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Diploma in Pharmacy 2nd Year
Pharmacotherapeutics
Chapter 2 (d) : Central Nervous System

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Chapter 2 (d)

Central Nervous System

- → The principal functional unit of the central nervous system (CNS) is the neuron.
- → Neuron is the structural and functional unit of the nervous system; it has the unique ability to receive and transmit information.
- → Neurons of different types and in different locations have distinct properties, including functional roles, distribution of their connections, neurotransmitters used, metabolic requirements, and levels of electrical activity at a given moment.
- → In addition to neurons the CNS contains other cells, such as astrocytes and oligodendrocytes, which make up the neuroglia. During any injury or abnormality these cells undergo a range of functional and morphological changes and leads to many of neurological disorders.

Clinical consideration

- Epilepsy.
- Parkinson's disease.
- Alzheimer's disease.
- Stroke.
- Migraine.
- Encephalopathy
- Seizure.

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Epilepsy

- Epilepsy is a nervous system disorder due to abnormal electrical activity in brain cells, it is also called seizure and convulsant.
- This disorder results contraction , involuntary movement , shaking of the body etc.



Classification of seizures

- Seizure is classified on the basis of behavioural and electrophysiologic pattern of activity as

1. Partial (Focal seizures)

- It mainly appears in only one hemisphere.
- That means symptoms only happen in a specific part or on one side of your body. But focal seizures can sometimes spread and become generalized seizures.
    a) Simple partial seizures with motor, sensory, or autonomic symptoms.
    b) Complex partial seizures.
    c) Partial seizures with secondary generalization.

2. Generalized seizures

- These are seizures that happen in both hemispheres of your brain side. These seizures tend to cause more severe effects and symptoms.
    a. Absence seizures.
    b. Tonic- clonic seizures.
    c. Other (Myoclonic, tonic, clonic, atonic)

Etiology

- Brain injury
- High fever
- lake of oxygen to brain
- Brain tumor
- Genetic brand disorder
- Stroke (reduce blood supply to brain)

Pathogenesis

Due to etiological factors ↓
Neuronal cell membrane altered ↓
Repeated Action potential ↓
Rapid generation of electrical Impulses ↓
spread to other cell of brain ↓
The abnormal electrical impulses reach to skeletal muscles ↓
Epilepsy

Clinical Manifestation

- Recurrent of seizure
- Sudden stiffness due to unknown reason
- Sudden falling due to unknown reason
- Sudden bouts of chewing due to unspecific reason
- Rpetitive involuntary movement
- Changes in sense of smell touch and sound

Non Pharmacological Management

- Ketogenic diet is useful in children are suffering from seizure . ketogenic diet is a high -fat adequate protein , and low carbohydrates diet for example fish , meat , eggs , seafood etc

Pharmacological managements

- Benzodiazepines— ex- clonazepam, lorazepam, diazepam.
- Barbiturates— ex- phenobarbital, desoxyphenobarbital.
- Deoxy barbiturates— ex- primidone.
- Hydantoin— ex-phenytoin, ethotoin.
- Aliphatic carboxylic Acid— ex- valproic acid, magnesium valproate.
- Oxazolidine derivatives— ex- trimethadione, paramethadione.
- Cyclic GABA Analogues— ex- gabapentin, pregabalin.
- Iminostilbene— carbamazepine, oxcarbazepine.
- Other drugs— ex- levetiracetam, parampanel, brivaracetam, lacosamide

Parkinson's Disease

→ It is a chronic, progressive , neurodegeneration disorder. in which slows down the voluntary movement of body parts (bradykinesia) , muscles tone changed (rigidity) and tremor at rest.



Etiology

- Genetic factors
- Advancing age : above 60 year mostly scene
- Head injury
- Drugs : like neuroleptics ,antiemetics etc.
- Exposure to toxin.
- Low production of Dopamine

Pathogenesis of Parkinson 's Disease

Degeneration of Dopamine production

↓

Deficiency Of Dopamine

↓

The normal balance between Dopamine and acetylcholine disturbed

↓

Motor control affected

↓

tremor , Rigidity , bradykinesia

↓

Parkinson's Disease

Clinical Manifestation

- Slow moment
- Tremor / trembling
- Low volume of speech
- Dropping of saliva
- Constipation
- Tendency to fall backwards
- Depression

Non Pharmacological Management

- Avoid and discard the all activities which cause/induce the depression, stress, sleep disorders etc.
- Follow and change the diet plans according to own demand or prescription by any RMP
- Practice the yoga, meditation, physical exercise regularly. Ventilation is one of the reasons which leads to brain disorders and cardiac disorders also
- Practice of herbal/natural medicine other than allopathic.
- Do such all activities which makes you happy and cheerful.

