Pharma Unit

Pharmacology Top 25 Most Important Questions with Answers According to New Syllabus ER 2020-21

2nd Year D. Pharmacy

1. Explain oral route of drug administration with advantages and disadvantages?

Ans. Oral Route: In this route of Drug Administration weather solid or liquid preparation is placed in mouth cavity and it is swallowed along with water or milk.

Advantages
- It is most common route of drug administration.
- It is most convenient route of drug administration.
- It is most economical route of Drug Administration.
- It is safest route of Drug Administration.
- Self-medication is possible.
- No complication is there as compared to injections.

Disadvantages
- Onset of action is slow.
- Irritant and unpalatable drugs cannot be given by oral route.
- This route cannot be employed in unconscious and uncooperative patients.
- Drug passes through first pass metabolism.
- 100% absorption is not possible.
- Drugs can be destroyed by digestive juice.

2. Explain parenteral route of drug administration with advantages and disadvantages?

Ans.
Parenteral Route: Route of Drug Administration other than alimentary or gastrointestinal tract are called as parenteral route to drug administration.
There are different types of parenteral routes; Intravenous, Intramuscular, Subcutaneous, Intradermal, Intrathecal, Inhalation route.

Advantages
- Onset of action is fast.
- Large quantity of drugs can be administered by this route.
- This route can be employed in unconscious patient.
- This route can be used in the patient who have nausea or vomiting.
- Avoidance of first pass metabolism.
- Drugs that are not absorbed by gastrointestinal tract can be given by this route.

Disadvantages

- Self-medication is not possible.
- This route is less safe as compared to oral route.
- This route is expensive.
- This route may cause inconvenient to some patient.
- Danger of infection if proper care is not taken.
- This route of drug administration is not suitable for oily solution.
- Bruising can occur at injection site.
- It can produce pain at the site of injection.

3. Explain absorption and different factor affecting drug absorption?

Ans.

Drug Absorption: Drug absorption is a movement of the drug from its site of administration into Blood circulation.

Types of Drug Absorption: Passive Diffusion, Facilitated Diffusion, Active Transport, Endocytosis

- Factors Affecting Drug absorption.

a) Physical state of drug: Liquid drugs are absorbed better as compared to solid drugs.
For example – Syrups absorb faster as compared to tablet or capsules.
b) Particle size of drugs: Smaller drug particles are absorbed faster as compared to larger drug particles.
c) Surface area: The drugs are absorbed faster on large surface area. For example – Drugs are better absorbed in intestine as compared to stomach due to larger surface area of intestine.
d) Concentration of drug: Higher concentrated form of drugs are quickly absorbed as compared to diluted form of drugs.
e) Solubility: Lipid soluble drugs are easily absorbed as compared to water soluble drugs
f) PH of drugs: Acidic drugs are better absorbed in stomach and basic drugs are better absorbed in intestine.
g) Ionization: Unionized drugs are lipid soluble and are well absorbed than ionized drugs.
h) Disease: Disease like diarrhoea reduces absorption of drug.
i) Presence of food: Some drugs are better absorbed in presence of food, some drugs are better absorbed in absence of food.

4. Explain the general mechanism of drug action?

Ans. Mechanism of drug action is a process through which a drug substance produces its pharmacological action or pharmacological effect.

- General mechanism of drug action

✓ By stimulation
✓ By depression
✓ By irritation
✓ By replacement
✓ By cytotoxic action
✓ By modification of immune system

1) By stimulation
- Increase in the activity of specialised cells is called as stimulation.
- For example, adrenaline drug stimulate heart.
- Drug which produces stimulation are called as stimulant drugs.

2) By depression
- Decrease in the activity of specialised cells is called as depression.
- For example, barbiturates drug depresses central nervous system.
- Drug which produces depression are called as depressant drugs.

3) By irritation
- Some drugs produce their action through irritation which can lead to adverse effect on the growth of living tissue.

4) By replacement
- Drug may be used for the replacement of certain deficient enzymes or deficient substances.
- For example, iron in anaemia and insulin in diabetes.

5) By cytotoxic action
- Cytotoxic is a process by which a cell dies or become damage.
- Some drugs produce their action by cytotoxic effect.
- For example, anti-cancer drugs destroy cancer cell.

6) By modification of immune system
- Some drugs such as COVID vaccine produces their action by modifying the immune system.

5. Explain factors modifying drug action?

Ans.

