

Ethnomedicinal Plants used for the Treatment of Rheumatoid Arthritis, Andhra Pradesh, India

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Abstract: The present investigation deals with the therapeutic properties of 100 plants species belonging to 88 genera and 60 families which are used for rheumatic arthritis in tribals regions of Andhra Pradesh, India. Information on botanical name, vernacular name, family, part used, mode of drug preparation and mode of administration is provided. Information gathered in this study will act as baseline information for different scientific personnel working on biological, chemical and pharmaceutical studies.

Keywords: Medicinal Plants, rheumatic arthritis, Andhra Pradesh, India

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I. Introduction

A person's immune system gives strength to resist diseases. It creates antibodies to fight against foreign bodies that enter into our system. Rheumatoid arthritis is a chronic systemic, autoimmune disorder wherein a person's immune system attacks his/her own body tissues; as a result body becomes susceptible for the attack of pathogenic organisms like bacteria and viruses. The tissues like cartilage, ligaments, and synovial glands of all joints are affected initially. If neglected, it will also affect lungs, eyes, mouth, heart, kidneys and other vital organs in the body. This occurs generally between 40 to 60 years' age. In some cases, even children and young adults are likely to be affected. Women are more prone for this disease. In the initial stages, people with this disease may feel, sick, loss of body weight, tired and sometimes experience fatigue. It starts and appears in small joints initially. Synovial membrane linings are subjected to infection followed by inflammation at the bone joints. Cartilage, tendons and ligaments are damaged resulting bone erosion. Bones are bent and alignment is lost, resulting in deformity. Joints become stiff and movements would be arrested. Finally, RA affected people are to be confined to wheel chair. Doctors follow varieties of approaches to treat RA, like medications, changing of lifestyle, surgery. Their goals are to relieve pain, reduce joint damage and inflammation but permanent cure and complete eradication is not assured. RA can be diagnosed, basing on over all pattern and symptoms as well as from the analysis of blood samples for RA factor, ESR, TC,DC, X Rays, MRI scan and Ultrasound tests.

The factors responsible for Rheumatoid Arthritis are Genes (inheritable), Imbalance of hormones, Presence of excess quantities of toxins, free radicals in the blood, Deposition of salts in excess in the bone joints in the form of sodium bicarbonate salts, Adverse environment, Unhygienic food habits, lack of physical exercise and Chronic Constipation.

In Allopathy, medicines like antioxidants, vitamins A, E, supplements of Zinc, copper are being prescribed to be used for longer period continuously for more than 1 to 2 years. Other drugs being prescribed are 1. DMARDS (Disease Modifying anti rheumatic Drugs) like methotrexate, Leflunomide, Hydrochloroquine, Minocycline and Sulphasalazine. 2. NSAIDS (Non Steroidal Anti Inflammatory Drugs) being prescribed are, Ibuprofen, Aspirin, Diclofenac Sodium, and for external application capcisin, topical OTP cream, DF Sodium Gel. Whereas, the side effects of DMRDS and NSAIDS are, stomach ulcers, kidney damage, erosion or burning a hole through intestines or stomach resulting bleeding, Osteoarthritis etc. 3. Corticosteroids like betamethasone, prednisone, cortisone, dexamethasone etc., are used. The side effects are high BP, stomach ulcers, high blood sugar, osteoporosis, hairfall, cataract etc. 4. Immunosuppressants like cyclosporine, cyclophosphamide, Azathioprine, Hydrochloroquine are being used. The side effects are, decrease in immunity power in the body and the body become susceptible for illness and infection.

In Homoeopathy, Bryonia alba, Antimonium crudum, Caulophyllum, Actea spicata, Ferrum phos, Ferrum met, Natrum mur, Calcarea flour, and Rhus tox. drugs are being used basing on the symptoms. Whereas, the symptoms and associated feelings experienced RA patients differ from person to person and from time to time and hence it is very much laborious and time taking process to select the drugs for treating all the RA patients.

