



ERAND A POTENT DRUG FOR AMAVATA (RHEUMATOID ARTHRITIS)

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ABSTRACT

Ama is an unprocessed product of digestion formed due to agnimandya (poor digestive fire) which is the causative factor for the disease Amavata. Ama does not reveal itself directly physically but expresses itself through the effect it has on the body. Ama (undigested food) hinders the physiological channels of the body, it slows down the metabolism, impedes the supply of produced metabolites and toxins that are produced which results in increased production of Ama. Now as the level of tissue has been penetrated, our immune system starts to attack the affected cells. This causes the inflammation or allergic reaction that can lead to autoimmune disease. Ama then combines with Vata and lodges in the joints and causes amavata. Erand (*Ricinus communis*) can be used as a complete treatment in Amavata internally as well as externally. Single drug is cost effective, economical and easy to use. Amavata is a chronic inflammatory disease and is a kaphavrit vata vyadi. Erand is said to be kaphavata hanti and its Ras panchak breaks its pathogenesis at every step. Due to its ushna virya it works both on kapha and vata. Due to sukshma guna, it can enter minute channels of the body and due to its bhedniya, svedopug guna has mentioned by acharya charak. It causes the loosening of dosha-dushya samurchna and causes the bhedan of the samurchna. It has angmardprashman property too, which relieves the pain in Amavata, which is a major cry of the patients of Amavata. Due to its snigdha Guna it decreases the stiffness of the joint and increases the mobility of the joint.

KEYWORDS: Erand, Ama, Amavata, Kaphavrit vata, Ras panchak.

INTRODUCTION^[1]

Ricinus communis Linn; Family Euphorbiaceae. An evergreen, glabrous shrub, 2-4.5m high. Leaves palmately 7- many-lobed, lobes oblong to linear, acute or acuminate. Flowers- in large terminal subpanicked racemes; in a dense globose head of branched filaments and anthers; yellowish. Fruits - capsules, globosely oblong, smooth or echinate. Seeds - oblong, smooth, mottled.

Flowers and fruits occur almost throughout the year.

Distribution - Cultivated throughout India and found in the wild.

Taxonomical Classification^[2]

Kingdom : Plantae
subkingdom. : Viridiplantae
InfraKingdom : Streptophyta
Superdivision : Embryophyta
Division. : Tracheophyta
SubDivision : Spermatophyta
Class. : Magnoliopsida

Superorder. : Rosanae
Order. : Malpighiales
Family. : Euphorbiaceae
Genus. : *Ricinus*
Species : *communis*
Binomial Name : *Ricinus communis* L.

Classical Categorization

Acharya Charak : *Bhedaniya, Angmardaprasmana, Svedopaga*
Acharya Sushrut : *Vidarigandadi, Adhobhaghara, Vatasamamana*
Acharya Vagbhata : *Vidarigandadi*

Vernacular Names^[3]

Sans. : Gandharva-Hasta, Panchangul, Vatari
Assam : Erri
Beng. : Bherenda
Eng. : Castor oil Plant
Guj. : Erando
Hindi : Erand, Rende, Andu
Kan. : Harlu
Mal. : Ambanakka, Avanakku

Mar. : Erand, Erandee
 Ori. : Bheranda
 Punj. : Erand

Tam. : Amanakku
 Tel. : Amudanu, Amud
 Urdu. : Erand

Properties and Action^[4]

Rasa	Madhur, Katu, Kasaya
Guna	Snighda, Tikсна, Suksma
Viryā	Usna
Vipaka	Madhur
Karma	Kapha-vatahara, Rechana, Vrshya(Root)

Position of Erand in Different Ayurvedic Literature

Acharya Charak	Bhedaniya ^[5] , swedopag ^[5] , Angmardprashman ^[5] Madhurskand ^[6]
Acharya Sushrut	Vidarigandadi ^[7]
Kaydev Nighantu	Aushadhi Varg(pg no. 25) ^[8]
Dhanvantri Nighantu	Guduchiyadi Varg(Pg no. 69) ^[9]
Bhavprakash Nighantu	Guduchiyadi Varg(299) ^[10]
Raj Nighantu	Shalmaliaadi Varg(pg no. 243) ^[11]

Traditional Uses^[12]

