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Course Name	**: D. Pharm**
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Ch – 2.3

ADRENERGIC DRUGS

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Adrenergic drugs are medications that mimic or enhance the effects of adrenaline (epinephrine) and noradrenaline (norepinephrine), the neurotransmitters released by the sympathetic nervous system. These drugs act on adrenergic receptors, which are found throughout the body, to produce a variety of physiological effects.

Classification and Examples:

Adrenergic drugs can be classified based on their mechanism of action or specific receptor subtype targeted. Common subclasses include:

A. According to mode of action:

i. Directly acting – adrenaline, noradrenaline, dopamine, isoprenaline.

ii. Indirectly acting – amphetamine, methamphetamine,

iii. By both mechanism – ephedrine, metaraminol.

B. According to receptor selectivity:

i. α1 agonist – methoxamine, phenylepeneprine.

ii. α2 agonist – clonidine, α-methyl noradrenaline.

iii. Both α1-α2 agonist - adrenaline, noradrenaline.

iv. β1 agonist – prenalterol, dobutamine.

v. β2 agonist – salbutamol, terbutaline.

vi. Both β1–β2 agonist – adrenaline, isoproterenol.

vii.Both α - β agonist – adrenaline, ephedrine.

C. According to chemical nature:

i. Catecholamines – adrenaline, noradrenaline, dopamine, isoprenaline.

ii. Noncatecholamines – ephedrine, amphetamine, metaraminol.

D. According to therapeutic effect:

i. Vasoconstrictor – adrenaline, noradrenaline, ephedrine, metaraminol.

ii. Vasodilator – dopamine, isoprenaline.

iii. Bronchodilator – salbutamol, terbutaline.

iv. CNS stimulant – amphetamine, methamphetamine.

v. Cardiac stimulant – adrenaline, isoprenaline, prenalterol.

vi. Nasal decongestant – ephedrine, oxymethazoline.

vii. Uterine relaxants – Nylidrine, salbutamol.

Pharmacological Actions:

Adrenergic drugs produce a variety of effects by activating or modulating adrenergic receptors. These effects include:

- Increased heart rate and cardiac output.
- Vasoconstriction or vasodilation, depending on the receptor subtype activated.
- Bronchodilation and relaxation of smooth muscle in the respiratory tract.
- Pupil dilation (mydriasis) and inhibition of lacrimation.
- Lipolysis and glycogenolysis, leading to increased blood glucose levels.
- Stimulation of the central nervous system, leading to increased alertness and arousal.

Dosage form:

Dosage of adrenergic drugs varies depending on the specific medication, indication, and patient factors such as age, weight, and renal or hepatic function. Dosage forms include oral tablets, capsules, injections, inhalers, and ophthalmic solutions.

Uses/Indications:

Adrenergic drugs are used for various medical conditions, including:

- **Anaphylaxis:** Epinephrine is the drug of choice for the treatment of severe allergic reactions.
- **Hypotension and shock:** Norepinephrine and other vasopressors are used to increase blood pressure and maintain organ perfusion.
- **Asthma and COPD:** Beta2-adrenergic agonists such as albuterol are used to relieve bronchoconstriction and improve airflow.
- **Cardiac arrest:** Epinephrine is used during cardiopulmonary resuscitation (CPR) to stimulate cardiac activity.
- **Attention deficit hyperactivity disorder (ADHD):** Stimulant medications such as amphetamines are used to improve focus and concentration.
- **Local anesthesia:** Cocaine is used as a local anesthetic and vasoconstrictor for certain procedures.

Contraindications:

Adrenergic drugs are contraindicated in patients with hypersensitivity or allergy to the medication or its components.

They should be used with caution or avoided in patients with certain medical conditions, including:

- Hypertension, due to the potential for exacerbation of high blood pressure.
- Cardiac arrhythmias or ischemic heart disease, due to the potential for exacerbation of cardiac dysfunction.
- Hyperthyroidism, due to the potential for exacerbation of hypermetabolic state.
- Closed-angle glaucoma, due to the potential for exacerbation of intraocular pressure.
- Prostatic hypertrophy, due to the potential for exacerbation of urinary retention.

Special Considerations:

- Adrenergic drugs can have significant side effects, including tachycardia, hypertension, palpitations, anxiety, tremors, and insomnia. Therefore, they should be used cautiously and under the supervision of a healthcare professional.
- Dosage adjustments may be necessary in patients with hepatic or renal impairment.
- Patients should be monitored closely for adverse effects and drug interactions when using adrenergic drugs.