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Analysis of the Analgesic Effects of Jasminum Multiflorum and JasminumSambac Formulations in Experimental Mice

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Abstract

The present study was undertaken to evaluate the analgesic potential of JM15 (Jasminummultiflorum) and JS25 (Jasminumsambac) formulations using the hot plate method in mice. Both formulations were prepared using successive solvent extraction and supercritical fluid extraction (SFE) techniques to enrich bioactive phytoconstituents. Analgesic activity was assessed by measuring latency to nociceptive response and percentage inhibition of pain threshold. Both formulations significantly increased pain threshold compared to the control group ($p < 0.001$), with JS25 demonstrating superior efficacy comparable to the standard formulation. The results suggest that Jasminum-derived phytochemicals, particularly flavonoids and lactones, may exert central analgesic effects through modulation of nociceptive pathways.

Keywords: Analgesic activity; Jasminummultiflorum; Jasminumsambac.

1. Introduction

Pain is a multifaceted physiological and pathological process involving both peripheral and central nervous system mechanisms. It serves as a protective response but becomes detrimental when persistent, leading to chronic pain conditions that significantly impair quality of life [1]. The management of pain remains a major clinical challenge due to the limitations of currently available pharmacological agents.

Conventional analgesics such as opioids and nonsteroidal anti-inflammatory drugs (NSAIDs) are widely used; however, their prolonged use is associated with adverse effects including gastrointestinal toxicity, renal dysfunction, tolerance, and dependence [2, 3]. These limitations have prompted the search for safer and more effective alternatives, particularly from plant-derived natural products.

Phytochemicals such as flavonoids, alkaloids, and terpenoids have demonstrated significant analgesic activity through various mechanisms, including inhibition of cyclooxygenase enzymes, suppression of inflammatory mediators, and modulation of central nociceptive pathways [4, 5]. Flavonoids are

particularly important due to their ability to interact with opioid receptors and influence neurotransmitter systems involved in pain perception [6].

The genus Jasminum (family Oleaceae) has been traditionally used in herbal medicine for the treatment of inflammation, fever, and pain. Jasminummultiflorum and Jasminumsambac are rich in bioactive constituents such as flavonoids, phenolic compounds, and lactones, which exhibit anti-inflammatory, antioxidant, and smooth muscle relaxant properties [7, 8]. These pharmacological activities suggest their potential role in analgesia.

Supercritical fluid extraction (SFE) is an advanced technique that enhances the extraction efficiency of thermolabile and bioactive compounds, leading to improved pharmacological activity. The present study was therefore designed to evaluate the analgesic effects of JM15 and JS25 formulations using the hot plate model in mice, which is a well-established method for assessing centrally mediated analgesic activity.

2. Materials And Methods

2.1. Experimental Animals

Swiss albino mice (25–30 g) were used and maintained under standard laboratory conditions. The experimental protocol was approved by the Institutional Animal Ethics Committee (Approval No.: RCP//P-3/2025) under CPCSEA guidelines.

2.2. Composition of Formulations

JM15: Prepared using successive solvent extraction followed by supercritical fluid extraction (SFE) of Jasminummultiflorum leaves. The extract was characterized using FTIR, ^{1}H NMR, and GC-MS/MS.

JS25: Prepared using sequential solvent extraction and SFE of Jasminumsambac. The methanolic fraction was rich in flavonoids and characterized using TLC, FTIR, ^{1}H NMR, and GC-MS/MS.

2.3. Hot Plate Test (Analgesic Activity)

Analgesic activity was evaluated using the hot plate method described by Eddy and Leimbach [9].

The temperature was maintained at 55 ± 1°C. The latency time for paw licking or jumping was recorded at 0, 30, 60, 120, and 150 minutes.

The percentage inhibition of pain threshold was calculated using:

[\text{Pain Threshold Inhibition (%)} = \frac {(P_t - P_0)}{P_0} \times 100]

Where:

(P_0) = Baseline pain threshold

(P_t) = Pain threshold at specific time interval

2.4. Statistical Analysis

Statistical analysis was performed using GraphPad Prism software. Results were expressed as Mean ± SEM. Data were analyzed using one-way ANOVA followed by Dunnett's multiple comparison test. Statistical significance was considered at $p < 0.05$.

3. Results

3.1. Effect of Formulations on Pain Response (Hot Plate Test)

The analgesic activity of JM15 and JS25 formulations was evaluated by measuring latency to nociceptive response in mice. The control group exhibited a relatively constant pain response latency ranging from approximately 2 to 3 seconds across all time points. Treatment with JM15 resulted in a moderate increase in latency, particularly at 30 minutes, followed by sustained effects up to 150 minutes. In contrast, JS25 demonstrated a marked and sustained increase in latency, with values reaching approximately 9–12 seconds at various time intervals. The standard formulation showed the highest analgesic activity, with latency values ranging from 12 to 17 seconds, particularly at 120 minutes. Notably, the analgesic effect of JS25 was comparable to that of the standard formulation at later time points, indicating strong central analgesic activity.

