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Clinical Efficacy and Safety of Gokshur (Tribulus terrestris) in the Management of Amavata (Rheumatoid arthritis)

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ABSTRACT

The current research aims to assess the effectiveness of Gokshur (Tribulus terrestris) kwatha in comparison to Amavata. Madhava Nidana was the first to provide a detailed account of Amavata. He dedicated an entire chapter to describe the aetio-pathology, clinical characteristics, and classifications based on Dosa-Pradhanya and Sadhya-Asadhyata of Amavata (M. N. 25). Amavata can be likened to Rheumatoid arthritis, which is a chronic, systemic inflammatory polyarthritis that predominantly impacts the small diarthrodial joints of the hands and feet in a symmetrical manner. For the first time in the literature, Cakradatta elaborates on the principles and treatment protocols for Amavata, utilizing an effective combination of medications. Subsequent authors in their works, including Chikitsa sarasamgraha (Vangasen), Yogaratnakara, Bhavaprakash, and Bhaisajya ratnavali, have discussed the condition along with treatment strategies and the incorporation of additional formulations such as decoctions, tablets, and powders

Keywords: *Amavata, Gokshurakwatha, Rheumatoid arthritis*

1. INTRODUCTION

The present study deals with the Amavatahar karma of Gokshur. आमेन सहितः वातः आमवातः [1]. As per this derivation, 'Ama' and 'Vata' come together to create the term Amavata. This indicates the significance of these two elements in the samprapti of Amavata. The Ama, by associating with Vata, swiftly travels to various locations of Kapha within the body. It diminishes the digestive fire and leads to feelings of weakness and heaviness in the heart, which ultimately becomes the locus of disease [2]. आमशच वातशच आमवातः[1]

It means Vata in association with Ama is termed as 'Amavata'. The virulent Ama circulates in the whole body, propelled by the vitiated vata, causing Srotobhisyanda and gets deposited in the sandhisthana, giving rise to Amavata [3] (M. N. 25/3-4).

Rheumatoid arthritis (RA) is a chronic autoimmune disease that primarily affects joints, causing pain, swelling, and stiffness. It occurs when the body's immune system mistakenly attacks its own tissues, particularly the lining of the joints (synovium). This inflammation can lead to joint damage, pain, and loss of function. While RA predominantly affects joints, it can also impact other parts of the body, including the skin, eyes, lungs, heart, and blood vessels [4]. The exact cause remains unknown. However, both genetic and environmental factors play a significant role in the disease's pathogenesis. Pathological changes induced by autoantibodies lead to synovitis, which is triggered by the secretion of cytokines, predominantly from CD4+ T cells. This process ultimately results in cartilage damage and bone erosions, severely compromising joint integrity. A defining characteristic of RA is bilateral, peripheral symmetrical joint involvement accompanied by early morning stiffness. The global prevalence of rheumatoid arthritis is approximately 0.8%, while in India, it ranges from 0.5% to 0.75% [4]. Modern medicine includes NSAIDs, steroids, and disease-modifying anti-rheumatic drugs (DMARDs) for long-term use and has severe side effects. Langhana, Swedana, Deepana, Virechana, Snehana, and Basti are the lines of treatment mentioned for Amavata by Acharya Chakradatt [5].,

DEFINITION OF AMAVATA:

Acharya Madhav was the first scholar to provide an appropriate definition of Amavata. Vitiated Vata and Ama simultaneously enter the kosthatrika and sandhi pradesha, leading to gatrastabdhata and trika sandhi vedana. This condition is known as Amavata. The term 'yugapat' means simultaneous vitiation of Vata and Kapha dosha, as the main pathogenic factor of the disease [6].

NIDANA OF AMAVATA:

In Ayurvedic texts, much importance has been given to nidana as the nidana is the responsible factor that plays a key role in disturbing the normal human system, leading to morbidity. To the context of Amavata, Acharya Madhava described the disease scientifically and mentioned different nidanas, which were followed unchanged in later works like Yogaratnakar, Bhaisyajya ratnavali, etc [3].

