

**AIM: Analgesic Effect of Morphine in Mice Using the Hot Plate Method**

**INTRODUCTION:**

The study of analgesic effects is crucial in understanding pain management. In this experiment, we investigate the analgesic properties of morphine using the hot plate method. Morphine, a potent opioid, is known for its pain-relieving properties. By subjecting mice to a heated surface, we can observe their response time and evaluate the effectiveness of morphine in reducing pain sensitivity.

**EQUIPMENT REQUIRED:**

**Apparatus:** Eddy's Hot plate Analgesiometer (Techno), mice cages.

**Animal:** Mice (25-30 gm)

**Drugs:** Morphine sulphate (Dose 5mg/kg; s.c, prepare the stock solution containing 0.5mg/ml and inject 1ml/100g of body weight of mouse).

**PRINCIPLE:**

**1. Algesia and Analgesia:**

- **Algesia** refers to an increased sensitivity to pain stimuli, while **analgesia** refers to the reduction or inhibition of pain perception.
- In this method, we induce algesia in animals (such as mice) by subjecting them to a painful stimulus (heat in this case).
- Analgesic drugs are then administered to observe their effect on pain sensitivity.

**2. Hot Plate Apparatus:**

- The **hot plate apparatus** consists of a heated surface (usually maintained at a constant temperature, e.g., 55°C).
- Animals are placed on this hot plate, and their responses are monitored.
- The heat serves as the source of pain in this experiment.

**3. Animal Responses:**

- When placed on the hot plate, animals exhibit specific behaviours in response to the heat:
  - **Jumping:** Animals may jump or lift their paws due to discomfort.
  - **Paw Licking:** Some animals lick their paws as a reaction to the heat.
  - **Withdrawal:** Animals may withdraw their paws from the hot surface.

- These responses serve as indicators of pain sensitivity.

#### 4. Experimental Procedure:

- Basal reaction time is determined by observing the animal's initial response on the hot plate (usually within 6-8 seconds).
- A cut-off time (e.g., 15 seconds) is set to prevent paw damage.
- Analgesic drugs (e.g., morphine) are administered to the animals.
- Reaction times are recorded at different intervals (15, 30 and 60 minutes) after drug treatment.
- An increase in reaction time indicates analgesic activity.

#### 5. Calculation and Interpretation:

- Percent increase in reaction time is calculated relative to basal values.
- If the drug prolongs the reaction time, it suggests analgesic efficacy.
- The longer the reaction time, the stronger the analgesic effect.

#### 6. Conclusion:

- From this experiment, we can infer that the drug inhibits pain stimuli and possesses analgesic properties.
- Further studies explore dose-response relationships and safety profiles.

### OBSERVATION TABLE:

Sr No.	Body weight (gm)	Basal Reaction time (sec) of Jumping				Mean Basal Reaction time after Morphine Administration		
		1	2	3		15 min	30 min	60 min
1	22				Mean			
2	20							
3	23							
4	21							
5	24							
6	25							
Mean								

### INFERENCE:

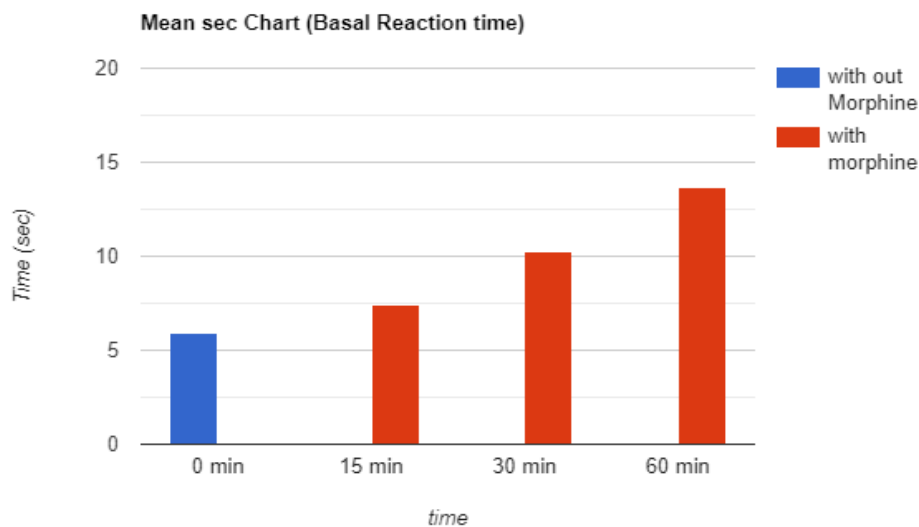
Sr No.	Body weight (gm)	Basal Reaction time (sec) of Jumping				Mean Basal Reaction time after Morphine Administration		
		1	2	3		15 min	30 min	60 min

1	22	5	5.5	5	Mean	6.5	9	12
2	20	5.5	5	6.5		6	10	13
3	23	5	6	5.5		8	11	13
4	21	6	6.5	5		9	12	15
5	24	7	8	6		8	10	14
6	25	6.5	7	7.5		7	9.5	15
Mean					5.92	7.42	10.25	13.67

\*Observation table after completion of the experiment can be downloaded by clicking tab (RJPT SimLab)

**DISCLAIMER: "The results provided here are only for reference or comparison purposes. Students are expected to perform the experiment and record their actual observations."**

#### GRAPH:



#### PROCEDURE:

##### 1. Animal Preparation:

- Weigh and mark the animals.
- Place the animals individually on the hot plate.
- Observe their basal reaction time (usually within 6-8 seconds) when exposed to the constant temperature (55°C).
- Set a cutoff time of 15 seconds to prevent paw damage.

##### 2. Drug Administration:



- Administer the drug (e.g., morphine sulfate) to the animals (intraperitoneally).
- Record the reaction time of the animals on the hot plate apparatus at different time intervals (15, 30, 60, and 120 minutes) after drug treatment.
- Consider 15 seconds as the maximum analgesia. Remove the animals from the hot plate to prevent injury.

### 3. Calculation:

- Calculate the percent increase in reaction time compared to basal values.

### RESULT:

Morphine significantly increases the reaction time of mice on the hot plate, indicating analgesic activity. The experiment demonstrates the effectiveness of morphine in reducing pain sensitivity.

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