clinical aspects of insulin • Discuss the clinical significance of oral hypoglycemic agents • Describe the physiology of the gonadal hormones • Explain the basic and clinical pharmacology of gonadal agonists and antagonists	CBL	SEQs
	Chemotherapeutic Drugs	• List the uses, side effects and drug interaction of all classes of antimicrobial agents • Classify the following classes of Antimicrobial drugs i. Cell wall synthesis inhibitors: Penicillin, β-lactam antibiotics, Cephalosporins and others ii. Protein Synthesis Inhibitors, Aminoglycosides, Macrolides, Tetracyclines and others	IL	MCQs

		iii. Antimetabolites: Sulfonamides, Fluoroquinolones and others iv. Anti-Protozoal drugs including Anti-amoebic and Antimalarial Drugs v. Anti-viral drugs based on the type of infecting viruses vi. Anti-Fungal drugs on the basis of the types of infection • Classify different anticancer drugs according to function and cell cycle specificity. • Explain the life cycle of malarial parasites and its importance • Explain the general principles of antimicrobial therapy • Discuss the various types of fungal infections • Describe various types of viral infections according to the different phases of infection • Discuss Chemotherapeutic spectra of different drug classes, • Discuss rational of antimicrobial drug dosing. • Discuss selection of anti-microbial agents, incidence of drugs resistance, combination therapy and complication of these agents • Explain the basic and clinical pharmacology of above all antimicrobial agents • Discuss the rationale of Anti-Microbial therapy • Discuss various types of Anti-Microbial drugs along with their importance • Describe causes of cancer and discuss rationale of cancer chemotherapy. • Discuss basic and clinical pharmacology of anticancer drugs	CBL	SEQs
	Locally	• Define demulcents, emollients, irritants,	IL	MCQs

	Acting Drugs	counter-irritants , astringents, antiseptics, disinfectants • Discuss various types of topical drug preparations with examples Describe the basic and clinical pharmacology of locally acting drugs • Explain various types of antiseptics and disinfectants • Describe the clinical uses of antiseptic sand disinfectants.	CBL	SEQs
	Practical	• Demonstrate a brief introduction to Power Lab • Demonstrate the preparation of Tyrode Solution • Write prescription writing following a standard format • Demonstrate the procedure of the use of nebulizers and inhalers	Lab Demo	OSPE

Reading Sources:

Text Book: Lippincott Illustrated Reviews: Pharmacology Edition 6

Power Lab: Power lab is a data acquisition system comprising hardware and software and designed for use in life science research and teaching applications. It is commonly used in physiology, pharmacology, biomedical engineering, and psychophysiology laboratories to record and analyze physiological signals from human or animal subjects or from isolated organs.

Internet resources: With easy excess to digital library students will use internet resources with added time flexibility to enrich and update their knowledge and its application.

Library: It provides wealth of resources, space to study alone or in a group. It also provide world of books to discover and borrow.

Assessment Criteria:

Knowledge:

- MCQs (Multiple Choice Questions) are used to asses objectives covered in each module.
- A MCQ has a statement or clinical scenario followed by four options (likely answer).

- Students after reading the statement/scenario select ONE, the most appropriate response from the given list of options.
- Correct answer carries one mark, and incorrect 'zero mark'. There is no negative marking.
- Students mark their responses on an answer sheet provided by examination department.

Skills:

- OSPE: Objective Structured Practical Examination:
- Each student will be assessed on the same content and have same time to complete the task.
- Comprise of 12-25 stations.
- Each station may assess a practical tasks include practical skills and application of knowledge
- Stations are observed, interactive, application of knowledge based and rest.
- In Observed and Interactive Stations these will be assessed by internal or external examiners through structured viva or a task.
- Application of knowledge Stations: it will be static stations in which there will be pictures, clinical scenarios with related questions for students to answer on the provided answer copy.
- Rests: It is a station where there is no task given and in this time student can organize his/her thoughts.

AIDM Internal Assessment Policy

Students will be assessed to determine achievement of learning objectives through the following:

- Midterm Examination will be scheduled on completion of half of the course
- Mock Examination will be scheduled on completion of whole course
- The method of examination comprises theory exam which includes MCQs, and practical examination by OSPE (Objective Structured Practical Examination).
- Student's behaviors and attitudes will be observed during all academic activities.

Annual Examination:

- Marks of both internal assessments will constitute 20% weightage as per JSMU policy.
- University Annual examination will be based on MCQs and OSPE.

Attempts:

There are 2 attempts in the third professional examination only. 2nd attempt is the supplementary examination which if not passed student has to repeat the year.

Course Evaluation:

- Pass/fail ratio of continuous and summative assessments will be evaluated.
- 75% attendance is mandatory to be eligible for annual professional examination
- Feedback will be taken
  - Regarding course from students and faculty
  - Student feedback regarding faculty
  - Faculty feedback of students

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