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EVALUATION OF SKELETAL MUSCLE RELAXANT ACTIVITY USING POPPY SEEDS, CHAMOMILE EXTRACT, AND THEIR COMBINATION IN WISTAR RATS

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ABSTRACT

Skeletal muscle relaxants are drugs that reduce muscle tone and relieve muscle spasms. Herbal medicines are increasingly investigated as safer alternatives to synthetic muscle relaxants. Herbal medicines are widely used for the treatment of neurological and muscular disorders due to their fewer side effects and better safety profile. The present study was conducted to evaluate the skeletal muscle relaxant activity of ethanolic extract of poppy seeds, chamomile extract, and their combination in Wistar rats.

The study was carried out using Rota-rod apparatus to assess motor coordination and muscle relaxation. Diazepam was used as the standard drug. Experimental animals were divided into five groups consisting of control, standard, poppy extract, chamomile extract, and combination extract groups.

The results demonstrated that both poppy seed and chamomile extracts produced significant skeletal muscle relaxation. The combination extract exhibited greater activity than individual extracts and showed effects comparable to diazepam.

The study suggests that the presence of flavonoids, alkaloids, and terpenoids may contribute to skeletal muscle relaxant activity. Herbal combinations may provide effective and safer alternatives for treating muscle spasms and muscular disorders.

Keywords: Skeleton muscle relaxant activity, Poppy seed extract, Chamomile extract, Ethanolic extract, Wister rats.

1 INTRODUCTION

Skeletal muscle relaxants are agents that decrease muscle tone and reduce muscular spasms without affecting consciousness. Muscle spasms occur due to excessive contraction of muscles caused by injury, inflammation, stress, neurological disorders, or pain.

Conventional skeletal muscle relaxants such as diazepam, baclofen, and thiocolchicoside are commonly prescribed but may produce adverse effects such as sedation, dizziness, weakness, dependency, and fatigue. Hence, researchers are focusing on herbal medicines as alternative therapies.

Medicinal plants have been used traditionally for centuries for treating pain, anxiety, inflammation, and muscular disorders. Herbal remedies contain bioactive phytochemicals that act on the central nervous system and provide therapeutic effects with minimal side effects.

1.1 Poppy Seeds

Poppy seeds obtained from *Papaver somniferum* contain alkaloids, phenolic compounds, flavonoids, carbohydrates, proteins, and fatty acids. Traditionally, poppy seeds are known for sedative, analgesic, and calming effects. Certain alkaloids present in poppy influence neurotransmitter activity and may produce muscle relaxation.

1.1.1 Scientific Classification of Poppy

Botanical name: Papaver somniferum

- Family: Papaveraceae
- Common name: Poppy
- Part used: seeds

Figure 1: Poppy seeds

1.2 Chamomile

Chamomile is one of the oldest medicinal herbs used worldwide. It possesses anti-inflammatory, anxiolytic, sedative, and muscle relaxant properties

Chamomile is a medicinal herb widely used for anxiety, insomnia, muscle spasms, and inflammation. Chamomile contains flavonoids such as apigenin, terpenoids, and essential oils that exhibit sedative and relaxant activity through benzodiazepine receptor interaction. Previous studies demonstrated that several herbal extracts show skeletal muscle relaxant activity using Rota-rod and Actophotometer methods in Wistar rats. However, limited data are available regarding combined effects of poppy seed and chamomile extracts. Therefore, the present study was designed to evaluate the skeletal muscle relaxant activity of poppy seed extract, chamomile extract, and their combination in Wistar.

1.3 Scientific Classification of Chamomile:

- Botanical name: Matricaria chamomilla
- Family: Asteraceae
- Common name: Chamomile
- Part used: Flowers

Figure 2: Chamomile

2 EXPERIMENTAL ANIMALS

Wistar Rat are one of the most commonly used experimental animals in pharmacological and toxicological studies. They are preferred because of their calm nature, easy handling, rapid growth, and well-known physiological responses.