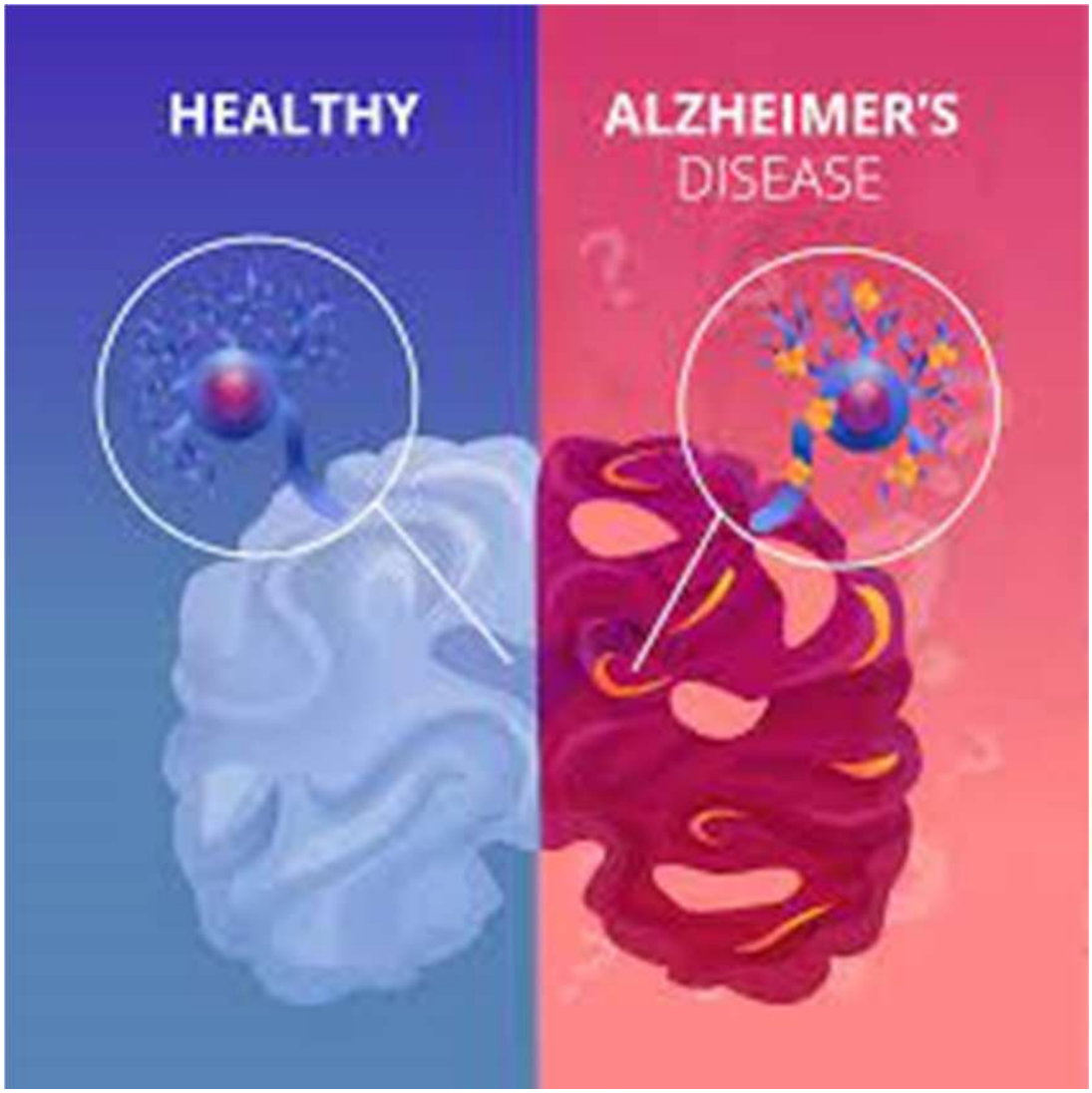
Pharmacological Management

- **Levodopa :** It converts into dopamine when reach to the brain . It is the most effective drug For PD.
- **Dopamine agonist :** Bromocriptine , ropinirole : They work like dopamine on dopaminergic receptors.
- **MAOI :** Selegiline , Rasagline.
- **Anti-cholinergic drugs :** Benztropine , Procyclidine.