Factors modifying drug action

a) Age: In newborn child the liver and kidneys are not fully developed and in old patient the function of liver, kidneys and vital organs are very slow hence the dose of drug for newborns and old patient should be smaller than the adults.
b) Body weight: The normal dose of drug is calculated for healthy and medium weight person for obese and underweight patient the dose must be calculated individually.
c) Gender (Sex): Same drug can produce different response in male and in female due to difference in hormonal level. For example, zolpidem this drug metabolism slowly in female as compared to male that is why female higher effect of zolpidem in body.
d) Route of Drug Administration: Route of administration can modify the drug action. For example, magnesium sulphate given orally act as purgative but when given intravenously it causes central nervous system depression.
e) Time of drug administration: Time of drug administration can modify the drug action. When the drugs are taken before food it can produce stomach irritation but when the drugs are taken after eating food it does not produce stomach irritation.
f) Diet: Food interferes with the absorption of many drugs. For example, when tetracycline is taken with milk the absorption of tetracycline is decreased.
g) Genetic factors: Genetic factors can modify the action of drugs. For example, primaquine produces haemolysis in patient with a deficiency of glucose 6 phosphate dehydrogenase.
h) Cumulation: When the excretion process of drug is slow repeated administration of drug leads to accumulation in the body which can produce toxic effect. For example, digoxin is excreted from the body very slowly so repeated administration of digoxin leads to accumulation of digoxin which results into toxic effect.
i) Tolerance: When large dose of drugs required to get an effect produced by the normal dose of drug this phenomenon is known as drug tolerance. Drug tolerance can be natural or required.
j) Presence of disease: Presence of disease can modify the action of drug. For example, if patient have any liver disease, then the metabolism of drug decreases which can leads to toxic effect in the body.
k) Additive effect: When the total pharmacological response produced by two drugs is equal to the sum of the individual effect is called as additive effect. Additive effect can modify the action of drug. For example, acetaminophen and ibuprofen combines to achieve greater reduction in pain.
l) Synergism: When the action of one drug is enhanced by another drug is called as synergism. For example, levodopa and carbidopa are given in a combination to enhance each other action.
m) Antagonism: When the action of one drug is inhibited by the action of another drug is called as antagonism. For example, acetylcholine and adrenaline inhibits each other's action.

6. Define local anaesthetic agent with classification, pharmacological action, dose, indication and contraindications?

Ans.

- Definition: Local anaesthetics prevent the generation and conduction of impulses in the nerve by blocking voltage dependent sodium channels which prevents depolarization.

- Classification:
  1) Injections
     A. Low potency: Ex: procaine, chlorprocaine.
     B. Intermediate potency: Ex: Lignocaine, prilocaine
     C. High potency: Ex: tetracaine, bupivacaine, dibucaine
  2) Surface anaesthetics: Ex: cocaine, lignocaine, tetracaine

- Pharmacological Action:
  a) Effect on C.N.S.: Local anaesthetics produce stimulation of CNS which causes euphoria, restlessness, and tremors.
  b) Effect on CVS: All local anaesthetics produces vasodilation, except cocaine.
  c) Effect on sensations: Local anaesthetics block the sensation of pain, temperature, touch, and pressure.
  d) Skin and Mucous Membranes: Topical application blocks sensory nerve endings on the skin or mucous membranes, inducing temporary numbness.

e) Effect on eye: Topical eye drops containing local anaesthetics provide rapid-onset anaesthesia for ophthalmic procedures like tonometry and minor eye surgeries.

- Dose:
  1) Bupivocaine: 1 – 2.5mg/kg
  2) Lignocaine / lidocaine: 4 – 5mg/kg
  3) Mepivacaine: 4 – 5mg/kg
  4) Prilocaine: 5 – 7mg/kg
  5) Ropivacaine: 2.5 - 3mg/kg

- Indication:
  a. Surface anaesthesia is used to treat pain due to burns and ulcers.
  b. Infiltration anaesthesia is used to anaesthetize nerve ending by subcutaneous in filtration.
  c. Nerve block anaesthesia is used to anaesthetize nerve when injected dose to specific nerve.
  d. Spinal anaesthesia is used in case of spinal surgery.

- Contraindications:
  1) Allergy or hypersensitivity to the specific local anaesthetic agent or its components
  2) severe liver disease
  3) cardiac arrhythmias
  4) Infection at the site of administration
  5) Pre-existing neurological conditions
  6) Pregnancy

7. Explain non-steroidal anti-inflammatory drugs with its classification and pharmacological action?

Ans.

- Definition: These are the drugs produce relief of pain and elevated body temperature. As these drugs also produce anti-inflammatory effects they are known as NSAIDS. NSAIDs do not interact with opioid receptors.

