

# WELCOME

# TO



This is an Education Platform

We provide Free PDF Notes and Videos Classes for Pharmacy Students

Web Site <http://www.fdspharmacy.in/>

You tube <https://www.youtube.com/channel/UC77iEsiuZolU4pB8WAJIR5Q>

What app <https://chat.whatsapp.com/IzSgXtFEvhS4LN5xhUgq5z>

Telegram <https://t.me/+cvxm17xSloA4MjVI>

Face book <https://www.facebook.com/Fdspharmacy-105764311994440/>

E-mail [fdspharmacyinfo@gmail.com](mailto:fdspharmacyinfo@gmail.com)

**Diploma in Pharmacy 2<sup>nd</sup> Year**  
**Pharmacology**  
**Important Questions**  
**Chapter 2 : Drugs Acting On Peripheral Nervous System**

<b>Questions</b>	<b>Page No</b>
<b>Q1. Write the brief note on Neurotransmitters.</b>	3
<b>Q2. Write the steps involved in Neurohumoral Transmission.</b>	4
<b>Q3. Explain the Cholinergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Cholinergic drugs.</b>	4
<b>Q4. Explain the Anti-Cholinergic Drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Anti-Cholinergic.</b>	6
<b>Q5. What are Adrenergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Adrenergic drugs.</b>	8
<b>Q6. What are Anti-adrenergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Anti-adrenergic drugs.</b>	10
<b>Q7. Explain the Neuromuscular Blocking Agents ? Write the classification, pharmacological action, Indication, contraindications, dose, of Neuromuscular Blocking Agents.</b>	12
<b>Q8. Write the note on Drug used in Myasthenia Gravis.</b>	13
<b>Q9. What are the local anaesthetics ? Write the classification, pharmacological action, Indication, contraindications, dose, of local anaesthetics.</b>	13
<b>Q10. Write the brief note on Non-steroidal Anti-inflammatory Drugs (NSAIDs)</b>	15

## Chapter 2

# Drugs Acting On Peripheral Nervous System

### IMPORTANT Questions

#### Q1. Write the brief note on Neurotransmitters.

**Ans.**

### Neurotransmitters

- Neurotransmitters are chemical compounds present in the brain.
- They are made up of amino acids and some of them are hormones.
- They transmit information from one neuron to the other.
- Major body functions like movement, emotional response, and the physical ability to experience pleasure and pain are controlled by neurotransmitters.
- Neurotransmitters are specific chemical signals allowing communication between nerve cell and effector cells/organs.

**Substances acting as neurotransmitters can mainly be categorised into the following three classes:**

- Amino acids (primarily glutamic acid, Gamma-Aminobutyric Acid (GABA). aspartic acid, and glycine).
- Peptides ( vasopressin, somatostatin, neurotensin, etc.)
- Monoamines (NE, dopamine and serotonin ) plus Ach

### Classification of Neurotransmitters

The neurotransmitters can be classified:

On the Basis of Secretion Site: These are of two types:

1. **Neurotransmitters of Sympathetic Nervous System:** In this, two neurotransmitters are present:
  - Acetylcholine (ACh) (liberated at the ganglion) acts as a neurotransmitter for the preganglionic sympathetic nerves.
  - Nor-adrenaline (NA) acts a neurotransmitter for the postganglionic sympathetic nerves.

**Neurotransmitters of Parasympathetic Nervous System :** In parasympathetic nervous system, only Ach is released at the ganglion and it acts as a neurotransmitter for the preganglionic parasympathetic nerves. Acetylcholine (ACh) also acts as a neurotransmitter for the postganglionic parasympathetic nerves.

## Q2. Write the steps involved in Neurohumoral Transmission.

Ans.

### Steps Involved In Neurohumoral Transmission

- ⇒ Initiation Of an Action Potential and Axonal Conduction.
- ⇒ Arrival of an AP at nerve terminal , resulting in the release of the transmitter.
- ⇒ Events at the synaptic cleft and post - junctional sites.
- ⇒ Termination of effect of released Transmitter.

