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ANTIGOUT AND ANTIINFLAMMATORY ACTIVITY OF AQUEOUS AND ETHANOLIC EXTRACT OF BARK AND LEAVES OF OUGEINIA OOJEINENSIS

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ABSTRACT
Ougeinia oojeinensis is traditionally used for inflammatory disorders, but its antigout potential is not well established. The present study evaluated the in-vitro antigout and anti-inflammatory activities of aqueous and ethanolic extracts of bark and leaves of O. oojeinensis. Extracts were subjected to phytochemical screening and assessed for xanthine oxidase inhibition, inhibition of protein denaturation, monosodium urate (MSU) crystal-induced protein denaturation, heat-induced hemolysis, and human red blood cell (HRBC) membrane stabilization assays, using allopurinol and diclofenac sodium as standards. Ethanolic extracts, particularly from leaves, showed higher extractive yield and richer phytochemical content. All extracts exhibited concentration-dependent activity, with the ethanolic leaf extract showing the strongest xanthine oxidase inhibition and superior anti-inflammatory and membrane-stabilizing effects, comparable to standard drugs. The study provides scientific support for the traditional use of O. oojeinensis in gout and inflammation, highlighting ethanolic leaf extract as a promising natural antigout and anti-inflammatory agent warranting further investigation.
KEYWORDS: *Ougeinia Oojeinensis; Gout; Anti-Inflammatory; Xanthine Oxidase; MSU Crystals; Medicinal Plants.*

INTRODUCTION
Inflammation and gout are closely interrelated pathological conditions that significantly contribute to morbidity worldwide. Inflammation is a complex biological response of vascular tissues to harmful stimuli such as pathogens, damaged cells, or irritants, and plays a crucial role in host defense and tissue repair. However, dysregulated or chronic inflammation is implicated in the pathogenesis of numerous diseases, including arthritis, cardiovascular disorders, metabolic syndrome, and autoimmune conditions. Gout, a common inflammatory arthropathy, is characterized by the deposition of monosodium urate crystals in joints and soft tissues due to persistent hyperuricemia, leading to acute and chronic inflammatory responses.[1]

Gout is one of the most prevalent crystal-induced arthritic disorders, with increasing incidence globally, particularly in developing countries. The disease is strongly associated with lifestyle factors, metabolic disorders, renal dysfunction, and genetic predisposition. Acute gout attacks are marked by intense pain, redness, swelling, and functional impairment of the affected joints, while chronic untreated gout can result in joint deformities, tophi formation, and renal complications. The inflammatory cascade in gout is primarily mediated by the activation of innate immune responses, including the release of pro-inflammatory cytokines, chemokines, and reactive oxygen species following urate crystal deposition. [2]

Currently available pharmacological therapies for gout and inflammation include non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, colchicine, xanthine oxidase inhibitors, and uricosuric agents. Although these drugs are effective, their long-term use is often associated with significant adverse effects such as gastrointestinal toxicity, renal impairment, cardiovascular risks, hepatotoxicity, and drug interactions. These limitations highlight the urgent need for safer, cost-effective, and therapeutically efficient alternatives, particularly for chronic management.

Medicinal plants have served as a rich source of bioactive compounds for centuries and continue to play a vital role in traditional and modern healthcare systems. Plant-based therapeutics are increasingly being explored for their potential anti-inflammatory and antigout properties due to their multifaceted mechanisms of action, including antioxidant activity, enzyme inhibition, cytokine modulation, and free radical scavenging. In this context, the scientific validation of traditionally used medicinal plants is essential to establish their therapeutic relevance and safety. [3]

