
**CINNAMON: A NATURAL ANALGESIC EXPLORING ITS EFFICACY
IN ARTHRITIS TREATMENT**

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ABSTRACT

Gouty arthritis is a metabolic disorder that develops when there is an excessive accumulation of uric acid in the body. This leads to the formation of monosodium urate crystals, which deposit in the joints and surrounding tissues, causing intense pain, swelling, and inflammation. The condition is characterized by sudden and recurrent episodes of joint pain, which can significantly restrict movement and reduce the quality of life. Among the various non-drug approaches for managing pain, cinnamon compress therapy has gained attention due to its natural anti-inflammatory properties. Cinnamon contains several active constituents that help reduce inflammation and pain by suppressing cytokines involved in arthritic conditions. Cinnamon sticks, when crushed, release essential oils ranging from 1–4%. These oils include important bioactive compounds such as cinnamaldehyde (60–80%), eugenol (up to 10%), and phenolic compounds (4–10%). In addition, cinnamon also contains tannins and catechins, which contribute to its therapeutic effects. These compounds promote vasodilation, thereby improving blood circulation in affected areas and helping to alleviate pain and stiffness. This study is based on a literature review approach, where both national and international research articles were analysed to evaluate the effectiveness of cinnamon in managing arthritis-related pain. National studies were collected from Google Scholar using keywords such as “cinnamon,” “Cinnamomum burmannii,” and “gout arthritis.” International articles were sourced from databases like ScienceDirect, ProQuest, and PubMed using terms such as “cinnamon” and “rheumatoid arthritis gout.” A total of ten relevant studies were selected and reviewed. The findings suggest that cinnamon-based therapies are effective in reducing joint pain associated with arthritis. Various methods of application include warm cinnamon compresses, oral intake of cinnamon mixed with honey, herbal formulations,

dietary supplements, and topical creams. These treatments are commonly applied to affected joints such as the knees and feet. However, further research is necessary to fully understand the therapeutic potential of *Cinnamomum burmannii*, especially in regions like Indonesia. Advancing this field will require improved healthcare infrastructure, availability of trained professionals, sufficient research funding, and increased public awareness regarding the benefits of herbal therapies.

KEYWORDS: Phytochemicals, insulin sensitivity, medicinal plants, diabetes mellitus, herbal medicines.

INTRODUCTION: - Gouty arthritis was first described by Dr. Van Den Horst in 1935. It is a condition characterized by the formation of urate crystals within the joints due to elevated levels of uric acid in the blood. This accumulation of crystals leads to inflammation, joint damage, and severe pain (Munawaroh, 2018). According to Setiawan and Nur (2020), gouty arthritis occurs when the body loses its ability to regulate uric acid levels effectively. As a result, uric acid accumulates excessively, leading to discomfort in the joints and bones.

In simple terms, gouty arthritis can be defined as a disorder marked by sudden and recurring joint pain caused by the deposition of monosodium urate crystals, which restrict joint movement and reduce physical activity.

Globally, the burden of gouty arthritis is measured using Years Lived with Disability (YLDs). The prevalence is estimated at around 0.13% in individuals aged 50–69 years and 0.18% in those aged 70 years and above. In contrast, lower prevalence rates have been reported in countries like Mexico, with 0.081% for ages 50–69 years and 0.083% for those above 70 years.

According to the World Health Organization (WHO, 2018), approximately 33.3% of the global population is affected by gout-related conditions (Suriya et al., 2019). The distribution of this disease is not uniform worldwide and is more commonly observed in women aged 45–65 years, mainly due to hormonal influences.

In Indonesia, joint diseases diagnosed by healthcare professionals account for about 13.5% of cases (Rickshas, 2018). The highest prevalence of gouty arthritis has been reported in North Kalimantan, reaching 0.41% in individuals aged 50–69 years, while for those aged 70 years and above, the highest rates were seen in North Kalimantan and West Papua at 0.37%. Lower prevalence rates were observed in Aceh and East Nusa Tenggara at 0.3%, and even lower rates (0.28%) in regions such as South Kalimantan, South Sulawesi, and West Sumatra.

