

***Ricinus communis* (ERANDAMOOL) Decoction Provides Symptomatic Relief in Patients of Gout-Scientific Evidences**

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Received: 2025-2-04

Revised: 2025-2-16

Accepted: 2025-2-25

ABSTRACT

Gout is the most common form of inflammatory arthritis, with higher prevalence in males than females. Initial presentation is mainly severe painful episodes of peripheral joint synovitis (acute self-limiting 'attacks') with joint damage and deformity. Due to prevalent side effects of existing allopathic drug molecules, there is a need to develop formulations and seek its efficacy and toxicity profile to create scientific evidences. Present study was conducted to evaluate the efficacy of decoction of *Ricinus communis* Linn. in the management of Gout in 30 patients for subjective and objective criteria. Open interventional study showed improvement in symptoms like swelling, stiffness, pain in joints, sleeplessness etc. and reduced values of uric acid. The study reflects potential of *Ricinus communis* Linn. as alternate therapy in gout.

Keywords: Gout, Uric acid, *Ricinus communis*, *Erandamool*

INTRODUCTION

Gout is the most common form of inflammatory arthritis, manifesting as acute flares of severe joint pain, swelling, redness, and warmth in one or more joints, which can progress to chronic destructive arthropathy. The prevalence of gout is higher in males than females, and increases with age^[1, 2]. Gout is a disease accompanied by crystal-deposition in joints as a result of chronic elevation of uric acid levels above the saturation point. Initial presentation is mainly severe painful episodes of peripheral joint synovitis (acute self-limiting 'attacks') however joint damage and deformity, chronic usage-related pain and subcutaneous tophus deposition can eventually develop. The global burden of gout is substantial and seems to be increasing in many parts of the world over the past 50 years^[3]. In most of the western world the overall prevalence is 0.13 to 0.37 per cent of the population. The prevalence relates both the degree of elevation of the serum urate and to the duration over which this elevation is sustained. The prevalence of gout in developing countries like India is basically under 0.5%^[4].

Worldwide incidence of gout is increasing gradually due to poor dietary habits such as fast foods, lack of exercises, increased incidence of obesity and metabolic syndrome. Symptoms of gout occur due to the deposition of urate (monosodium urate monohydrate) crystals in a joint, leading to an acute inflammatory response, or in soft tissues, such as cartilage, causing no inflammation^[5]. A gout flare typically occurs over the span of a few hours with pain, redness, warmth, and swelling in a joint developing because of the presence of uric acid crystals. Often a gout flare involves a single joint (most commonly the big toe) but sometimes can affect multiple joints, including those in the feet, ankles, knees, and wrists. A gout flare tends to last several days; for most patients, it subsides over 2 weeks without treatment. Over time, repeated attacks can damage the joint, resulting in chronic gouty arthritis^[6].

Signs and Symptoms of *Vatarakta* mentioned in Ayurveda texts like itching, warmth, piercing pain, stretching, swelling, constricting sensation around the joint, discoloration (blackish red or coppery) of skin have resemblance with the contemporary disease Gout. A number of allopurinol based preparations are available in market however there are few side effects like kidney damage, liver derangements, dizziness etc. related to its regular consumption by patients. Urate crystals deposition in tissues starts to occur when serum uric acid (SUA) level rises above the normal threshold and pathological threshold of hyperuricemia is defined as 6.8 mg/dL^[7]. SUA level in the body is determined by the balance between its production either from purine intake in diet or endogenous production by cellular turnover and its excretion by the kidneys and GIT. Increased production of UA is responsible for only 10% of cases of gout while the remaining 90% are caused by its renal under-excretion^[8]. Deposition of UA crystals in the joint cavity initiate the inflammatory process by being engulfed by synovial phagocytic cells leading to release of lysosomal enzymes and production of

inflammatory chemokines. Another mechanism is that UA crystals change the stability of cell membrane of phagocytic cells by direct cross-linkage with membrane lipids and glycoproteins. The acute attack of gout is usually self-limiting and resolves within hours to few days of its beginning. This occurs by removal and phagocytosis of crystals by macrophages, hence suppressing cellular and chemokine activation^[9].