Role in Skeletal Muscle Relaxant Activity Study

In the evaluation of skeletal muscle relaxant activity using poppy seed extract, chamomile extract, and their combination, Wistar rats are used as experimental models to assess muscle coordination and muscle relaxation effects.

2.1 Characteristics of Wistar Rats

- Species: Rattus norvegicus
- Color: Albino (white)
- Weight used in studies: 150–200 g
- Age: 6–8 weeks
- Nature: Calm and easy to handle
- Housing: Maintained under controlled temperature and 12-hour light/dark cycle

Wistar Rats are Used because:

- Their nervous and muscular systems respond well to skeletal muscle relaxants.
- They are suitable for behavioral and pharmacological experiments.
- Results obtained are reliable and reproducible.
- They are widely accepted in preclinical drug evaluation studies.

2.2 Experimental Design

The rats are usually divided into five groups:

- Control group
- Standard group (Diazepam)
- Poppy seed extract group
- Chamomile extract group
- Combination extract group

Each group generally contains 3 animals.

Figure 3: Wister rats

3 REVIEW OF LITERATURE

Several medicinal plants have been reported to possess skeletal muscle relaxant activity.

- Chamomile has been used traditionally for anxiety, insomnia, and muscle spasms.
- Poppy seeds are known for sedative and analgesic effects.
- Flavonoids present in medicinal plants can enhance GABA-mediated neurotransmission.
- Previous animal studies demonstrated that herbal extracts significantly reduce motor coordination in Rota-rod tests.

Recent studies suggest that herbal combinations may produce synergistic therapeutic effects and reduce side effects associated with synthetic drugs.

4 MATERIALS AND METHODS

4.1 Materials Required

4.1.1 Chemicals

- Ethanol
- Diazepam
- Distilled water
- Normal saline

4.1.2 Instruments

- Soxhlet apparatus
- Rota-rod apparatus
- Weighing balance
- Beakers and glassware

5 PREPARATION OF EXTRACTS

5.1 Preparation of Poppy Seed Extract

- Poppy seeds were cleaned and shade dried.
- Seeds were powdered using grinder.
- Powder was cold extracted with ethanol.
- Extract was concentrated and stored.

Figure 4: Poppy seeds are Powdered using grinder

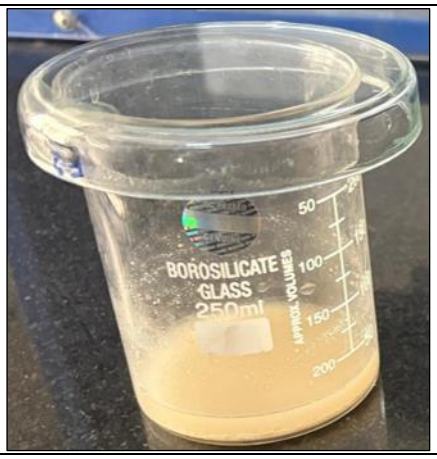

Figure 5: Extract was Concentrated and stored

5.2 Preparation of Chamomile Extract

- Fresh chamomile flowers were collected, dried properly, and then powdered using motor and pestle.
- The powdered material was subjected to Soxhlet extraction using ethanol as the solvent.
- The obtained extract was concentrated carefully by evaporating the solvent.
- The concentrated chamomile extract was stored in an airtight container for further experimental studies.