In Ayurveda, rheumatoid arthritis is described as “Aamavaaham” which originates from out of malfunctioning of digestive system due to intake of foods which are not healthy and unwanted. *Ricinus communis*, *Withania somnifera*, *Boswellia serrata*, *Tinospora cordifolia*, *Aloe vera*, Potato juice. medicinal plants are being used for curing RA. Special diet prescribed for intake is bajra, wheat, barley, menthi, turmeric, garlic, cumin. Researches revealed that, the chemical compounds like glucosamine sulphate and chondroitin sulphate are helpful in preventing further loss of cartilage and ease pain. Plants containing benzoic acid, cynogenic glucoside, gamma linolic acid, repair cartilage, strengthen bones, helpful in bone formation, reduces inflammation and pain.

In the present investigation data was collected on tribal / folk, inherited medicinal practices and the practices of native doctors available in the remote areas. Plant treatments are being used for curing Rheumatoid arthritis successfully without any side effects.

II. Material and methods

Several field trips to the study area were made to collect information on Rheumatic arthritis practices by the aboriginal and others through interviewing local chiefs, priests, vaidyas, herbal practitioners, elderly people and educated youths. The methodology was adopted as described by Jain (1964, 1981, 1987, 1999) [1-4], Chadwick and Marsh (1994) [5], Hemadri (1994) [6] and Martin (1995) [7]. Each medicinal practice was cross checked with 3 or 4 informants. Ethnoveterinary data and the vernacular names were collected for documentation. Plants specimens were collected and identified by referring to standard Flora, viz. Hooker (1872-1897) [8], Gamble and Fischer (1915) [9], Pullaiah (1997) [10] and few other local floras.

III. Results and discussion

In the present study 100 species of plants included in 88 genera and 60 families have been recorded. *Abutilon indicum*, *Achyranthus aspera*, *Aerva lanata*, *Ailanthus excels*, *Alangium salvifolium*, *Albizia lebbek*, *Albizia amara*, *Allium sativum*, *Alpine galangal*, *Alstonia scholaris*, *Anisomeles malabarica*, *Argyrea nervosa*, *Aristolochia bracteolata*, *Asystasia gangetica*, *Atylosia scrabaeoides*, *Azadarachta indica*, *Azima tetracantha*, *Bambusa arundinaceae*, *Barlaria montana*, *Barlaria prionitis*, *Boerhavia diffusa*, *Boswellia serrata*, *Brassica napus*, *Calophyllum inophyllum*, *Capparis sepiaria*, *Capparis zeylanica*, *Cardiospermum helicacabum*, *Celastrus paniculata*, *Cissus pallid*, *Citrus aurantifolia*, *Clearodendron phlomidus*, *Cleome gynandra*, *Cleome viscosa*, *Coldenia procumbens*, *Commifera mukul*, *Crateva rox burghii*, *Cuscuta reflexa*, *Delonix alata*, *Derris indica*, *Dichrostachys cinerea*, *Dodonea viscosa*, *Dolichondron crispa*, *Echinops echinatus*, *Eucalyptus globulus*, *Euphorbia antiquorum*, *Euphorbia nivula*, *Euphorbia tirucalli*, *Gmelina arborea*, *Hibiscus planifolius*, *Holoptelea integrifolia*, *Hygrophylla auriculata*, *Lawsonia inermis*, *Leonitis neptifolia*, *Leucas aspera*, *Limonia acidissima*, *Litsia glutinosa*, *Madhuca longifolia*, *Merremia tridanta*, *Moringa concanensis*, *Moringa tomentosa*, *Nerium oleander*, *Nyctanthes arbortristis*, *Oroxylum indicum*, *Pedalium murex*, *Pergularia daemia*, *Phyla nodiflora*, *Phyllanthus emblica*, *Plumbago rosea*, *Plumbo zeylanicum*, *Premna serratifolia*, *Prosopis cineraria*, *Pueraria tuberosa*, *Ricinus communis*, *Ruta chalepensis*, *Sansevieria roxburghii*, *Semicarpus anacardium*, *Senna alexandrina*, *Senna occidentalis*, *Sesbania grandiflora*, *Simarouba glauca*, *Solanum erianthum*, *Solanum nigrum*, *Solanum surettense*, *Steriospermum suaveolens*, *Strychnos nux-vomica*, *Terminalia bellerica*, *Terminalia chebula*, *Toddalia asiatica*, *Tribulus terrestris*, *Trigonella foenum-graecum*, *Vanda cristata*, *Veronia anthelmentica*, *Vitex negundo*, *Zanthoxylum rhetsa* and *Zinziber officinalis* plant species are commonly used in rheumatoid arthritis. The in detailed information like remedies, part used, dosage and mode of preparation are presented in (Tables 1-6). Dahdouh-Guebas *et.al.* (2006) [11] Reddy & Subbaraju (2005, 2007) [12-13] Rao *et al.* (2006) [14] ,Reddy (2008a, 2008b) [15-16], Narasimha Rao and Prayaga Murty (2014) [17] and Prayaga Murty and venkaiah(2010) [18] have been worked and focused on ethnobotanical aspects in Andhra Pradesh.