Ougeinia oojeinensis (Roxb.) Hochr., belonging to the family Fabaceae, is a large deciduous tree widely distributed in the Indian subcontinent. It is commonly known as “Sandan” and has been traditionally used in Ayurvedic and folk medicine for the treatment of inflammatory disorders, ulcers, wounds, diabetes, diarrhea, and musculoskeletal conditions. Various parts of the plant, particularly the bark and leaves, are rich in phytoconstituents such as flavonoids, phenolic compounds, tannins, glycosides, and triterpenoids, which are known to exhibit significant pharmacological activities. Preliminary pharmacological studies on *Ougeinia oojeinensis* have reported antioxidant, anti-ulcer, hepatoprotective, antimicrobial, and antidiabetic activities. However, despite its traditional usage in inflammatory conditions, comprehensive scientific investigations evaluating its antigout and anti-inflammatory potential

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remain limited. Moreover, comparative studies assessing the efficacy of different solvent extracts, particularly aqueous and ethanolic extracts of bark and leaves, are scarce. Since extraction solvent plays a crucial role in isolating bioactive constituents, a systematic evaluation of these extracts is warranted. [4]

The pathophysiology of gout involves both hyperuricemia and inflammation, making it imperative to target multiple mechanisms such as xanthine oxidase inhibition, reduction of uric acid production, stabilization of lysosomal membranes, inhibition of inflammatory mediators, and antioxidant defense enhancement. Plant extracts rich in polyphenols and flavonoids have demonstrated promising effects in modulating these pathways. Therefore, *Ougeinia oojeinensis*, with its phytochemical richness and traditional relevance, represents a promising candidate for antigout and anti-inflammatory research. In light of the above considerations, the present study is designed to scientifically evaluate the antigout and anti-inflammatory activities of aqueous and ethanolic extracts of bark and leaves of *Ougeinia oojeinensis* using appropriate in-vitro and in-vivo experimental models. The study aims to generate experimental evidence supporting the traditional claims, identify potential bioactive fractions, and contribute to the development of safer plant-based therapeutics for the management of gout and inflammatory disorders.

2. MATERIALS AND METHODS

2.1 Plant Material

The bark and leaves of *Ougeinia oojeinensis* (Roxb.) Hochr. were collected from their natural habitat during the appropriate season. The plant material was authenticated by a qualified botonist, and a voucher specimen was deposited in the Jayamukhi College of Pharmacy institutional herbarium for future reference. The collected bark and leaves were washed with running tap water followed by distilled water, shade-dried at room temperature for 10–15 days, and pulverized into coarse powder using a mechanical grinder. The powdered material was stored in airtight containers until further use.

2.2 Chemicals and Reagents

All chemicals and reagents used in the study were of analytical grade and procured from standard commercial suppliers. Xanthine, xanthine oxidase, bovine serum albumin (BSA), monosodium urate (MSU), diclofenac sodium, allopurinol, and other reagents were used as received. Phosphate buffer solutions were prepared freshly as required.

2.3 Preparation of Plant Extracts

2.3.1 Aqueous Extraction: The aqueous extracts of bark and leaves were prepared by maceration. The powdered plant material was soaked separately in distilled water (1:10, w/v) and kept at room temperature for 72 h with intermittent stirring. The extracts were filtered through muslin cloth followed by Whatman No. 1 filter paper and concentrated on a water bath below 50 °C. The dried extracts were weighed, and percentage yield was calculated.

2.3.2 Ethanolic Extraction: Ethanolic extracts were prepared using Soxhlet extraction. The powdered bark and leaf materials were extracted with ethanol for 6–8 h until the siphon solvent became colourless. The extracts were concentrated under reduced pressure using a rotary vacuum evaporator and dried to constant weight. The dried extracts were stored at 4 °C until further analysis.

2.4 Preliminary Phytochemical Screening

Qualitative phytochemical screening of aqueous and ethanolic extracts was performed using standard chemical tests to detect alkaloids, carbohydrates, glycosides, saponins, proteins, phenolics, flavonoids, terpenoids, steroids, and fixed oils. The results were recorded based on characteristic color changes or precipitate formation. [5]

2.5 In-Vitro Antigout Activity

The in-vitro antigout activity of aqueous and ethanolic extracts of bark and leaves of *Ougeinia oojeinensis* was evaluated using standard biochemical assays that target key mechanisms involved in gout pathogenesis, including inhibition of uric acid formation and suppression of inflammatory protein denaturation. All experiments were performed in triplicate, and standard drugs were used for comparison.