Figure 6: Powdered chamomile flowers

Figure 7: Soxhlet extraction using ethanol

Phytochemical	Poppy	Chamomile
Alkaloids	Present	Absent
Flavonoids	Present	Present
Tannins	Present	Present
Glycosides	Present	Present
Terpenoids	Present	Present

5.3 Phytochemical screening

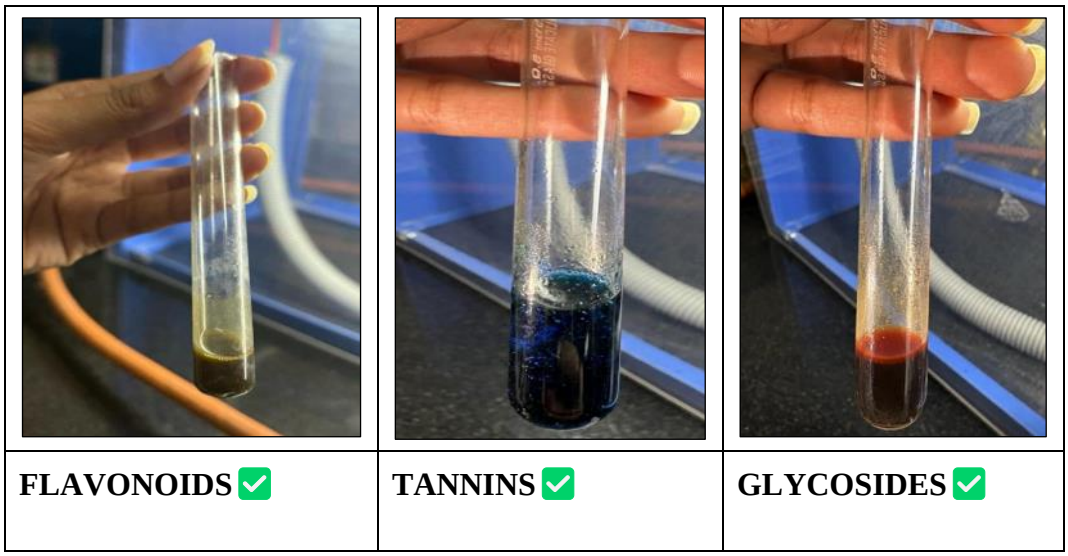

Figure 8: Phytochemical evaluation tests

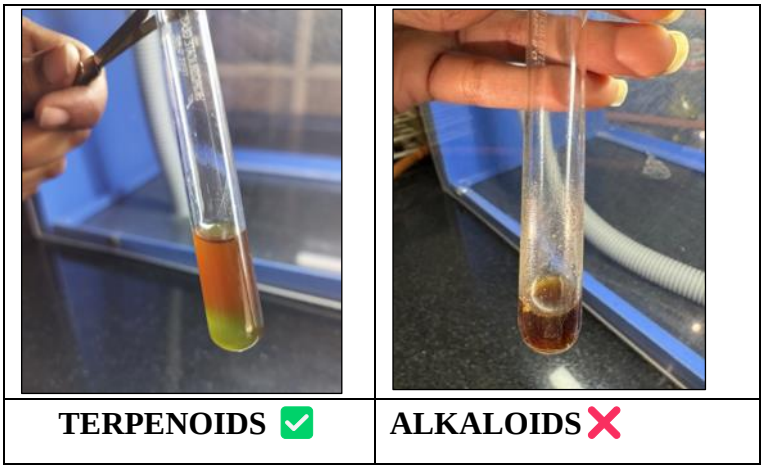

Figure 9: Terpenoids and alkaloids

5.4 Experimental Design

- Group 1 Control (Normal saline)
- Group 2 Diazepam (1ml)
- Group 3 Poppy extract (2ml)
- Group 4 Chamomile extract (2 ml)
- Group 5 Combination extract (1+1 =2ml)

5.5 Rota-Rod Method

The skeletal muscle relaxant activity is evaluated using the Rota-rod apparatus. This method helps in assessing muscle strength and motor coordination in rats.

5.5.1 Procedure

- Rats are placed carefully on a rotating rod.
- Healthy rats are able to stay on the rod for a longer duration.
- After administration of the test extracts, muscle relaxation may reduce their ability to remain on the rotating rod.
- Due to relaxation of muscles, the rats tend to fall earlier from the rod.
- The time taken for the rats to fall is recorded and compared between different experimental groups.

A decrease in retention time on the rotating rod indicates skeletal muscle relaxant activity. Diazepam is generally used as the standard reference drug in this method.