Parts of Erand	Uses in Ayurveda
Leaves	Vatanashak, kapha nashak, kriminashak, gulma, bastishool nashak
Flowers	vataghan, kaphapitta nashak, mutradoshahar.
Fruit	Ushna virya, gulma, shool. Useful in diseases of liver, spleen, piles, udar roga etc.
Seeds	Virechak
Phal majja	vatakaphanashak, udar rog, malbhedan
Root	vrishya, vatahara

Parts of Erand	Chemical Constituents
Leaves	Aldehydes, Alkanes, Chlorogenic acid, Ellagic acid, Quercetin, Linoleic acid, Palmitic acid, Ricinine, Oleic acid, Stearic acid, Ricinine. ^[13,14]
Fruit	Fruit- The pericarp of the fruits of R. communis contain alkaloid and ricinine. ^[15,16]
Seeds	The seeds contain 45% of fixed oil, which consist glycosides of ricinoleic, isoricinoleic, stearic and dihydroxystearic acids and also lipases and a crystalline alkaloid, ricinine. The GLC study of castor oil. ^[17,18]
Root	Ricinussterryl benzoate, Ricipiperanyl ester, erandone, Ricipentatriacontanol, indole-3-acetic acid, lupeol, kaempferol, isoquercetin. ^[19,20]

4. Chemical Constituents in Various Parts of Erand PATHOGENESIS of Aamvata (AYURVEDA)^[21]

Causes - Aaharaj - Kapha Prakopak aahar

Viharaj - Vata Prakopak vihar

This causes accumulation of Ama + Vata.

This (Aama + Vata) travels through dhamni, makes its Sthansanshrya in the Sandhi and leads to Aamvata disease.

A person suffering from agnimandya (poor digestion) if indulges in improper food habits, sedentary lifestyle, it results in the formation of Ama in the body. Ama then associates with vata dosha forming a complex. This complex travels to the sleshma adhistan (joints) via

blood and lodges here resulting in various symptoms while degenerating the joint.

Samprapti Ghatak^[22]

Dosha : Vata Kapha pradhan tridosha, Ama Dosha

Dushya : Rasa, Rakht, Mamsa, Snayun, Asthi, Sandhi, Kandara

Srotas : Rasawah srotas

Srotodushti : Sang

Adhistan : Sarva sandhiya

Udbhav sthan : Amashyashrot

Rog Marg : Madhyam

Vyadhi Swabhav : Ashukari, Kashtprad

Agni : Agnimandhya

Sadhya - Asadhya : Naveen sadhya, Puran yapyā

Symptoms^[23]

Angmarda (body ache)
Aruchi (anorexia)
Trishna (thirst)
Alasya (lethargy)
Gauravam (heaviness in the body)
Jwar (fever)
Apaka (indigestion)
Shunyata anganam (numbness in the body)

Chikitsa Sutra^[24]

Langhanam swedanam tiktam deepanani katuni ch/
Bastyasch aammarutey || saindavaadyen anuvasya
ksharvasti prashasyate || (Chakrapani-25/1)
Langhan
Swedan (fomentation)
Deepan (by katu and tikta rasa)
Basti
Ksharbasti
Virechan
Snehan

Action of Erand in Amavata

Amavata is a *kaphavrit vataj* disease. Erand is said to be *Kaphavatahanti*. Due to its *ushna guna* it subsides *kapha* and causes *vatanuloman*. *Acharya Charak* has mentioned it to be *Shrestha vata haranam*. Due to its *ushna virya* it penetrates the cell as well as ignites the *agni* that decreases *Ama* formation. Due to its *teekshana guna* it causes *vibhedan* of *doshas*. Erand has been said *param deepanam* in *bhav prakash*. It causes *Ama pachana* well as vasodilatation as in inflammation prostaglandins are released that causes vasoconstriction. Due to its *swedopug* property it decreases the stiffness and causes *sthaliya* (loosening) of the *doshas* and causes '*sthambham gauravam sheetagnam*'. Due to *snigdha guna* it surrounds the *doshas*, and produces '*mridukaroti Deham malanam vinihanti sangham*', and when erand oil is given as laxative it flushes the *doshas* from the *srotas* thus decreasing the intensity of the *doshas*. According to the various studies it has been proved that flavinoids present in *Ricinus* have anti-inflammatory action (involves the inhibition of the synthesis and activities of different proinflammatory mediators such as cytokines). External application of *Erand patra* decreases the *shoth* due to ricinoleic acid present in it. It has anti-oxidant property due to gallic acid, quercetin, rutin, epicatechin present in it. Due to the disease undergoing oxidation is continued that result in increase of free radicals that results in degeneration of the bone. Erand prevents it.

