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Research Article

Role of *Kalmegha* (*Andrographis paniculata* (Burm.F.) Wall. Ex Nees) in treating *Vatarakta* (Gout)

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ABSTRACT

Andrographis paniculata (Burm.f.) Wall. Ex. Nees (*A. Paniculata*), i.e. *Kalmegha* is a medicinal plant traditionally used for various diseases such as fever, diarrhea, worm infestation, hepatic and skin diseases. Modern studies have also explicitly revealed that *A. Paniculata* has a wide range of pharmacological effects such as anti-inflammatory, anti-hyperglycemic, anti-diarrhoeal, anti-viral, anti-malarial, hepato-protective, anti-cancer, anti-human immunodeficiency virus (HIV), and also work as an immune stimulator. On the other hand, Gout (*Vatarakta*) is one common metabolic disorder which affects over 1% of the world's adult population.

Objective: To assess the clinical efficacy of *A. Paniculata* in Gouty Arthritis.

Study Design: A clinical research, prospective in style, wherein a hypothesis, based on the previous studies on the various effects of *A. Paniculata*, was made; to assess its efficacy in treating Gout.

Methodology: Randomly selected patients (n = 31) were administered powder of *A. Paniculata*, 2 gms thrice daily with water, for 45 days with a follow-up in every 15 days for one month. Assessment of the treatment was based on before treatment (BT) and after treatment (AT) effects of *A. Paniculata* on the parameters namely; subjective, i.e. the symptoms of Gout and objective, i.e. the levels of Serum Uric Acid.

Results: In subjective parameters, Wilcoxon non-parametric test was used. The outcome shows that except the symptom i.e. Pallor (*shwetata*), in all other symptoms of Gout, p value was either < 0.05 or < 0.01, which is considered to be significant to highly significant. In objective parameter, Z test was used, in which the outcome of p value was < 0.01, which indicates that the effect of *A. Paniculata* on Serum Uric Acid is highly significant.

Keywords: *Kalmegha*, *Andrographis paniculata*, Gout, *Vatarakta*, Serum Uric Acid, Clinical Studies

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INTRODUCTION

With an increase in the erratic ways of dietary and life-style habits, we are witnessing an ever growing menace of several metabolic disorders. Gouty arthritis is one of them affecting over 1% of the world's adult population.¹ Modern aspect defines gout as a hereditary metabolic disease that is a form of acute arthritis and is marked by inflammation of the joints with the etiology of excessive uric acid in the blood (hyperuricemia) and deposits of urates of sodium in and around joints. Several different metabolic abnormalities may also cause hyperuricemia.²

Gout is a disease of antiquity. Considering the symptoms and pathogenesis, Gout can be co-related with *Vatarakta* in Ayurvedic sciences. Some common symptoms of *Vatarakta* include; *Kandu* (Itching), *Daha* (Burning sensation), *Ruja*

(Pain), *Sira-ayama* (Dilatation of the vessels), *Toda* (Pricking pain), *Sphurana* (Trembling or throbbing sensation), *Sira-akunchana* (Contraction), *Shyav-twak* (Cyanosis of skin), *Rakta-twak* (Reddish coloration of skin), *Bheda* (Splitting type of pain), *Gourava* (Heaviness), *Suptata* (Numbness), etc.³

Modern Drugs used to treat acute attacks and prevent future attacks of Gout includes: Non-steroidal anti-inflammatory drugs (NSAIDs), Colchicine and Corticosteroids, etc. Owing to the rise in awareness about the disease, its treatments and undesirable possible adverse effects of modern drugs, more and more people are opting for a safe and cost effective treatment options. In the past few years, there is growing an interest in Ayurveda, especially in the herbal sector, worldwide.

