Experiment no. 12

Aim: Anticonvulsant effect of drugs by MES and PTZ method

References

1. Goodman, L. S., & Gilman, A. (2018). *Goodman and Gilman's The Pharmacological Basis of Therapeutics* (13th ed.). McGraw-Hill Education.
2. Löscher, W., & Schmidt, D. (1988). Which animal models should be used in the search for new antiepileptic drugs? *Epilepsy Research*, 2(3), 145–181.
3. Turner, R. A. (1965). *Screening Methods in Pharmacology*. Academic Press.
4. Kulkarni, S. K. (1999). *Handbook of Experimental Pharmacology*. Vallabh Prakashan.

Objective

To evaluate the effectiveness of anticonvulsant drugs by observing their ability to suppress seizures in two distinct animal models: MES and PTZ-induced seizures.

Materials and Methods

Materials

- Laboratory rodents (mice or rats)
- Test drugs (e.g., Phenytoin, Sodium Valproate)
- Electroconvulsiometer (for MES model)
- Pentylenetetrazol (PTZ) solution (80 mg/kg)
- Anesthetic agents (if required)
- Control solution (e.g., saline)
- Stopwatch
- Data recording sheets
- Personal protective equipment (PPE)

A. MES (Maximal Electroshock Seizure) Method

Procedure:

1. **Animal Preparation:** Acclimate animals for 1 hour in the lab. Handle gently to minimize stress.
2. **Baseline Activity:** Record baseline behavioral parameters.
3. **Drug Administration:** Administer test drug (i.p. or oral) as per study design. Control group receives equivalent volume of saline.
4. **Seizure Induction:** After 30–60 minutes of drug administration, induce seizures using an electroconvulsiometer (e.g., 50 mA for 0.2 sec via corneal electrodes).
5. **Observation:** Record the duration of each seizure phase:
   - Tonic flexion
   - Tonic extension
   - Clonic convulsions
   - Stupor
   - Recovery
6. **Post-Experiment Monitoring:** Observe animals until full recovery and provide appropriate care.

Sample Results Table:

Group	Tonic Flexion (s)	Tonic Extension (s)	Clonic Convulsions (s)	Stupor (s)	Recovery Time (s)
Control	5	12	8	20	40
Drug-treated	4	6	5	15	35

B. PTZ (Pentylenetetrazol-Induced Seizure) Method

Procedure:

1. **Animal Preparation:** Acclimate animals for 1 hour. Handle with care.
2. **Baseline Activity:** Record initial behavioral status.

3. **Drug Administration:** Administer the test drug intraperitoneally or orally. Control group receives saline.
4. **Seizure Induction:** 30–60 minutes post-drug, inject PTZ (80 mg/kg, i.p.) to induce seizures.
5. **Observation:** Monitor and record:
   - Latency to myoclonic jerks
   - Latency to clonic convulsions
   - Latency to tonic convulsions
   - Total recovery time
6. **Post-Experiment Care:** Monitor until complete recovery and treat animals ethically.

Sample Results Table:

Group	Latency to Myoclonic Jerks (s)	Latency to Clonic Convulsions (s)	Latency to Tonic Convulsions (s)	Recovery Time (s)
Control	45	60	75	100
Drug-treated	80	120	No tonic convulsions	150

Discussion

1. Seizure Phase Interpretation:

MES Model: Best for evaluating drugs effective against generalized tonic-clonic seizures. Reduction in tonic extension duration is a key indicator.

PTZ Model: Suitable for assessing drugs active against absence and myoclonic seizures. Increased latency to seizure onset indicates effectiveness.

2. Drug Efficacy Assessment: An effective anticonvulsant increases latency, reduces seizure severity, and may prevent specific seizure phases (e.g., tonic convulsions in PTZ).

3. Comparative Analysis: Compare seizure parameters between control and drug-treated groups to determine statistical and therapeutic significance.

Precautions

- Follow all ethical guidelines for animal handling and experimentation.
- Calibrate the electroconvulsiometer before each use to ensure accurate stimulation.
- Maintain consistent environmental conditions and gentle handling to reduce variability.