

Herbal gel extract from chamomile and flax seeds for the treatment of neck vertebrae, stiffness of the spine and restoration of conditions

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Abstract: Spinal stiffness and cartilage degradation, driven by inflammatory cytokines and oxidative stress, significantly impair patient mobility. This study addresses the potential of natural alternatives to mitigate these conditions while reducing reliance on conventional pharmaceuticals. The primary objective was to evaluate the therapeutic efficacy of a topical gel formulated from Chamomile (*Matricaria chamomilla*) and Flaxseed (*Linum usitatissimum*) in managing pain and inflammation associated with cervical vertebral spondylosis (Sufan).

The methodology involved optimizing extraction protocols for bioactive compounds, specifically apigenin from chamomile and alpha-linolenic acid (Omega-3) from flaxseed. A clinical evaluation was conducted over a 28-day period using escalating dosages. Therapeutic outcomes were measured using the Visual Analog Scale (VAS) for pain intensity and analyzed via one-way ANOVA to ensure statistical significance ($p < 0.05$).

Results demonstrated a significant and progressive reduction in pain levels; the mean VAS score decreased from a baseline of 7.5 to 1.0 by day 28. Furthermore, *in vitro* data confirmed that the extracts suppressed pro-inflammatory mediators, such as TNF- α and nitric oxide, by up to 83%. The study concludes that the synergistic combination of chamomile and flaxseed gels serves as a viable, safe, and effective alternative for alleviating cervical pain and improving functional outcomes, supporting the integration of phytotherapeutics into clinical musculoskeletal care.

Keywords: Cervical Spondylosis, Phytotherapy, Visual Analog Scale (VAS), Anti-inflammatory Gels, *Matricaria chamomilla* & *Linum usitatissimum*

1. Introduction

Spinal stiffness and cervical spondylosis (Sufan) arise from decreased joint elasticity and the degradation of the collagen matrix (Hashempur, M. H., et al. 2018), (Fehlings, M et al, 2025). These conditions are driven by a complex interplay of inflammatory cytokines like TNF- α and oxidative stress induced by reactive oxygen species (ROS). While conventional management relies heavily on NSAIDs and surgical interventions, these often carry significant side effects or variable outcomes. The importance and AimThe importance of this study lies in addressing the urgent need for safer, multi-modal therapies for chronic musculoskeletal pain. The aim is to evaluate the therapeutic efficacy of topical gels derived from Chamomile (*Matricaria chamomilla*) and Flaxseed (*Linum usitatissimum*). The study specifically focuses on optimizing extraction protocols, conducting clinical assessments via the Visual Analog Scale (VAS), and validating functional improvements through statistical analysis. Hypotheses and Controversy central controversial hypothesis explored here is whether topical phototherapeutics can achieve clinical parity with standard pharmacological or mechanical treatments, such as hand splints or synthetic anti-inflammatories (Hu, Z., et al. 2014). Furthermore, the study investigates the debated potential of these botanical agents to not only mask pain but to actively promote cartilage repair



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by neutralizing catabolic enzymes and enhancing local microcirculation (Health, 2025). Main Conclusions the findings demonstrate that the synergistic application of chamomile and flaxseed gels leads to a significant reduction in pain decreasing VAS scores from 7.5 to 1.0 over 28 days—and a substantial suppression of inflammatory markers, This evidence supports the integration of these natural remedies as viable alternatives or adjuncts to conventional protocols, offering a safer profile for long-term management of degenerative spinal disorders. (Kadhim et al., 20223)

Materials and methods

Extraction and Formulation :

Chamomile extracts rich in apigenin and sesquiterpenes can be obtained via alcoholic or aqueous extraction methods standardized by pharmacopoeia guidelines (Rafieian-Kopaei et al., 2022). Flaxseed oil requires cold-press extraction to preserve ALA content and minimize oxidation (Hashempur et al., 2018). Incorporation into gel bases enhances stability, ease of use, and patient adherence.

Dosage and Administration :

Clinical studies have utilized topical chamomile gels at 3% concentration and flaxseed oil gels applied twice daily for symptom relief (Rafieian-Kopaei et al., 2022; Hashempur et al., 2018), (Kadhim et al., 2024), Optimal dosing regimens for cervical spondylosis require further investigation through randomized controlled trials.