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Alzheimer 's Disease

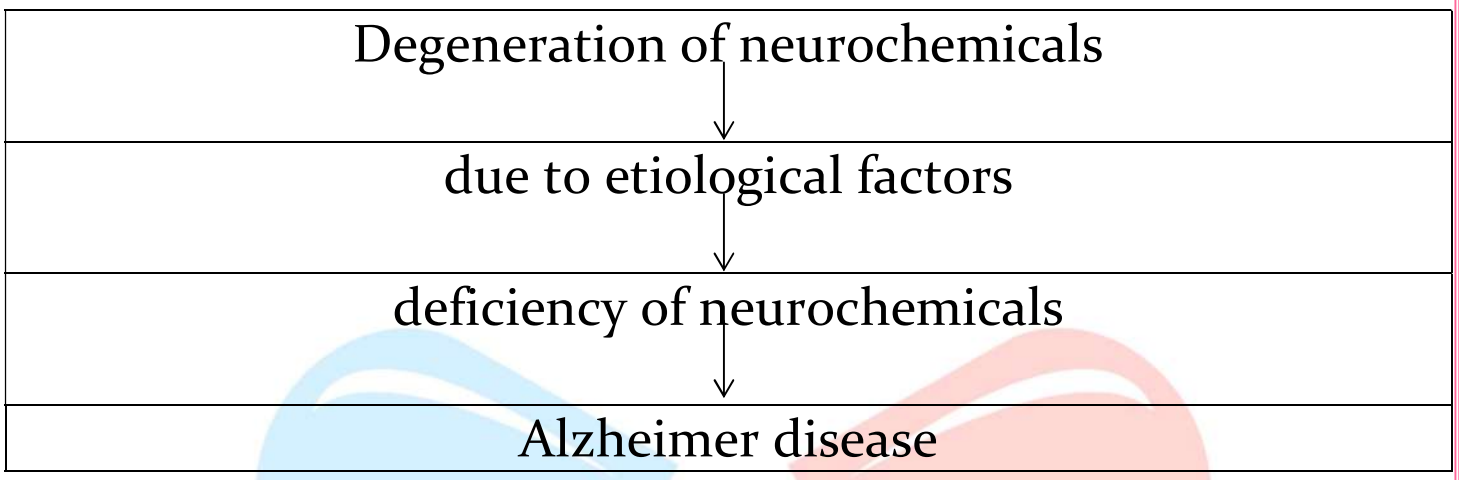
→ Alzheimer's disease is a chronic irreversible neurodegeneration disease which gradually destroy the ability to think, remember, and learn ,and involves memory loss.



Etiology

- Neurochemical factor
- Genetic factors
- Environmental factors
- Head injury
- Smoking
- Advancing age (above 65 years).

Pathogenesis



Clinical Manifestation

- Loss of memory
- Placing object at unusual place
- Confusion about events, time and place
- Asking the same question repeatedly
- Problem to perform familiar work
- Getting lost of or wandering
- Problem in sleeping
- Behaviour changes like agitation , anxiety
- Poor thinking or understanding
- Difficulty in recognising family members or friends
- Difficulty in speaking during choosing the right words.

Non Pharmacological Management

- Avoid and discard the all activities which cause/induce the depression, stress, sleep disorders etc.
- Follow and change the diet plans according to own demand or prescription by any RMP
- Practice the yoga, meditation, physical exercise regularly. Ventilation is one of the reasons which leads to brain disorders and cardiac disorders also
- Practice of herbal/natural medicine other than allopathic.
- Do such all activities which makes you happy and cheerful.