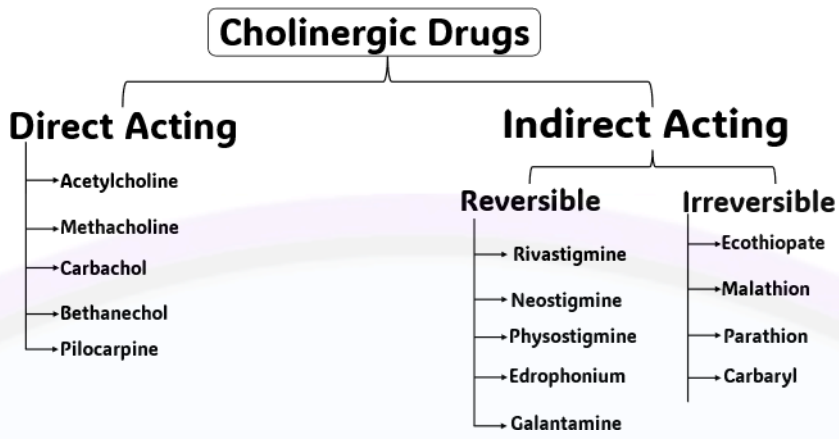
- Classification:
  A) NON-SELECTIVE COX-I INHIBITORS
     1. SALICYLATES AND CONGENERS
        Ex: salicylates, aspirin, salicylic acid, sodium salicylate
     2. PARA-AMINO PHENOL DERIVATIVES Ex: paracetamol
     3. PYRAZOLON DERIVATIVES: Ex: aminopyrine, antipyrine, phenylbutazone
     4. MISCELLANEOUS: Ex: Indomethacin, ibuprofen, Diclofenac, Nimesulide
  B) SELECTIVE COX-II INHIBITORS: Ex: celecoxib, rofecoxib, valdecoxib

- Pharmacological action:
  a) Analgesic: aspirin is a good analgesic and effective only in dull achieving pain of low intensity.
  b) Antipyretics: In fever salicylate bring down the temperature to normal level. But in normal individual there is a no change in temperature.
  c) Respiration: salicylate stimulate respiration indirectly and directly and increase respiration rate and volume and may lead respiratory alkalosis.
  d) G.I.T: aspirin causes gastric irritation and produces pain, nausea, vomiting, salicylates also cause gastric ulceration and haemorrhage.
  e) Anti-inflammatory action: at higher dose of 4-6gm/day aspirin act as anti-inflammatory agents and suppressed the sign of swelling erythema and pain.
  f) Kidneys: in low dose it depresses uric acid excretion whereas in high dose it enhances uric acid excretion.
  g) C.V.S: No effects at normal dose, toxic doses produce paralysis of vasomotor centres.
  h) Blood: salicylate lower erythrocytic sedimentation rate (ESR). They also increase Prothrombin level of plasma prolong bleeding time.
  i) Endocrines: salicylate stimulates the release of adrenaline, adrenal medulla ACTH. They interference with the binding of thyroxine depresses the secretion of thyroid stimulating hormones.
  j) Local action: salicylate having antiseptic, fungi statics and keratolytic affects.

8. Explain cholinergic drugs with its classification and pharmacological action?

Ans. Cholinergic drugs are the substances that enhances the action of acetylcholine. Acetylcholine is the main neurotransmitter of parasympathetic nervous system. Cholinergic drugs are also called as parasympathomimetic drugs. Cholinergic drugs act by 2 main mechanisms viz. By directly binding to cholinergic receptors and by inhibiting acetylcholinesterase enzyme.

- Classification:



- Pharmacological action: The pharmacological action of cholinergic drugs are divided into 2 parts, Muscarinic action and nicotinic action

A. Muscarinic Action:

1) Heart: Cholinergic drugs decrease heart rate and force of contraction by acting on M2 receptors.
2) Blood vessels: Cholinergic drugs dilates all blood vessels in the body. It produces vasodilation by which blood pressure decreases.
3) GIT: Cholinergic drug produces contraction of smooth muscles of GIT. It increases peristaltic movements and tone of the gut. It also increases GT secretions.
4) Bronchi: It produces contraction of bronchial muscles and produces bronchospasm.
5) Urinary tract: It contract smooth muscles of GIT and increase peristalsis movement.
6) Glands: It increases glandular secretions, it increases sweating, salivation, lachrymation.
7) Eyes: It produces miosis by acting on M3 receptors.

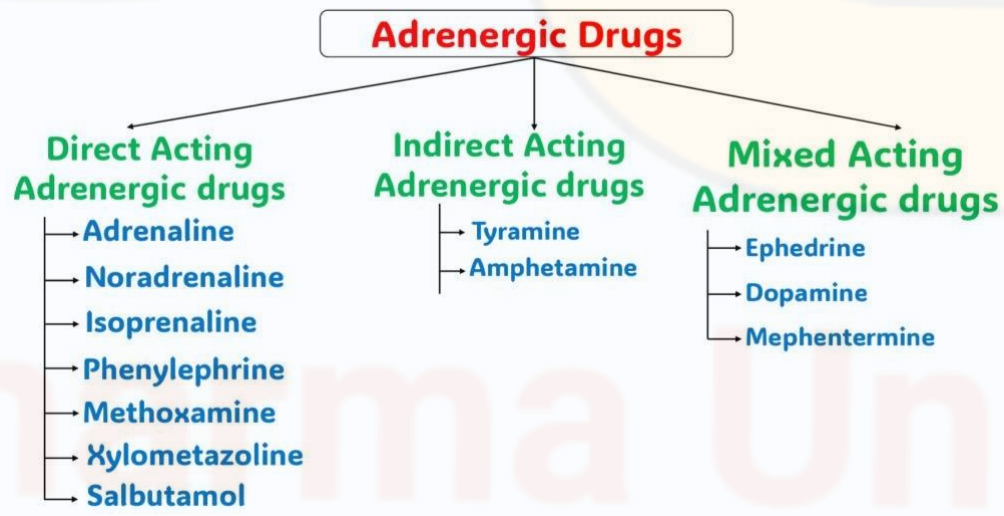
B. Nicotinic action:

1) Skeletal muscle: It stimulates skeletal muscle contraction.
2) Autonomic ganglia: It stimulates both sympathetic and parasympathetic ganglia.