Viruddhahara: Acharya Charak elucidated the detrimental diet (including drugs) that displaces the various dosas but fails to eliminate them from the body, which is referred to as Viruddhahara. Eighteen distinct types of Viruddhaharas have been detailed by Charaka. The consumption of any of these Viruddhahara results in the formation of dosas or ama, thereby triggering the onset of Samprapti.

Viruddhachesta: The practices that negatively affect the body humours are classified as Viruddhachesta. In other terms, Viruddhachesta signifies all activities of the body that adversely influence its normal physiology. Consequently, when the body's normal physiology is disrupted, the vitiation of Agni occurs. This altered Agni results in the creation of ama. Additionally, Viruddhachesta contributes to the vitiation of vata. The combination of these two factors leads to the development of amavata.

Mandagni: Mandagni plays a central role in the manifestation of the disease, as it is considered the root cause of many diseases. Etiological factors impair the normal functioning of Agni and produce ama, which is consequently held responsible for Srotorodha and Vataprakopa.

Nischalata: Nischalatva or sedentary life generates Kaphavriddhi in the body. Vriddhkapha, by its snigdha, guru, madhur, and shitagunas, hampers the Agni and leads to the formation of ama.

Vyayama after Snigdhabhojana: If a person exercises after snigdhabhojana, blood circulation within the gastrointestinal tract will not be sufficient for its proper digestion, which produces ajirana and ama, the foremost pathological factor of Amavata.

Miscellaneous causes: Many other disorders, such as Garbhasrava, Garbhapata, Pandu, Tundikerisotha, etc, are also found in practice, which act as a causative factor in the manifestation of Amavata.

Modern era: In the modern era, Acharya Mahamahopadhyaya Gananath Sen (1943) compiled all the joint diseases and coined the term Rasavata for Amavata; later on, Prof. Y. N. Upadhyaya (1953) and others equated Amavata with Rheumatoid arthritis.

Table 1. Rupa of Amavata, according to different authors [3]

Sr. No.	Rupa	M.Ni	A.Ni	B.P [7]	Y. R	H. S
1	Angamarda	+	-	+	+	-
2	Aruci	+	-	+	+	-
3	Gaurav	+	-	+	+	-
4	Jwara	+	+	+	+	+
5	Angasunyata	+	-	+	+	-
6	Agnisada	+	+	+	+	-
7	SarujamShotha	+	+	+	+	+
8	Bahumutrata	+	+	+	+	-
9	Nidraviparyaya	+	-	+	+	-
10	Koshthabaddhta	+	-	+	+	-

M.Ni..- Madanpal Nighantu; A.Ni- Ashtanga Nighantu; B.P- Bhavprakashnighantu; Y.R-Yog Ratnakar; H.S- Harita Samhita.

2. MATERIALS AND METHODS:

Twenty patients diagnosed with cases of Amavata (Rheumatoid arthritis) were randomly selected for the proposed study; 19 patients had completed the treatment, and one patient left against medical advice. The disease was diagnosed on the basis of signs and symptoms as described in Ayurvedic modern texts, aided by A.R.A. criteria (1988), and the RA Factor test was done in all the patients.

Dose: Patients received the trial medication Gokshur (Tribulus terrestris) Bija Kwatha at a dosage of 40 ml per day, administered in two divided doses. The results were subjected to statistical analysis, where the percentage of symptom relief was calculated as Mean (both pre-treatment and post-treatment), along with Standard Deviation (S.D.), Standard Error (S.E.), 't' value, and P value, utilizing the paired 't' test.