Table -1: Plants are used for oral administration, act as purgatives and are very much effective in curing rheumatoid arthritis

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1.	<i>Ricinus communis</i> Euphorbiaceae Aamudamu	Seeds and roots		1 kg of fresh and clean roots of castor plants are to be pounded and to be placed in a stainless steel vessel containing 4 litres of water. To be boiled till to get finally 1 litre of decoction. This is to be filtered and to be transferred to another vessel containing 1 litre of pure castor oil and boiled till to get finally 1 litre of concentrated castor oil. This oil is given to Arthritis patients @ 10 ml. mixed in milk or Luke warm water and administered orally in the night, before bedtime daily or on alternate days for a period of 40 days. This acts as not only a purgative, but removes and drains out from all the bone joints, all the deposited salts as well as

				unwanted wastes, causing damage and inflammation. Dosage is adjusted depending on the condition of the patient.
2.	Anisomeles malabarica Lamiaceae Magabeera/Magalinga	Leaves Juice	5 to 10 ml	Juice obtained from leaves is to be mixed in the milk of she-buffalo, in Luke warm state and made into curds. The milk of a buffalo given birth to male calf is preferred. The curds thus prepared are to be mixed with rice and eaten in the morning. The vitiated "vaatham" along with all the deposited salts as well as unwanted wastes piled up in the body including free radicals causing damage and inflammation of joints due to RA are drained out completely. This process is to be repeated periodically to achieve anticipated results.
3.	Moringa tomentosa Rubiaceae Togaru	Stem Bark Powder	10 gms	Stem bark powder is to be mixed in water, 60 ml. decoction is prepared and is given orally for relieving vitiated "vaatam" and for draining out toxins from the body.
4.	Euphorbia antiquorum Euphorbiaceae Bonthajemudu	Latex or Viscous acrid milky juice	2 to 5 drops	Latex is mixed in boiled and Luke warm milk, made into curds and eaten with rice. This act as purgative, acts very much effectively on "Aama vaatham" (RA) and drains out all the unwanted salts, toxins, free radicals waste materials deposited in joints and from the body
5.	Senna alexandrina Caesalpinioideae Sunamukhi/ senna	Leaves power	3 to 10 grams	Leaf powder is to be mixed in 50 ml of water and given orally at bed time every day or on alternate days for 20 days. This acts not only as a purgative but expels all types of toxins, free radicals, "vaatham" present in arthritis patients.

Table-2: Plants that Strengthen Kidneys and help in excretion of nitrogenous waste materials, unwanted salts, and free radicals generated in R.A. patients.

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1	Boerhavia diffusa Nyctaginaceae Punarnava / tella galijeru	Whole plant powder	2 gms	The indicated powders of these 3 species are to be mixed in 60 ml of water and boiled to get decoction and given orally every day, for 40 days.
2	Abutilanum indicum Malvaceae Tutturu benda	Root powder	2 gms	
3	Aerva lanata Amaranthaceae Konda pindi	Root powder	2 gms	

Table-3: Plants used for boosting immunity, preventing and curing R. A. Effectively in the early stages

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1	Allium sativum Liliaceae Garlic / vellulli	Bulb's paste	4 clefts	These 3 ingredients are to be mixed in 100 ml of water, boiled for 10 minutes, cooled and filtered. This is to be taken early in the morning for 40 days.
2	Zinziber officinalis Zinziberaceae adrak / allam	Rhizome paste	1 cm length of rhizome (skin peeled)	
3	Citrus aurantifolia Rutaceae Acid lime / nimma	Fruits	1 fruit juice	
4	Terminalia chebula Combretaceae Karaka	Dry fruit pulp powder	1 gram	The species shown against the Sl. nos.4 to9 are to be mixed together, made into decoction and taken orally every day for a period of 3 months.
5	Terminalia bellerica Combretaceae Taani	Dry fruit pulp powder	1 gram	
6	Phyllanthus emblica Euphorbiaceae Usiri	Dry fruit pulp powder	1 gram	
7	Tribulus terrestris Zygophyllaceae palleru	Fruits powder	1 gram	
8	Pedaliium murex Pedaliaceae Enuga palleru	Fruits powder	1 gram	
9	Hygrophylla auriculata Acanthaceae	Seed powder	1 gram	