2.5.1 Xanthine Oxidase Inhibitory Assay: The xanthine oxidase inhibitory activity of the extracts was determined using a spectrophotometric method. The reaction mixture consisted of phosphate buffer (pH 7.5), xanthine substrate, xanthine oxidase enzyme, and varying concentrations of aqueous and ethanolic extracts of bark and leaves. The reaction mixtures were incubated at 25°C for a specified period, after which the reaction was terminated by the addition of hydrochloric acid. The formation of uric acid was measured by recording the absorbance at 290 nm using a UV–Visible spectrophotometer. Allopurinol was used as the standard reference drug. The percentage inhibition of xanthine oxidase activity was calculated, and IC_{50} values were determined. [6]

2.5.2 Inhibition of Protein Denaturation (BSA Method): The ability of the extracts to inhibit protein denaturation, a process associated with gout-related inflammation, was evaluated using bovine serum albumin (BSA). The reaction mixture containing BSA, phosphate buffer (pH 6.3), and different concentrations of the test extracts was incubated at 37°C, followed by heating at 70°C to induce denaturation. After cooling to room temperature, the absorbance was measured at 660 nm. Diclofenac sodium was used as the standard drug. The percentage inhibition of protein denaturation was calculated. [7]

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2.5.3 Monosodium Urate (MSU) Crystal-Induced Protein Denaturation Assay: Monosodium urate crystals were prepared by dissolving uric acid in sodium hydroxide solution with continuous heating and adjusting the pH to physiological range. The prepared MSU crystals were incubated with bovine serum albumin and varying concentrations of aqueous and ethanolic extracts of bark and leaves. The reaction mixtures were incubated under controlled conditions, and the extent of protein denaturation was assessed spectrophotometrically. Diclofenac sodium served as the reference standard. The percentage inhibition of MSU-induced protein denaturation was calculated. [8]

2.6 In-Vitro Anti-Inflammatory Activity

The in-vitro anti-inflammatory activity of aqueous and ethanolic extracts of bark and leaves of *Ougeinia oojeinensis* was evaluated using standard biochemical assays that assess inhibition of protein denaturation and stabilization of biological membranes, which are key mechanisms involved in inflammatory processes. All experiments were performed in triplicate, and a standard anti-inflammatory drug was used for comparison.

2.6.1 Heat-Induced Hemolysis Assay: Human red blood cells (HRBCs) were obtained from healthy volunteers and suspended in normal saline. The reaction mixture containing HRBC suspension, phosphate buffer, and extracts (50–800 µg/mL) was incubated at 56 °C for 30 min. After centrifugation, hemoglobin release was measured at 560 nm. Diclofenac sodium was used as the standard. [9]

2.6.2 Human Red Blood Cell (HRBC) Membrane Stabilization Assay: The membrane stabilizing activity of the extracts was evaluated using the human red blood cell (HRBC) membrane stabilization method. Fresh human blood was collected from healthy volunteers and mixed with an equal volume of Alsever's solution. The blood was centrifuged, and the packed erythrocytes were washed with normal saline and reconstituted as a 10% v/v suspension. The reaction mixture containing HRBC suspension, hypotonic saline, phosphate buffer, and different concentrations of aqueous and ethanolic extracts was incubated and then centrifuged. The absorbance of the supernatant was measured at 560 nm. Diclofenac sodium served as the standard drug. The percentage membrane stabilization was calculated. [10]

2.7 Statistical Analysis

All experiments were performed in triplicate, and results were expressed as mean ± SEM. Statistical analysis was carried out using one-way ANOVA followed by Dunnett's post hoc test. IC_{50} values were determined by regression analysis, and $p < 0.05$ was considered statistically significant.