9. Explain adrenergic drugs with its classification and pharmacological action?

Ans. Adrenergic drugs are the substances that mimics the action of adrenaline or noradrenaline. Adrenergic drugs are also called as sympathomimetic drugs and adrenergic agonists.

- Classification



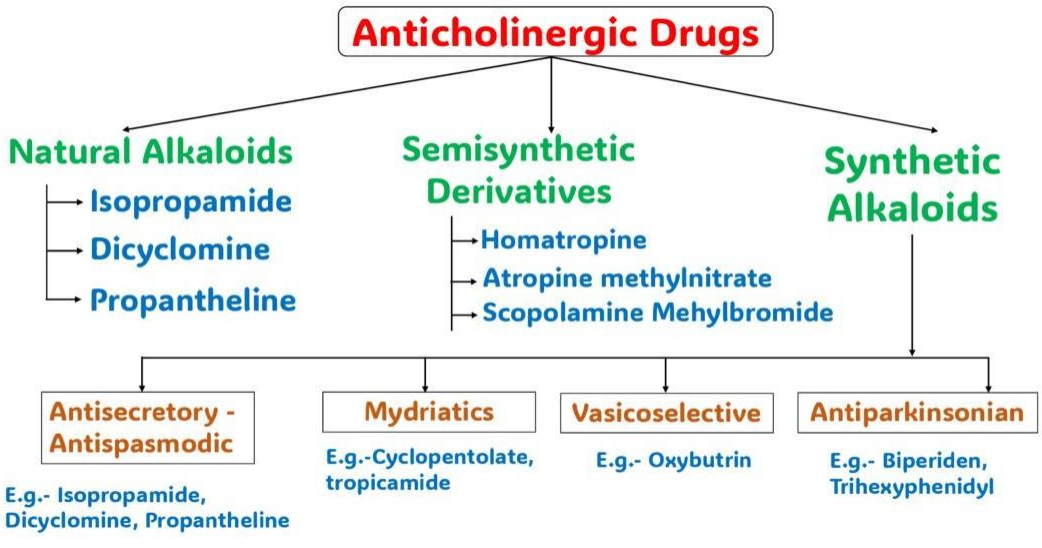
- Pharmacological action

1. Cardiovascular systems: Adrenaline increases heart rate and force of contraction, adrenaline increases cardiac output, adrenaline increases systolic blood pressure. Adrenaline also produces vasodilation.
2. Respiratory system: Adrenaline produces bronchodilation when acting on beta receptors and decreases bronchial secretions when acting on alpha receptors.
3. Eyes: Adrenaline produces mydriasis. It also increases the secretion of aqueous humor.
4. Skeletal muscles: Adrenaline facilitates neuromuscular transmission, and it decreases fatigue in skeletal muscles.
5. Glands: Adrenaline decreases the secretion of all glands.
6. Urinary bladder: Adrenaline relaxes detrusor muscle and contract trigone.
7. Gastrointestinal tract (GIT): Adrenaline reduces gastric acid secretions. Adrenaline decreases intestinal motility.
8. Metabolism: Adrenaline overall increases catabolism and causes hyperglycemia, hyperlactacidemia and it also causes rise in body temperature.

10. Define anticholinergic drugs with classification and pharmacological action?

Ans. The drugs which block the action of adrenaline or noradrenaline are called as anti-adrenergic drugs. Or The drugs which block the action of Alpha- and Beta-adrenergic receptors are called as antiadrenergic drugs.

- Classification



- Pharmacological Action
  1. Heart: Antiadrenergic drugs decrease the heart rate, force of contraction and cardiac output.
  2. Blood pressure: Antiadrenergic drugs such as beta blockers decreases blood pressure.
  3. Respiratory system: Antiadrenergic drugs produce bronchoconstriction by acting on Beta1 receptor.
  4. Eye: Antiadrenergic drugs reduce aqueous humor.
  5. Uterus: Antiadrenergic drugs produce relaxation of uterus.
  6. Local anaesthetics: Anti Adrenergic drugs like propranolol has some local anaesthetic action.
  7. Metabolism: Antiadrenergic drugs increase Low density lipoprotein (LDL) and decreases High density lipoprotein (HDL).

