- INTRODUCTION

EFFECTS OF PHYSOSTIGMINE ON THE DRC OF ACETYLCHOLINE ON FROG RECTUS ABDOMINIS MUSCLE

Physostigmine is an acetylcholinesterase inhibitor that increases acetylcholine (ACh) levels by preventing its breakdown. In the frog rectus abdominis muscle, ACh induces muscle contraction, and its effects can be studied using a dose-response curve (DRC). Adding physostigmine enhances ACh activity, modifying the DRC and providing insights into its impact on cholinergic transmission and muscle sensitivity.

- EQUIPMENT REQUIRED

Animal :-	Frog
Drug:-	Physostigmine stock solution (1mg/ml)
Instrument:-	Student Organ Bath, kymograph.
Physiological salt solution:-	Frog Ringer's solution

- PRINCIPLE

Physostigmine is anticholinesterase drug, inhibits the metabolites of the acetylcholine. Thus, action of acetylcholine is enhanced. The concentration response curve of acetylcholine shifted toward left in the presence of physostigmine. The shift in the DRC, demonstrating the physiological and pharmacological effects of cholinergic enhancement. The frog rectus abdominis muscle contracts in response to ACh, with the dose-response curve (DRC) reflecting the relationship between ACh concentration and muscle response.

PROCEDURE:

1) Pith the frog and lay it on its back on the frog- dissecting board. Pin the four limbs to the frog board.
2) Remove the skin of the abdomen region and expose the rectus abdominis muscle.
3) Cut and prepare two rectus muscle preparation from each frog.
4) Tie thread to the top and bottom of each muscle preparation before detaching the muscle from the body of the frog.
5) Tie ends of tissue to aeration tube and isotonic lever respectively in up-right position, student organ bath containing, frog Ringer's solution under a tension of 1g. There is no need of maintain bath temperature and bubble the organ bath with air.

6) Relax the tissue for 30 min, during which period wash the tissue with fresh ringer's solution at least four times at every 10 minutes interval.

7) Record the contractions due to acetylcholine using either simple side way or frontal writing lever, for proper reading of response the contact time should be 90 Seconds and 5 min time cycle, take at least four readings.

8) Add physostigmine to student organ bath, containing frog ringer's solution and irrigate the tissue for 30minutes.

9) Repeat the DRC of acetylcholine in presence of physostigmine.

10) Label and fix both the DRC of physostigmine and acetylcholine.

CONCLUSION

The effects of physostigmine on the dose-response curve (DRC) of acetylcholine (ACh) in the frog rectus abdominis muscle highlight the importance of acetylcholinesterase in regulating cholinergic transmission. Physostigmine improves ACh availability by blocking its breakdown, increasing muscle sensitivity, and changing the DRC. This demonstrates the potential of acetylcholinesterase inhibitors to modulate neuromuscular function, offering useful insights for pharmacological and physiological study.

- IDEAL OBSERVATION

Sr. No	Conc. Of Ach (µg/ml)	Amount Added In Organ bath		Conc. In Organ bath		In Absence of Physostigmine		In Presence of physostigmine (0.2 ml)	
		In mL	In µg	µg/ml	Log Conc.	Response (mm)	Percent Response	Response (mm)	Percent Response
1.	100	0.1	10	0.5	-0.301	20	21.98	26	27.8
2.	100	0.1	10	0.5	-0.301	20	21.98	26	27.8
3.	100	0.2	20	1	0	45	49.45	52	54.16
4.	100	0.4	40	2	0.301	76	83.52	81	84.37
5.	100	0.8	80	4	0.602	90	98.90	95	98.95
6.	100	1.6	160	8	0.903	91	100	96	100

RESULT:

The addition of physostigmine caused a leftward shift in the dose-response curve (DRC) of acetylcholine on the frog rectus abdominis muscle. This indicates increased muscle sensitivity to acetylcholine due to acetylcholinesterase inhibition, leading to stronger contractions at lower acetylcholine concentrations.

DISCUSSION:

The leftward shift in the DRC after adding physostigmine highlights the role of acetylcholinesterase in regulating Acetylcholine activity. Physostigmine inhibits this enzyme, increasing Acetylcholine availability and enhancing muscle response. This demonstrates the potential of acetylcholinesterase inhibitors in studying neuromuscular function and treating conditions involving reduced cholinergic activity.