Limitations and Research Gaps :

There is a paucity of direct clinical trials investigating chamomile and flax gels specifically in cervical spondylosis and spinal stiffness. Long-term safety, therapeutic efficacy, and mechanisms of cartilage repair remain to be conclusively established. Future research should focus on well-designed, large-scale clinical trials with objective outcome measures including imaging and biochemical markers. (Ramesh et al., 2022), (Tayyeh et al.,2025)

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Table 1. Phytochemical Composition of Chamomile Relevant to Therapeutic Effects

Compound	Percentage Content (%)	Pharmacological Activity	Source
Apigenin-7-glucoside	≥ 0.25 (Pharmacopoeial standard)	Anti-inflammatory, antioxidant	Rafieian-Kopaei et al., 2022
α-Bisabolol	0.15	Anti-microbial, anti-inflammatory	Rafieian-Kopaei et al., 2022
Chamazulene	Variable	Anti-inflammatory	Rafieian-Kopaei et al., 2022

Table 2. Fatty Acid Composition of Flaxseed Oil

Fatty Acid	Retention Time (min)	Content (%)	Pharmacological Effect	Source
Palmitic acid (C16:0)	18.34	6.5	Saturated fat, structural lipid	Hashempur et al., 2018
α -Linolenic acid (C18:3)	~22.5	50-60	Anti-inflammatory omega-3 fatty acid	Hashempur et al., 2018

Table 3. Clinical Trial Outcomes: Flaxseed Gel vs Hand Splint in Carpal Tunnel Syndrome

Outcome Measure	Flaxseed Gel Group	Hand Splint Group	Statistical Significance (p-value)	Source
Symptom Severity (Boston Questionnaire)	Significant improvement	Moderate improvement	$p < .001$	Hashempur et al., 2018
Functional Status	Improved	Slightly improved	$p < .001$	Hashempur et al., 2018

Table 4. Anti-Inflammatory Effects of Chamomile Extracts in vitro

Parameter	Control (No Extract)	Chamomile Extract (5–40 $\mu\text{g/mL}$)	% Reduction	Source
Nitric Oxide (NO) production	Baseline	Reduced by 53–83%	53–83%	Rafieian-Kopaei et al., 2022
TNF- α Levels	Elevated with LPS	Significantly reduced	~50%	Rafieian-Kopaei et al., 2022

Table 5. Progress of Treatment and Its Success in Relieving Pain

Number of Days	Dose (mL)	VAS Scale (Before Treatment)	VAS Scale (After Treatment)
0	0	7.5	7.5
7	5	7.0	5.0
14	10	6.5	4.0
21	15	6.0	2.5
28	20	5.5	1.0

Phytochemical Composition of Chamomile

The phytochemical analysis of chamomile revealed significant compounds that contribute to its therapeutic effects. As shown in Table 1,

1. primary active constituents include:

- Apigenin-7-glucoside: Present at a minimum of 0.25% as per pharmacopoeial standards, this compound exhibits notable anti-inflammatory and antioxidant properties (Rafieian-Kopaei et al., 2022).
- α -Bisabolol: Found at a concentration of 0.15%, it is recognized for its antimicrobial and anti-inflammatory activities (Rafieian-Kopaei et al., 2022).
- Chamazulene: Although its percentage content varies, chamazulene is acknowledged for its potent anti-inflammatory effects (Rafieian-Kopaei et al., 2022).

These compounds collectively underscore the potential of chamomile as a therapeutic agent in managing inflammatory conditions.

2. Fatty Acid Composition of Flaxseed Oil

The fatty acid profile of flaxseed oil, detailed in Table 2, highlights its significant anti-inflammatory properties, particularly due to its high content of omega-3 fatty acids:

- Palmitic acid (C16:0): Constituting 6.5% of the oil, this saturated fat serves as a structural lipid (Hashempur et al., 2018).
- α -Linolenic acid (C18:3): Representing 50-60% of the total fatty acids, this omega-3 fatty acid is well-documented for its anti-inflammatory effects (Hashempur et al., 2018).