Treatment of Gout is focused on clearance of Uric acid from body and prevention of its deposition in joints. Ayurveda has many herbal and mineral based drugs mentioned for the use of arthritic conditions. Due to prevalent side effects of existing allopathic drug molecules, there is a need to develop formulations and seek its efficacy and toxicity profile to create scientific evidences. Present study was conducted to evaluate the efficacy of decoction of *Ricinus communis* Linn. in the management of gout.

MATERIALS AND METHODS

An open interventional study was conducted at OPD level in 37 patients selected from Kayachikitsa OPD of Ayurvedic College at Patiala, Punjab with their informed written consent based on inclusion and exclusion criteria designed from modern as well as Ayurvedic texts mentioned in Table.1. The study was registered with the CTRI number: CTRI/2022/07/043885.

Table 1: Inclusion Criteria and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Patients who gave written consent for the study.	Patients who did not give written consent for the study.
Patients falling between the age group of 30 and 70 years were selected irrespective of sex, religion and economic status etc.	Patients below the age of 30 and above the age of 70 years.
Patients who were having clinical features of gout	Pregnancy and lactating mothers.
	Patients of severe gout having complications and uncontrolled co- morbidities.
	Patients with <i>Pittaj Prakriti</i> and suffering from other <i>Pittaj</i> diseases.
	Patients having history of any serious systemic illness.

The decoction was prepared from coarsely ground powder of *Erandamool* (*Ricinus communis* Linn roots) which was provided to patients in a zip lock packs of 25g to be used daily. The decoction (50 ml) was given orally twice daily empty stomach in the morning and at a gap of 3 - 4 hrs before meals in the evening. The decoction was administered for 30 days and a follow up was done at D0, D15, D30 and D45 (15 days after stopping the medicine). In the present study, total 37 patients were registered out of which 30 patients completed the course of trial and 7 patients dropped out from the study at different stages due to personal reasons.

The results of the treatment were assessed on the basis of improvement in terms of: Symptomatic relief, which was assessed on the basis of improvement in score mention for all symptoms as mentioned in Table 2 and Table 3 respectively. Improvement was also assessed on the basis of decrease in Uric acid levels in Gout (*Vatarakta*). For comparing categorical data Wilcoxon signed rank test was performed and for quantitative data paired Student 't'- test was applied.

Assessment Criteria

Subjective parameters as classified in modern system of medicine and Ayurveda texts

- Pain in joints (*Sandhi Shool*)
- Stiffness of joints (*Sandhi Graha*)
- Swelling in joints (*Sandhi Shotha*)
- Discoloration of joints (*Twaka Vairnaya*)
- Tenderness of joints (*Sparsha-Asahatva*)
- Redness of joints (*Raga*)
- Warmth in joints (*Vidaha*)
- Deformity of joints (*Sandhi Vikriti*)
- Sleep disturbance (*Nidranasha*)
- Distention of stomach (*Aadhman*)

Objective Criteria

- Serum Uric Acid (Before and after treatment)

Table 2: Results were assessed as per following percentage relief criteria:

1	Complete relief	76-100% relief
2	Marked improvement	51- 75% relief
3	Moderate relief	26-50% relief
4	Mild relief	10-25% relief
5	No relief	less than 10% relief

Table 3: Assessment scale for different symptoms of Gout

S. No.	Parameter	Finding	Scoring
1.	Pain in joints (<i>Sandhi Shool</i>)	No pain at rest, working	0
		No pain at rest but mild while working	1
		Mild pain at rest, moderate while working but tolerable	2
		Moderate pain at rest but intolerable while working	3
2.	Stiffness of joints (<i>Sandhi Graha</i>)	No tenderness	0
		Mild tenderness	1
		Moderate tenderness	2
		Severe tenderness	3
3.	Swelling in joints (<i>Sandhi Shotha</i>)	No swelling	0
		Feeling of heaviness + swelling	1
		Apparent swelling	2
		Huge swelling	3
4.	Discoloration of joints (<i>Twaka Vaivrnaya</i>)	No discoloration of skin	0
		Mild discoloration of skin	1
		Moderate discoloration of skin	2
		Severe discoloration of skin	3
5.	Tenderness of joints (<i>Sparsha-Asahatva</i>)	No pain on palpation	0
		Mild pain on palpation	1
		Moderate pain on palpation	2
		Severe pain on palpation	3
6.	Redness of joints (<i>Raga</i>)	No redness	0
		Mild redness	1
		Moderate redness	2
		Severe redness	3
7.	Warmth in joints (<i>Vidaha</i>)	No burning sensation	0
		Mild burning sensation	1
		Moderate burning sensation	2
		Severe burning sensation	3
8.	Deformity of joints (<i>Sandhi Vikriti</i>)	No deformity	0
		Mild deformity of single joint	1
		Deformity of 2-3 joints	2
		Formation of tophi in multiple joints	3
9.	Sleep disturbance (<i>Nidranasha</i>)	No disturbance	0
		Mild disturbance	1
		Moderate changes in sleep	2
		Wakes up with severe pain in night	3
10.	Distention of stomach (<i>Aadhman</i>)	No distention	0
		Distended when empty	1
		Distended after meals too	2
		Distended most of the time	3