5.6 Expected Findings

- Poppy seed extract may exhibit muscle relaxant activity because of the presence of alkaloids and flavonoids.
- Chamomile extract may also show relaxant effects due to compounds such as apigenin and terpenoids.
- The combined extract of poppy seeds and chamomile may produce enhanced activity because of synergistic effects.
- The results obtained are compared with the standard drug, diazepam.

Figure 10: Administration of extract

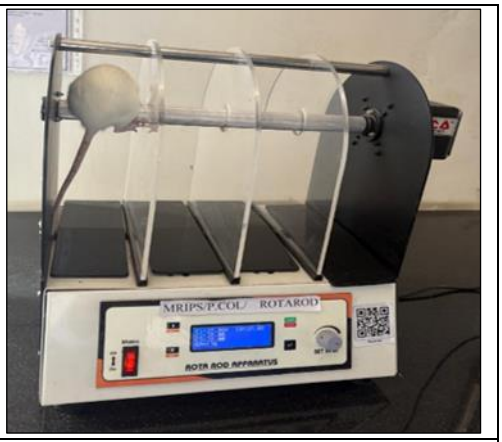

Figure 11: Rats placed on Rota Rod

6 RESULTS

Table 1: Results expressed in mean values

Group	10 min	20 min	30 min
Control	180 ± 5	178 ± 4	176 ± 5
Diazepam	75 ± 3	60 ± 2	58 ± 3
Poppy Extract	130 ± 4	120 ± 5	118 ± 4
Chamomile Extract	115 ± 4	100 ± 3	98 ± 4
Combination	90 ± 3	82 ± 3	80 ± 2

