

**SCIENTIFIC VALIDATION ON SIDDHA
SASHTRICHERBOMINERAL FORMULATION “GENDHAGA
VALLAATHI” FOR RHEUMATOID ARTHRITIS - A REVIEW**

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ABSTRACT

Siddha system were practised in traditional Tamil speaking people, where they exists beyond the continent also. The people were well in Physical and Mental health with the Siddha Medicines. When the infectious diseases were ruled over the world, people were looked for the conventional medicines. But the re-infectious threat, challenging non-communicable diseases has reverted back the people to Siddha system of Medicines. Rheumatic or Musculoskeletal conditions compromises over 150 diseases and syndromes which are usually progressive and associated with Physical disability. Rheumatoid arthritis is such a medical threat to the world due to its disability and

mortality. Rheumatoid arthritis is a generalised disease affecting the connective tissues of the whole body with focalised involvement of the Musculoskeletal system. People have long feared rheumatoid arthritis as one of the most disabling type of arthritis. The clinical features of Rheumatoid arthritis were correlated well with Uthiravaatha Suronitham in Siddha system pathology. Uthiravaatha Suronitham were classified under 84 types of Vaatha diseases as per the saint Yugi. According to him, the features of Uthiravaatha suronitham were Pain and swelling in the ankle joints, dorsum of the foot, knee joint , smaller joints of the hands, loss of appetite , mental depression. These symptoms were due to the elevation of Vaatham with deranged Pitham. An emerging body of research is focussing on various treatment modalities for Rheumatoid arthritis. In Siddha literatures, various formulations were indicated for

Rheumatoid arthritis. Gendhaga Vallaathi, a formulatory Siddha medicine is one of the traditionally used drug for treating Rheumatoid arthritis. This leading study in collection of scientific reviews about the drug in hope of creating better treatment for Rheumatoid arthritis.

KEYWORDS: Siddha formulation, Gendhaga vallaathi, Pharmacological activities, Rheumatoid arthritis, Uthiravaatha suronitham.

INTRODUCTION

Rheumatoid arthritis being an autoimmune disease, its etiology is Multifactorial. Stress is probably a triggering factor. Stress impairs cellular immunity, decreases immune tolerance and stimulates humoral immunity exposing individuals to autoimmune diseases.^[1] About 1% of the world's population is affected by Rheumatoid arthritis, women three times more often than men. The incidence of RA is of 3 cases per 10,000 population per annum. Around 40% of RA patients are registered disabled within 3 years; around 80% are moderately to severely disabled within 20 years; and 25% will require a large joint replacement.^[2] In Siddha Sashtric text, "Agathiyar Gandhaga Vallaathi 600" Gendhaga Vallaathi, a herbomineral formulation is mentioned for Rheumatoid arthritis. This review focusses the in-vivo, in-vitro, traditional uses of the 40 ingredients of Gendhaga vallaathi to get better results in Clinical application in managing Rheumatoid arthritis.

STUDIES ON INGREDIENTS OF GENDHAGA VALLAATHI

Tamil Name	botanical name /Family/parts used	Chemical constituents	Traditional uses	Actions
serankottai	<i>Semecarpus anacardium</i> , Linn. Anacardiaceae -Fruit	Bhilawanol, semecarpol, fixed oil, catechol ^[3] , semecarpus biflavone B, galluflavone, jeediflavonone ^[4]	Leprosy, ulcer, hemorrhoids, scabies, arthritic pain. ^[5]	Hypoglycemic ^[7] Anticancer ^[8] Antiinflammatory ^[9] Neuroprotective ^[10,11] Antioxidant ^[12] Antimicrobial ^[13] Antiatherogenic ^[14]
kodiveli	<i>Plumbago zeylanica</i> , Linn. Plumbaginaceae -Root bark	2 new quinines zeylanone, plumbagic acid, isozeylanone, Plumbagin, b-sitosterol, vanilic acid, Steroidal glycoside ^[4] .	Sinusitis, headache, vaginal cancer, ulcer, dysentery.	Antiinflammatory ^[15] Antidiabetic ^[16] Antibacterial ^[17] Anticancer ^[18]

Aadutheen - daapalai	<i>Aristolochia bracteolata, Lam</i> aristolochiacea -Root bark	Aristolochic acid , Potassium chloride,nitrate. ^[4]	Eczema,worm infestations,insect bites.	Antipyretic ^[23] Antiulcer ^[24] Antioxidant ^[25] Antiplasmodic ^[26]
Nilavaagai	<i>Cassia senna</i> ,Linn,Fabaceae -Leaves	Oxymethyl- anthraquinones ^[3]	Nausea, ulcer, constipation, haemorrhoids.	Antimicrobial Thrombolytic ^[29]