RESULTS AND DISCUSSION

Data was collected on the basis of demography, etiological factors mentioned in Ayurveda texts and symptoms found in the disease. Demographic data showed that maximum patients were males above 40 years of age [10]. This coincides with the data already established for gout prevalence. Patients belonged to urban area with a lack in tendency towards exercise or physical activity. *Prakriti* (Body constitution) plays an important role in disease and health. After analysis it was found that maximum patients were having *Vata-Pittaj Prakriti* (Body constitution). *Prakriti* or a person's constitution of his/her *tridoshas* also has a clear link to the susceptibility one has for chronic diseases. *Vata* is associated with bone, *pitta* with blood. *Vata-Pittaj Prakriti* prakirti is predominated by digestive disorders, inflammatory conditions like RA, gout, itchy skin, erratic pain etc [11]. This coincided with the etiological factors mentioned in Ayurveda texts. In 60% of patients disturbed sleep pattern was found due to pain. Maximum 83.3% of patients showed no family history of gout, displaying increasing incidence of newer cases of gout / *Vatarakta*. The % change in symptoms of Gout before and after the treatment are shown in Table 4.

Table 4: Overall scores of Subjective criteria (BT-AT)

S.No.	Symptoms	Before treatment (BT)	After treatment (AT)	% change
1.	Pain in joints / <i>Sandhi Shool</i>	71	28	60.5%
2.	Stiffness of joints / <i>Sandhi Graha</i>	68	25	63.2%
3.	Swelling in joints / <i>Sandhi Shotha</i>	60	24	60%
4.	Discoloration of joints / <i>Twaka Vaivarnya</i>	52	21	59.6%
5.	Tenderness of joints / <i>Sandhi Sparshasahatva</i>	67	24	64.17%
6.	Redness in joints / <i>Raga</i>	63	24	61.9%
7.	Warmth in joints / <i>Vidaha</i>	71	30	57.7%
8.	Deformity of joints / <i>Anga Vikriti</i>	9	7	22.2%
9.	Sleep disturbance / <i>Nidranasha</i>	61	21	65.5%
10.	Distention of stomach / <i>Adhamana</i>	67	22	67.16%

The patients falling in various categories based on the relief they felt in overall symptoms is shown in Table 5. The overall relief and statistically highly significant results were found in all the subjective criteria except deformity of joints / *Anga Vikriti*. Maximum relief of 67.16% was found in distention of stomach / *Adhamana* and minimum 22.2% in deformity of joints / *Anga Vikriti*. Relief in Sleep disturbance / *Nidranasha* (65.5%), tenderness of joints / *Sandhi Sparshasahatva* (64.17%), stiffness of joints / *Sandhi Graha* (63.2%), warmth in joints / *Raga* (62%), / *Sandhi Shotha* (60%), swelling in joints / *Sandhi Shool* (60.5%), *Twaka Vaivarnya* (59.6%), redness in joints / *Vidaha* (57.7%) was observed.

Table 5. Result assessment showing overall effect of therapy in terms of relief

Assessment	No. of patients	% of patients
Complete relief	4	13.3%
Marked improvement	18	60%
Moderate relief	8	26.7%
Mild relief	0	0%
No relief	0	0%
Total	30	100%

Effect of decoction of *Ricinus communis* Linn. on Uric acid (Objective criteria)

Mean Uric Acid of 30 patients before treatment was 6.54 mg/dl, this came down to 5.1 mg/dl after treatment. Mean change was 1.45 mg/dl which was statistically highly significant (p-value 0.001) as shown in Figure 1.

