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A Comprehensive Review on Anti-Arthritic Medicinal Plants

		
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ABSTRACT

Arthritis is an autoimmune disease and it is chronic inflammation. It mainly affects the joints. The current pathophysiology is not known. There are various medicines and therapies are available but proper treatment is not available. Medicines such as DMARDs and NSAIDs are used in the treatment of arthritis but they have many side effects and these are very costly. So researchers are working for the alternatives treatment for arthritis. The idea of medicinal plants may be useful. There are various medicinal plants which have the potential of good antiarthritic activity. In India, there are many medicinal plants are used in different forms of treatment of Medicinal plants are widely used to treat and prevent arthritis. The main objective of this review article is to reveal the information of medicinal plants which have significant anti-arthritis activity. So here the possible mechanism of action of medicinal plants are also discussed.

INTRODUCTION

Arthritis is a chronic, inflammatory and auto-immune disease. It is a long term inflammation of joints. It can also affect the other organ of body like muscles, skin and heart. Arthritis is an inflammation of the joints. It can affect one joint or multiple joints. The symptoms of arthritis disease are stiffness, fatigue, immobility of joints, swelling and muscle weakness. It is occurring in women more than men. There are many types of arthritis are existing such as rheumatoid arthritis, osteoarthritis, gouty arthritis, fibromyalgia, Ankylosing spondylitis etc. Mainly people are suffering from rheumatic arthritis and osteoarthritis. Most of the cases of arthritis are getting these types and some people are also suffering from gouty arthritis. Prevalence is found to be two to three times higher in women over the age of 40 years than the man. Immune cells stimulate the production of various pro-inflammatory markers such as tumour necrosis factor- α (TNF- α) and interleukin (IL-6) and increase the severity of disease. The pathophysiology of RA involves several pathways such as mitogen-activated protein kinase (MAPK), nuclear factor-kappaB and Janus kinase (JAK)-signal transducer and activator of transcription (JAK/STAT pathway). There are some allopathic medicines such as Non-steroidal anti-inflammatory drugs (NSAIDs, examples- aspirin, ibuprofen, diclofenac etc.), corticosteroids (hydrocortisone, cortisone, etc.) and disease modifying anti-rheumatic drugs (sulfasalazine, methotrexate, etc.) which are used in the treatment of arthritis. But they have major side effects and prolonged use of these drugs, they lead to adverse effects and many severe cases. People cannot afford these medicines because they are very expensive. Natural products may become very useful and promising resources for the development of pharmaceutical products and therapeutic agents. India is a country which has the rich source of natural products because India has many varieties of herbal and medicinal plants. Researchers are researching on natural products globally. So the motive of this review we explored the medicinal plants which are exposed to have good anti-arthritic activity by through the literature survey.

MATERIALS AND METHODS

The work of this review was accomplished by over seeking of many research articles from various journals from Science Direct, PubMed, Google Scholar etc. We possessed the articles endorsed plants which are having good anti-arthritic activity.

Cuscuta reflexa

It is a parasitic plant, belonging to the family Convolvulaceae. It contains many phytoconstituents like cuscustin, lycopene, lutein, cuscotalin, sitosterol, mannitol, hyperoside, dulcitol etc. It has many pharmacological properties like antioxidant, antidiabetic, neuroprotective and anti-inflammatory activity. Alamgeer *et al* investigated that *Cuscuta reflexa* extract has the potential to inhibit the symptoms like paw oedema, swelling, redness etc. of arthritis. Their investigation proved that the *Cuscuta reflexa* has the anti-arthritis activity. Venilla *et al* suggested that the methanolic extract of *Cuscuta reflexa* showed the antiarthritic activity against the denaturation of proteins. Kumaraswamy *et al* proposed the antiarthritic activity of ethanol extract of this plant and it reduced the symptoms of arthritis (body weight and paw oedema) against the CFA induced arthritis in rats. The result possessed that the ethanol extract of *Cuscuta reflexa* showed the significant effect on the biochemical parameters such as erythrocyte sedimentation rate (ESR), red blood cells (RBC), haemoglobin and white blood cells (WBC). They observed all the biomarkers of arthritis increased significantly so the result concluded that this plant has the potential of antiarthritic activity.