PATHOGENESIS (Modern View)^[25]

Rheumatoid arthritis is the most common inflammatory arthritis in women. The typical phenotype of RA is a symmetrical, deforming, small and large joint polyarthritis, often associated with systemic disturbance and extra-articular disease. The prevalence is lowest in black Africans and Chinese, and highest in the Pima

Indians of Arizona. Female to male ratio 3:1. Aetiology.^[26]

Genetic factors
 Smoking
 Obesity
 Environmental factors
 Sex

PATHOGENESIS^[27]

RA is characterised by persistent cellular activation results in secretion of cytokines (TNF-alpha, INF-gamma, IL-1) Autoimmunity and the presence of immune complexes at sites of articular and extra-articular lesions. This leads to chronic inflammation, granuloma formation and joint destruction. The earliest change is swelling and congestion of the synovial membrane and the underlying connective tissues, which become infiltrated with lymphocytes (CD4 T cells), plasma cells and macrophages. Effusion of synovial fluid into the joint space macrophages. Hypertrophy of the synovial membrane occurs, with the formation of lymphoid follicles resembling an immunologically active lymph node. Pannus spreads over and under the articulate cartilage. Which is progressively eroded and destroyed. Later, fibrous or bony ankylosis may occur. Muscles adjacent to inflamed joints atrophy and there may be focal infiltration with lymphocytes.

SYMPTOMS^[28]

Morning stiffness (>1 hour)
 Tender, warm, swollen joints
 Joint stiffness that is usually worse in the mornings and after inactivity.
 Fatigue, fever and loss of appetite.

TREATMENT^[29]

Physical rest, targeted anti-inflammatory therapy and passive exercises are the mainstay of treatment for acute RA. Hospital admission in order for the patient to undergo multiple intra-articular injections, joint splinting, regular hydrotherapy, physiotherapy and education may be beneficial. Most of the time it can be managed out of hospital by judicious use of either intramuscular or intra-articular corticosteroids, oral analgesics and NSAIDs, and adjustment of DMARDs (Methotrexate and Sulfasalazine are generally the first choice).

OTHER PHARMACOLOGICAL ACTIVITY**Anti-Inflammatory Activity**^[30]

Anti-inflammatory activities of the leaves and root extract were studied in Wistar albino rats in acute and chronic inflammatory models. The study indicated that the paw edema formation due to sub plantar administration of carragennan, characterizing the cellular events of acute inflammation. The 250 and 500 mg/kg dose of *R. communis* methanolic leaves extract possess protective effect in prevention of cellular events during

edema formation and in all the stages of acute inflammation. The anti-inflammatory activity of *R. communis* methanolic extract was due to the presence of flavonoids because the flavonoids have the protective effect against carrageenan-induced paw edema in rats.

Antioxidant Activity

R. communis seed extract produces the antioxidant activity by using lipid per oxidation via ferric thiocyanate method and free radical scavenging effect on 2,2-diphenyl-1-picrylhydrazyl radical (DPPH) and hydroxyl radical generated from hydrogen peroxide. The high antioxidant activity of the *R. communis* seed at low concentration shows that it could be very useful for the treatment of disease resulting from oxidative stress. The responsible chemical constituent of *R. communis*, which produces antioxidant activity, is methyl ricinoleate, ricinoleic acid, 12-octadecadienoic acid and methyl ester. *R. communis* stem and leaf extracts also produce antioxidant activity due to presence of flavonoids in their extracts.^[31] Some studies revealed that gallic acid, rutin, epicatechin and ellagic acid are the major phenolic compounds responsible for the antioxidant activity of the *R. communis* dry leaves.^[32]

Wound healing activity^[33]

The *Ricinus communis* possess wound healing activity due to the active constituent of castor oil which produce antioxidant activity and inhibit lipid per oxidation. Those agents which inhibits lipid per oxidation is believed to increase the viability of collagen fibrils by increasing the strength of collagen fibres, increasing the circulation, preventing the cell damage and by promoting the DNA synthesis. The study of wound healing activity of castor oil was in terms of scar area, % closure of scar area and epithelization in excision wound model. Due to the astringent and antimicrobial property the tannins, flavonoids, triterpenoids and sesquiterpenes promotes the wound- healing process, which are responsible for wound contraction and increased rate of epithelialisation. The study resulted that the Castor oil showed wound healing activity by reducing the scar area and also the epithelization time in excision wound model. The comparison study of two different concentrations (5% w/w and 10% w/w) of castor oil was resulted that the 10 % w/w Castor oil ointment possesses better wound-healing property.