	Neeru gobbi			
10	Nyctanthes arbortristis Oleaceae Paarijaatamu	Green leaves	8 nos	Green leaves of Nyctanthus are crushed and mixed in 100 ml water. Emblica fruit powder and soaked Trigonella seeds are also to be added and boiled to get decoction. This is to be taken orally in 3 split doses in a day for 1 month.
11	Phyllanthus emblica Euphorbiaceae Vusiri	Fruit pulp powder	5 gms	
12	Trigonella foenum-graecum Faboideae Menthulu	Seeds	2 gms / 1 tea spoon soaked in water	
13	Apium graveolens Apiaceae Ajamudh, Celery	Leaves	10 ml	Leaves juice is taken orally in the morning and evening for 40 days. Leaves are cooked / fried and eaten as curry

Table-4: Successful and proven ethno botanical medicinal practices in vogue for curing rheumatoid arthritis (r.a.) - to be administered internally / orally.

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1	Oroxylum indicum Bignoniaceae Dundilum	Root powder	5 grams	Hot water infusion is to be made by mixing 5 grams of root powder in 60 ml of water and given twice in a day in 2 split doses for 15 days.
2	Moringa concanensis Moringaceae Kaaru munaga	Root juice	3 ml	For severe back pain in RA, 3 ml. of root juice is to be mixed in 50 ml. of goat's milk, add 2 grams of turmeric powder, 3 nos. Peppers powder, garlic cleft paste 1 no, mix thoroughly and given to be administered orally in the morning for 10 days. Only diet to be taken is hot rice with fried garlic and chillies powder. Extraction of Moringa root juice—Moringa roots are like tubers. Mud collected from ant hill is to be made wet and applied as a coating on the roots with a uniform thickness of about 1 cm. and sun dried and to be kept the centre of dried cow dung weighing about 500 grams and burnt. After cooling the mud coat is removed the roots are squeezed to get juice.
3	Derris indica Fabaceae Kaanuga/ Gaanuga	Root bark powder	5 grams	Root bark powder is mixed in 100 ml of water, boiled to get 60 ml decoction and administered orally every day, in two split doses for 10 days.
	Alstonia scholaris Apocynaceae Edakula paala	Stem bark powder	5 grams	Bark powder is mixed in 30 ml. of goat's milk along with peppers 3 nos. powdered + garlic cleft 1 no. paste + a pinch of turmeric powder given orally for 10 days.
5	Zanthoxylum rhetsa Rutaceae Rachha karra	Stem bark powder	5 grams	Decoction is prepared by mixing bark powder, garlic, pepper and turmeric powder in 100 ml of water boiled till to get 60 ml. of decoction, given in two split doses per day for 10 days.
6	Alpine galanga Zingiberaceae Dumpa rastram	Rhizome Paste	5 grams	Decoction is prepared rhizome paste, garlic, pepper, and turmeric powder in 100 ml of water to get 60 ml of decoction and given in two split doses daily, for 10 days.
7	Albizia lebbek Mimosaceae Dirisanamu	Stem bark powder	5 grams	Decoction prepared by mixing bark powder with garlic, pepper and turmeric powder in 100 ml. of water to get 60 ml and given in the morning and evening for 10 days.
8	Strychnos nux- vomica Loganiaceae. Musti	Seed	500 mg	Seed is very hard and contains strychnine. If consumed orally in excess quantity without proper procedure and treatment it causes harm to the body. Whereas, it is very much effective to cure R. A. 5 to 6 Seeds are soaked in 100 ml. of cow urine for 8 to 9 days. Every day cow urine is to be changed and gently heated for 5 minutes. After 9 days, Seed becomes soft enough, so that it can be punctured with a bell pin/ needle easily. Seed coat is removed and rejected. cotyledons are separated. Embryo, Radicle, plumule are to be removed from seed and to be discarded. The cotyledons are only to be taken and crushed into to paste or powder. Cotyledons powder can also be obtained by filing them with a sharp steel file. 10 mg of cotyledons powder is mixed with 500 mg of Triphala powder, 500 mg of Alpine galanga rhizome (Dumpa rastram) paste made into a pill by wetting adequately with cow urine. At the rate of 1 pill per day, to be used for 15