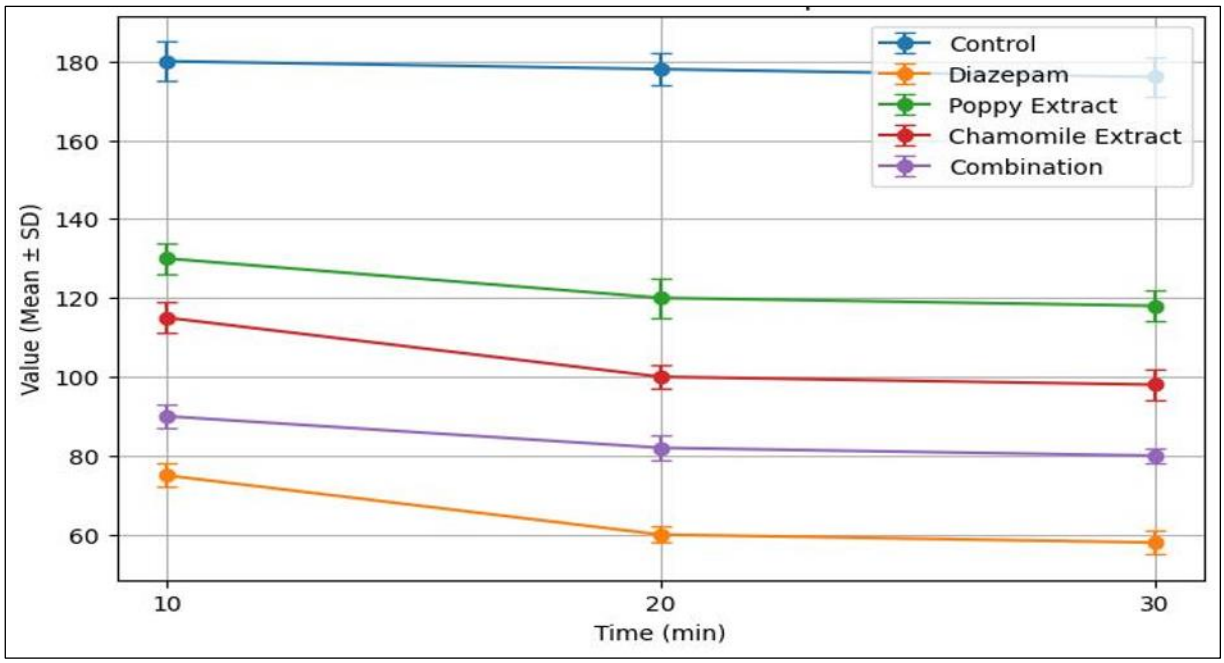

Figure 12: Graphical representation of different experimental groups

6.1 Interpretation of Results

- The control group animals maintained normal muscle coordination and balance throughout the study.
- Diazepam showed the highest muscle relaxant activity among all the groups tested.
- Poppy seed extract produced moderate skeletal muscle relaxation in Wistar rats.
- Chamomile extract demonstrated better relaxant activity when compared with poppy seed extract alone.
- The combination of poppy seed and chamomile extracts exhibited the strongest effect among the herbal treatment groups, suggesting enhanced activity due to combined action.

7 DISCUSSION

The present study revealed that both poppy seed and chamomile extracts possess noticeable skeletal muscle relaxant activity in Wistar rats. The reduction in retention time on the Rota-rod apparatus indicates decreased muscle coordination and relaxation of skeletal muscles after treatment with the extracts.

The observed activity may be attributed to the presence of phytoconstituents such as flavonoids, alkaloids, and terpenoids. These compounds are believed to act through the GABAergic system in the central nervous system, which plays an important role in muscle relaxation and sedation. Chamomile contains apigenin, a well-known flavonoid that can interact with benzodiazepine receptors and contribute to calming and relaxant effects.

The combination extract showed greater activity than the individual extracts, indicating a possible synergistic interaction between the bioactive compounds present in both plants. This enhanced effect suggests that combining herbal extracts may improve therapeutic potential.

Herbal medicines are often considered safer alternatives to synthetic muscle relaxants because they may produce fewer adverse effects and better patient tolerance. However, additional studies are necessary to confirm their safety and effectiveness.

8 CONCLUSION

The present study was carried out to investigate the skeletal muscle relaxant activity of ethanolic extracts of poppy seeds (Papaver somniferum), chamomile (Matricaria chamomilla), and their combination in Wistar rats. Diazepam was used as the standard drug for comparison. The results showed that both herbal extracts were able to reduce muscle activity and motor coordination when compared to the control group, indicating their potential skeletal muscle relaxant properties.

Among the individual extracts, chamomile demonstrated better muscle relaxant activity than poppy seed extract throughout the study period. However, the effect produced by both extracts was lower than that of diazepam. Interestingly, the combination of poppy seed and chamomile extracts produced a greater muscle relaxant effect than either extract alone. This suggests that the two plants may work together synergistically to enhance their pharmacological activity.

The combination extract maintained its effectiveness at all observation intervals (10, 20, and 30 minutes), showing a consistent and sustained response. Although diazepam remained the most effective treatment, the herbal combination exhibited considerable activity and could be considered a promising natural alternative for skeletal muscle relaxation.

The observed effects may be due to the presence of various bioactive compounds such as flavonoids, alkaloids, phenolic compounds, and terpenoids, which are known to influence the central nervous system and contribute to muscle relaxation. The enhanced activity seen with the combined extract further supports the possibility of synergistic interactions between these phytoconstituents.

Overall, the study concludes that ethanolic extracts of poppy seeds and chamomile possess significant skeletal muscle relaxant activity, with the combination extract showing the best performance among the herbal treatments tested. These findings highlight the potential of this herbal combination as a natural muscle relaxant. However, further research is needed to identify the active constituents, understand their mechanism of action, and evaluate their safety and efficacy through advanced pharmacological and clinical studies before their therapeutic use can be established.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflict of interest regarding this manuscript.

Statement of ethical approval

The study was conducted in accordance with the relevant institutional and national guidelines for the care and use of laboratory animals. All efforts were made to minimize animal suffering and to reduce the number of animals used.

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