3.2. Percentage Pain Threshold Inhibition

The percentage inhibition of pain threshold further confirmed the analgesic potential of the formulations. JM15 exhibited moderate inhibition ranging from 64.60% at 30 minutes to approximately 74.65% at 120 minutes, followed by a slight decline at 150 minutes. JS25 demonstrated significantly higher inhibition values, ranging from 79.64% at 30 minutes to 84.98% at 150 minutes, indicating a sustained and potent analgesic effect. The standard formulation exhibited the highest inhibition (~85%) across all time points. These findings indicate that JS25 possesses analgesic efficacy comparable to the standard drug, while JM15 shows moderate but significant activity.

Effect of Formulations expressed as pain response in seconds induced by hot plate in mice (n = 5). The results are shown as mean ± SEM and a significant difference from the control group is shown as $P < 0.001$.

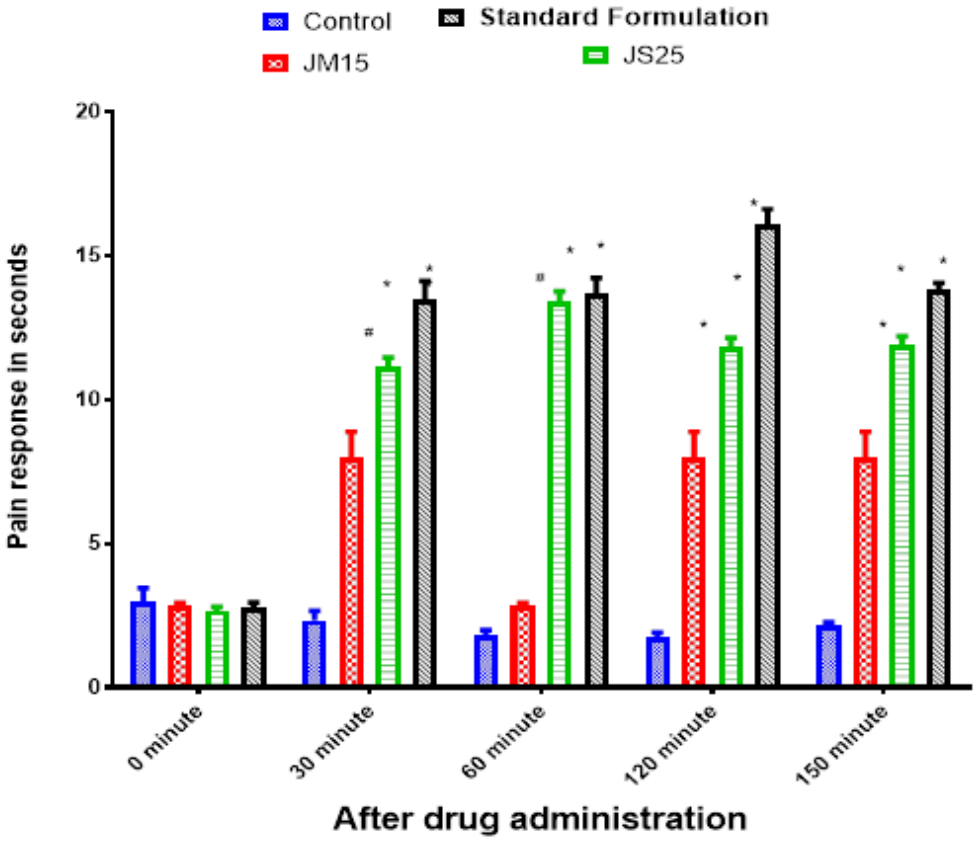

Fig. 1. *Analgesic effect of Formulations.*

Effect of Formulations expressed as the %inhibition threshold induced by hot plate in mice (n =5). The results are shown as average mean inhibition at that particular time point.