Kalmegha (*Andrographis paniculata* (Burm.f.) Wall.ex Nees), Family – Acanthaceae, a common herb, used extensively in liver disorders and is a potent blood purifier is found throughout the planes of India, Pakistan, Sri Lanka and West Indies.⁴

Kalmegha is commonly known as *Bhunimba*, *Yavatikta* and *Desi chirayata*. According to Ayurvedic texts, *Kalmegha* is a herb with *Tikta rasa*, *Katu vipaka*, *Laghu-Ruksha Guna*, and *Ushna Veerya* and due to these attributes it performs various therapeutical actions such as *Vishodhan* (purificatory), *Tridosha-shaman* (helps balancing *Tri-doshas*), *Shothaghna* (edema) and *Udar-Rog Nashak* (gastro-intestinal disorders)⁵, *Kapha-Pitta shamana* (pacifies *Kapha-Pitta*), *Deepan* (appetizer), *Swedan* (diaphoretic), *Jwaraghna* (anti-pyretic), *Kriminashak* (anti-helminthic) and *Kushthaghna* (skin diseases)⁷. It is a very effective *Katu-paushtik* (bitter yet nourishing), and *Yakrit-rog Nashak* (hepatoprotective) drug.⁶ Modern studies have also explicitly revealed that *A.Paniculata* has a wide range of pharmacological effects and some of them extremely beneficial such as anti-hyperglycemic (Bu-Chin et al., 2003)⁸, anti-diarrhoeal (Gupta et al.,1990; Gupta et al.,1993)^{9,10}, anti-viral (Wiart et al., 2005)¹¹, anti-malarial (Mishra et al.,1992)¹², hepato-protective (Clander et al., 1995)¹³, anti-cancer (Cheung et al., 2005)¹⁴, anti-human immunodeficiency virus (HIV) (Calabrese et al., 2000)¹⁵, and also work as an immune stimulator (Puri et al., 1993)¹⁶.

MATERIAL AND METHODS

A clinical study, made to observe the effect of *Kalmegha* (*A. paniculata*) in *Vatarakta* (Gout), was approved by the Research Development Committee (RDC) of Uttarakhand Ayurved University, Harrawala, Dehradun on July 28th, 2016.

1) Source of the drug:

The plant material, *A. Paniculata*, whole plant, used in the clinical study was procured from a reliable source of Dehradun market. Its authentication was done in the PG Department, DravyaGuna, UAC, Dehradun.

2) Identity, Purity and Strength:

At the same time, the whole plant of *A.Paniculata* was collected from the Non Wood Forest Products (NWFP) Division, Forest Research Institute (FRI), Dehradun and a herbarium specimen was made and deposited at the Systematic Botany Branch (SBB), FRI, Dehradun. The plant was authenticated and an Herb Registration Number – 172435, dated November 17th, 2017 was assigned to it. This plant sample was set as standard.

Thin layer chromatography (TLC) technique was used to ascertain the identity and quality of the commercially available plant material through comparison of its TLC profile with that of the authenticated plant material used as standard. Results of the comparative TLC revealed that both the samples were qualitatively alike.

3) Preparation of drug for the clinical trial: A total of 15 kgs of commercially available plant material of *A.Paniculata* was purchased and after cleaning, washing and shade drying, it was milled and a fine powder of 35 mesh size from a normal sieve was prepared.

4) Dosage and Duration of treatment: Dosage of 2 gms of *A.Paniculata* powder thrice daily to be taken with water was prescribed.

5) Number of patients: Total 43 patients were registered for the studies from the OPD of Uttarakhand Ayurvedic Hospital, Dehradun during the month of August 2017.

6) Follow-up: After the completion of 45 days treatment, a follow-up was done for one month in every 15 days to ascertain the adverse effects of the treatment if any. Out of 43 cases registered for the study, 31 cases turned up for full follow-ups.

7) Inclusion Criteria:

- Randomly selected patients within the age group of 20-60 years irrespective of sex, cast, religion, economic status.
- Patients having common clinical features of *Vatarakta* as described in Ayurveda, namely; oedema (*shvyathu*), stiffness (*stabdhata*), inflammation (*shotha*), itching (*kandu*), heaviness (*guruta*), numbness (*suptata*) and piercing pain (*toda*) in knees, shanks, thighs, waist, shoulder, hands, feet and joints of the body. And fatigue (*shram*), pallor (*shwetata*), thirst (*trishna*) and indigestion (*ajirna*).
- Diagnosed patient of *Vatrakta* (Gout).
- Patients having serum uric acid level 5.5 to 10.0 mg/dl.