Asparagus racemosus

It is very effective medicinal plant, used in traditional medicinal belonging to family Asparagaceae. It is an Asian plant which is found in Sri Lanka, Nepal and India. It has many useful chemical constituents such as Steroidal saponins, shatavaroside B, shatavaroside C, schidigera saponin D5, shatavaroside, afiliasparoside C, Shatavari's and immune side. It has many pharmacological properties like antioxidant, antidiarrheal, antibacterial, antiprotozoal, adaptogenic, cardioprotective, anticancer, antitussive and anti-inflammatory property. Dixit *et al* proposed that the hydroalcoholic extract of this plant have significant antiarthritic activity against the carrageenan induced paw edema and complete Freund's adjuvant (CFA) induced arthritis. They got the body weight was increased and paw volume was decreased significantly. They concluded that *Asparagus racemosus* has significant antiarthritic activity.

Boswellia serrata

It is very useful plant which is mainly found in India (Punjab region), belongs to family Burseraceae. It is commonly known as Indian olibanum and salai guggul and in Sanskrit, it is known as sallaki. It consists of various types of chemical constituents like 11-keto- β -boswellic acid, acetyl-11-keto- β -boswellic acid, acetyl- β -boswellic acid and β -boswellic acid. It has many pharmacological properties like antidiarrheal, antifungal, antiasthmatic, antihyperlipidemic and anti-inflammatory property. Kumar *et al* evaluated the antiarthritic activity of *Boswellia serrata* extract against CFA induced arthritis in rats. They reported that *Boswellia serrata* extract showed significant improvement in body weight, decrease in diameter of ankle, paw volume and inflammatory parameters also reduced.

Piper longum

It is an antique plant which is also known as Indian long pepper and pipli, belongs to family Piperaceae. It is also used as food supplements. It contains many phytoconstituents such as piperlonguminine, piperine, methyl 3, 4, 5-trimethoxycinnamate and piperlongunine. It has many pharmacological properties like antifungal, antiulcer, antibacterial, antiplatelet, hepatoprotective, anticancer, anti-obesity, antiasthmatic and antidepressant properties. Yende *et al* evaluated the antirheumatic activity of aqueous extract of *Piper longum* against CFA induced arthritis in rats. They reported that the extract of this plant showed significant reduction in paw swelling and also reduction in symptoms of arthritis.

Coriandrum sativum

Coriandrum sativum is an annual herb plant which belongs to family Apiaceae/ Umbelliferae. Every parts of this plant such as seeds, leaves and fruits are very useful and it is used as smell and taste materials in food supplements. It contains volatile oil and many useful chemical constituents like camphor, γ -terpinene, limonene, r-cymene, linlyl acetate, myrcene, camphene, a-pinene, geranyl acetate. It is revealed that *Coriandrum sativum* showed many pharmacological activities such as anticonvulsant, insecticidal, antioxidant, antidiabetic, hepatoprotective, antimutagenic, analgesic, antifungal, neuroprotective, antidepressant, cardiovascular, anti-inflammatory and antibacterial activities. Nair *et al* revealed the antiarthritic activity of this plant. They investigated antiarthritic activity of the hydroalcoholic extract of *Coriandrum sativum* against the formaldehyde and CFA induced models in male wistar rats and they got the significant reduction in paw volume and inhibition of the pro-

inflammatory cytokines and TNF- α . Their study proved that *Coriandrum sativum* has the antiarthritic activity.

Abutilon hirtum

Abutilon hirtum is a small shrub belongs to family Malvaceae. It is native to tropical and subtropical regions and in India, it is mostly found in Tamil Nadu and Karnataka. It contains many useful chemical constituents like elemene, α -cineole, geraniol, farnesol, borenol, endesmol, α -pinene, caryophyllene and geranyl acetate. Deshpande *et al* performed the antiarthritic activity of this shrub. They used the aqueous extract of this shrub and found that the extract decreased the symptoms of arthritis. Prasanna *et al* also reported the antiarthritic activity of this shrub. They used the aqueous extract of areal part of this shrub against the denaturation of proteins method and they got the significant effect. Result concluded that the aqueous extract of this shrub decreased the symptoms such as redness, swelling, pain, warmth and immobility.

