

Dmci Syllabus

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DIPLOMA IN CLINICAL LABORATORY TECHNOLOGY COURSE
KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY, CHENNAI-32

G.O.No.1049/Health and Family Welfare Department, dt. 23.7.'93

S Y L L A B U S

MICROBIOLOGY

THEORY

I. GENERAL MICROBIOLOGY

- a. Introduction and History of Microbiology
- b. Laboratory Bio safety procedure and laboratory accidents Administration and discipline, laboratory planning, recording of specimens, handling of infectious materials, maintenance of laboratory records, cataloging.
- c. Microscopes - various types - maintenance and uses.
- d. Equipments : pH meter, incubator, hot air oven, autoclave, glassware dryer, centrifuges, filters, laminar flow, inspirator, ARNOLD sterilizer, colony counter, waterbath, bacteriological loop and incinerator.
- e. Classification and Morphology of microbes, structure of bacteria, cultivation, metabolism, growth requirements and disposal.
- f. Sterilisation and disinfection
- g. culture media and their preparation.
- h. Identification of micro organisms, different stains and staining procedures, antimicrobial agents, drug sensitivity tests, drug resistance, phase typing, bacteriocine typing and sero typing.
- i. Laboratory experimental animals
- j. Preservation of cultures.

II. Systematic Microbiology

Gram positive cocci, Gram positive bacilli, gram negative cocci, Gram-negative bacilli, vibrios, anaerobic organism, spirochaetes, bacteriology of water and milk and food microbiology, myco-bacteria, chlamydia, rickettsia, mycoplasma.

III. Virology

Introduction, Morphology, general properties, classification and cultivation, identification, antiviral agents, common viral diseases, viral vaccines and antisera.

IV. Immunology

Introduction, infection, immunity, antigen, antibody and its reactions. Diagnostic immunological tests - invitro and invivo. Vaccines and antisera, Hypersensitivity reaction, auto immunity, Toxin and Toxoid, source, spread and transmission of microbes.

V. Mycology

Classification and general properties, cultivation, dermatophytes, systematic fungus, opportuniatic fungus, yeast, mycotoxin, Keratomycosis.

VI. Protozoology and Relminthology

Intestinal protozon, and blood protaxon, Flagellates - Helminthology - rounds worm Tapeworms, flukes - identification, cultivation immunological diagnosis.

VII. Entomology

Vector and Vector borne diseases

VIII. Clinical Microbiology

Epidemiology - selection, collection and transport of specimen for microbiological examination - Direct microscopic examination - cultivation, concentration, special techniques - rapid diagnostic tests.

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|-----------|----------------|-------------------------|
| 1. Blood | 4. Sputum | 7. Tissue |
| 2. Urine | 5. CSF | 8. Bacterial food |
| 3. Stools | 6. Throat Swab | 9. Poisoning and others |

IX. Laboratory experimental Animals

The mousing, feeding, cleaning and handling of experimental animals, cage sterilisation - germ free animals - uses - sacrificing the animal and post mortem - Disposal of animals and excreta.

X. Vaccines and Sera

Bacterial and viral vaccines - Prophylatic, Therapeutic Vaccine.

- Immunoglobulins - specific and non specific.

XI. Diagnostic Immunological Reagents:

Antigens, HTS, complement, amboceptor, ASC, Bacterial typing, and grouping, kits, Rapid diagnosis, Hospital/ Lab infection - Control procedures.

PRACTICAL

I. General Bacteriology:

- Microscopes
- Preparation of Bacteriological loop
- Hanging drop, cover glass preparation
- Preparation of stains and staining procedures,
simple stains, gram stain, acid fast stain
- capsule stain, Media preparation
- Inoculation techniques
- Cultivation - Aerobic
Anaerobic
- Colony count
- Isolation and identification of bacteria
- Sterilization methods, cleaning, washing, drying,
packing and storage
- Disinfectants
- Sensitivity tests
- Preparation of Pasteur pipettes.

II. Immunology

- Preservation of microbes and transport of isolates to
reference (within and outside India) centres
- Antigen and antibody preparation
- High titre sera preparation and its estimation
- Agglutination test - Widal, Brucella, Weil-Felix test
- Vaccine, Sera, diagnostic reagents
- Flocculation test, WRL, Pregnancy test, Rose Waaler
test and Paul Bunnell test
- Ambacptor
- Elisa, Electrophoresis, immunofluorescence, Latex test
- Haemagglutination inhibition, HA tests.
- C reactive protein, ASO titre
- Radio immunodiffusion.