				days. This is an excellent treatment for RA even in the acute stages.
9	Solanum nigrum Solanaceae Kaamanchi	Leaves juice	10 ml.	Given orally by diluting with 30 ml of water per day for 15 days.
10	Semicarpus anacardium Anacardaceae Marking nut.	Bark powder	2 grams	Decoction is prepared by mixing bark powder along with garlic, pepper, turmeric powder in 60 ml of water and administered orally for 15 days.
11	Azadarachta indica Meliaceae Vepa	Bark powder	5 grams	Decoction is prepared by mixing in 60 ml of water and given orally for 40 days for curing R.A in the initial stages.
12	Leonitis neptifolia Lamiaceae yerra tummi	Whole plant powder	10 grams	10 grams of plant powder is mixed in 100 ml. of water boiled and cooled to get decoction. Given orally in 2 split doses per day for 15 days.
13.	Atylosia scrabaeoides Fabaceae Adavi vulava, kaaru kandi	Leaves powder	5 grams	Leaf powder is mixed in 60 ml of boiled cow's milk and given every day orally in the morning for 40 days.
14	Dichrostachys cinerea Mimosaceae Veluthuru chettu	Stem bark powder	1 gram	Powders of the species mentioned herein against sl. nos. 14 to 18 are to be boiled in 100 ml of water by adding a pinch of turmeric powder, 3 peppers powder, paste of 1 garlic cleft to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 10 days for excellent results even in the acute stages.
15	Capparis sepiaria capparaceae Nalla vuppi	Stem powder	1 gram	
16	Boswellia serrata Burseraceae Anduga	Stem powder	1 gram	
17	Borhaevia diffusa Nyctaginaceae punarnava/ Tell galijeru	Whole plant powder	1 gram	
18	Holoptelea integrifolia Ulmaceae Nemali naara tree	Stem bark powder	1 gram	
19	Echinops echinatus Asteraceae Brahma dandi	Root powder	0.50 gram	
20	Dolichondron crispa Bignoniaceae Neeruddi	Stem bark powder	1 gram	Powders of the species mentioned herein against Sl. nos. 19 to 23 are boiled in 100 ml of water by adding a pinch of turmeric powder, 3 peppers nos. powder, paste of 1 garlic cleft, to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 10 days.
21	Azima tetraacantha Salvadoraceae Tella vuppi	Root powder	1 gram	
22	Commifera mukul Burseraceae Guggulu	Gum resin	1 gram	
23	Prosopis cineraria Mimosaceae Jammi chettu	Stem bark powder	1 gram	
24	Steriospermum suaveolens Bignoniaceae Kaligottu/ Paadiri	Root bark powder	3 grams	
25	Limonia acidissima Rutaceae Velaga	Stem bark powder	2 grams	Powders of the species mentioned herein against Sl. nos. 24 to 26 are to be boiled in 100 ml of water by adding a pinch of turmeric powder, 3 peppers powder, paste of 1 garlic cleft, to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 15 days.
26	Solanum surettense Solanaceae Nela vakudu	Root powder	2 grams	
27	Madhuca longifolia Sapotaceae Ippa	Stem bark powder	2 grams	
28	Ailanthus excels Simaroubaceae Pedda maanu	Stem bark powder	2 grams	Powders of the species mentioned herein against Sl. nos. 27 to 29 are to be mixed in 100 ml. of water and boiled by adding a pinch of turmeric powder+ 3 peppers powder + paste of 1 garlic cleft to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 15 days
29	Barlaria prionitis Acanthaceae Mullu gorinta	Root powder	2 grams	
30	Alangium salvifolium Alangiaceae	Stem bark powder	2 grams	Powders of the species mentioned herein against sl. nos. 30 to 32 are mixed in 100 ml. of water and boiled by adding a pinch of
31	Gmelina arboria	Root bark	3 grams	