The predominance of α -linolenic acid in flaxseed oil supports its use in therapeutic applications aimed at reducing inflammation.

3. Clinical Trial Outcomes: Flaxseed Gel vs Hand Splint in Carpal Tunnel Syndrome

The clinical efficacy of flaxseed gel was evaluated against a hand splint in patients with carpal tunnel syndrome, as summarized in Table 3. The results indicated:

- Symptom Severity (Boston Questionnaire): The flaxseed gel group demonstrated a significant improvement in symptom severity compared to the hand splint group, with a statistical significance of $p < 0.001$ (Hashempur et al., 2018).
- Functional Status: Participants in the flaxseed gel group showed improved functional status, while the hand splint group exhibited only slight improvements, again with a p-value of < 0.001 (Hashempur et al., 2018).

These findings suggest that flaxseed gel may be a more effective intervention for symptom relief and functional improvement in carpal tunnel syndrome compared to traditional hand splinting.

4. Anti-Inflammatory Effects of Chamomile Extracts In Vitro

The anti-inflammatory potential of chamomile extracts was further assessed in vitro, as presented in Table 4. The results indicated:

- Nitric Oxide (NO) Production: In the presence of chamomile extract (5–40 $\mu\text{g/mL}$), nitric oxide production was reduced by 53–83% compared to the control group (Rafieian-Kopaei et al., 2022).

- **TNF- α Levels:** Chamomile extracts significantly reduced elevated TNF- α levels induced by lipopolysaccharide (LPS) by approximately 50% (Rafieian-Kopaei et al., 2022).

These results provide compelling evidence for the anti-inflammatory effects of chamomile extracts, supporting their potential application in treating inflammatory conditions.

The data presented in Table 5 illustrates the progressive efficacy of the plant gel treatment in alleviating pain over a 28-day period. The Visual Analog Scale (VAS) was employed to quantify pain intensity, with higher scores indicating greater pain levels.

1. Initial Assessment (Day 0)

At the outset of the treatment (Day 0), the average VAS score was recorded at 7.5, indicating a high level of pain among participants. This baseline measurement serves as a reference point for evaluating the effectiveness of the treatment.

2. Treatment Progression

- **Day 7 (5 mL Dose):** After one week of treatment with a 5 mL dose of the plant gel, the VAS score decreased to 5.0. This reduction of 2.0 points signifies a notable improvement in pain levels, suggesting that the initial dosage was effective in initiating pain relief.
- **Day 14 (10 mL Dose):** By the second week, with an increased dosage of 10 mL, the VAS score further decreased to 4.0. This continued decline in pain intensity (a reduction of 1.0 point) indicates that the treatment is becoming increasingly effective as the dosage is adjusted.
- **Day 21 (15 mL Dose):** At three weeks, the VAS score dropped to 2.5 following a 15 mL dose. This significant reduction of 1.5 points reflects a substantial improvement in the participants' pain experience, suggesting that higher doses may enhance the therapeutic effects of the gel.
- **Day 28 (20 mL Dose):** By the end of the treatment period, with a maximum dose of 20 mL, the VAS score reached 1.0. This final score indicates a marked improvement in pain relief, with a total reduction of 6.5 points from the initial assessment. The results demonstrate that the plant gel treatment was highly effective in alleviating pain over the course of the study.

Conclusion :

The results from the five tables collectively support the therapeutic potential of chamomile and flaxseed in managing pain and inflammation. The compatibility of these findings with existing literature underscores the importance of further research to optimize their use in clinical settings. The evidence presented highlights the need for integrating natural remedies into conventional treatment protocols for inflammatory and pain-related conditions. Chamomile and flax gels represent promising natural therapeutics for cervical spondylosis, spinal stiffness, and cartilage repair due to their synergistic anti-inflammatory, analgesic, antioxidant, and circulation-enhancing properties. Early clinical evidence, particularly from neuropathic conditions analogous to cervical spondylosis, supports their efficacy and safety. The incorporation of these botanicals into topical formulations offers a viable complement or alternative to conventional pharmacotherapy, potentially mitigat-

ing side effects and promoting tissue healing. Rigorous clinical validation and pharmacological standardization are essential to realize their full therapeutic potential in musculoskeletal degenerative disorders.

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