Pharmacological Management

- **Chonilesterase Inhibitors :** Donepezil , galantamine.
- **Glutametergic Drugs :** Gabapentin , Lamotrigine

Stroke

- → Stroke is a condition in which blood supply to the brain reduced or stops due to blockage or hemorrhage.
- → In stroke condition brain function is stopped due to the death of brain cell.
- → Stroke is also called brain attack and cerebrovascular accident (CVA).



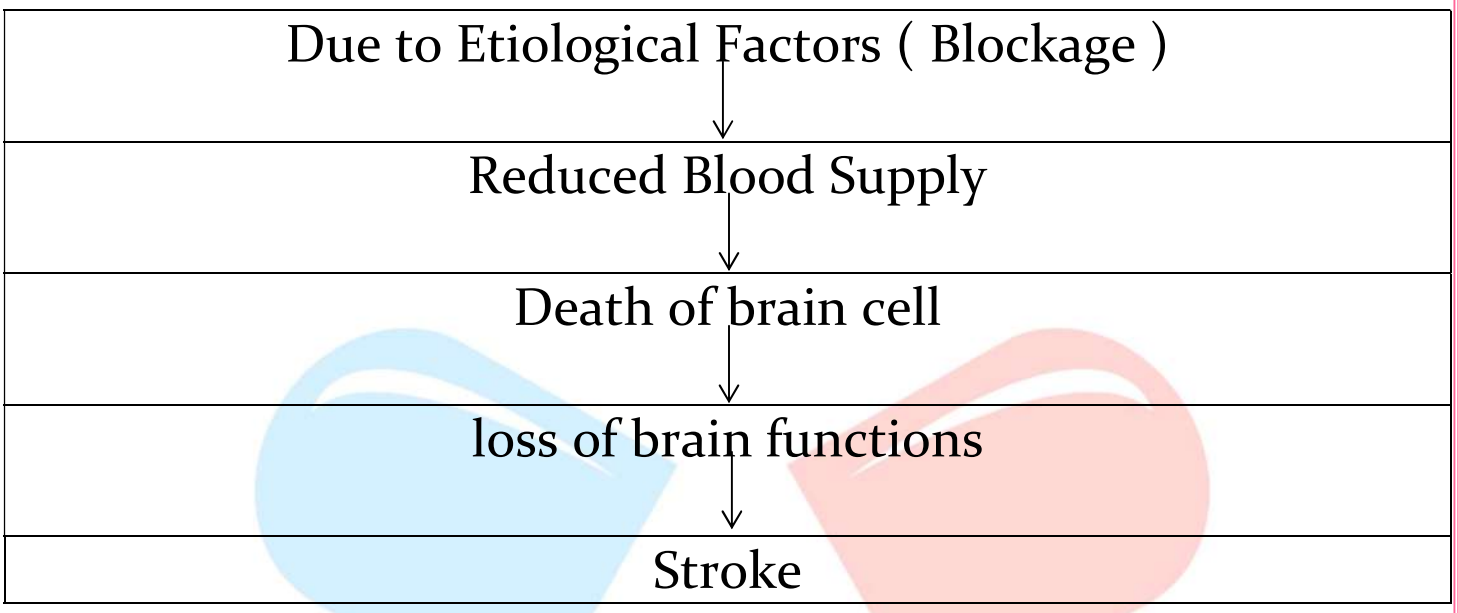
Types

- **Islamic stroke :** Blood flow to the brain reduced due to narrowed or blocked arteries of brain by Thrombus(lipid deposition) or embolus (blood clot).
- **Haemorrhagic stroke :** Blood flow is disturbed due to leakage of blood vessels of brain.

Etiology

- Blockage in brain arteries
- Leakage in blood vessels
- Diabetes mellitus
- Smoking
- Inactivity
- Obesity
- Alcoholism
- Estrogen use
- Advancing age
- Family history

Pathogenesis



Clinical Manifestations

- Dizziness
- Loss of control and coordination
- Difficulty in speaking and understanding
- Paralysis in face, leg, arms , mostly on one side of the body
- Blurred vision
- Severe headache

Non Pharmacological Management

- Early Contact to doctor
- Early Diagnosis

Pharmacological Management

- Emergency treatment with medications
- Alteplase Injection : it is given by vein in arm , it dissolves the blood clot and restore the blood flow
- Anticoagulant drugs : these drugs prevent further blood clot .Heparin , warfarin.