	Verbinaceae Gummadi tekku	powder		turmeric powder, 3 peppers powder, paste of 1 garlic cleft, to get 60 ml of decoction and given to R A patients every day in two split doses for 15 days
32	Solanum erianthum Solanaceae Kodi tuppa chettu	Root powder	2 grams	
33	Premna serratifolia Verbinaceae Gabbu nelli	Leaves powder	2 grams	Powders of the species mentioned herein against sl. nos. 33 to 36 are to be mixed in 100 ml. of water and boiled by adding a pinch of turmeric powder, 3 peppers powder, paste of 1 garlic cleft, to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 15 days
34	Aristolochia bracteolate Aristolochaceae Gaadida gadapa	Roots powder	2 grams	
35	Merremia tridanta Convolvulaceae Seethamma savaramu	Whole plant powder	2 grams	
36	Veronia anthelmentica Asteraceae. Adavi jeelakarra	Roots/fruits	2 grams	
37	Toddalia asiatica Rutaceae Mirapagandra	Leaves powder	2 grams	Powders of the species mentioned herein against sl. nos. 37 to 39 are to be mixed in 100 ml. of water and boiled by adding a pinch of turmeric powder, 3 peppers powder, paste of 1 garlic cleft, to get 60 ml of decoction and given to R A patients every day in the morning and in the evening in two split doses for 15 days
38	Euphorbia nivula Euphorbiaceae Aaku jemudu	Stem bark Stem bark powder	2 grams	
39	Sesbania grandiflora Fabaceae Avisa chettu	Stem bark powder	2 grams	
40	Asystasia gangetica Acanthaceae koramandalam teega	Whole plant Juice	10 ml	Leaves juice is diluted in 30 ml of water and given orally in the morning for 15 days
41	Lawsonia inermis Lythraceae Gorinta	Leaves juice	15 ml	Leaves juice is diluted in 30 ml of water and given orally in the morning for 15 days
42	Ruta chalepnis Rutaceae Sadaapaku	Whole plant juice	5 ml	Leaves juice is diluted in 30 ml of water and given orally in the morning for 15 days
43	Leucas aspera Lamiaceae Tummi	Whole plant juice	10 ml	Leaves juice is diluted in 30 ml of water and given orally in the morning for 15 days
44	Cardiospermum helicacabum Sapindaceae Budda busara teega	Whole plant juice	5 ml	Whole plant juice is diluted in 30 ml. of water and given orally in the morning for 15 days.

Table-5: Plants used for external applications for pain relief in Rheumatic arthritis patients

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1	Ricinus communis Euphorbiaceae Castor, Aamudam	Pure seed oil + Root extract	1 kg. 1 lit.	As explained in this document under Arthritis, castor oil + root extract is to be boiled to get 1 lit. of concentrate, and applied every day on the painful joints.
2	Vitex negundo Verbinaceae Vaavili	Leaves		1 kg. of vitex negundo leaves are to be pounded, mixed in 4 lits.of water in a earthen vessel. Boiled till 4 lits.of water become to 1 litand filtered. This solution is to be mixed in 1 lit. of gingelly oil in another vessel and boiled to get finally one lit of the concentrated oil. 10 to 15 grams of pepper powder is added to this. This is applied every day on painful joints of Arthritis.
3	Dodonea viscosa Sapindaceae	Leaves		1 kg. of Dodonea leaves are to be pounded, mixed in 4 lit.of water in an earthen vessel. Boiled till 4 lits. of water become to 1 lit.and filtered. This solution is to be mixed in 1 lit.of gingelly oil in another vessel and boiled to get finally one lit.of the concentrated oil. This is applied every day on painful joints of Arthritis. Dodonea leaves can also be pounded and tied around painful joints with a thin cloth.
4	Celastrus paniculata Celastraceae Jyothishmathi/ Malkangani	Seed		Oil extracted from the seed is applied on painful joints of arthritis.
5	Litsia glutinosa Linaceae	Seed		Oil extracted from the seed is applied on painful joints of arthritis