Assessment Parameters:

Pain in joints	Score
No pain	0
Mild pain	1
Moderate pain	2
Severe pain	3
Stiffness in joints	Score
No stiffness	0
0-10 minutes	1
10-120 minutes	2
More than 2 hours	3
Swelling in joints	Score
No swelling	0
Mild swelling	1
Moderate swelling	2
Severe swelling	3
Mobility of joints	Score
No pain on moving	0
Mild pain on moving	1
Moderate pain on moving	2
Severe pain on moving	3
Deformity in joints	Score
No deformity	0
Mild deformity	1
Moderate deformity	2
Severe deformity	3
Tenderness in joints	Score
No tenderness	0
Mild tenderness	1
Moderate tenderness	2

Severe tenderness	3

"The 2010 American College of Rheumatology (ACR) and European League Against Rheumatism (EULAR) classification criteria for rheumatoid arthritis" [8].

Joint distribution (0-5)	Score
1 large joint	0
2–10 large joints	1
1–3 small joints (large joints not counted)	2
4–10 small joints (large joints not counted)	3
>10 joints (at least 1 small joint)	5
Serology (0–3)	Score
Negative RF AND negative ACPA	0
Low positive RF OR low positive ACPA	2
High positive RF OR high positive ACPA	3
Symptom duration (0–1)	Score
<6 weeks	0
≥6 weeks	1
Acute phase reactants (0–1)	Score
Normal CRP and normal ESR	0
Abnormal CRP or abnormal ESR	1

"Total score ≥6 = classification of 'definite' RA. The score can be calculated prospectively over time (cumulatively) or retrospectively if data have been recorded in the past.

ACPA = anti-cyclic citrullinated protein antibody; CRP = C-reactive protein; ESR = erythrocyte sedimentation rate; RF = rheumatoid factor."

Inclusion Criteria:

Patients who provided consent to participate

Patients in the age group of 18-70 years.

Patients suffering from Amavata (Rheumatoid Arthritis).

Only uncomplicated cases diagnosed on the basis of signs and symptoms were considered.

Exclusion Criteria:

Patients who were not willing to participate.

Patients below the age of 18 years and above 70 years.

Chronicity below six weeks or more than 10 years.

Gout, Osteoarthritis, etc., and other comorbidities.

OBSERVATIONS AND RESULTS:

Table 2: Percentage Relief of general Signs and Symptoms after treatment

Signs and Symptoms	Mean		%	S.D.	S.E.	't' Value	'P'Value
	BT	AT					

Angamarda	1.98	1.05	45.51	0.47	0.14	2.05	<0.05
Aruchi	0.74	0.57	22.70	0.42	0.07	1.23	>0.05
Gaurav	0.57	0.36	23.21	0.43	0.10	1.27	>0.05
Jwara	0.50	0.37	18.85	0.26	0.03	1.38	>0.05
Shunta	0.45	0.11	30.97	0.27	0.03	1.41	>0.05
Sarujam Shotha	0.85	0.14	65.71	0.56	0.12	4.17	<0.001
Agni Daurblya	1.51	0.91	30.18	0.40	0.07	1.50	>0.05
Bahumutrata	0.32	0.29	10.21	0.36	0.04	0.36	>0.05
Nidraviparyaya	0.37	0.25	11.45	0.54	0.10	0.35	>0.05
Koshthabaddhta	1.13	0.76	48.57	0.72	0.15	2.03	<0.05

BT-Before treatment, AT-After treatment, S.D-Standard deviation, S.E-Standard error

The treatment resulted in statistically significant relief for three general signs and symptoms: Angamarda (body ache), Sarujam Shotha (inflammatory swelling), and Koshthabaddhta (constipation), with percentage improvements of 45.51%, 65.71%, and 48.57% respectively, and corresponding p-values <0.05, <0.001, and <0.05. Among these, Sarujam Shotha showed the most pronounced improvement both in effect size and statistical significance ($t = 4.17$, $p < 0.001$). Other symptoms such as Aruchi (anorexia), Gaurav (heaviness), Jwara (fever), Shunta (numbness), Agni Daurblya (weak digestion), Bahumutrata (frequent urination), and Nidraviparyaya (insomnia) showed mild to moderate percentage relief ranging from approximately 10% to 30%, but did not reach statistical significance ($p > 0.05$), indicating that the observed changes may be due to chance rather than treatment effect [Table 2].