8) Exclusion Criteria:

- Patients with Chronic Debilitating Diseases.
- Patients having Cardio Vascular Disease.
- Patients below 20 years and above 60 years.
- Patients suffering from any Infectious Disease.
- Diagnosed cases of Thyroid abnormalities.
- Patients of CRF and Hepatic disorders.
- Immuno-compromised patients.
- Patients of Gout associated with any severe arthritis condition like acute rheumatoid arthritis, crooked fingers (*anguli-vakrata*), mental confusion (*moha*) and tumor like hard swelling (*arbud*) will be excluded from the study.

9) Assessment Criteria: The assessment criteria of the clinical studies were both subjective and objective.

a) Subjective (symptoms based):

- Oedema (*shvyathu*)
- Stiffness (*stabdhata*)
- Inflammation (*shotha*)
- Itching (*kandu*)
- Heaviness (*guruta*)
- Numbness (*suptata*)
- Piercing pain (*toda*)
- Fatigue (*shram*)
- Pallor (*shwetata*)
- Thirst (*trishna*)
- Indigestion (*ajirna*)

b) Objective:

- Serum Uric Acid

10) Pathyapathya (diet and life-style guidelines): *Pathya* and *Apathya* in terms of diet and life-style guidelines were prescribed as mentioned in Ayurvedic texts.

- **Do's (Pathya Aahar- Vihaar):** Light and easy to digest food, barley (*puranyava*), wheat (*godhuma*), shali rice, flesh broth of gallinaceous birds (*vishikar mansras*), pigeon pea (*arhardaal*), bathua, bengal gram (*chana*),

petha, moongdaal, red lentil (*masoordaal*), bitter gourd (*karela*), pointed gourd (*parwal*), amla, raisins (*munakka* and *kishmish*), black night-shade (*makoya*), milk and pure ghee. Oil massages (*abhyanga*), poultice (*upnaha*), *pradeha* and *parishek*.

- **Don'ts (*Apathya Aahar-Vihaar*):** Katu rasa (*pungent*), food which causes heating effect and is heavy to digest, fried, spicy, sour (*amla*) and salty (*lavan*) food items, curd and its products, sesame (*til*) and its products, black gram (*udad*), horse gram (*kulath*), alcohol, beans (*sem*) and radish. Diurnal sleep (*diwaswap*), sun bathing (*aatap-sewan*), excessive exercise and over indulgence in sexual activities.

a) Subjective (symptoms based): Wilcoxon non-parametric test was used to analyze the effect of *A. Paniculata* on the various symptoms of *Vatarakta* (Gout) in different patients under study. The positive and negative ranks based upon the patient's response along with the Wilcoxon statistics are shown in the Table 1. The p-value mentioned in this table is for two tailed test and at 5% level of significance. The meaning of nature of the rank is as:

Negative Ranks – Grade is decreasing i.e. improvement in the symptom after treatment.

Positive Ranks – Grade is increasing i.e. deterioration in the symptom after treatment.

Ties – No difference in the grades i.e. no change or relief in the symptom after treatment.

The results were analyzed by the Statistical software SPSS (version 16).

OBSERVATIONS AND RESULTS

Table 1: Ranks Due to Wilcoxon Non parametric test

Symptom	Ranks			% Improvement	Wilcoxon Statistic	p value
	Negative	Positive	Ties			
Edema	15	0	16	48.35%	- 3.771	< 0.01
Stiffness	21	0	10	67.74%	- 4.491	< 0.01
Inflammation	9	0	22	29.03%	- 3.000	< 0.01
Itching	4	0	27	12.90%	- 2.000	< 0.05
Heaviness	13	0	18	41.94%	- 3.606	< 0.01
Numbness	6	0	25	19.35%	- 2.449	< 0.05
Piercing pain	26	0	5	83.87%	- 4.874	< 0.01
Fatigue	7	0	24	22.58%	- 2.646	< 0.01
Pallor	0	0	31	0%	0.000	> 0.05
Thirst	5	0	26	16.13%	- 2.236	< 0.05
Indigestion	22	0	9	70.97%	- 4.690	< 0.01

The outcome in the above table indicates that out of 11 symptoms assessed, in 7 symptoms namely, edema (*shvyathu*), stiffness (*stabdhata*), inflammation (*shotha*), heaviness (*guruta*), piercing pain (*toda*), fatigue (*shram*), and indigestion (*ajirna*), p value obtained was less than < 0.01 which is considered to be highly significant at 5% level of significance. In 3 symptoms namely, itching (*kandu*), numbness (*suptata*) and thirst (*trishna*), p value was found

to be less than < 0.05 which is considered to be significant at 5% level of significance. It was only the symptom pallor (*shwetata*) which showed the p value > 0.05, which means that *A. Paniculata* shows no effect on pallor (*shwetata*) symptom of *Vatarakta* (Gout).

b) Objective: Z Test was used to see the significant effect, if any, of *A. Paniculata* on the levels of Serum Uric Acid based upon 31 observations under study.