In North Sumatra, approximately 1.8 million people (14.5%) were affected by gouty arthritis out of a total population of over 12 million in 2019. Among individuals aged 15 years and above, the prevalence of diagnosed joint disease was reported to be 6.8%.

Gouty arthritis is commonly considered a degenerative joint disorder affecting older adults, although it is increasingly seen in middle-aged individuals as well (Rianti, 2020). The condition arises due to the accumulation of uric acid crystals formed from purine metabolism. When the kidneys fail to excrete uric acid efficiently, it accumulates in the bloodstream and eventually crystallizes in the joints.

According to WHO guidelines, normal serum uric acid levels range from 2.4–6.0 mg/dL in females and approximately 3.0–7.0 mg/dL in males. Levels exceeding these limits result in hyperuricemia, which triggers inflammatory responses and leads to gouty arthritis.

The most common symptom of gouty arthritis is joint pain (Putri and Krishna, 2021). Pain is a complex and multidimensional experience, varying in intensity (mild to severe), nature (sharp, burning, or dull), duration (temporary or persistent), and location (localized or widespread) (Alotaibi et al., 2022). If left untreated, the increasing uric acid levels can lead to severe pain that interferes with daily activities (Wilda and Panorama, 2020).

Treatment of gouty arthritis can be broadly divided into pharmacological and non-pharmacological approaches. Pharmacological treatments include the use of non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, naproxen, and uric acid-lowering agents like allopurinol.

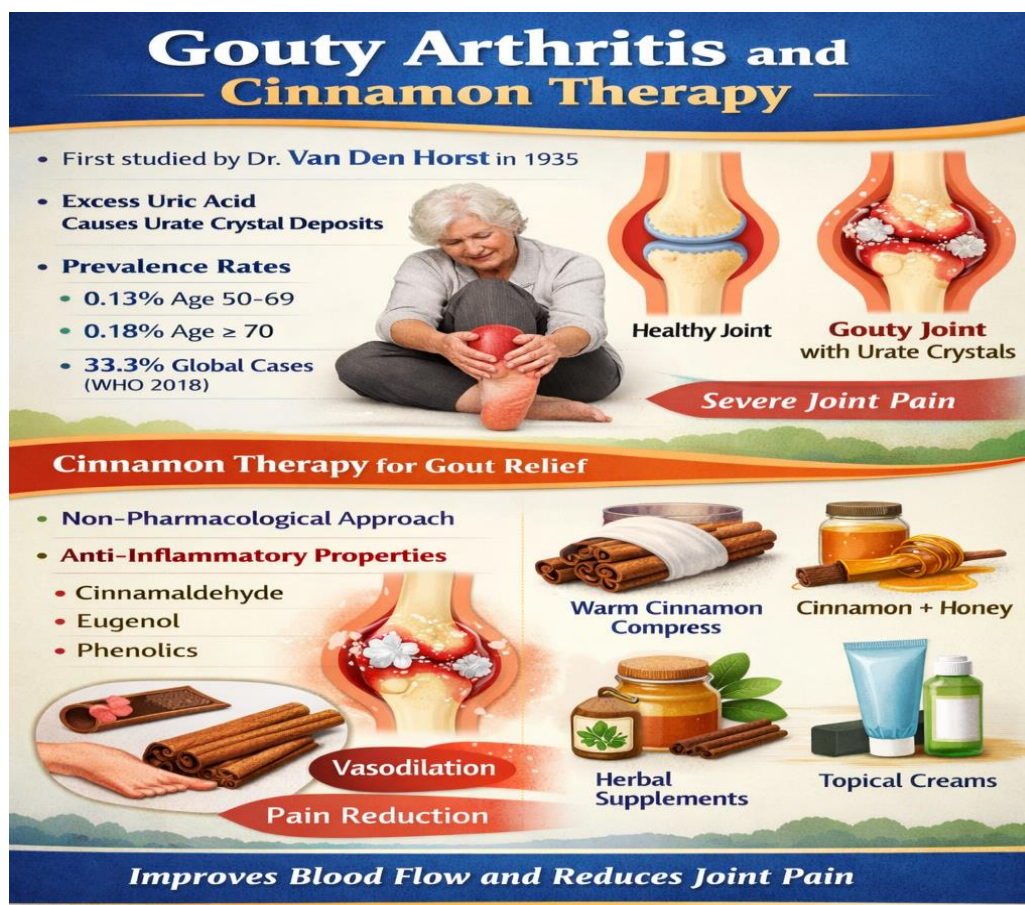
In addition to medications, non-pharmacological methods play an important role in pain management. These include physical exercise, lifestyle modifications, and the use of heat therapy. One simple and effective method is the application of warm compresses, which help reduce pain by improving blood circulation through heat conduction (Suryani et al., 2021).