11. Explain Myasthenia gravis?

Ans. Myasthenia gravis: It is a chronic disease characterized by abnormal skeletal muscle weakness and fatigability. It is as autoimmune disease caused by the deficiency of the postsynaptic neuromuscular acetylcholine receptor complex.

- Signs and Symptoms
  1. Weakness of muscles of eye
  2. Diplopia
  3. Difficulty in chewing
  4. Swallowing
  5. Slurring of speech
  6. Respiratory failure
- Drugs of Choice: Neostigmine, physostigmine, pyridostigmine.
- Treatment:
  a) Anticholinesterases act by inhibiting acetylcholinesterase, thereby prolonging the action of acetylcholine and thus enhancing neuromuscular transmission.
  b) Neostigmine: Neostigmine bromide 15 mg tablets. When injection is required neostigmine methylsulfate 500 g/ml of 2.5 mg/ml are used. In myasthenic crisis, the intramuscular or subcutaneous injection of neostigmine is used•
  c) Pyridostigmine: It has slower onset but longer duration of effect than neostigmine, Pyridostigmine bromide tablet 60 mg and injection 1 mg/ml are used.
  d) Glucocorticoids have shown clinical improvement in treatment of myasthenia gravis.
  e) Immunosuppressive agents like corticosteroids are also used.

12. Explain glaucoma and drug used in glaucoma?

Ans.

- Glaucoma: Glaucoma is an ocular disease in which intraocular pressure is increased. It causes damage to optic nerve producing visual loss. The damage to optic nerve and visual loss is probably due to decrease in the blood supply to any part of the body and may be due to direct pressure on nerve. Glaucoma is a major cause of blindness in persons who are above 40 years.
- Types of glaucoma:
  There are two major types, Open angle glaucoma, narrow angle glaucoma.
- Drugs used in Glaucoma:

a) Miotics: Pilocarpine and physostigmine are the miotics used in glaucoma. They produce contraction of the ciliary muscle.
b) Adrenergic agents: The drugs used in apraclonidine and brimonidine. They act by decreasing aqueous humour production.
c) Adrenergic blockers: Timolol, betaxolol and levobunolol are the blockers effective in glaucoma. They act by reducing the formation of aqueous humour.
d) Carbonic anhydrase inhibitor: Acetazolamide is used. It acts by inhibiting the generation of bicarbonate ion in the ciliary epithelium.
e) Osmotic agents: Mannitol.
f) Prostaglandin: Latanoprost is used to treat increased pressure inside of the eye. Latanoprost is applied as eye drops.

13. Define general anaesthetic agents with its classification and pharmacological action?

Ans.

- Definition: General anaesthetics are the agents which produce reversible loss of sensation and consciousness.

- Classification:
  A. Inhalation anaesthetics
     - Volatile liquids: Ex: ether, halothane, enflurane, isoflurane
     - Gases: Ex: nitrous oxide, Cyclopropane

  B. Intravenous anaesthetic
     Ex: thiopentone, propofol, Ketamine, benzodiazepines.

- Pharmacological action:
  a) Heart: General anaesthetic agents can depress myocardial contractility and reduce cardiac output. Some anaesthetics can also induce cardiac arrhythmias, especially at higher doses.
  b) Blood Pressure: general anaesthetics generally cause vasodilation, which leads to a decrease in systemic vascular resistance and blood pressure. They can also depress the baroreceptor reflex, further contributing to hypotension. Certain agents, such as ketamine, may increase blood pressure due to their sympathomimetic effects.
  c) Lungs: General anaesthetics typically depress respiratory and cause respiratory depression. They can decrease tidal volume and minute ventilation, leading to hypoventilation.
  d) Gastrointestinal Tract (GIT): Anaesthetics can inhibit gastrointestinal motility and secretion. They may delay gastric emptying and impair bowel peristalsis, which can lead to postoperative ileus.
  e) Eyes: general anaesthetics cause pupillary dilation (mydriasis) by inhibiting the parasympathetic tone. General anaesthetics can also reduce lacrimation and blink reflexes, potentially leading to dry eyes during surgery.

14. Explain different stages of anaesthesia?

Ans. During the administration of general anaesthetics it is necessary to control the depth of anaesthetics which is related to dose. The progress of anaesthesia divided into four stages.

A. Stage of analgesia: this stage extent from the beginning of inhalation of anaesthetics up to loss of consciousness. There is a gradual depression of cortical centre and caused sensation of falling, suffocation, and visual and auditory disturbance. Minor surgical operation such as dental extraction can be carried out during this stage, with continued administration of anaesthetics the patient passes into the second stage.
B. Stages of delirium or excitement: this stage extends from loss of consciousness to the beginning of surgical anaesthesia. This stage may be associated with marked excitement with increased in muscular activity and vomiting.
C. Stages of surgical anaesthesia: It has divided into four phases.
   - Phase 1: the pupils are constricted, and eyeballs are moving. The blood pressure and pulse rate are normal.
   - Phase 2: the eyes balls are fixed the pupil begin dilating. There is a loss of cornea reflexes and skeletal muscular relax.
   - Phase 3: pupils are dilated, and light reflex lost, the B.P begins to fall. There is a marked muscle relaxant.
   - Phase 4: the pupil or widely dilated, there in a shallow abdominal respiration, B.P is low.