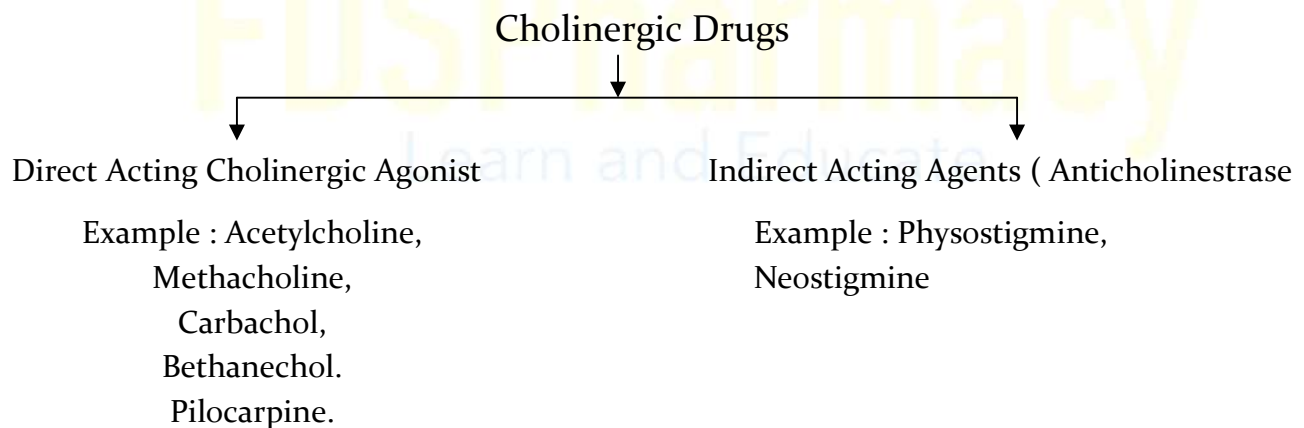
## Q3. Explain the Cholinergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Cholinergic drugs.

Ans.

### Cholinergic Drugs ( Parasympathomimetic Agents )

- Cholinergic Drugs are those drugs which give action similar to acetylcholine.
- They give their action by directly binding to the cholinergic receptors or by indirect process.

### Classification



#### 2. Direct Acting Cholinergic Agonist

- These drugs produced actions similar to ACh by directly interacting with cholinergic receptors . Acetylcholine , Methacholine , Carbachol , Bethanechol. Pilocarpine.

#### 3. Indirect Acting Agents ( Anticholinestrases )

- These drugs inhibit the enzyme cholinesterase , this enzyme inactivates the Acetylcholine . Physostigmine ( this can cross blood brain barrier ) Neostigmine ( this can't cross blood brain barrier ).

# Pharmacological Actions

## 1. Muscarinic Action

- Heart : bradycardia ( slow down heart rate )
- Blood Vessels : dilates blood vessels , lowers blood pressure
- Respiratory System : bronchoconstriction
- smooth muscles : contracts smooth muscles
- Exocrine Gland : Increase secretion ( saliva ,HCL , Pancreatic Juice )
- GI Tract : Increase peristalsis Movement .
- Urinary Bladder : Contraction
- Eye : Contraction of Pupils

## 2. Nicotinic Action

- Skeletal Muscle : Contraction
- CNS : ACh does not cross BBB , but if injected directly into brain and stimulates initially and then depresses.

## Indication

1. Acetylcholine is mainly used in experimental studies , and has limited clinical value because of following reasons.
  - It is rapidly hydrolysed by the Pseudocholinesterases.
  - It spread widely and diffuses in easily and thus does not produce a selective pharmacological action.
  - It can not be administered orally as it immediately hydrolysed and degraded by gastric enzymes.
2. Methacoline is not used nowadays.
3. Carbachol shows action on M and N receptors non selectively , so no longer in use.
4. Bethanechol Is in use as
  - In case of gastroparesis , postoperative abdominal distension.
  - In case of urinary bladder retention.

## Dose

- Bethanechol : 5 or 10 mg tablets , 10-30 mg 3-4 times in a day.

## Contraindications

- ◇ Hyperthyroidism : Choline ester may precipitate cardiac arrhythmias.
- ◇ Bronchial Asthma : Choline ester may precipitate bronchospasm.
- ◇ Peptic ulcer : Choline ester may increase gastric acid secretion.
- ◇ Myocardial Infarction : Choline ester may cause hypotension and form conduction block.