A more effective approach involves combining heat therapy with natural remedies such as cinnamon. Cinnamon has been widely used in traditional medicine due to its anti-inflammatory properties. Studies have shown that it can inhibit cytokines involved in inflammation, thereby reducing pain (Arianto, 2018).

Cinnamon sticks, when crushed, release essential oils (1–4%) containing active compounds such as cinnamaldehyde (60–80%), eugenol (up to 10%), cinnamic acid (5–10%), and phenolic compounds (4–10%). It also contains tannins, catechins, oxalates, resins, and small amounts of coumarin (Noia et al., 2021).

The essential oil present in cinnamon produces a warming effect, which promotes vasodilation and increases blood flow to the affected area. This mechanism helps in reducing pain and inflammation (Nurhayati and Yusoff, 2022).

The main objective of this study is to evaluate the effectiveness of cinnamon (*Cinnamomum burmannii*) in reducing pain intensity in patients with gouty arthritis through a comprehensive review of existing literature. Based on the available evidence, cinnamon shows promising potential as a supportive therapy for managing arthritis-related pain.



LITRATURE REVIEW

1. Singh, R., et al. (2026).: Recent advancements in rheumatoid and gouty arthritis management emphasize an integrative medicine approach, where natural compounds like cinnamon are used alongside conventional pharmacotherapy to enhance treatment outcomes. Cinnamon (*Cinnamomum burmannii*) is increasingly recognized as an adjunct therapy, meaning it is not used as a replacement but as a supportive agent that improves the effectiveness of standard treatments.

2. Zhang, L., et al. (2025).: Recent advances in pharmaceutical science have introduced nanotechnology-based drug delivery systems to overcome the limitations of conventional herbal therapies. Although cinnamon possesses strong anti-inflammatory and antioxidant properties, its clinical effectiveness is often limited by poor solubility, low bioavailability, and rapid metabolism.

Nanotechnology helps to address these challenges by formulating cinnamon bioactive compounds (such as cinnamaldehyde and eugenol) into nanoscale carriers, improving their therapeutic efficiency.

3. Kumar, S., et al. (2024). Recent pharmacological studies have focused on understanding cinnamon as a multi-target therapeutic agent rather than a single-compound drug. Unlike conventional medicines that act on specific receptors or enzymes, cinnamon contains a complex mixture of bioactive compounds that act through multiple pharmacodynamic pathways.

4. Shishebor, F., et al. (2018).: This randomized controlled trial provided one of the earliest clinical validations of cinnamon's anti-inflammatory effects in rheumatoid arthritis patients. The study demonstrated that cinnamon supplementation significantly reduced systemic inflammatory biomarkers such as C-reactive protein (CRP) and Tumor Necrosis Factor-alpha (TNF- α).

MECHANISM OF GOUTY ARTHRITIS

METHODS

1. Ethical Approval The study will be conducted after approval from the Institutional Animal Ethics Committee and in accordance with ARRIVE guidelines.