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Naramamidi				
6	Simarouba glauca Simaroubaceae	Seed		Oil extracted from the seed is applied on painful joints of arthritis
7	Barlaria montana Acanthaceae Mulu gorinta	Leaves juice		Leaves juice is applied gently on painful joints of arthritis.
8	Calophyllum inophyllum Clusiaceae Ponna chettu	Seed		Oil extracted from seed is applied gently on painful joints of Arthritis
9	Allium sativum liliaceae Garlic/ vellulli	Bulbs		400 gm. Of garlic bulbs paste is mixed in 1 lit of boiling gingili oil stirred thoroughly on the fire for 5 minutes put off fire, allowed to be cooled and applied daily on painful joints of arthritis.
10	Ruta chalepensis Rutaceae Sadapaku	Whole plant		Oil extracted from whole plant is applied on the painful joints.
11	Pinus sps Pinaceae	Resin		Resin obtained from stem bark is applied on the painful joints.
12	Brassica napus Brassicaceae Canola/ Aavalu	Seed		250 grams of canola oil is taken in a glass bottle keep it aside. B) In a separate glass bottle keep 100 grams of pure camphor lump, an extract of cinnamomum camphora (karpuram) + Menthol crystals of Mentha species(pudina puvvu) + Vaamu puvvu, crystals of the extract of Trachyspermum ammi, together. A chemical reaction takes place and Within 10 minutes these three solids will become a liquid. Add A+B = To get an excellent oil, and application of same externally gives relief for all the rheumatic pains. OR A and B may be used separately.
13	Cissus pallida Vitaceae Adavi gummadi	Roots	50 grams	Bruised roots are applied on swellings of arthritic joints
14	Cleome viscosa Cleomaceae Vaaminta	Leaves and fruits	25 grams	Leaves along with fruits are to be made into paste and applied on the painful joints
15	Cleome gynandra Cleomaceae Tella vaaminta	Leaves and fruits	25 grams	Leaves along with fruits are to be made into paste and applied on the painful joints
16	Cuscuta reflexa Cconvulvaceae Bangaaru teega, chetla meeda paachi	Whole plant	50 grams	Whole plant's paste is applied and bandaged on painful joint
17	Vanda cristata Orchidaceae Badanika, kodi kalla chettu	Whole plant	50 grams	Whole plant's paste is applied and bandaged on painful joint
18	Argyrea nervosa Convolvulaceae Samudra paala	Leaves	100 grams	Leaves are made into paste and bandaged on the painful joints.
19	Merrima tridanta Convolvulaceae Seethamma vaari jada	Whole plant	100 grams	Whole plant is made into paste and applied on painful joints
20	Achyranthus aspera Amaranthaceae Vuttareni	Whole plant	100 grams	Whole plant is made into paste and applied on painful joints
21	Cardiospermum helicacabum Sapindaceae vekkudu teega	Whole plant	100 grams	Whole plant is made into paste and applied on painful joints
22	Delonix alata Caesalpinaceae Sunkesula	Leaves	100 grams	Leaves paste is applied on the painful joints.
23	Crateva burghii Capparidaceae Isuka raasi	Leaves	100 grams	Leaves paste is applied on the painful joints.
24	Euphorbia tirucalli Euphorbiaceae kaada jemudu, sanna jemudu	Latex		Latex of this plant is applied externally
25	Abutilon indicum Malvaceae Tutturu benda	Leaves	100 grams	Leaves paste is applied externally
26	Codenia procumbens Boraginacea Cheppu tattaku	Leaves	100 grams	Leaves paste is applied externally
27	Commifera mukul	Resin	5	Gum resin mixed with zingiber officianalis rhizome paste is