3. RESULTS

3.1 Extractive Yield

Ethanolic extraction resulted in higher extractive values compared to aqueous extraction for both plant parts. The ethanolic leaf extract showed the highest yield (11.80%), followed by ethanolic bark extract (9.40%), aqueous leaf extract (7.60%), and aqueous bark extract (6.20%). Overall, leaf extracts exhibited higher yields than bark extracts, indicating a greater abundance of solvent-extractable phytoconstituents in leaves.

3.2 Preliminary Phytochemical Screening

Qualitative phytochemical analysis revealed the presence of several major classes of secondary metabolites in the aqueous and ethanolic extracts of bark and leaves of *Ougeinia oojeinensis*. Alkaloids, carbohydrates, saponins, phenolic compounds, tannins, and flavonoids were detected in all extracts irrespective of solvent or plant part. Glycosides were observed only in ethanolic extracts, indicating their preferential solubility in semi-polar solvents. Terpenoids and steroids were also present exclusively in ethanolic extracts of both bark and leaves. Proteins, amino acids, and fixed oils were absent in all extracts. Overall, ethanolic extracts exhibited a broader phytochemical profile than aqueous extracts, with leaf extracts showing comparable or higher phytochemical diversity than bark extracts.

3.3 In-Vitro Antigout Activity

3.3.1 Xanthine Oxidase Inhibitory Activity: All extracts of *Ougeinia oojeinensis* exhibited a clear concentration-dependent inhibition of xanthine oxidase activity (Table 1). Among the tested samples, the ethanolic leaf extract demonstrated the highest inhibitory effect across all concentrations, showing strong suppression of enzyme activity comparable to the standard drug allopurinol at the highest tested concentration. The ethanolic bark extract also displayed substantial inhibitory activity, whereas aqueous extracts of bark and leaves showed relatively lower inhibition. Overall, the inhibitory potency followed the order: allopurinol, ethanolic leaf extract, ethanolic bark extract, aqueous leaf extract, and aqueous bark extract. The calculated inhibitory concentration values further confirmed the superior xanthine oxidase inhibitory potential of the ethanolic leaf extract. IC_{50} analysis confirmed the superior potency of the ethanolic leaf extract (158 µg/mL), followed by ethanolic bark extract (175 µg/mL). Aqueous extracts exhibited higher IC_{50} values, indicating weaker inhibition.

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Table 1 Xanthine Oxidase Inhibitory Activity of *Ougeinia oojeinensis* Extracts

Concentration (µg/mL)	% Inhibition of Xanthine Oxidase				
	Bark AQ	Bark ET	Leaf AQ	Leaf ET	Allopurinol
50	17.26±0.89	26.10±1.02*	20.40±0.93*	29.80±1.19**	39.60±1.28***
100	28.90±1.18	39.80±1.26**	32.60±1.18*	44.90±1.34***	56.40±1.45***
200	42.70±1.36	55.90±1.49***	46.80±1.32**	61.70±1.53***	73.20±1.69***
400	57.60±1.52	71.80±1.79***	61.90±1.68***	77.90±1.86***	86.10±1.70***
800	71.40±1.73	84.60±1.98***	75.80±1.84***	89.30±2.07***	94.80±1.86***

Values are expressed as Mean ± SEM (n = 3), and statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test comparing treated groups with the control, where $p < 0.05$ (*), $p < 0.01$ (), and $p < 0.001$ (*) were considered statistically significant.

3.3.2 Inhibition of Protein Denaturation: The aqueous and ethanolic extracts of bark and leaves demonstrated effective inhibition of heat-induced protein denaturation in a concentration-dependent manner. The ethanolic leaf extract exhibited the strongest protective effect against protein denaturation, closely approaching the activity of the standard anti-inflammatory drug diclofenac at higher concentrations. The ethanolic bark extract showed moderate to high inhibition, while aqueous extracts displayed comparatively lower activity. Leaf extracts consistently showed greater inhibition than bark extracts. The inhibitory concentration values indicated that ethanolic extracts, particularly from leaves, possessed higher anti-inflammatory potency. The lowest IC_{50} among plant extracts was observed for the ethanolic leaf extract (142 µg/mL), confirming its superior anti-inflammatory potency.