Central analgesic Activity^[34]

The crude extract of root bark of *R. communis* possesses central analgesic activity in tail flick response model to radiant heat at a dose of 250mg/kg. ethanolic extract of pericarp of fruit of *R. communis* possesses typical CNS stimulant and neuroleptic effects. The stimulant effects, such as exophthalmus, hyperreactivity (evidenced by tremors or by the pinna and grip-strength reaction), memory improvement, and clonic seizures, seem to be due to the presence of the alkaloid ricinine. The main toxic compound of the extract also seems to be ricinine, because animals that died after administration of extract

or ricinine showed similar signs: they all died after the occurrence of clonic seizures followed by an apparent breathing arrest. On the other hand, compounds other than ricinine may be responsible for the neuroleptic-like effects of the extract, because ricinine did not cause reduction of locomotor activity or catalepsy in the mice.

Bone Regeneration Activity^[35]: *Ricinus communis* polyurethane (RCP) has been studied for its biocompatibility and its ability to stimulate bone regeneration. Results showed that RCP blended with calcium carbonate or calcium phosphate could promote matrix mineralization and are biocompatible materials. Incorporating alkaline phosphatase to RCP with subsequent incubation in Synthetic body fluid could improve the biological properties of RCP. The advantage seen in RCP as compared to demineralized bone is that the former has slow reabsorption process.

Antitumour activity^[36]: Ricin A, a lectin isolated from *R. communis* possess antitumor activity, it was more toxic to tumor cells than to non-transformed cells, judged from the ED50 of the lectin towards tumor cells and non-transformed cells.

Anti-arthritis activity^[37]

Anti-arthritis activity of methanolic extract of the stem bark (MESB) at dose level of 400 mg/kg/day p.o was studied in formalin and Complete Freund's adjuvant (CFA) induced arthritis in rats by using arthritis score, oxidative stress, radiographic pattern of hind legs and biomarkers viz. lipid peroxidation, antioxidants (non-enzymatic and enzymatic), nitricoxide, serum lysosomal enzymes (ALT, AST, and LDH), connective tissue biomarkers (sialic acid, hydroxyproline and glucosamine) and pro-inflammatory mediators (IL-6 and TNF- α). Diclofenac sodium, dexamethasone and methotrexate at dose level of 10, 0.03 and 0.007 mg/kg/day p.o. respectively were used as reference standards. Anti-arthritis activity of MESB was slightly better than that of diclofenac sodium and less effective than that of dexamethasone and methotrexate.

Laxative and uterine contraction^[38]

Castor oil induces laxation and uterus contraction by involving ricinoleic acid activating prostaglandin receptors 2. Castor oil and ricinoleic acid induce contraction of the intestinal smooth muscle. Both gut and uterus motility is affected. Prostaglandin receptors 2 are proved to be potential targets for drugs to induce laxation.

Immunomodulatory activity^[39]

The plant and animal origin immunomodulatory agents generally increase the immune response of the human body against pathogens by activating the non-specific immune system. The presence of tannins in the leaves of *R. communis* significantly increased the phagocytic function of human neutrophils and resulted in production of a possible immunomodulatory effect. Thite AT, Patil

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CONCLUSION

Ricinus communis is an easily available plant which is found in abundance. It has multiple properties. Rheumatoid arthritis is considered to be *vatakaphatmak* disease. The drug in Ayurveda is considered *vatakapha hanti*. The drug breaks the pathogenesis of disease at every step by its *ushna*, *tikshna*, *sukshma* guna by its *snigdha* and *virechak* property. Its various formulations can be easily prepared. The abundance of the plant makes its availability for poor too. Many ayurvedic formulations which are given in Aamvata have erand as a key ingredient.

RA is a chronic inflammatory disease, which immobilises the patient affecting their daily routine and increasing stress mentally, physically and economically. This plant can be a solution to various above problems.

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