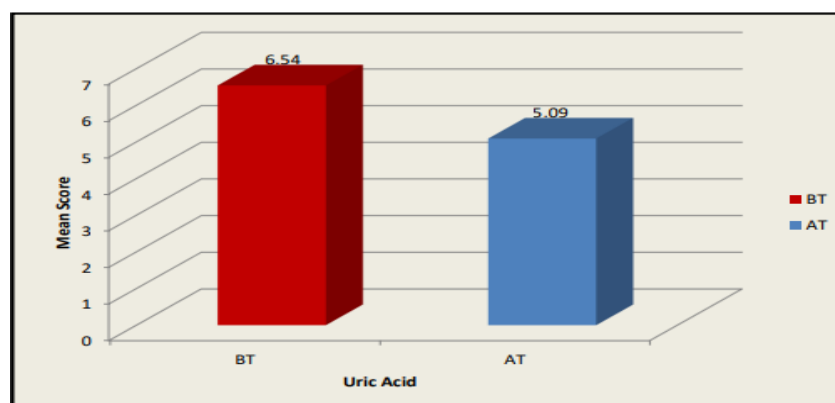


Figure 1. Effect of decoction of *Ricinus communis* Linn. on Uric acid

Inflammation is a localized response that produces redness, warmth, swelling and pain due to infection or injury. In the Indian system of medicine, the leaves, roots and seeds of this plant have also been recommended for the treatment of inflammation [12]. In a recent study methanolic extract of the root have been reported for anti-inflammatory activity in carrageenan induced hind paw edema model in Wistar albino rats. Ricinine, Quercetin and n-butanol soluble fraction of methanol extract gave promising result for anti-inflammatory activity. Root crude methanolic, enriched n-hexane fraction isolates at doses 100 mg/kg p.o. exhibited significant ($P < 0.001$) anti-inflammatory activity in carrageenan-induced hind paw oedema model. The decoction of roots of Eranda (*Ricinus communis* Linn.) also decreased inflammation in Gout patients. This was assessed during the study as symptoms swelling in joints / *Sandhi Shotha*, Stiffness of joints / *Sandhi Graha* and tenderness of joints / *Sandhi Sparshashatva* showing 60%, 63.2%, 64.17%, improvement respectively with p value < 0.001 .

Quercetin found in roots of *Ricinus communis* Linn. Has also been reported to increase the expression of IFN- γ cells and decreases IL-4 positive cell expression [13]. Various studies in cells of human and animal models suggest that quercetin exhibits anti-inflammatory activities[14]. Quercetin is also known to suppress the activity of NF- κ B translocation, I- κ B-phosphorylation, AP-1, and reporter gene transcription and hence fights against inflammation. It also modulates the activity of NF- κ B, JNK, and AP-1 signaling pathways. The activity of TNF- α was also reduced when treated with quercetin[15].

As it is known 90% of hyperurecemia occurs due to reduced excretion of uric acid. Root and root bark of *Ricinus communis* Linn. is reported to be a powerful purgative and diuretic, the decoction of *Ricinus communis* Linn. helps in the fast removal of uric acid from body by increasing peristaltic movements and lowers the risk of gout. This was coherent from change in uric acid values before and after the treatment.

Study also showed relief in Pain in joints / *Sandhi Shool* as roots of *Ricinus communis* Linn. / *Erandamool* are known for their analgesic properties. Ricinine found in the decoction may be responsible for the analgesic action shown. This also improved the state of disturbed sleep or *Nidranash* in patients which is also an apparent symptom found in gout [16].

CONCLUSION

Vatarakta is a disease caused by vitiation of *Rakta dosha*, impurities present in the blood. This is correlated with the gouty arthritis due to the symptomatic similarities found in both the diseases. Treatment method in both diseases is focused on clearing uric acid from body *Shodhana* and urate lowering therapy / *Shamana chikitsa*. Present study provides sufficient evidence in favour of decoction of roots of *Ricinus communis* Linn. / *Erandamool* for the use in Gout. This is evident from the symptomatic relief and objective change seen in terms of reduced uric acid that clearly supports the potential use of *Ricinus communis* Linn. in gout.

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How to cite this article:

Parveen Bansal et al. *Ijsrm.Human*, 2025; Vol. 28 (2): 55-60

Conflict of Interest Statement: All authors have nothing else to disclose.

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