III. Systematic Bacteriology

- Acid test staining by Ziehl Neelsen's method
- Water Bacteriology, coliform count
- Other Bacterial pathogens
- Collection, transportation, processing of food,
other beverages etc.

IV. Parasitology

- Microscopic examination of ova, cyst, trophozoites
- Preservation of specimens and slides
- Preparation of mounting of specimens in slides
- Concentration methods of examination of ova and cyst
- Cultivation of amoeba, giardia, malarial parasites etc.

V. MYCOLOGY

- Microscopic examination of filamentous fungi and yeast
- Staining - Bismphenol cotton blue staining gram's
staining
- KGH mount, skin scraping, cultivation

- Preparation of Sabouraud's medium with and without antibiotics
- Identification, sensitivity tests for antifungal agents.

VII Virology

- Collection, transport of specimen
- Preparation of culture medium
- Processing specimen
- Primary culture - cell line, maintenance, preservation passage
- Cultivation of virus, animal inoculation, chick embryo, HA, and HAI tests, Neutralisation test
- Immunofluorescence, Elisa

VII. Clinical Microbiology

- Preparation of transport media
- Syringes, containers, swabs, sterile cotton preparation
- Processing specimens - stool, blood, pus, swabs, tissues, CSF and other body fluids, sputum.

VIII. Quality control

- Sterility test for any vaccine
- Potency, safety test, pyrogen test
- Quality control in microbiology
- Hospital infection, investigation of hospital infection
- Investigation of epidemics.

Pathology including Blood Transfusion Medicine

THEORY

I. INTRODUCTION:

- Introduction to pathology, history of pathology;
- Introduction to human anatomy and physiology
- Normal animal cell;

II. Clinical Pathology:

a. Haematology:

- Blood - various components and their functions - collection of blood - coagulation of blood, anticoagulants, importance of blood clotting, factors involved in blood clotting.
- Principle, procedures and significance of CT, BT, ESR, PCV, Haemoglobin, total count, differential count, reticulocyte count, absolute Eosinophil count.

- RBC - Development of RBC, enumeration of RBC, fragility of RBC, anaemia, different types of anemia, bone marrow smear, recognition of normal bone marrow cells.
- WBC - Development, enumeration of WBC count, leukemia, different types, preparation of blood smear, Leishman's stain - Thin smear and thick smear - Technique of staining.
- Platelets - Development
 - Platelet count - Direct
 - Indirect
 - Causes of thrombocytopenia.

~~Peripheral blood picture~~

- b. Examination of Urine, Urinary deposits, microscopic examination of organised and unorganised sediments.
- c. Examination of stool : Normal, and abnormal constituents, microscopic examination, concentration methods of Ova and cyst.
- d. Examination of CSF : Physical, chemical, cell amount
- e. Semen analysis : Sperm motility, Sperm count and morphology.
- f. Examination of sputum, body fluids.

III. Blood Transfusion Medicine:

- Importance of blood bank, principles of blood transfusion, anticoagulants used in blood bank, preservation and storage of blood. Different components used in blood transfusion, fundamentals of blood grouping - significance and methods of grouping - sub group - group sera preparation.

Rh typing - Tube
- Tile method.

Gross matching - single unit
cross matching

Massive transfusion - Inter bottle cross matching

Exchange transfusion

Autologous transfusion, p artificial blood -

Comb's test

Direct and indirect

Blood fractions and components - Donors - Panel
of 1 donors,

Screening of Donors

Transfusion reaction and their investigation -

blood components - packed cells, fresh frozen

plasma, cryoprecipitates, leucocytes, platelets,
specific and Non specific globulins, Mandatory tests
for safe blood transfusion - Microbes transmitted
through blood.

IV. Histopathology: Introduction - Museum Technique, fixatives, Tissue processing, paraffin embedding - Block preparation microtomes - preparation of albuminised slides Haemotoxylin and Eosin staining - Preparation of different Haemotoxylin-staining of glycogen, amyloid, fat, fibro tissue, PAS stain preparation and method of staining - Exfoliative cytology - Cancer staining - Pap's stain - Mounting of specimens - cytopathology - Immuno Peroxidase staining - Biopsy, Frozen section - Automatic Tissue processing. (Hisokinate)

PRACTICALS

1. Clinical Pathology

1. Study of cotton fibre, hair, starch granules and air bubble under the microscope.
2. Study of stained blood smear, Identification of RBC, WBC and Platelets.
3. Hb estimation
4. RBC count
5. WBC estimation
6. Differential count
7. ESR estimation
8. PCV estimation
9. Blood grouping and Rh typing
10. Clotting time, bleeding time
11. Stool examination
12. Urine examination

II. HISTOPATHOLOGY

- Tissue processing Hering, Stropping, section cutting
- Preparation of Albuminised slides, fixing section to the slide. H&E staining and mounting - Despatch of pathological specimen by post.