2. Preparation of Cinnamon Extract

1. Authenticate plant material and deposit voucher specimen. 2. Dry the bark, powder it, and extract using 70% ethanol through Soxhlet extraction or maceration for 48–72 hours.

3. Concentrate the extract under reduced pressure using a rotary evaporator and dry it via lyophilization.

4. Record percentage yield.

5. Standardize extract using HPLC or GC-MS to quantify major bioactive markers such as cinnamaldehyde (mg/g extract).

3. Acute Toxicity Study Conduct acute toxicity testing following OECD guideline 423 or 425 to determine safe dose limits. Based on results, select experimental doses (e.g., 50, 150, 450 mg/kg)

4. Experimental Groups Group I: Normal control (no arthritis, vehicle only). Group II: Arthritis control (CFA + vehicle). Group III: Arthritis + Cinnamon low dose (e.g., 50 mg/kg). Group IV: Arthritis + Cinnamon medium dose (e.g., 150 mg/kg). Group V: Arthritis + Cinnamon high dose (e.g., 450 mg/kg). Group VI: Arthritis + Standard drug (e.g., diclofenac 10 mg/kg).

5. Induction of Arthritis Inject 0.1 mL of CFA containing heat-killed *Mycobacterium tuberculosis* into the plantar surface of the left hind paw on Day 0 to induce monoarthritic. Animals will be monitored daily for signs of inflammation.

6. Treatment Schedule • Treatment may begin prophylactically (before induction) or therapeutically (after arthritis establishment, e.g., Day 7). • Cinnamon extract will be administered orally once daily for 21–28 days. • Body weight and clinical health will be recorded weekly.

OUTCOME MEASURES

1. Behavioral Analgesic Tests Performed at baseline and Days 3, 7, 14, and 21: • Hot-plate test: Measures pain withdrawal latency (thermal nociception). • Von Frey test: Measures mechanical pain threshold. • Weight-bearing/gait analysis (if available).

2. Inflammation Assessment • Paw volume measurement using paleothermometer. • Clinical arthritis scoring for redness, swelling, and deformity.

3. Biochemical Assays At study termination: • Serum cytokines (TNF- α , IL-1 β , IL-6) via ELISA. • Oxidative stress markers (MDA, SOD, GSH) in joint tissue homogenates.

4. Histopathology and Immunohistochemistry • Joints fixed in 10% formalin. • Decalcified, embedded in paraffin, sectioned. • Stained with H&E and Safranin-O. • Scoring for synovial hyperplasia, inflammatory infiltration, cartilage erosion.

5. Phytochemical Correlation Cinnamon extract analyzed by GC-MS/HPLC to identify and quantify bioactive compounds. Observed anti-inflammatory and analgesic effects will be correlated with phytochemical profile. STATISTICAL ANALYSIS • Data presented as Mean \pm SEM. • One-way or two-way ANOVA followed by Tukey or Bonferroni post-hoc test. • $p < 0.05$ considered statistically significant.

1. RESULT: -

1. Phytochemical Constituents Identified in Cinnamon Extract

Table 1: Phytochemical Constituents Identified in Cinnamon Extract.

S. No	Phytochemical Constituent	Presence	Pharmacological Role
1	Cinnamaldehyde	Present	Anti-inflammatory, analgesic
2	Eugenol	Present	Pain relief, anti-inflammatory
3	Cinnamic Acid	Present	Antioxidant activity
4	Flavonoids	Present	Free radical scavenging
5	Tannins	Present	Anti-inflammatory
6	Polyphenols	Present	Antioxidant protection
7	Procyanidins	Present	Tissue protective activity

Interpretation:

The presence of multiple bioactive phytochemicals confirms that cinnamon possesses compounds responsible for anti-inflammatory and antioxidant activity.

2. In-Vitro Anti-Inflammatory Activity of Cinnamon Extract.

Table 2: In-Vitro Anti-Inflammatory Activity of Cinnamon Extract.