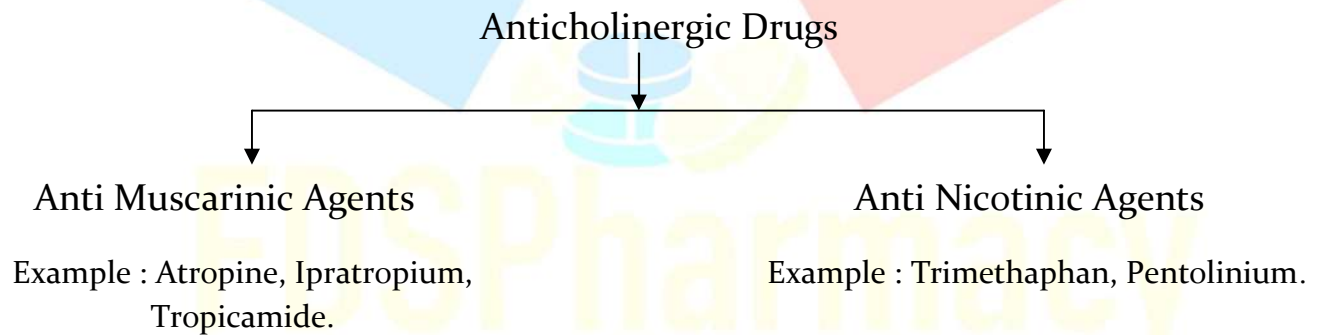
**Q4. Explain the Anti-Cholinergic Drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Anti-Cholinergic.**

**Ans.**

## Anticholinergic Drugs

- These are the drugs which occupy the ACh receptors and do not allow ACh to bind to the receptors .
- Anticholinergic Drugs are also called " Parasympatholytic "
  - AntiParasympathetic Agents "
  - Cholinergic blocking Agents "
  - Cholinergic antagonist

### Classification



#### 4. Anti Muscarinic Agents :

- These act by inhibiting the action of Ach by blocking the muscarinic acetylcholine receptors.
- Example : Atropine , Ipratropium , Tropicamide.

#### 5. Anti Nicotinic Agents :

- These act by inhibiting the action of Ach at nicotinic acetylcholine receptors.
- Example : Trimethaphan , Pentolinium.

# Atropine

→ It is most common anti muscarinic agent . It is an alkaloid and blocks the all types of muscarinic receptors.

## Pharmacological Action

- CNS : Mild stimulation
- Eye : Mydriasis
- CVS : It cause bradycardia initially and then tachycardia.
- Respiratory System : Bronchodilation
- Secretion : Secretions of sweat , saliva , and gastric are reduced.
- GIT : Relaxation , decrease peristaltic movement so it used as antispasmodic and anti diarrhoeal drug.

## Indication

- ▲ For dilation of pupil.
- ▲ Pre - Anaesthetic
- ▲ In bronchial Asthma and COPD.
- ▲ In hypersalivation.
- ▲ To treat diarrhoea
- ▲ As antidote for organophosphorus poisoning.
- ▲ To treat parkinsonism

## Dose :

- ❖ It is given IV , IM and SC, routes.
- ❖ 0.4-0.6mg for preoperative and pre anaesthetic,
- ❖ 1% solution in eye drop for mydriasis

## Contraindication

- ◇ In glaucoma condition
- ◇ In infants suffering from Down' syndrome ( delay in development of body and brain )
- ◇ In patients are hypertensive with atropine .