III. DEMONSTRATION OF:

- | | |
|--------------------------------|------------------------------|
| a. Platelet count | b. Absolute eosinophil count |
| c. Reticulocyte count | d. Sperm count |
| e. Cross matching | f. Deposits in urine |
| g. Pap's staining | h. Electron microscope |
| i. Post mortum | j. Autopsy |
| k. Immune, peroxidase staining | |

BIOCHEMISTRY:

THEORY:

I. GENERAL BIOCHEMISTRY

- Introduction quality control
- Electronics and Instrumentation
- Solution - Types of solution
- Standardisation - PH Indicator - Buffer and Colloidal State-Membrane phenomenon-Osmosis - Surface tension adsorption viscosity
- Biological oxidation
- Carbohydrate-protein-Lipid-enzyme-nucleic acids
- Muscle and biochemical aspects of muscle contraction, digestion and absorption

II. Blood Chemistry

- Anticoagulant - preservation of blood-deproteinisation of blood

Estimation:

- Sugar, G.T.T.
- Urea-creatinine
- Cholesterol - Triglycerides
- Uric Acid
- A/G ratio Total Protein Fibrinogen
- Calcium
- Phosphorous
- Electrolytes (Na^+ , K^+ , HCO_3^- , Cl^-)

III. Metabolism

- Carbohydrates-Lipid - Protein - Nucleic acid - Vitamins-Mineral- water and body fluids - Haemoglobin-metabolism - BMR.

IV. Energy

- Nutrition - composition of food-Balanced diet.

V. Function Tests:

- Liver function test, Renal function test-Tyroid - Thyroid - Pancreas-Gastric analysis (FTM).

VI. Biochemical analysis of CSF

VII. Biostatic and Biogenetics - Fundamentals only

VIII. Hormone Assay Endocrinology

- stone Analysis, Analysis of Biological Fluids

IX. Modern Techniques in Biochemistry

- EPP - Chromatography - Photometry
- Ultracentrifugation, auto analysis, Isotopes
- ELISA

- X. - Special Tests :
- Lipid Profile - TGL, HDL, LDL, VLDL
 - Amylase, Acid Phosphates alkaline Phosphates
 - Inborn error metabolism (Urine screening)
SGOT, SGPT, LFT, CPK

XI. Instruments

- Balance - Calorimeter - Spectrophotometer, Flame Photometer.
- Centrifuge - Spectroscope - ELISA equipment - Electrophoresis.

PRACTICALS FOR BIOCHEMISTRY:

I. Introduction:

- Cleaning of Glasswares - General Bio-chemistry Laboratory work - Accidents and First aid and precaution.

II. Instruments:

- Balances, calorimeter, Flame photometer Spectrophotometer
- Centrifuge, Refrigerator - Incubators, Ovens

III. Analytical work:

- Estimations - Bodyfluids - blood - Urine and identifications of substances of physiological importance.
1. Standardisation and Estimation of blood sugar (Folin Wu method)
 2. Standardisation and Estimation of blood sugar
 3. Standardisation and estimation of urea in blood
 4. Standardisation and estimation of serum cholesterol
 5. Standardisation and estimation of serum creatinine
 6. Standardisation and estimation of serum uric acid
 7. Analysis of CSF.
 - a. Estimation of sugar in CSF
 - b. Estimation of Proteins in CSF
 - c. Estimation of Chloride in CSF
 - d. Estimation of globulin in CSF.

8. Standardisation and estimation of blood chloride
9. Standardisation and estimation of blood carbonates & potassium Sodium
10. Standardisation and Estimation of Total protein in serum
11. Standardisation and estimation of Albumin in Serum
12. Estimation of serum amylase
13. Urine analysis (Normal constituents)
14. Urine analysis (abnormal constituents)
15. Urea clearance test Creatinine clearance test
16. Paper electrophoresis Gel Electrophoresis
17. Paper chromatography and detection of amino acids in urine.
18. Serum enzyme studies

IV. Miscellaneous

- Interpretations - Storage of chemicals - preparation of normal solutions, standards, controls etc.
- conversion tables - Molecular weight - Eq. weight - OD - Charts, etc.