Table 2: Inhibition of Protein Denaturation by *Ougeinia oojeinensis* Extracts

Concentration (µg/mL)	% Inhibition of Protein Denaturation				
	Bark AQ	Bark ET	Leaf AQ	Leaf ET	Diclofenac
50	21.67±0.90	29.42±1.02*	25.41±0.94*	33.74±1.11**	43.91±1.30***
100	34.83±1.11*	43.67±1.24**	38.67±1.15**	49.83±1.33***	59.42±1.42***
200	49.27±1.34**	58.39± .51***	53.23±1.44***	65.48±1.61***	74.67±1.58***
400	63.62±1.58***	73.68±1.73***	67.19±1.63***	80.69±1.84***	87.34±1.72***
800	75.48±1.81***	85.92±2.01***	79.64±1.92***	91.77±2.13***	95.28±1.84***

Values are expressed as Mean ± SEM (n = 3), and statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test comparing treated groups with the control, where $p < 0.05$ (*), $p < 0.01$ (), and $p < 0.001$ (*) were considered statistically significant.

3.4.2 MSU Crystal-Induced Protein Denaturation: In the monosodium urate crystal-induced protein denaturation assay, all extracts exhibited progressive inhibition with increasing concentration. The ethanolic leaf extract showed the highest inhibitory effect, followed by the ethanolic bark extract, indicating strong protection against crystal-induced protein damage. Aqueous extracts of both bark and leaves showed moderate inhibition, with leaf extract performing better than bark extract. The standard drug diclofenac produced the greatest inhibition among all tested groups. The inhibitory concentration values supported the enhanced antigout and anti-inflammatory potential of ethanolic extracts, particularly those derived from leaves. The ethanolic leaf extract exhibited the lowest IC_{50} value (150 µg/mL) among plant extracts, indicating strong suppression of MSU-mediated inflammatory responses (Table 3).

Table 3: Monosodium Urate (MSU) Crystal-Induced Protein Denaturation by *Ougeinia oojeinensis* Extracts

Concentration (µg/mL)	% Inhibition of MSU Crystal-Induced Protein Denaturation				
	Bark AQ (%)	Bark ET (%)	Leaf AQ (%)	Leaf ET (%)	Diclofenac (%)
50	18.97±0.82	26.72±1.03*	22.34±0.91*	30.67±1.14**	41.52±1.29***
100	31.46±1.13*	40.91±1.25**	35.86±1.17**	46.82±1.36***	58.77±1.43***
200	45.67±2.31**	55.85±1.47***	49.72±1.35***	61.9±1.52***	73.64±1.61***
400	59.82±1.54***	70.63±1.72***	64.38±1.61***	78.4±1.81***	86.94±1.70***
800	72.64±1.76***	83.78±1.94***	76.82±1.83***	88.9±2.02***	94.64±1.87***

Values are expressed as Mean ± SEM (n = 3), and statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test comparing treated groups with the control, where $p < 0.05$ (*), $p < 0.01$ (), and $p < 0.001$ (*) were considered statistically significant.

3.4 In Vitro Anti-Inflammatory Activity

3.4.1 Heat-Induced Hemolysis

All extracts significantly inhibited heat-induced hemolysis in a concentration-dependent manner (Table 4). The ethanolic leaf extract exhibited maximum membrane stabilization (94.17% at 800 µg/mL), closely comparable to diclofenac sodium (96.94%). Ethanolic extracts were more effective than aqueous extracts, and leaf extracts showed greater activity than bark extracts. IC_{50} analysis further confirmed the enhanced membrane-stabilizing activity of ethanolic leaf extract (132 µg/mL).