**Q5. What are Adrenergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Adrenergic drugs.**

**Ans.**

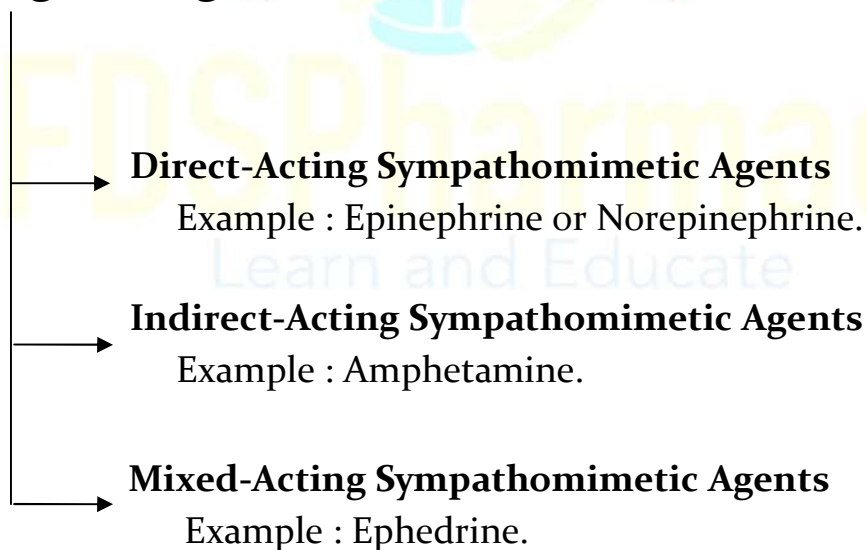
## Adrenergic Drugs

- Adrenergic drugs or adrenergic agonists or sympathomimetic agents are drugs causing stimulation of the adrenergic receptors in the sympathetic nervous system.
- They are named so as they mimic the actions of major neurotransmitters of the sympathetic nervous system, i.e., epinephrine and norepinephrine.

### Classification

- ⇒ On the basis of effects they produce on the organ cells, the sympathomimetic drugs can be categorised into three classes ;

### Adrenergic Drugs



1. **Direct-Acting Sympathomimetic Agents** : They stimulate the adrenergic receptors directly, e.g., Epinephrine or Norepinephrine.
2. **Indirect-Acting Sympathomimetic Agents** : They act by stimulating the release of nor-epinephrine from the terminal nerve endings, e.g., Amphetamine.



3. **Mixed-Acting Sympathomimetic Agents** : They act both directly (stimulating adrenergic receptor sites) and indirectly (stimulating release of nor-epinephrine from the terminal nerve endings), e.g., Ephedrine.

## Location of adrenergic receptors

1.  $\alpha_1$  : Smooth muscles = Heart , , Bladder , spleen , Ureters, ( contraction ) eye ( mydriasis )
2.  $\alpha_2$  : Pancreas ( decrease insulin )
3.  $\beta_1$  : Heart ( Increase heart rate )
4.  $\beta_2$  : Smooth muscles = heart , bronchi , uterus , GIT , ( relaxation )

## Pharmacological Action

- **Cardiovascular system** : Stimulate the  $\alpha_1$  receptor and increase the contraction force of heart and then output of blood.
- **Respiratory system** : Stimulate  $\beta_2$  receptor and dilate the bronchi smooth muscles.
- **Pancreas** : Bind to  $\alpha_2$  receptor of pancreas and decrease the release of insulin ,so give hyperglycemic effect.

## Indication

- ▲ To control bleeding
- ▲ To slow the absorption of local anaesthetics.
- ▲ To increase blood pressure

## Contraindication

- ◇  $\alpha_1$  receptor agonist is contraindicated in hypertension .
- ◇  $\alpha_2$  receptor agonist is contraindicated in low blood pressure .

## Dose

- ✚ Amphetamine 5-10mg tablet in the morning and midday
- ✚ Epinephrine in acute asthma 0.01ml/ml, in cardiac arrest 0.01ml/ml

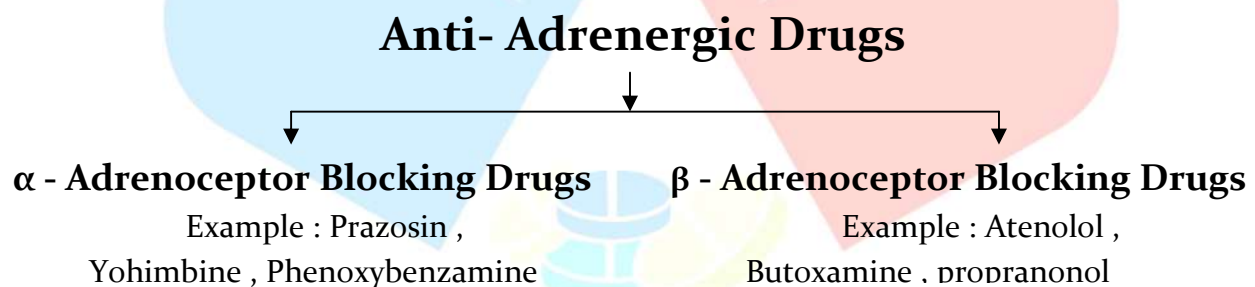
**Q6. What are Anti-adrenergic drugs ? Write the classification, pharmacological action, Indication, contraindications, dose, of Anti-adrenergic drugs.**