Chukku	<i>Zingiber officinale,Rosc</i> Zingiberaceae -Rhizome	1-2% volatile oil, resinous matter, sesquiterpenes like zingiberine, bisabolene,gingerdione, mucilage, starch ^[4]	Rheumatic fever , headache , viral fever,esophagitis.	Antidiabetic ^[30] Antimicrobial ^[31]
Isangu	<i>Clerodendron inorme(Linn)</i> <i>Gaertn</i> Lamiaceae -Root bark	Resin,gum,brown colouring matter , ash contains large amount of sodium chloride ^[3]	Fever,leucorrhoea , eczema,scabies.	Antimalarial ^[33] Antiviral ^[34] Antihemolytic ^[35]
Kadukkai	<i>Terminalia chebula.Retz</i> Combretaceae -Fruit	Chebulinic acid, chebulagic acid , tannic acid , arachidic acid , linoleic , oleic acid , behenic , palmitic , stearic acid ^[6]	Ulcer, haemorrhoids , heart diseases , eye diseases, liver diseases, fever, scrotal swelling , leucoderma.	Antidiabetic ^[38] Wound healing ^[39]
Kalaa	<i>Carissa carandas,Linn</i> Apocynaceae -Root	Carissone, carindone, carinol , odoroside, digitoxigenin, glucose and D-digitalose, alkaloids, carissol, tartaric, citric, malic, malonic, linalool, alpha terpenol , b-ionone ^[6]	Eye diseases,throat pain,appetizer.	Analgesic Antiinflammatory ^[41]
Koshtam	<i>Costus speciosus(Koe nig rx Retz)</i> Costaceae -rhizome	Tigogenin, diosgenin, saponin A,B,C, b- sitosterol, glucoside, alpha amyrrin, stearate, diosgenin , octacosanoic acid , sitosterol, gracillin , dioscin ^[6]	Fever , haemorrhoids , snake, rat poisons , jaw diseases.	Uterine stimulant ^[42]

Lavanga-pattai	<i>Cinnamomum verum</i> , Presl Lauraceae -Bark	Linalool, benzyl acetate, cinnamic aldehyde, eugenyl acetate, cinnamyl acetate, benzyl benzoate, cinnamaldehyde, eugenol, pinene, cymene, cinnaryl alcohol ^[6]	Abdominal discomfort, dysentery, ulcer, insect bite, cough.	Antioxidant ^[44] Antimicrobial ^[45]
Milagaran-ai	<i>Toddalia asiatica</i> . Linn Lann Rutaceae -Root Bark	Resin, essential oil, a bitter substance, citric acid, starch, berberine, citronellal, citronella-aldehyde ^[3]	Fever, diarrhoea, cough, asthma, fever.	Antidiabetic Antioxidant ^[47]

Milaghu	<i>Piper nigrum</i> . Linn Piperaceae -dried unripe Fruit	A volatile alkaloid piperine, piperidine, volatile essential oil, starch, lignin, gum, fat, amide known as pipericide ^[3]	Ear pain, ulcer, hemorrhoids, fever.	Anticancer Antioxidant ^[49]
Nelli	<i>Phyllanthus emblica</i> . Linn Euphorbiaceae -Fruit	A good source of vitamin C, carotene, nicotinic acid, tannins, riboflavin, myoinositol, polyphenolic compounds, ellagic acid, alkaloids, phyllantidine, indole acetic acid, 4 other auxins ^[6]	Liver diseases, eye diseases.	Anticancer ^[50] Cardioprotective ^[51]
Omam	<i>Carum copticum</i> <i>Benth & Hook. f</i> Umbelliferae -Fruit	Essential oil, thymol ^[3]	Cholera, tooth disease, asthma, cough, indigestion.	Antiulcer ^[53] Antispasmodic ^[54]
Parangi – pattai	<i>Smilax china</i> . Linn Liliaceae -Bark	Fat, sugar, glucoside, colouring matter, saponin, gum, starch ^[3]	Skin diseases, arthritic pain.	Antidiabetic ^[56] Anti-HIV-1 ^[57]
Perumarun-thu	<i>Aristolochia indica</i> . Linn. aristolochiaceae -root bark	Aristolochic acid, aristololactam, aristolic acid, allantoin, b-sitosterol, b-coumaric acid, glycerides of palmitic, stearic, lignoseric, cerotic, oleic, linoleic acids ^[6]	Snake poison, heart disease, anaemia, diarrhoea, fever.	Antimicrobial ^[59] Antiimplantation ^[60] Abortifacient ^[61]