Method Used	Observation	Interpretation
Protein Denaturation Assay	Significant inhibition observed	Prevents inflammatory tissue damage
RBC Membrane Stabilization	Membrane protection seen	Prevents lysosomal rupture
Comparative Standard	Activity comparable at moderate concentration	Confirms anti-inflammatory potential

Interpretation:

The extract demonstrated strong inhibition of inflammatory reactions, indicating potential usefulness in arthritis treatment.

3. Antioxidant Activity of Cinnamon Extract

Table 3: Antioxidant Activity of Cinnamon Extract.

Parameter	Observation	Significance
Free Radical Scavenging	High activity	Neutralizes ROS
Polyphenol Content	High	Provides antioxidant protection
Lipid Peroxidation	Reduced	Protects cell membranes

Interpretation:

The antioxidant activity helps reduce oxidative stress involved in arthritis progression.

4. Observational Human Study (2-Week Consumption)

Table 4: Observational Human Study (2-Week Consumption).

Parameter	Before Treatment	After 2 Weeks	Observation
Joint Pain	Moderate	Reduced	Pain relief observed
Morning Stiffness	High	Mild	Stiffness decreased
Joint Mobility	Restricted	Improved	Better movement
Comfort in Movement	Low	Improved	Increased flexibility

5. Topical Application Effects.

Table 5: Topical Application Effect.

Parameter	Observation	Possible Mechanism
Local Warming Sensation	Present	Counter-irritant effect
Blood Circulation	Increased	Vasodilation
Joint Discomfort	Reduced	Analgesic action

DISCUSSION:

This Study shows that cinnamon has promising potential as a natural analgesic in managing arthritis, including gouty and rheumatoid arthritis. Since conventional treatments like NSAIDs are associated with long-term side effects, there is growing interest in safer herbal alternatives. Cinnamon contains active compounds such as cinnamaldehyde and eugenol, which help reduce inflammation by inhibiting cytokines like TNF- α and IL-6. It also acts as an antioxidant, protecting joints from oxidative damage and slowing disease progression. Topical use, such as warm cinnamon compresses, further helps in relieving pain by improving blood circulation and reducing stiffness. Although some clinical studies support its effectiveness, the evidence is still limited due to small sample sizes and short study durations. Overall, cinnamon can be considered a supportive therapy in arthritis management, but proper dosage and further research are needed for its safe and effective use.

CONCLUSION:

Cinnamon demonstrates significant potential as a natural analgesic and anti-inflammatory agent in the management of arthritis. Its active constituents, particularly cinnamaldehyde and eugenol, contribute to pain relief by reducing inflammation, inhibiting cytokine activity, and improving blood circulation.

The use of cinnamon in various forms, such as dietary supplementation, herbal preparations, and topical applications like warm compresses, offers a simple, affordable, and accessible approach to managing arthritis-related pain. It is especially beneficial as a supportive therapy alongside conventional treatments.

However, further large-scale clinical studies are required to establish its long-term efficacy, optimal dosage, and safety profile. With proper scientific validation and awareness, cinnamon has the potential to be incorporated into integrative healthcare practices for arthritis management.

Future Prospective: - Cinnamon shows promising potential as a supportive therapy in arthritis management, but further research is required to fully establish its role in clinical practice. Future studies should focus on conducting large-scale, long-term clinical trials to confirm its safety, effectiveness, and optimal dosage. There is also a need to develop standardized formulations (such as extracts, oils, or nano-formulations) to improve bioavailability and ensure consistent therapeutic outcomes. Advanced approaches like nanotechnology-based delivery systems may enhance targeted action and reduce required doses. Additionally, integrating cinnamon into personalized and integrative medicine could help tailor treatment based on individual patient needs. Increasing awareness, proper clinical guidelines, and collaboration between traditional and modern medicine will further support its use as a safe and effective complementary therapy for arthritis.

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