D. Stages of medullary paralysis: It is seen only with overdose. It is the stage of medullary depression. Less action of breathing, circulation failure and death may follow.

15. Define sedative and hypnotic with its classification and pharmacological action?

Ans.

- Definition:
  1. Sedative: these are the drugs which reduce excitement without producing sleep.
  2. Hypnotics: these are the drugs which produces sleep resembling natural sleep.

Sedative act as hypnotic and vice-versa the main difference is in the dose about 1/3 dose of a hypnotics will acts as sedatives.

- Classification:

A. Barbiturates:
   a) Long action barbiturates (duration of action in 8hrs or more): Ex: barbitone, Phenobarbitone.
   b) Intermediate acting barbitone (4 hrs or more): Ex: amylobarbitone, cyclobarbitione
   c) Short acting barbitone (less than 4 hrs): Ex: hexobarbitone, secobarbitone.
   d) Ultra short acting barbiturates. (less than 1 hrs) Ex: thiopentone, methohexitone.

B. Non- barbiturates:
   a) Benzodiazepines: Ex: diazepam, nitrazepam, alprazolam.
   b) Alcohol: Ex: chlorhydrate
   c) Aldehydes: Ex: paraldehyde

- Pharmacological Action
   a) C.N.S: barbiturates produce C.N.S depression such that from mild sedation to even coma.
   b) Sleep: barbiturates induce sleep resemble natural sleep, but it decreases the time spent on REM sleep.
   c) C.V.S: they depress cardiac activity and in higher dose cause fall in BP.
   d) Respiratory system: in higher dose they depress respiratory centre in brain and may produces death.
   e) Kidneys: large dose decrease urinary output due to decrease in glomerular filtration and release of ADH (anti diuretics hormone).
   f) Liver: large dose may produce hepatic dysfunction.

16. Explain anti-convulsant drugs with its classification and pharmacological action?

Ans.

- Definition: The medication used to control or prevent seizures (convulsions) are called as anti-convulsant drugs.

- Classification:
   A) Hydrations: Ex: phenytoin
   B) Barbiturates: Ex: Phenobarbitone, primidone
   C) Iminostilbenes: Ex: carbamazepine
   D) Succinimides: Ex: ethosuximides
   E) Aliphatic carboxylic acids: Ex: sodium valproate
   F) Benzodiazepines: Ex: clonazepam, diazepam
   G) Newer antiepileptic: Ex: lamotrigine, gabapentin
   H) Miscellaneous: Ex: trimethadione, Acetazolamide

- Pharmacological action:
   a) Central Nervous System (CNS): Anti-convulsant drugs Stabilize brain activity to prevent seizures.it inhibit abnormal electrical activity, which helps prevent seizures. It Modulate neurotransmitters to balance brain signals.
   b) Heart: Anti-convulsant drugs generally, do not directly affect the heart. Some drugs such as phenytoin may rarely cause irregular heartbeats.
   c) Blood Pressure: Anti-convulsant drugs do not impact blood pressure. Some drugs, like gabapentin and pregabalin may cause mild increases in blood pressure.
   d) Lungs: May cause respiratory depression rarely.
   e) Gastrointestinal Tract (GIT): Anti-convulsant drugs Can lead to nausea, vomiting, diarrhoea, or constipation.
   f) Eyes: Anti-convulsant drugs can occasionally cause visual disturbances or eye-related side effects.

17. Define opioid analgesics and classify it with examples and pharmacological action?

Ans.

- Definition: These are the drugs which are used to relive moderate to severe pain, by acting on central nervous system.

- Classification:

A. Natural opium alkaloids
   - Phenanthrene derivatives: Ex: morphine, thebaine, codeine
   - Benzyl isoquinoline derivatives: Ex: papaverine, noscapine

B. Semi synthetic derivatives of opium alkaloids: Ex: heroin, apomorphine, dihydromorphine

C. Synthetic derivatives: Ex: pethidine, pentazocine, methadone, nalbuphine

- Pharmacological action:

a) Analgesic action: morphine is a potent analgesic and relieves pain without loss of consciousness.

b) Action of CNS: morphine produces euphoria in the presence of pain, but in the absence of pain, and in increased dose it produces sleep.
c) Respiratory action: morphine produces depression of respiration by directly depress the respiratory centre in the brain.
d) Pupils: morphine produces constriction of the pupil and higher dosage it characterized by pinpoint pupil.
e) Emetics action: in small dose morphine produce vomiting due to stimulation of CTZ (chemo receptor trigger zone) but in higher dose it depresses the vomiting centre and hence there is no vomiting in poisoning.
f) Antitussive effect: morphine suppresses cough of depressing the cough centre.
g) ADH secretion: morphine produce release of ADH this result in decrease of urine output.
h) GIT effect: morphine decreases the mortality of the gout and produces constriction of intestinal smooth muscle and increase absorption of water and it all leads to constipation.
i) CVS effect: normal dose of morphine produces no effect on heart or circulation, but hypotension may be produced at toxic dose.