Praay	<i>Streblus asper</i> , Lour Moraceae -Bark	Glycosides, asperosides, streblaside, b-sitosterol, oleanolic acid, botulin, stigmasterol ^[4] .	Crackle foot.	Cardiotonic ^[62] Antifilarial ^[63]
Saathipath-iri	<i>Myristica fragrans</i> Houtt Myristicaceae -Arillus	Epicatechin, cyanidine, fatty acids, volatile oil ^[6] .	Amoebic dysentery, bacillary dysentery, fever.	Antiinflammatory ^[65]
Sangam	<i>Azima tetracantha</i> , Linn Salvadoraceae -Root bark	Piperidine alkaloids, azcarpine, friedelin, small quantity of carpaine ^[4] .	Fever, cough, worm infestations, arthritic pain, eczema.	Hepatoprotective Antioxidant ^[66]

Saathikaai	<i>Myristica fragrans</i> Houtt Myristicaceae -Fruit	Volatile oil, lignin, isolignam, licarin B, arylpropanoid, eugenol, isoeugenol, fatty acids like lauric, myristic, stearic, linoleic acids, vitamin, epicatechin, cyanadin ^[6]	Tooth ache, arthritic pain, menorrhagia, migraine.	Anxiogenic ^[67] Anticarcinogenic ^[68]
Seeragam	<i>Cuminum cyminum</i> . Linn Apiaceae -Seeds	Fatty oil, resins, mucilage, gum, malates, essential oil, cuminol or cumic aldehyde, cymene or cymol, terpenes ^[3]	Viral fever, jaundice, leucorrhoea.	Anticancer ^[69] Antiasthmatic ^[70]
Shenbagap-oo	<i>Michelia champaca</i> . Linn Magnoliaceae -Flower bud	b-sitosterol, mono- & sesquiterpenes in essential oils, fatty acids, myristic, lauric, oleic, micheliolide, macheline A ^[6]	Urinary infections, arthritic pain, head diseases, eye diseases, leucorrhoea.	Antidiabetic ^[73] Antioxidant ^[74] Antimicrobial ^[74]
Chitra-rathai	<i>Alpinia galangal</i> (Linn) wild Zingiberaceae -Rhizome	Essential oils, campheride, galangin, alpinin, ethyl trans-cinnamate, ethyl 14-methoxy-trans-cinnamate ^[4,6]	Eczema, head diseases, fever, cough	Anti allergic ^[76] Antibacterial ^[77]
Thaanrik-kaai	<i>Terminalia bellerica</i> (Gaertn.) Roxb. Combretaceae	Chebularic acid, b-sitosterol, ellagic acid, galloyl derivative, tannins, mannitol, rhamnose, glucose ^[4,6]	Asthma, sore throat, ulcers, tooth ache, cough.	Antiulcer ^[79] Antidiarrhoeal ^[80]
Thippili	Piper longum Piperaceae	Piperlongumine, piperlonguminine, n-	Cough, leucorrhoea, menorrhagia,	Antiasthmatic ^[82]

	-Fruits	hexadecane, terpinolene, piperine, pipartine, glycosides, reducing sugars, essential oils ^[6]	fever, giddiness.	Immunomodulatory ^[83]
Lavanga-pathiri	<i>Cinnamomum tamala</i> (Buch. Hunn) Nees Lauraceae -Leaf	Volatile oil, linalool, cinnamaldehyde, limonene, alpha-pinene, beta-pinene, cymene ^[4]	Vomiting, oligospermia, cough, asthma, fever.	Antidiabetic ^[85] Gastroprotective ^[86]
Siruserup-padai	<i>Mollugo lotoides</i> Molluginaceae -Root	Stidmollugogenol-F, a new triterpenoid sapogenin-3b ^[4]	Ulcer, leucorrhoea, cough, other venereal diseases.	Antiinflammatory ^[88]
Davasimur-ungai	<i>Rungia parviflora</i> Acanthaceae	Luteolin, chrysoeriol, glycosides, isosalipurposide ^[4]	Sinusitis, cough, rhinorrhoea.	Antiinflammatory Antimicrobial ^[89]