Table 3. Effect of Trial drugs on Cardinal signs and symptoms of Amavata

Signs & Symptoms	Mean		%	S.D.	S.E.	't' Value	'P'Value
	BT	AT					
Pain	**1.46**	**0.67**	**52.58**	**0.56**	**0.11**	**2.94**	**<0.05**
Stiffness	**1.05**	**0.75**	**27.24**	**0.57**	**0.13**	**1.47**	**>0.05**
Swelling	**1.41**	**0.45**	**70.49**	**0.68**	**0.13**	**4.97**	**<0.001**
Mobility	**0.51**	**0.30**	**34.49**	**0.32**	**0.06**	**2.15**	**>0.05**
Deformity	**0.39**	**0.34**	**13.57**	**0.20**	**0.02**	**0.94**	**>0.05**
Tenderness	**1.05**	**0.51**	**49.95**	**0.57**	**0.14**	**3.28**	**<0.05**

BT: Before treatment, AT: After treatment, S.D.: Standard deviation, S.E.: Standard error

The trial drug demonstrated statistically significant improvement in three cardinal symptoms of Amavata: Pain, Swelling, and Tenderness, with percentage relief of 52.58%, 70.49%, and 49.95%, respectively, and corresponding p-values <0.05 or <0.001. Swelling showed the most pronounced therapeutic effect ($t = 4.97$, $p < 0.001$), indicating robust efficacy in addressing inflammatory components. Although symptoms like Mobility and Stiffness showed moderate improvements of 34.49% and 27.24%, and Deformity showed minimal change (13.57%), these were not statistically significant ($p > 0.05$), suggesting that while functional gains were numerically evident, they may not be reliably attributable to the intervention alone. Overall, the drug appears effective in alleviating pain and inflammation, key pathological features of Amavata, while having a limited impact on structural and functional aspects [Table 3].

3. DISCUSSION:

Gokshur (Tribulus terrestris) is a celebrated herb in Ayurvedic medicine known for its Vata-Kapha pacifying, detoxifying, and anti-inflammatory properties. In the context of Amavata, these properties become particularly relevant due to the underlying pathogenesis involving the accumulation of Ama and the vitiation of Vata and Kapha doshas.

Vata-Kapha Shamana: Gokshur balances the two aggravated doshas that contribute to joint stiffness, swelling, and mobility restrictions [10].

Shodhana: By supporting the body's detox pathways, it aids in the elimination of Ama, the toxic substrate responsible for inflammatory responses [1, 5].

Virechana Effect: Gokshur has a mild purgative action, helping clear the gastrointestinal tract, which is often seen as the origin point of Ama accumulation [3, 7].

Anti-inflammatory Action: Clinical and traditional studies recognize its role in reducing joint swelling and improving musculoskeletal function [8, 9].

In summary, the mode of action of Gokshur in Amavata involves:

Ama Nirharana (Toxin Clearance): Through its detoxifying effect, Gokshur helps dislodge and eliminate Ama from the system.

Dosha Samana (Dosha Balance): By pacifying Vata and Kapha, it restores balance and reduces systemic inflammation.

Symptom Relief: It supports joint lubrication, reduces pain and stiffness, and improves range of motion in affected individuals [2, 6].