Emergency Procedure for removal of clot

1) Surgical Procedure
2) **Mechanical clot removal :** Using a catheter a small device is move into the brain , which removes the clot either by grabbing it or by breaking it .

Migraine

- Migraine is a recurrent attacks of headache that affects one side of head.
- Migraine may last 4-48 hours.
- A migraine is a headache that can cause severe throbbing pain or a pulsing sensation, usually on one side of the head and also involving altered regulation and control of afferents, with a particular focus on the cranium. It's often accompanied by nausea, vomiting, and extreme sensitivity to light and sound.



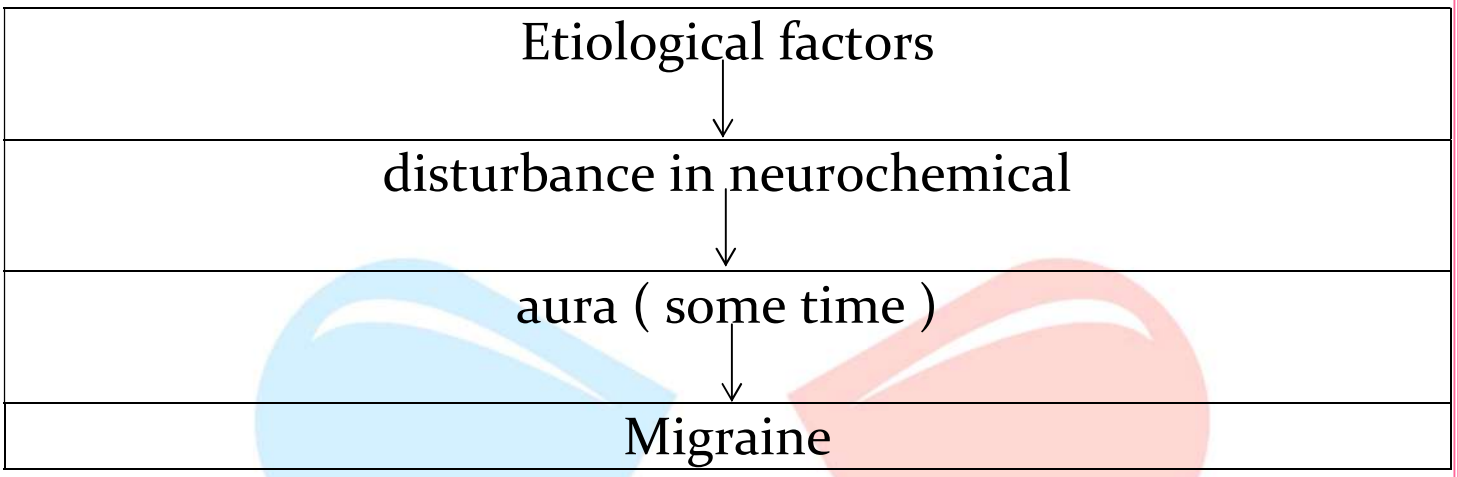
Types

- **Migraine with Aura :** It is a type of migraine in which a person has warning sign (aura) that a migraine attacks is going happen
  - Examples of aura : constipation , mood changes , neck stiffness , increasing urination
- **Migraine without aura :** This is the most common type of migraine.

Etiology

- Abnormal metabolism of serotonin in brain.
- Family History
- Age (above 30)
- Hormonal changes
- Pregnancy
- Oral contraceptives

Pathogenesis



Clinical Manifestation

- One side headache
- Nausea and Vomiting
- Blure vision
- Sensitivity to light noise or odours
- Feeling tired
- Stiff neck

Non Pharmacological Management

- Should avoid triggers of headache like intense light and sound , and stress etc.
- Should rest in a dark place

Pharmacological Management

- **NSAIDs :** Should use in mild to moderate headache. Paracetamol , Ibuprofen , aspirin
- **Calcium channel blocker :** Amlodipine , Verapamil.
- **ß Blockers :** Atenolol , propranolol.
- **Antidepressant :** Amitriptyline , Venlafaxine.
- **Anti- epileptic drugs :** Valproate , carbamazepine.
- **Vitamins :** Riboflavin (B2)