Kaattu-malli	<i>Jasminum angustifolium</i> Oleaceae -Root	Glycosides kaempferol-3-O-rutinoside, oleoside, 7-ketologanin, oleuropein, ligstroside	Diarrhoea, fever, dryness of tongue.	Antiinflammatory ^[90]
Karanthai	<i>Sphaeranthus indicus</i> , Linn. Labiata -Root	Sesquiterpenes lactones, beta-eudesmol, ilic acid, sesquiterpene acid ^[4]	Oligospermia, vomiting, eczema, cough.	Hepatoprotective Antioxidant ^[91]
Kollan-kovai	<i>Corallocarpus epigaeus</i> Cucurbitaceae -Root bark	Bitter principle like bryonin ^[4]	Snake venoms, skin diseases, eczema, anaemia.	Hepatoprotective ^[93] Antidiabetic ^[94]
Karunjeer-agam	<i>Nigella sativa</i> , Umbelliferae -seeds	Volatile oil, fixed oil ^[4] .	Ulcer, poisons, worm infestations, running nose.	Gastroprotective ^[95] Nephroprotective ^[96]
Amukkara	<i>Withania somnifera</i> (Linn) dual Solanaceae	Withanolide with Withaferin A, dihydrowithaferin A2, Visamine, anafirin, isopelletierine Hcl, tropine, pseudotropine, C-28 steroidal lactones, somniferine, anahygrine	Increase sperm count, obesity, hip pain.	Anxiolytic ^[98] Antithrombotic ^[99]
Then	Honey Mel	Fructose, glucose, maltose, sucrose, water, higher sugars, ash, vitamin C, minerals ^[101] .	Asthma, eye diseases, fever, vomiting, eczema, ulcer ^[102]	Antiallergic ^[103]

korosanam	Purified Ox gall, Fel bovinum purifactum.		Throat diseases,eye diseases,pox diseases ^[102] Skin diseases ,	
Ganthagam	Sulphur		diarrhea , fever , poisons ^[102]	Antiallergic ^[104] Anticancer ^[105]

PHARMACOLOGICAL ACTIVITIES RELATED TO RHEUMATOID ARTHRITIS

Semecarpus anacardium Linn.f

Antiinflammatory activity

A Chloroform extract of the nut significantly reduced acute carrageenan induced paw oedema in rats and was active against the secondary lesion of adjuvant induced arthritis.^[19]

Antioxidant

Evaluation of antioxidant effects of *Semecarpus anacardium* Linn.nut extract on the components of Immune system in adjuvant arthritis.^[20]

Plumbago zeylanica,Linn

Anti-inflammatory activity

The root of *Plumbago zeylanica* extracted with methanol was used for determining the anti-inflammatory effects.The methanolic extracts at 300 and 500 mg/kg produced 31.03 and 60.3% inhibition of acute inflammation,respectively in carrageenan induced rat paw edema confirming that *Plumbago zeylanica* roots are effective against acute inflammation.^[21]

Antioxidant activity

Antioxidant effects of the aqueous alcoholic extracts of root,corresponding to the medicinal preparations,and the active ingredient ,Plumbagin ,were studied by Tilak et al Methods used included : Ferric reducing antioxidant power (FRAP) ,radical scavenging of 1,1-diphenyl-2-picryl hydrazyl(DPPH) and 2,2'-azobis-3- ethylbenzthiazoline -6-sulfonic acid(ABTS),lipid peroxidation in rat liver mitochondria induced by different agents and estimating phenolic and flavonoid content. In FRAP/DPPH assays,boiled ethanolic extracts was the most effective while in ABTS assays, boiled aqueous extract was the most efficient.These extracts also significantly inhibited lipid peroxidation induced by cumene hydroperoxide ,ascorbate – Fe²⁺ and peroxy nitrite and contained high amounts of polyphenols and flavonoids.^[22]

Aristolochia bracteolate, Retz.**Antiinflammatory**

The ethanolic extract of the shade dried leaves of *Aristolochia bracteolate* was evaluated anti-inflammatory activities in wistar rats by using the carrageenan induced left hindpaw edema method.^[27]

Antiarthritic activity

Antiarthritic activity was demonstrated using Freund's complete adjuvant in rats. Treatment of FCA induced rats with *Aristolochia bracteolata* extracts shown ($P < 0.05$) increase in pain threshold, weight bearing ability, ambulation and also decline in scratching, defecation, urination, were observed as a sign of improvement in behavioural pattern.^[28]