The present study demonstrates that the Ayurvedic treatment protocol yielded statistically significant improvements in three key general symptoms associated with Amavata: Angamarda (body ache), Sarujam Shotha (inflammatory swelling), and Koshthabaddhta (constipation). The most pronounced therapeutic benefit was observed in Sarujam Shotha, which improved by 65.71% and achieved high statistical significance. This outcome suggests strong anti-inflammatory efficacy of the intervention, possibly mediated by herbs such as Gokshur (Tribulus terrestris), which possesses notable Vata-Kapha pacifying and Shodhana properties [10]. The relief in Angamarda and Koshthabaddhta also achieved statistical significance ($p < 0.05$), indicating beneficial effects on musculoskeletal discomfort and gastrointestinal motility, respectively. These improvements align with classical descriptions in Ayurvedic texts, where herbs are used to regulate Agni, reduce Ama, and pacify disturbed doshas [1, 5]. In contrast, other symptoms such as Aruchi (anorexia), Gaurav (heaviness), Jwara (fever), Shunta (numbness), Agni Daurblya (weak digestion), Bahumutrata (frequent urination), and Nidraviparyaya (insomnia) demonstrated mild to moderate relief but did not reach statistical significance. These effects, though clinically relevant, may reflect non-specific changes or placebo responses and therefore require further investigation in larger sample sizes and longer-duration studies. Overall, the statistically significant outcomes reinforce the potential of integrated Ayurvedic approaches in managing complex autoimmune conditions like Amavata, especially where conventional therapies may offer limited symptomatic relief or cause side effects.

The therapeutic intervention evaluated in this study revealed statistically significant efficacy in addressing the core symptomatic triad of Amavata (rheumatoid arthritis), such as pain, swelling, and tenderness. With percentage relief values of 52.58%, 70.49%, and 49.95% respectively, and p-values <0.05 to <0.001, these findings suggest that the trial drug effectively targets the inflammatory pathology central to Amavata. Notably, the effect on swelling was the most pronounced, highlighting its role in modulating inflammatory mediators, possibly through the Vata-Kapha pacifying and anti-inflammatory properties of constituents such as Gokshur (Tribulus terrestris) [10]. The moderate improvements in mobility (34.49%) and stiffness (27.24%), though promising in a clinical context, failed to achieve statistical significance, suggesting that functional restoration remains a long-term goal or may require adjunctive therapies such as Rasayana rejuvenatives or physical interventions. Similarly, the minimal change in deformity implies that structural damage caused by chronic disease progression may not be reversed through pharmacological means alone and warrants earlier intervention or supportive strategies.

These outcomes are in agreement with Ayurvedic principles, where initial treatment focuses on Ama elimination, followed by dosha balancing, and finally tissue restoration. The trial drug's success in symptom relief reinforces the relevance of Shodhana, Virechana, and anti-inflammatory actions, particularly when guided by classical formulations documented in texts like Madhava Nidanam, Chakradatta, and Dravyaguna Vijnana [1, 3, 5, 10]. Future studies with larger cohorts and longer treatment durations may better capture long-term structural outcomes and offer deeper insights into functional benefits.

4. CONCLUSION:

Amavata (Rheumatoid Arthritis) is the most common type of inflammatory polyarthritis. However, its early recognition can be challenging due to the variability in clinical presentation. Despite this, timely therapeutic intervention has been shown to provide significant long-term benefits, including the prevention of disability and the preservation of quality of life [9]. In the present study, Gokshurakwatha (prepared from Tribulus terrestris) was used as a trial drug in the management of Amavata. According to Ayurvedic principles, the primary underlying cause of Amavata is mandagni (impaired digestive fire), which leads to the formation of Ama (toxins). The aggravated Vata further contributes to joint pain and inflammation. Therefore, the primary therapeutic approach focuses on arresting the formation of Ama, eliminating the already formed Ama, and restoring normal Agni (digestive function), while simultaneously pacifying Vata, the main factor responsible for pain and inflammation.

Gokshura possesses Madhura Rasa (sweet taste), Guru (heavy) and Snigdha (unctuous) Gunas, Madhura Vipaka (sweet post-

digestive effect), and Shita Virya (cool potency). These attributes make it effective in pacifying Vata-Pitta doshas and provide actions such as Vedanasthapana (analgesic) and Shothahara (anti-inflammatory).

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