Table 2: Effect on BT and AT of *Kalmegha* (*A. Paniculata*) on Uric Acid: Descriptive Statistics and paired Z test for significance

Treatment	Mean (\pm SEM)	Correlation (p value)	Mean Difference (SD)	95% Confidence Interval	p value
BT	6.73 (\pm 0.11)	0.713 (<0.01)	0.655 (0.445)	0.492 - 0.818	<0.01
AT	6.07 (\pm 0.10)				

Above table shows that the average values of Serum Uric Acid for BT is 6.73 \pm 0.110 (mean \pm SEM) and the same is 6.07 \pm 0.10 for the AT. The sample correlation coefficient between BT and AT is found to be 0.713 which is highly significant at 1% level of significance as p value is less than 0.01. In addition, mean difference of Uric Acid was 0.655 mg/dl. The lower and upper bounds of this difference were found to be 0.492 mg/dl and 0.818 mg/dl respectively.

It shows that there is a significant difference between BT and AT of *A. paniculata* on Serum Uric Acid.

DISCUSSION

In both subjective and objective parameters, as mentioned above, a significant difference was found between BT and AT of using *A. Paniculata*. There is a marked improvement in the symptom indigestion (*ajirna*) shown by 70.97% of the patients. It could be because of the *Tikta Rasa*, *Laghu Guna* and *Katu Vipaka* of *A. Paniculata*, all of which acts as *laghav karma* in the body. Appetite, flatulence, acidity and bowel movements becomes better, which further leads to the improvement of other symptoms such as heaviness (*guruta*) and fatigue (*shram*). This once again proves the efficacy of *A. paniculata* on the proper functioning of liver enzymes. And the synonym "*Udarnashini*" of *Dhanwantari Nighantu* [5] is justified. 67.74% of the patients showed improvement in the stiffness (*stabdhata*), while 29.03% of

the patients got significant results in inflammation (*shotha*). This could be because of the *Kapha pitta shamaka* action of *A. paniculata*. Edema (*shvyathu*) also gets improved in 48.35% of the patients because of the *Ruksha* property and *Ushna Veerya* of *A. paniculata*.

It is interesting to note that except for one patient, the Serum Uric Acid levels of the remaining 30 patients showed good improvement. This fact again confirms the already established blood purifying properties of *A. Paniculata*. And hence piercing pain (*toda*), which was present in every patient, got highly significant results with 83.87% of patients reported to have marked improvement.

Couple of patients (age > 55 years) gave no response in any of the subjective and objective parameters. It could be because of their already sluggish metabolism, due to chronicity and age factor. However, many patients in this age bracket responded well with the recent symptoms of pain in smaller joints.

There were no adverse or undesirable side effects noted, in terms of clinical presentation or lab investigation, post studies. It is important to note that *Pathya-Apathya* plays

an important role in curing the disease. The patients, who followed the prescribed diet and life-style guidelines diligently, responded well and took less time to recover.

There were some other notable benefits too. One patient in the study was suffering from pitting nails, reported to have complete relief in this condition, after 45 days of the treatment. Another patient of psoriasis reported regression in the symptoms of psoriasis as well.

CONCLUSION

The present study illustrates that the overall effect of *A. paniculata*, with its *Rasa, Guna, Veerya, Vipaka* and *Karma*, corrects the metabolism and purifies the blood, eventually helping in disintegrating the pathogenesis (*samprapti-vighatan*) of *Vatarakta* (Gout). *A. paniculata*, is a potent medicinal plant with high adaptive qualities. With its varied usage in *Kushta, Kandu, Shvyathu, Yakratroga, Krimi, Kushta, Jwara*, etc, and with the highly encouraging results on *Vatarakta* as illustrated in the present study, it's one of the synonym i.e. *Yashaskari* - means that brings *Yash* (success and fame) to the physician is well established.

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