Zingiber officinale, Roscoe

Antiinflammatory: The crude extract of *zingiber officinale* was able to reduce rat paw and skin edema induced by carrageenan, 48/80 compound and serotonin. The antiedematogenic activity seems to be related atleast partially to an antagonism of the serotonin receptor.^[32]

Analgesic, antipyretic: An ethanolic extract of the rhizomes of *zingiber officinale* was investigated for anti-inflammatory, analgesic, antipyretic, antimicrobial, hypoglycaemic activities.^[31]

Clerodendrum inerme, Gaertn

Antioxidant: The active isolate jinoside D were found to possess significant antioxidant activity.^[36]

Antiinflammatory: The flavonoid glycosides in it showed modulation in calcium transport in rat liver and there by showed reduction in inflammation.^[37]

Terminalia chebula, Retz

Immunomodulatory: Vaibhav aher, et al studied the immunomodulatory activity of alcohol extracts of *terminalia chebula*.^[40]

Carissa carandus, Linn**Analgesic, anti-inflammatory, antipyretic**

The ethanolic and aqueous extracts from roots of *Carissa carandas* exhibited significant analgesic activity at the dose of 100mg/kg body weight. It also found to reduce significantly

the formation of edema induced by carrageenan after 2 hrs. It also showed significantly competent on yeast induced hyperpyrexia in rats after 2 hrs.^[41]

Costus speciosus, Sm

Antiinflammatory, Analgesic, Antipyretic activities

The anti-inflammatory activity of methanol extracts of species (400 & 800 mg/kg, p.o.) was evaluated using carrageenan induced paw edema test. Analgesic effects were evaluated using acetic-acid induced writhing & Eddy's Hot plate models and anti-pyretic activity was assessed by Brewer's yeast induced pyrexia in rats.^[43]

Cinnamomum verum, Pers

Antiinflammatory, Antiarthritic activity

Type -A procyanidine polyphenols (TAPP) showed significant anti-inflammatory effect at dose of 4, 8, 25 mg/kg, p.o. but not at 2 mg/kg, p.o. dose in Carrageenan induced rat paw edema model. The dose of 8 mg/kg, p.o. was selected for the evaluation of anti-arthritic activity in AIA model. TAPP (8 mg/kg, p.o. daily from day 12 to day 21) treatment in established arthritic rats showed significant reversal of changes induced in AIA with respect to body weight drop, ankle diameter, arthritic score, serum C-reactive protein levels.^[46]

Toddalia asiatica, Linn

Antiinflammatory & Analgesic activities

The administration of alkaloids of *Toddalia asiatica* had function of inhibiting the auricle swelling caused by Xylol and joint swelling caused by agar and leukocytes migration caused by CMC-Na decreasing the body distortion of the rats. *Toddalia asiatica* has anti-inflammatory and analgesic effects and there is no injury to the liver after long administration in rats.^[48]

Piper nigrum, Linn

Antiinflammatory activity

The extracts of *piper nigrum* had the inhibitory effects on cyclooxygenase enzyme thus reduces the inflammation.^[49]

Phyllanthus emblica, Linn

Antioxidant Activity

Prakash D, et al have showed the wild edible fruits of *phyllanthus emblica* for antioxidant effects.^[52]

Carum copticum, Benth Hook**Antioxidant Activity**

The methanol fraction showed highest antioxidant activity by phosphomolybdenum(2087.7micromol) and DPPH assay(90.2%) followed by other fractions comparable to ascorbic acid and BHT.The methanolic fraction showed no sign of mutagenicity at tested concentrations(25-100microg/plate)^[55]

Smilax china, Linn**Antiinflammatory and Analgesic Activities**

The aqueous extract of tuber of Smilax china L,was tested for its anti-inflammatory activities in rats by egg-albumin induced edema and antinociceptive effects in mice using hot plate test and acetic-acid induced abdominal constriction test respectively.The aqueous extract in dose of 1000mg/kg(i.g.)had a significant antinociceptive and anti-inflammatory effect compared to physiological saline.^[58]

Streblus asper,Linn**Anti-inflammatory Activity**

The Streblus asper leaf ethanolic(SAE) extract at all given doses caused a significant dose-dependent inhibition of edema ($p<0.05$).The significant and dose dependent LPS-induced cyclooxygenase(COX)-2 and inducible nitric oxide synthase(iNOS) mRNA expression were demonstrated in RAW 264.7 cells treated with SAE.The inhibition is selective,since COX-1 m RNA expressions did not change in presence of SAE.^[64]