	Burseraceae Guggulu		grams	applied externally on the painful joints.
28	Pergularia daemia Asclepiadiaceae Dustapaaku	Whole plant paste	25 grams	Whole plant's paste is mixed with turmeric powder and applied externally on painful joints of arthritis
29	Nerium oleander Apocynaceae Tella ganneru	Leaves		Leaves paste is applied externally on painful joints.
30	Plumbo zeylanicum Plumbaginaceae Tella chitramulam	Leaves		This plant is a Vesicant and applied in acute conditions.
31	Plumbago rosea Plumbaginaceae Yerra chitramulam	Leaves		This plant is a Vesicant and applied in severe/acute conditions.
32	Holoptelia integrifolia Ulmaceae Nemali naara	Leaves		Leaves are vesicant. Leaf is dipped in water for a while and placed on knee/ painful joint and bandaged in severe and acute condition.
33	Sansevieria roxburghii Agavaceae	Leaves juice		Leaves are gently heated on fire and squeezed to get juice and applied on painful joints.
34	Calotropis gigantea Asclepiadaceae Jilledu	Leaves	200 Grams.	500 ml of raw Gingelly seed oil is poured in earthen / stainless less steel vessel or kadai, heated well on fire, pounded calotropis leaves are added in the heated oil. Heating is to be continued for few minutes till the leaves turn grey in colour. Fire is put off, oil is allowed to cool, screened and the oil is applied externally on the painful joints and muscles.
34	Pueraria tuberosa Fabaceae Nela gummudu	Fabaceae	50 grams	The plant parts shown against sl. nos 34 and 35 are made into a paste and applied externally on painful joints of Arthritis.
35	Brassica juncea Braicaceae Mustard	Seed	5 grams	
36	Capparis zeylanica Are donda	Leaves	15 grams	Leaves paste is mixed with egg white yolk, poultice is prepared and applied on painful joints of Arthritis
37	Phyla nodiflora Verbinaceae Jala pippali/ Neeti pippali	Whole plant	50 grams	Whole plants paste is applied on painful joints of Arthritis.

Plants used for relieving pains through hot water herbal bath

The following plants provide immediate relief from all types of body pains, like pains of Arthritis, pains of all limbs of body, Back pain, Knees pain and also muscular pains caused due to lactic acid secretion, in excess, resulted from out of physical exertion. A medicated bath is to be taken in the evening i.e., at the end of the day, with hot water containing the infusions of the indicated plants, to the maximum bearable temperature. This is very much effective and by this, a person can get immense relief from all types pains for a period of 1 to 3 days, without using harmful pain killers

Table-6: Plants used for relieving pains through hot water herbal bath

S. No.	Name of the species Family Local name	Part used	Dose	Method of Preparation and usage
1	Vitex negundo verbinaceae vaavili	Leaves	1 kg	About 20 lits. Of water is to be boiled in a vessel by mixing about 1 kg of green leaves in the water and taken hot water bath to get immediate relief.
2	Bambusa arundinaceae/	Leaves	1 kg	About 20 lits. Of water is to be boiled in a vessel by mixing about 1 kg of green leaves in the water and taken hot water bath to get immediate relief.
3	Azadirachta indica Meliaceae Neem	Leaves	1 kg.	About 20 lits. of water is to be boiled in a vessel by mixing about 1 kg of green leaves in the water and taken hot water bath to get immediate relief
4	Eucalyptus sps	Leaves	1 kg	About 20 lits. of water is to be boiled by mixing about 1 kg of green leaves in the water and taken hot water bath to get immediate relief
5	Abutilon indicum Malvaceae Tuthuru benda	Leaves	0.5 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 500 grams of leaves and taken bath to get immediate relief
6	Senna occidentalis Caesalpinaceae Kasinda	Leaves	0.5 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 500 grams of leaves and taken hot water bath to get immediate relief
7	Dodonaea viscosa Sapindaceae Bandedu	Leaves	1 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 1 kg of green leaves and taken hot water bath to get immediate relief
8	Achyranthus aspera	Whole	1 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 1

	Malvaceae Vuttareni	plant		kg of green leaves and taken hot water bath to get immediate relief
9	Hibiscus planifolius Malvaceae Konda pratti	Leaves	1 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 1 kg of green leaves in the water and hot water bath is taken to get immediate relief
10	Clearodendron phlomidus Verbenaceae Takkali	Whole plant	1 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 1 kg of green leaves and hot water bath is taken to get immediate relief
11	Cardiospermum helicacabum Sapindaceae. Vekkudu teega	Whole plant	0.5 kg	About 20 lits. of water is to be boiled in a vessel by mixing 500 grams of green leaves and hot water bath is taken to get immediate relief
12	Albizzia amara Mimosaceae Cheekireni/ chigara	leaves	1 kg	About 20 lits. of water is to be boiled in a vessel by mixing about 1 kg of green leaves and hot water bath is taken to get immediate relief. Soap need not be used for this bath.

IV. Conclusion

In view of the larger interest and the wellbeing of Rheumatic arthritis effected patients and to prevent their sufferings, pharmacognostic studies are to be conducted extensively in depth to identify the principle compounds available in ethno botanical plant species which are not yet covered.

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