18. Define antihypertensive drugs with its classification and pharmacological action?

Ans.

- Definition: The drugs which reduce elevated blood pressure to normal level are called antihypertensive drugs. Or The drugs used in the treatment of hypertension are called antihypertensive drugs.
- Classification
  a) Drugs acting centrally: e.g. clonidine, methyldopa.
  b) Drugs acting on autonomic ganglia, i.e. ganglion blocking agents, e.g. hexamethonium, mecamylamine, pempidine, trimethaphan.
  c) Drugs acting on post-ganglionic sympathetic nerve endings:
  - Adrenergic neuron blockers, e.g. guanethidine.
  - Catecholamine depilators, e.g. reserpine.

  d) Drugs acting on adrenergic receptors:
  - Adrenergic blockers: e.g. phenoxybenzamine, phentolamine.
  - Adrenergic blockers, e.g. propranolol.

  e) Drugs acting directly on vascular smooth muscles(vasodilators): e.g. Hydralazine, diazoxide, minoxidil, sodium nitroprusside.
  f) Drugs acting by stimulating baroreceptor, e.g. veratrum.
  g) Drugs which block renin angiotensin aldosterone axis, e.g. saralsin, spironolactone, captopril, enalapril.
  h) Oral diuretics: e.g. thiazides (hydrochlorothiazide).
  i) Miscellaneous: e.g. MAO inhibitors (pargyline), nifedipine, sodium nitroprusside.

- Pharmacological action:
  a) Heart: Antihypertensive drugs can reduce the workload on the heart by decreasing blood pressure, reducing myocardial contractility
  b) Blood vessels: They relax blood vessels, making them wider, which lowers blood pressure by allowing blood to flow more easily.
  c) Lungs: Some drugs may affect breathing in some people, causing tightness in the chest and produce bronchoconstriction
  d) Gastrointestinal Tract (GIT): Antihypertensive drugs generally don't directly affect the gut, but they may cause stomach upset or diarrhoea in some patient.
  e) Eyes: Antihypertensive drugs may cause vision changes or eye discomfort in some individuals.
  f) Kidneys: Antihypertensive drugs can act on the kidneys to decrease sodium retention and decreases blood pressure.

19. Define anti coagulants with its classification?

Ans.

- Definition: The drugs which prevent coagulation of blood are called anticoagulants.
- Classification:
  1) In vivo anticoagulants
     - Rapid-acting (parenteral): e.g. heparin and derivatives.
     - Slow acting (oral): e.g. warfarin, phenindione, dicoumarol.
  2) In vitro anticoagulants: e.g. oxalic acid, sodium citrate.

20. Define diuretics and classify it with examples with pharmacological action?

Ans.

- Definition: The drugs which increase the formation and excretion of urine are called diuretics.
- Classification:

A. Weak diuretics
   I. Osmotic diuretics:
      - Electrolytes: e.g. sodium and potassium salts
      - Non-electrolytes: e.g. mannitol
   II. Acidifying salts: e.g. ammonium chloride
   III. Xanthine derivatives: e.g. aminophylline
   IV. Carbonic anhydrase inhibitors: e.g. acetazolamide
B. Moderately potent diuretics: e.g. benzothiadiazine.
C. Very potent diuretics: e.g. parenteral organic mercurials (mercaptomerin, mersalyl), frusemide, ethacrynic acid.
D. Potassium sparing diuretics: e.g. triameterene, amiloride, spironolactone.

- Pharmacological action:
  1) Heart: Diuretics reduce fluid volume in the bloodstream, which decreases the workload on the heart.
  2) Blood pressure: Diuretics lower blood pressure by reducing the volume of fluid circulating in the blood vessels. By promoting sodium and water excretion, they decrease the total volume of blood, which subsequently reduces blood pressure. It reduces blood pressure.
  3) Kidneys: Increases excretion of sodium, chloride, potassium, and water. By increasing urine production, diuretics help in the removal of excess fluid and electrolytes from the body.
  4) Gastrointestinal Tract (GIT): Diuretics can sometimes cause nausea, vomiting, diarrhoea, or constipation.
  5) Lungs: Diuretics decreases pulmonary edema by reducing fluid overload.

21. Define anti histaminic drugs with its classification?

Ans.

- Definition: The drugs which block the actions produced by histamine are called antihistaminic drugs.
- Classification:

A. H1-receptor antagonists
   1) Aminoalkyl ether types: e.g. diphenhydramine, dimenhydrinate.
   2) Alkylamine derivatives: e.g. chlorpheniramine, pheniramine.
   3) Ethylene diamine derivatives: e.g. mepyramine, antazoline.
   4) Piperazines: e.g. meclizine, buclizine, chlorcyclizine.
   5) Phenothiazines: e.g. promethazine.