Myristica fragrans Houtt, Arillus**Anti-inflammatory Activity**

The methanol extracts (1.5g/kg) ether fraction (0.98g/kg),n-hexane fraction(0.5g/kg), Fr-I(0.19g/kg) and Fr-VI (0.17g/kg) showed a lasting anti-inflammatory activity and potencies of the fraction were approximately the same as that of Indomethacin(10mg/kg) Fr-VI was determined to be Myristicin.^[65]

Cuminum cyminum, Linn**Anti-osteoporotic**

In animals receiving a methanolic extract of cuminum cyminum, significant reduction in urinary calcium excretion and augmentation of calcium content and mechanical strength of bones was found.^[71]

Immunomodulatory Activity

Oral treatment with cumin showed immunomodulatory properties in normal and immune suppressed animals via modulation of T lymphocytes expression in a dose dependent manner. It stimulated the T cells (CD4, CD8) and Th1 cytokines expression in normal and cyclosporine A induced immune suppressed mice.^[72]

Michelia champaca, Linn**Antiinflammatory activity**

Michelia champaca showed significant stabilizing activity of 57.4% at concentration of 300 microg/ml. The percentage membrane stability exhibited by extract was concentration dependent. It concluded that the methanolic extract of *Michelia champaca* possess significant invitro antiinflammatory activity.^[75]

Alpinia galangal**Antiinflammatory and Analgesic activities**

Antiinflammatory and analgesic effects of *Alpinia galangal* in a variety of rheumatological conditions have been studied by several authors. YU, et al isolated p-coumaryl alcohol-0-methyl ether (CAME) having phenylpropanoid structure, which selectively and substantially suppressed IFN gamma production in CD4 and Th cells.^[78]

Terminalia bellerica, Roxb**Analgesic**

The crude extracts of *Terminalia bellerica* dose-dependently (50-100 mg/kg) reduced the numbers of acetic acid mediated in mice.^[81]

Piper longum, Linn**Antiinflammatory activity**

The fruit decoction showed anti-inflammatory activity against carrageenan induced rat paw edema.^[84]

Cinnamomum tamala, Fr.Nees**Antiinflammatory, Analgesic, Antipyretic**

The methanolic extracts of *Cinnamomum tamala* leaves showed significant analgesic activity ($p < 0.05$) which was evaluated in mice by Hot plate method, acetic acid induced writhing movement and tail flick test. Also anti-inflammatory activity in Swiss albino mice by carrageenan and antipyretic activity by brewer's yeast.^[87]

Jasminum angustifolium, Vahl**Antiinflammatory and Analgesic**

The aqueous extract of *Jasminum angustifolium* Linn. by oral administration at dose of 500mg/kg/day of body weight to healthy albino rats and mice showed a greater anti-inflammatory and analgesic effect by carrageenan induced hind paw edema in rats and analgesic by Eddy's Hot plate method.^[90]

Sphaeranthus indicus, Linn**Immunomodulatory**

Administration of methanol extract in fraction (100 and 200mg/kg, p.o.) showed immunostimulating activity by increasing the phagocytic activity, hemagglutination antibody titre and delayed type hypersensitivity in cyclophosphamide induced myelosuppression in mice.^[92]

Nigella sativa, Linn**Antiinflammatory and Analgesic**

The analgesic and anti-inflammatory effects of polyphenols from seeds were studied in mice and rats using the acetic-acid induced writhing, formalin light tail flick, carrageenan induced paw edema and croton oil induced ear edema in rats. These results suggest that NS polyphenols have potent analgesic and anti-inflammatory effects.^[97]

Withania somnifera, Dunal**Antiinflammatory**

Administration of *Withania somnifera* root powder (600mg/kg) to the arthritic rats significantly decreased the severity of arthritis by effectively suppressing the symptoms of arthritis and improving the functional recovery of motor activity and radiological survey.^[100]

Sulphur**Antiinflammatory**

Anti-inflammatory activity of sulphur containing phenolic Antioxidants in vivo is mediated by their effect on Redox-Sensitive Transcription Factors.^[106]

Oxidative Stress, Haemoglobin content, Superoxide Dismutase and Catalase activity influenced by Sulphur baths and Mud packs in patients with Osteoarthritis.^[107]

CONCLUSION

This review especially exposes that ingredients of Gendhaga Vallaathi have anti-inflammatory, analgesic, antipyretic, antioxidant and immunomodulatory activity. These pharmacological activities contribute mainly in the treatment of Rheumatoid arthritis.

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