Caesalpinia pulcherrima

It is a flowering and very useful plant belongs to family Fabaceae. It has many phytochemical constituents such as aspartic acid, valine, threonine, leucine, proline, alanine and glycine. It has some important pharmacological properties such as anticancer, antioxidant, antidiabetic, anti-inflammatory and antimicrobial. Rajaram *et al* reported that ethanolic extract of this plant significantly reduce the paw volume and it also effects the haematological abnormalities against the complete Freund's adjuvant method in rats and the result concluded that *Caesalpinia pulcherrima* showed powerful antiarthritic activity.

Cinnammomum zeylicanium

It is an evergreen tree belongs to family Lauraceae. Mainly, it grows in Myanmar, Sri Lanka and India. It contains many phytoconstituents like cinnamyl acetate, eugenol, L-borneol, β -caryophyllene, trans-cinnamaldehyde, α -terpineol, α -thujene, α -cubebene, E-nerolidol, cinnamate and cinnamic acid. It showed several pharmacological activities such as antidiabetic, anti-pyretic, analgesic, antioxidant, anticancer etc. Vetal *et al* revealed that polyphenolic extract of the bark of *Cinnammomum zeylicanium* showed the antiarthritic activity against CFA method in rats.

Ruta graveolens

Commonly it is known as rue, common rue or herb-of-grace. It is an antique herb and plant, native to Balkan Peninsula. It belongs to family Rutaceae. It contains many important phytoconstituents such as rutin, graveoline, epoxide, coumarins, quercetin, genyrene, etc. It showed many pharmacological activities like antiandrogenic, analgesic, anticancer, antihyperglycaemic and anti-inflammatory etc. Ratheesh *et al* revealed antiarthritic activity of methanolic extract of the aerial part of this plant in wistar rats against CFA model. The result showed that the methanolic extract of this plant reduced ceruloplasmin, lipid peroxidation, release of inflammatory mediators and inhibition of prostaglandins synthesis.

Trigonella foenum graecum

It is also known as fenugreek and used as traditional medicine. It belongs to family Fabaceae. It is commonly known as methi in India and it is used as food ingredients. All parts of this plant are very useful. Seeds of this plant are the most usable part. It has very effective phytochemical constituents such as trigonelline, campesterol, stigmasterol, β -sitosterol, Quercetin, luteolin, vitexin, orientin, isoorientin, vicenin-1, vicenin-2, naringenin, kaempferol, 7,4'-dimethoxyflavanone, etc. The extract of this plant has various pharmacological activities like anticancer, antifungal, anti-inflammatory, antioxidant, antiulcer, hepatoprotective, antibacterial etc. Sindhu *et al* revealed that the mucilage of this plant has significant antiarthritic activity. They used it against CFA model and they got the significant inhibition in paw volume and inflammations were also cured. Another study is revealed by Suresh P *et al*, they revealed the ethanol extract of this plant has significant antiarthritic activity. They investigated the ethanol extract against CFA model on albino rats. They found the significant effect of inflammatory markers such as TNF- α , interleukins and RBC, WBC and haemoglobin also showed the significant result.

Lawsonia inermis

It is a flowering plant; it is commonly known as henna tree. Native countries are such as Northern Africa, Asia and Northern Australia. It belongs to family Lythreaceae. It contains some phytoconstituents such as isoplumbagin lawsoniaside, syringinoside, daphneside, agrimonolide 6-O- β -D-glucopyranoside, hennadiol, lawnermis acid, lawsone etc. It is reported that this plant showed the potential such as antibacterial, anticancer, antidiabetic, antiviral, antifungal, wound healing and anti-inflammatory activities. Kore K. J. *et al*

revealed that significant antiarthritic activity of this plant. They used the hydroalcoholic extract of *Lawsonia inermis* against CFA and formaldehyde induced arthritis. And they found this extract showed the significant inhibition in paw volume and other arthritic symptoms. One more study is reported by Kadhem H., he revealed that ethanolic extract of *Lawsonia inermis* against CFA induces arthritic rats. And it showed the significant inhibition in paw diameter and also showed the significant elevation of the SGOT, SGPT, ALP decreasing with TP level.