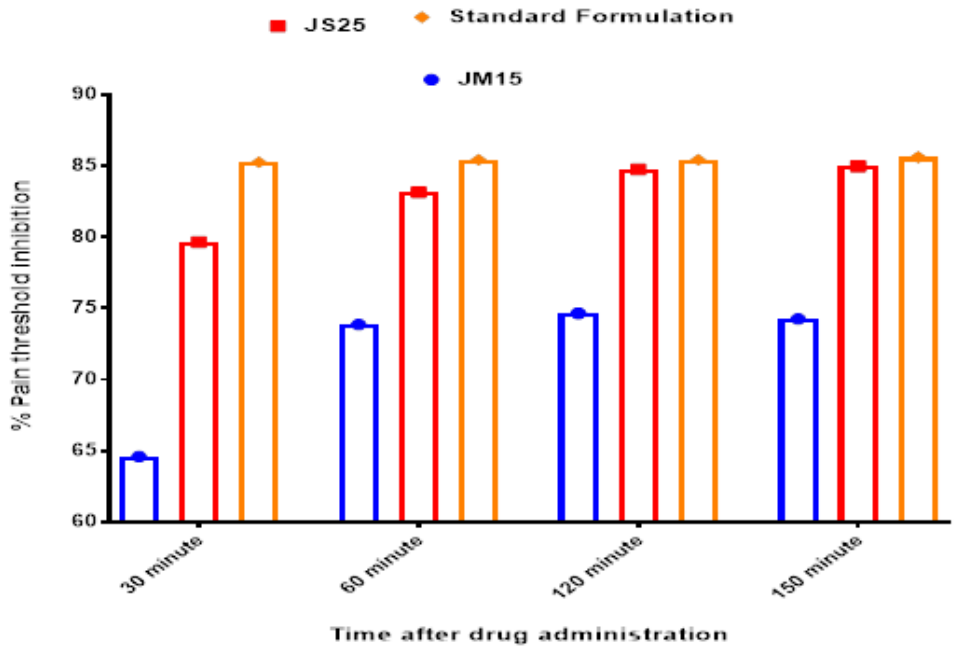

Fig 2. *Percentage Pain threshold inhibitionof Formulations in hot plate test.*

4. Discussion

The present study demonstrates that JM15 and JS25 formulations exhibit significant analgesic activity in experimental mice models. The hot plate test is a widely accepted method for evaluating centrally acting analgesics, as it primarily assesses supraspinal responses to thermal stimuli [9].

The significant increase in latency observed with both formulations suggests involvement of central pain modulation pathways. The superior analgesic effect of JS25 may be attributed to its higher concentration of flavonoids and phenolic compounds, which are known to inhibit cyclooxygenase (COX) enzymes and reduce prostaglandin synthesis, thereby attenuating pain perception [4].

Flavonoids have also been reported to interact with opioid receptors and modulate neurotransmitter systems involved in nociception, contributing to their central analgesic effects [6]. Additionally, the antioxidant properties of these compounds may reduce oxidative stress, which is known to play a role in pain signaling.

The presence of lactone derivatives in JM15 may contribute to its analgesic activity through membrane stabilization and anti-inflammatory mechanisms. However, the relatively lower efficacy compared to JS25 suggests differences in phytochemical composition and bioavailability.

The use of supercritical fluid extraction likely enhanced the pharmacological activity of JS25 by increasing the concentration and stability of bioactive compounds. This advanced extraction method preserves thermolabile constituents and improves extraction efficiency.

The sustained analgesic effect observed over 150 minutes indicates prolonged activity, which may be beneficial for therapeutic applications. The comparable efficacy of JS25 with the standard formulation highlights its potential as a natural alternative to conventional analgesics with fewer side effects.

5. Conclusion

JM15 and JS25 formulations exhibit significant analgesic activity in mice. JS25 demonstrated superior efficacy comparable to the standard formulation, indicating its potential as a natural analgesic agent. Further studies are warranted to elucidate the precise molecular mechanisms and clinical applicability.

References

[1] Apkarian AV, Baliki MN, Geha PY. Towards a theory of chronic pain. *Nat Rev Neurosci*. 2009; 10(6):397–407. doi:10.1038/nrn2621

[2] Varrassi G, Pergolizzi JV, and Dowling P, Paladini A. Ibuprofen safety at the golden anniversary: Are all NSAIDs the same? *Pain Ther*. 2019; 8(1):79–94. doi:10.1007/s40122-019-0112-7

[3] Bjarnason I, Scarpignato C, Holmgren E, Olszewski M, Rainsford KD, Lanas A. Mechanisms of damage to the gastrointestinal tract from nonsteroidal anti-inflammatory drugs. *Gastroenterology*. 2018; 154(3):500–514. doi:10.1053/j.gastro.2017.11.068

[4] Calixto JB, Beirith A, Ferreira J, Santos ARS, Filho VC, Yunes RA. Naturally occurring antinociceptive substances from plants. *Pharmacol Rev*. 2000; 52(1):1–50.

[5] Kumar V, Jaiswal AK, Singh PN, Bhattacharya SK. Anxiolytic activity of plant extracts: Possible mechanisms. *Phytomedicine*. 2009; 16(5):491–496. doi:10.1016/j.phymed.2008.12.005

[6] Fernández SP, Wasowski C, Paladini AC, Marder M. Sedative and sleep-enhancing properties of linarin, a flavonoid-isolated from *Valerianaofficinalis*. *Eur J Pharmacol*. 2006; 539(3):168–176. doi:10.1016/j.ejphar.2006.04.010

[7] Hossain MA, Al-Raqmi KAS, Al-Mijizy ZH, Weli AM, Al-Riyami Q. Study of total phenol, flavonoids contents and phytochemical screening of various leaves crude extracts of locally grown *Jasminumsambac*. *Arab J Chem*. 2013; 6(3):321–325. doi:10.1016/j.arabjc.2010.10.005

[8] Kumar S, Malhotra R, Kumar D. Euphorbia hirta: Its chemistry, traditional and medicinal uses, and pharmacological activities. *J Ethnopharmacol*. 2011; 135(3):341–347. doi:10.1016/j.jep.2011.03.024

[9] Eddy NB, Leimbach D. Synthetic analgesics. II. Dithienylbutenyl- and dithienylbutylamines. *J PharmacolExpTher*. 1953; 107(3):385–393.