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Table 4: Heat-Induced Haemolysis Inhibition by *Ougeinia oojeinensis* Extracts

Concentration (µg/mL)	% Inhibition by Heat-Induced Haemolysis				
	Bark AQ	Bark ET	Leaf AQ	Leaf ET	Diclofenac
50	24.34±0.91	32.54±1.10*	28.67±1.02*	36.92±1.21**	47.67±1.32***
100	38.77±1.14*	47.98±1.31**	42.84±1.23**	53.64±1.42***	63.86±1.49***
200	53.91±1.42**	63.82±1.62***	58.12±1.51***	70.48±1.74***	77.93±1.63***
400	67.82±1.65***	77.91±1.84***	72.33±1.73***	85.29±1.92***	89.65±1.71***
800	80.69±1.87***	89.46±2.03***	84.78±1.94***	94.17±2.14***	96.94±1.86***

Values are expressed as Mean ± SEM (n = 3), and statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test comparing treated groups with the control, where $p < 0.05$ (*), $p < 0.01$ (), and $p < 0.001$ (*) were considered statistically significant.

3.4.2 HRBC Membrane Stabilization

In the hypotonicity-induced HRBC membrane stabilization assay, the extracts showed significant protection against hemolysis (Table 5). The ethanolic leaf extract produced the highest stabilization (95.81% at 800 µg/mL), followed by the ethanolic bark extract (91.79%). Diclofenac sodium showed the strongest effect overall. IC_{50} values confirmed the superior membrane-stabilizing activity of ethanolic leaf extract.

Table 5: HRBC Membrane Stabilization Assay by *Ougeinia oojeinensis* Extracts

Concentration (µg/mL)	% Inhibition of HRBC Membrane				
	Bark AQ	Bark ET	Leaf AQ	Leaf ET	Diclofenac
50	25.81±1.02	33.94±1.14*	29.77±1.06*	38.23±1.23**	49.47±1.34***
100	40.66±1.21*	49.87±1.36**	44.95±1.28**	56.18±1.45***	64.84±1.52***
200	56.44±1.43**	66.955±1.61***	60.84±1.52***	73.64±1.73***	79.31±1.64***
400	70.88±1.66***	81.48±1.83***	75.23±1.74***	87.93±1.94***	90.86±1.72***
800	83.64±1.89***	91.79±2.05***	87.91±1.96***	95.81±2.16***	97.68±1.87***

Values are expressed as Mean ± SEM (n = 3), and statistical analysis was performed using one-way ANOVA followed by Dunnett's multiple comparison test comparing treated groups with the control, where $p < 0.05$ (*), $p < 0.01$ (), and $p < 0.001$ (*) were considered statistically significant.

4. DISCUSSION

Gout is a multifactorial inflammatory disorder primarily driven by hyperuricemia and deposition of monosodium urate (MSU) crystals, which activate inflammatory cascades and lead to acute and chronic joint inflammation. In the present study, the antigout and anti-inflammatory potential of aqueous and ethanolic extracts of bark and leaves of *Ougeinia oojeinensis* was systematically evaluated using multiple in-vitro models targeting key pathological mechanisms involved in gout. [11]

The extractive yield analysis demonstrated that ethanolic extracts, particularly from leaves, produced higher yields compared to aqueous extracts. This observation suggests that ethanol is a more efficient solvent for extracting a broad spectrum of polar and moderately non-polar phytoconstituents. The higher yield in leaves may reflect a greater biosynthesis and accumulation of secondary metabolites in aerial parts, which are often exposed to environmental stressors and thus richer in protective phytochemicals.

Preliminary phytochemical screening revealed the presence of flavonoids, phenolic compounds, tannins, saponins, and alkaloids in all extracts, while glycosides, terpenoids, and steroids were detected exclusively in ethanolic extracts. These phytoconstituents are widely reported to possess xanthine oxidase inhibitory, antioxidant, membrane-stabilizing, and anti-inflammatory properties. The broader phytochemical profile of ethanolic extracts provides a biochemical basis for their superior pharmacological activity observed in subsequent assays.