Allium sativum

It is mostly used for food materials. It is also known as garlic. It is native to Central Asia and northeastern Iran. It belongs to family Amaryllidaceae. All parts of this plant are very useful but the bulb is the most usable part of this plant. It consists of various types of chemical constituents such as allicin, ajoenes (E-ajoene, Z-ajoene), diallyl disulphide, allin, vinylidithins, diallyl trisulfide, S-methyl cysteine-sulfoxide, quercetin etc. Pareek S *et al* revealed that the derivatives of *Allium sativum* significant managed the symptoms of arthritis. Result concluded that allicin decreased the levels cytokines, nitrous oxide, prostaglandins E₂, matrix metalloproteinase-13, IL-6, IL-8, TNF- α and NF-KB mitogen-activated protein kinase and increased the levels of heme oxygenase-1 enzyme and cycle proteins (D1, CDK4 and CDK6). The levels of MMP-1,3,13, cox1, cox2, ROS, JNK & P38 phosphorylation inhibited and levels of heme oxygenase-1, NAD(P)H quinine oxidoreductase, glutathione S-transferase-P1, superoxide dismutase-1 and glutathione peroxidase were increased significantly by diallyl sulphide or diallyl disulphide. And the levels of amyloid genesis and NF-KB were decreased by thiacremonone and the levels of NF-KB, nitric oxide, prostaglandin E₂, TNF- α , IL-6, IL-1 β were decreased by ajoene.

Citrullus colocynthis

It has many common names such bitter apple, desert gourd, colocynth, wild gourd, vine of sodon or bitter cucumber. Asia, Basin and Mediterranean are the native places of *Citrullus colocynthis*. It belongs to family Cucurbitaceae. All parts of this plant are useful. It has various essential chemical constituents such as glycosides, tannins, flavonoids, alkaloids, steroids, Cucurbitacin A, B, C, D, E, anthranol etc. It showed many types of pharmacological properties such as antimicrobial, antidiabetic, antioxidant, anticancer, analgesic, anti-inflammatory etc. Vetrivelan V *et al* revealed antiarthritic activity of hydro-alcoholic extract

of fruits of this plant against the collagen induced arthritis model. It showed the significant inhibition of TNF- α and IL-6. It showed effective decrease in blood glucose level and also reduce the paw volume.

Xanthine strumarium

Commonly, it is called as broad bur or cocklebur. It is a flowering plant which is native to Eastern Asia and Americas. It belongs to family Asteraceae. This plant contains very active phytoconstituents such as xanthine, xanthatin, xanthinol, linoleic acid, hydroquinone, α and γ -tocopherol, xanthumin, xanthanolides, isoxanthol, xanthinosin, xanthostrumarin etc. Many pharmacological properties such as antifungal, antibacterial, antimalarial, anticancer etc. have been reported. Patil MV *et al* revealed that the ethanolic extract of *Xanthine strumarium* produced essential antiarthritic activity. Result showed that ethanolic extract of this plant inhibit the inflammatory markes.

Vitex negundo

It is known as nisinda, Chinese chaste tree, horseshoe vitex or five-leaved chaste tree. It belongs to family Lamiaceae. The chief phytoconstituents of *Vitex negundo* are such as vanillic acid, vitamin C, nishidine, phthalic acid, β -sitosterol, benzoic acid, luteolin-7-glucoside, iridoid glycosides etc. It showed various therapeutic activities such as analgesic, antioxidant, anticonvulsant, antipyretic, astringent, antiseptic, anti-inflammatory etc. Devi PR *et al* revealed the leaf extract of *Vitex negundo*, it showed a significant change in G6PD, CAT and GPx against the CFA induced arthritic rats. Pandey *et al* reported that ethanolic extract of this plant showed the antiarthritic activity and they got the significant decrease in the levels of PGE₂, cytokines, IL-17, TNF- α , ESR etc.