**Ans.**

## Anti- Adrenergic Drugs

- The drugs block the effect or actions that occur by release of adrenaline are called antiAdrenergic Drugs.
- These drugs are also called " Adrenergic Blocking Agents " " Adrenoceptor antagonist " .

### Classification



- α - Adrenoceptor Blocking Drugs** : The effects of catecholamine facilitated via  $\alpha$  receptors are blocked by these agents. Furthermore, depending on the ability of these drugs to dissociate from the receptors, they may either be reversible or irreversible.
  - **Example** : Prazosin , Yohimbine , Phenoxybenzamine
- β - Adrenoceptor Blocking Drugs** : The effects of catecholamine facilitated via the  $\beta$  - adrenoceptors are blocked by  $\beta$  - adrenoceptor blocking drugs. They can further be categorised as selective or non-selective  $\beta$  - adrenoceptor blocking agents.
  - **Example** : Atenolol , Butoxamine , propranolol

### Pharmacological Actions

- ⤴ On Eye : miosis
- ⤴ Decrease the heart rate
- ⤴ Bronchodilation
- ⤴ Vasodilation .
- ⤴ Lower blood pressure
- ⤴ Increase intestinal motility .

## Indication

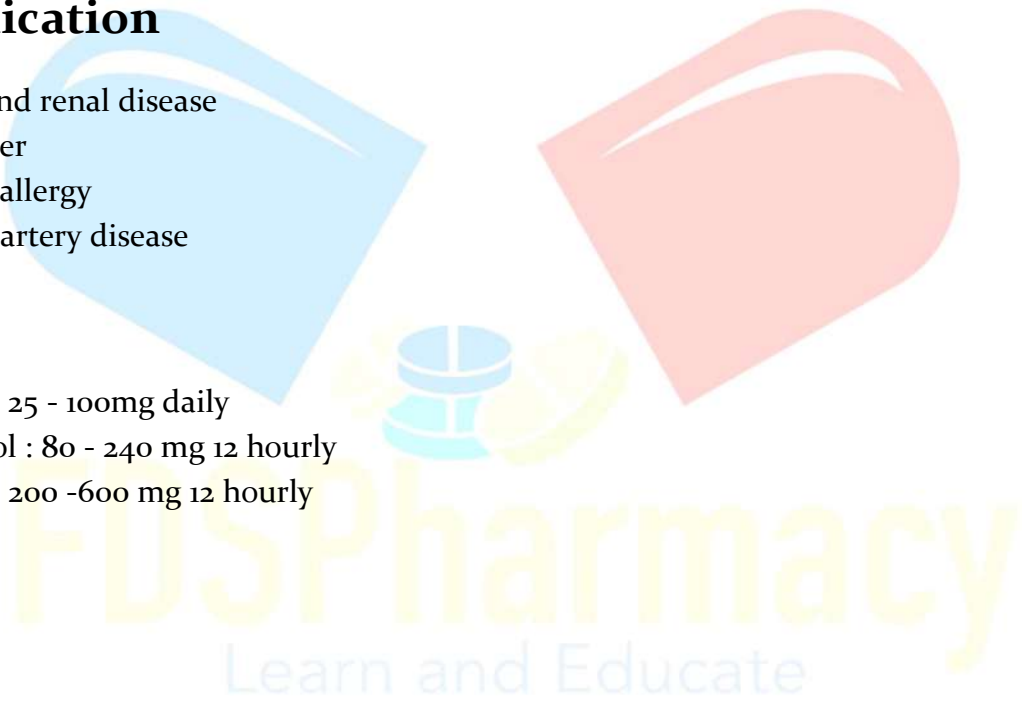
- ◇ To treat hypertension
- ◇ In congestive heart failure
- ◇ In migraine
- ◇ Angina pectoris
- ◇ Anxiety
- ◇ Parkinson's disease