B. H2-receptor antagonists: e.g. cimetidine, ranitidine, famotidine, metiamide, burimamide.

22. Define antitubercular drug with its classification indication and contraindication?

Ans.

- Definition: The drugs which are used in the treatment of tuberculosis are called antitubercular drugs.

- Classification

A. Primary drugs or first line drugs: e.g. isoniazid, rifampicin, ethambutol, streptomycin, pyrazinamide, para aminosalicylic acid, Thioacetazone.
B. Secondary drugs or second line drugs: e.g. kanamycin, capreomycin, Cycloserine.

- Indication:
  1) Used in the treatment of tuberculosis.
  2) Used in the treatment for leprosy.
  3) Used in the treatment of pneumonia.
  4) Used in the treatment of gonorrhoea.

- Contraindications: Hepatic injury, acute liver damage, hypersensitivity, renal impairment.

23. Define anti neoplastic agents with its classification indication and contraindication?

Ans.

- Definition: The drugs which are used in the treatment of cancer are called antineoplastic agents/anticancer agents.

- Classification:

A. Alkylating agents
   - Nitrogen mustards: Mechlorethamine, cyclophosphamide, melphalan, mustard, chlorambucil.
   - Ethyleneimines: Triethylenemelamine, triethylene thiophosphoramide.
   - Alkyl sulfonates: Busulfan.
B. Antimetabolites

- Folic acid antagonist: Methotrexate.
- Purine antagonists: 6-mercaptopurine, azathioprine.
- Pyrimidine antagonists: Fluorouracil, cytosine arabinoside.

C. Radioactive isotopes: Radioiodine, radio phosphorus, radiogold.
D. Antibiotics: Actinomycin-D, rubidomycin, mitomycin, bleomycin.
E. Hormones: Androgens, oestrogens, progestins, corticosteroid.
F. Enzymes: L-asparaginase.
G. Miscellaneous agents
   - Vinca alkaloids: Vincristine, vinblastine, Taxol
   - Others: Hydroxyurea, cisplatin.

- Therapeutic uses:
  1. Used in the treatment of Breast cancer.
  2. Used in the treatment of Hodgkin's disease.
  3. Used in the treatment of Lung cancer.
  4. Used in the treatment of Neuroblastoma.
  5. Used in the treatment of Cancer of ovary.
  6. Used in the treatment of Ewing's sarcoma.
  7. Used in the treatment of Malignant lymphomas.
  8. It is used as an immunosuppressive agent.
  9. Used in the treatment of Chronic leukaemia's.
  10. Used in the treatment of Chronic granulocytic leukaemia.
  11. Used in the treatment of Chronic myeloid leukaemia.

- Contraindications: Pregnancy, Breastfeeding, Immunosuppression, Allergic reaction, organ disfunction.

24. Define penicillin and with its classification indication and contraindication?

Ans.

- Definition: Penicillin was discovered in 1929 by Alexander Fleming in England. It is extracted from the mould Penicillium notatum and Penicillium chrysogenum.

- Classification
  1. Natural penicillins: e.g. benzylpenicillin, phenoxymethyl penicillin.
  2. Penicillinase resistant penicillins: e.g. cloxacillins, oxacillin, methicillin.
  3. Broad spectrum penicillins: e.g. ampicillin, amoxycillin.
  4. Penicillins active against Pseudomonas, e.g. carbenicillin.

- Indication:
  1) Used in the treatment of pneumococcal infections.
  2) Used in the treatment of actinomycosis.
  3) Used in the treatment of streptococcal infections.
  4) Used in the treatment of Anthrax.
  5) Used in the treatment of staphylococcal infections.
  6) Used in the treatment of Diphtheria.
  7) Used in the treatment of Tetanus.
  8) Used in the treatment of meningococcal infections.
  9) Used in the treatment of rheumatic fever.
  10) Used in the treatment of syphilis and gonorrhoea.

- Contraindications: Allergy, Hypersensitivity reaction, Liver disease, kidney disease, pregnancy, breastfeeding.

25. Explain antimalarial drugs with its classification?

Ans.

- Definition: The drugs which are used in the treatment of malaria are called antimalarials.

- Classification
  1. Cinchona alkaloids: e.g. quinine
  2. 4-aminoquinolines: e.g. chloroquine, amodiaquine
  3. 8-aminoquinolines: e.g. primaquine
  4. Acridine: e.g. mepacrine
  5. Biguanides, e.g. proguanil

6. Diaminopyrimidines, e.g. pyrimethamine
7. Quinoline methanol, e.g. mefloquine
8. Miscellaneous, e.g. sulphonamides, tetracycline

Very Imp Note:

- Please Read All the chapters very carefully before Pharmacology Exam.
- These questions are only for the reference purpose.