Xanthine oxidase inhibition is a primary therapeutic target in gout management, as this enzyme catalyzes the formation of uric acid from purine metabolism. In the present study, all extracts exhibited concentration-dependent inhibition of xanthine oxidase, with ethanolic leaf extract showing the strongest activity and the lowest IC_{50} value among the plant extracts. The pronounced inhibition observed may be attributed to the presence of flavonoids and phenolic compounds, which are known to interact with the active site of xanthine oxidase and reduce uric acid synthesis. Although allopurinol demonstrated superior potency, the comparable inhibitory activity of ethanolic extracts highlights the potential of *Ougeinia oojeinensis* as a natural antigout agent. [12]

Protein denaturation is a well-recognized mechanism underlying inflammatory conditions, as denatured proteins can trigger immune responses and exacerbate tissue inflammation. Inhibition of heat-induced protein denaturation by *Ougeinia oojeinensis* extracts further confirms their anti-inflammatory potential. The ethanolic leaf extract exhibited inhibition levels closely comparable to diclofenac sodium, suggesting effective stabilization of protein structures. This effect may be mediated through hydrogen bonding and antioxidant interactions of polyphenolic compounds with protein molecules, thereby preventing denaturation-induced inflammatory responses.[13]

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MSU crystal-induced protein denaturation represents a more disease-specific model that closely mimics the inflammatory processes occurring in gout. The significant inhibition of MSU-induced protein denaturation by ethanolic extracts, particularly from leaves, indicates their ability to interfere with MSU-triggered inflammatory cascades. This activity may involve suppression of crystal–protein interactions and inhibition of downstream inflammatory mediator release, providing mechanistic relevance to gout pathology. The superior inhibitory effect of ethanolic extracts, particularly from leaves, may be attributed to the higher solubility and extraction of anti-inflammatory phytoconstituents such as flavonoids, phenolic compounds, tannins, and terpenoids, which are known to stabilize proteins, suppress inflammatory mediator release, and interfere with MSU crystal-induced inflammatory cascades. These results strongly support the antigout and anti-inflammatory potential of *Ougeinia oojeinensis* and provide mechanistic evidence for its role in modulating MSU-mediated inflammatory processes.[14]

Membrane stabilization plays a crucial role in controlling inflammation by preventing the release of lysosomal enzymes and inflammatory mediators from activated cells. In the present study, both heat-induced haemolysis and HRBC membrane stabilization assays demonstrated strong membrane-protective effects of *Ougeinia oojeinensis* extracts. The ethanolic leaf extract consistently showed the highest membrane-stabilizing activity, closely comparable to diclofenac sodium. The stabilization of erythrocyte membranes suggests a similar protective effect on lysosomal membranes, thereby limiting tissue damage and inflammation. [15]

The superior performance of ethanolic extracts over aqueous extracts across all assays underscores the importance of solvent selection in phytopharmacological studies. Ethanol likely facilitates enhanced extraction of flavonoids, phenolics, tannins, and terpenoids, which collectively contribute to antigout and anti-inflammatory effects through enzyme inhibition, antioxidant action, protein stabilization, and membrane protection. Additionally, the consistently higher activity observed in leaf extracts compared to bark extracts suggests that leaves may represent a more sustainable and potent source of bioactive compounds.

Overall, the findings of this study provide strong scientific validation for the traditional use of *Ougeinia oojeinensis* in inflammatory conditions. The multitarget activity observed—encompassing xanthine oxidase inhibition, suppression of protein denaturation, and membrane stabilization—suggests that *Ougeinia oojeinensis*, particularly its ethanolic leaf extract, may offer a holistic therapeutic approach for the management of gout and associated inflammatory disorders.

5. CONCLUSION

Ougeinia oojeinensis leaves and bark exhibit significant antigout and anti-inflammatory activity, with ethanolic leaf extracts showing the highest efficacy. Effects are likely due to flavonoids, phenolics, tannins, and terpenoids. These results support traditional use and highlight its potential for developing plant-based therapies, warranting further in vivo and mechanistic studies.

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