## Contraindication

- Hepatic and renal disease
- Peptic ulcer
- Any drug allergy
- Coronary artery disease

## Doses

- + Atenolol : 25 - 100mg daily
- + Propranolol : 80 - 240 mg 12 hourly
- + labetalol : 200 -600 mg 12 hourly



**Q7. Explain the Neuromuscular Blocking Agents ? Write the classification, pharmacological action, Indication, contraindications, dose, of Neuromuscular Blocking Agents.**

**Ans. Neuromuscular Blocking Agents ( Skeletal Muscle Relaxant )**

- The drugs are used to block the transmission of nerve impulses at the skeletal neuromuscular junction and cause skeletal muscle relaxation are called Neuromuscular Blocking Agent.
- They are used to reduce spasm and pain in skeletal muscles.

**Classification**

Drugs Acting Peripherally at the Neuromuscular Junction

**1) Non Depolarising Agents**

- a) long acting ( 60 - 120 minutes ) e.g. tubocurarine ,Dexacurium
- b) Intermediate acting ( 20 -50 minutes ) e.g. Atracurium
- c) Short Acting ( 10 -20 ) e.g. Mivacurium

**2) Depolarising Agents : Succinyl Choline**

**Pharmacological Action**

- ▲ Skeletal muscle : parental Administration of Tubocurarine results in weakness of Motor Impulses .
- ▲ CVS : These agents produce Hypotention and cardiac arrhythmia ( increase or decrease in heart rate )

**Indications**

- ❖ Adjuvant ( helping ) to general Anaesthesia : Neuromuscular Blocking Agents are use with general anaesthesia to achieve adequate ( as need ) muscle relaxation.
- ❖ In Convulsant : These drugs are used for muscle relaxation in epileptic condition.
- ❖ In sever tetanus : Tetanus cause a painful muscle contraction , these drug are used only in severe case of tetanus.

**Contraindications**

- ▲ Heart patients : These are contraindicated in heart patients .
- ▲ Asthma patients ; These are contraindicated in asthma patients .

**Dose**

- d -tubocurarine 0.5 - 0.6 mg/kg
- Dexacurium 0.03 -0.05 mg / kg
- Atracurium 0.4 -0.5 mg / kg
- mivacurium 0.15 -0.2 mg/kg
- Succinyl Choline 1.0 -1.5

## Q8. Write the note on Drug used in Myasthenia Gravis.

Ans.

# Drugs Used in Myasthenia Gravis

## Myasthenia Gravis

- It is an autoimmune disorder in which antibodies are produced that blocks or destroy Muscles receptors
- Patients with Myasthenia show severe muscular weakness.
- Breakdown in communication between nerves and muscles.

## Drugs used In Myasthenia Gravis

- 1) Anticholinesterases: Pridostigmine
- 2) Immunosuppression : Cyclosporine , Azathioprine
- 3) Intravenous Immune Globulin ( IVIG )
- 4) Immunoabsorption : this procedure helps to remove anti AChR ABs ( Acetylcholine Receptor Antibodies )
- 5) Plasma Exchange : It helps to remove the abnormal antibodies .

## Q9. What are the local anaesthetics ?Write the classification, pharmacological action, Indication, contraindications, dose, of local anaesthetics.

Ans.

## Local Anaesthetic

- The drugs are used to block the sensation in a limited area are call Local anaesthetics .
- Or
- we say The drugs are used to abolish the sensory perception over a local area are called local anaesthetics.

## Classification Of Local anaesthetics

1. Injectable Anaesthetics
  - Short duration : procaine
  - Intermediate duration : Lignocaine ( lidocaine )
  - Long duration : Tetracaine
2. Surface Anaesthetics : Cocaine , Lignocaine

# Pharmacological Action Of Local Anaesthetics

The local anaesthetic have the following two types of actions :

- Local Action
- systemic action

## 1) Local Action

- They block the nerve ending
- They block the neuromuscular junction
- They delay the release of acetylcholine from motor neuron.

## 2) Systemic Action

### a) CNS

- They stimulate the CNS in starting and then depress
- They produce restlessness , mental confusion.

### B) CVS

- Heart : Cardiac depression
- Blood Vessels : Vasodilation
- Lower Blood pressure

## Indications

- ◇ These are used for infiltration anaesthetics ( anaesthetic of an operative site by local injection )
- ◇ These are used as antiarrhythmic agents.
- ◇ These are used to treat status epilepsy.

## Contraindications

- ▲ These are contraindicated in coronary disease.
- ▲ These are contraindicated in heart failure.
- ▲ These are contraindicated in heart block.
- ▲ These are contraindicated in liver disease.

## Dose

- ✚ Lignocaine : 4mg/ kg and should not exceed 300 mg or 500mg
- ✚ Procaine : 12mg/kg and should exceed 1000mg

## Q10. Write the brief note on Non-steroidal Anti-inflammatory Drugs (NSAIDs)

Ans.

### Non-Steroidal Anti-Inflammatory Drugs ( NSAIDs)

→ The drugs are used to treat Inflammation , and mild to moderate Pain and fever are called Non steroidal anti Inflammatory drugs .

#### Analgesic

- Analgesic are those drugs which used in the treatment of pain.
- NSAIDs reduce only slow pain
- These drugs can not used in severe pain.
- Eg : Aspirin etc,

#### Anti-Pyretics

- Antipyretics are those drugs which to reduce the high blood temperature.
- These drugs reduce only high body temperature not normal body temperature.
- Mainly antipyretics drugs used in the treatment of fever
- Eg : Paracetamol etc.

#### Anti-Inflammation Agent

- Anti-inflammatory are those drugs which used to reduce the inflammation in the body.
- Eg :Ibuprofen

#### Classification of (NSAIDs)

##### 1) Non -Selective COX inhibitors

- Salicylates : Aspirin
- pyrazolone Derivatives : Phenylbutazone
- Indole Derivatives : Indomethacin
- Propionic Acid Derivatives : Ibuprofen
- Aril Acetic Acid Derivatives : Diclofenac
- Oxycame Derivatives : Piroxicam

##### 2) Preferential COX 2 inhibitors : Nimesulide , meloxicam

##### 3) Selective COX - 2 inhibitors : Celecoxib , Rofecoxib

##### 4) Analgesic Antipyretics with poor Anti inflammatory Action :

- Paraaminophenol Derivatives : Paracetamol ( acetaminophen )
- Pyrazolone Derivatives : Metamizol .



## Indications

- Analgesia : NSIADs are used to eliminate or treat mild to moderate pain like :
  - Headache
  - Toothaches
  - Muscle aches
  - Arthritis
  - Migraine
  - Dysmenorrhea
- Antipyresis : NSIADs are used to treat fever / to normalize body temperature .
- Anti Inflammation : NSIADs are used to stop inflammation and pain like :
  - ▲ Rheumatoids
  - ▲ Osteoarthritis
  - ▲ Ankylosing spondylitis
  - ▲ Bursitis

## Contraindication

- ❖ With NSIADs hypersensitivity ( an exaggerated response by immune to a drug ).
- ❖ In peptic Ulcer,
- ❖ In children suffering from chicken pox or influenza.
- ❖ In chronic liver disease
- ❖ In during pregnancy.
- ❖ In breastfeeding mother.

## Dose

### 1) Aspirin :

- Adults : 325 -650mg orally 4 -6 Hours as need and should not exceed 3.9 g/day
- Children under 12 years : 10-15mg/kg

### 2) Paracetamol

- Adults : 500- 650 mg , duration 4-6 hours , and should not exceed 4000mg/day
- Children under 18 years : 15mg/kg duration 6 hours.

**Hello**

**Friends**

**If you Get Any Help From This Notes /  
Videos**

**Next You Turn To Help Us**

**Please Contribute Some Amount**

**To Our**

**FDSPharmacy Team**

**Phone pe 6398439940**

**Paytm 6398439940**

**Google Pay 6398439940**



Amir Khan

**Thank You**

**Keep Supporting**