Lantana camara

It is ornamental plant, commonly known as wild-sage, big-sage, red-sage, korsu wiri, tick berry, Indian lantana and gu phool. It belongs to Verbenaceae. *Lantana camara* consists of very essential phytoconstituents like germacrene, limonene, α -zingiberene, α -phellandrene, germacrene-D, β -caryophyllene, α -humulene, sabinene, lentadenes A, B, C, D, camarin, lantacin, camarinin, theveside, hederagenin, camarilic acid, lamiridoside etc. It consists of important pharmacological properties such as antiasthmatic, antiulcer, antidiabetic, antioxidant, antifungal, antibacterial, wound healing and anti-fertility. Vennila V *et al*

revealed the antiarthritic activity of aqueous and methanolic flower extract, it showed the significant inhibition denaturation of proteins. This study possessed that the methanolic extract showed better antiarthritic activity than aqueous extract. Another study was reported by Gundamaraju *et al*, they investigated the ethanolic extract of leaves of this plant and they found that extract has potential to inhibit the cyclooxygenase and lipoxygenase.

Withania somnifera

It is very useful plant. Commonly it is known as ashwagandha, winter cherry, Indian ginseng, or poison gooseberry. It is mainly cultivated in drier regions of India and also found in China, Yemen and Nepal. It belongs to family Solanaceae. It contains active phytochemical constituents such as withanosides, withanolides, isopelletierine, anahygrine, saponins, sitoindosides VII-X, acylsterylglucosides, anaferine, withaferin-A, 5-dehydroxy withanolide-R, withasomniferin-A etc. It contains many pharmacological activities like antistress, immunomodulatory, antidiabetic, cardioprotective, neuroprotective etc. There are many studies have done to evaluate the antiarthritic activity of *Withania somnifera*. Gupta A *et al* evaluated the antiarthritic activity of this plant and they observed that *Withania somnifera* significantly inhibits the inflammatory markers and improves the symptoms of arthritis. Khan MA *et al* also evaluated the antiarthritic activity of aqueous extract of *Withania somnifera* against Collagen Induced Arthritic (CIA) rats. This aqueous extract showed the increased in levels of TNF- α , IL-1 β , IL-6 and IL-10. Rasool *et al* also revealed the antiarthritic of this against CFA arthritic rats.

Curcuma longa

It is commonly known as turmeric and it is a flowering plant. This is very essential for cooking. This plant is using for more than 1000 of years. It is mainly used in Siddha medicine, Ayurveda, traditional Chinese medicine and Unani. It is yellow in colour and hard in nature. It belongs to family Zingiberaceae. It has many active phytoconstituents such as curcumin, bisdemethoxycurcumin and demethoxycurcumin, bisabolol 3, curcumenone, 5-epoxide, 10-diene 2-one, bisacurone, curcumenol, 4-hydroxybisabolol-2, procurcumadiol, arturmenone, epiprocurcumenol etc. Therapeutically it showed various activities such as antioxidant, hypolipidemic, hepatoprotective, antidiarrheal, antitumor, anticancer, antibacterial, anti-inflammatory, immunomodulatory, anti-diabetic, wound healing etc. There are many studies are reported on antiarthritic of this plant. Akuri MC *et al* evaluated the

antiarthritic activity of this plant and they got that plan reduced the pro-inflammatory markers TNF- α , IL-1 β , IL-6, IL-8. And also decreased the inflammatory process by reducing ROS production. A study is evaluated by Huang G *et al* that curcumin protected against collagen induced arthritis. Arora R *et al.* revealed that curcumin has the significant potential pain inhibitor in arthritis. Another study is evaluated by Nonose *et al.* that curcumin has given through oral route and it showed effective reduced inflammation in zymogen induced arthritis.

Strychnos potatorum

Commonly it is known as clearing-nut tree. Seeds of this plant are used in traditional medicine. It belongs to family Loganiaceae. It is used in the purification of water in Myanmar and India. It contains many phytochemicals such as loganin, mannose, lignoceric, stigmasterol, linoleic, oleic, stearic acid, brucine, sucrose etc. Various types of pharmacological properties have been reported of this plant like antidiabetic, antiulcer, antioxidant, hepatoprotective, anti-inflammatory, diuretic, antidiarrheal etc. The antiarthritic activity of aqueous extract of *Strychnos potatorum* against CFA induced arthritic rats performed by Ekambaram S *et al.* and they gave the 200mg/kg dose orally to the rats. Result concluded the significant reduction in paw volume and body weight also increased. The elevated levels of biochemical parameters (serum creatinine, acute phase proteins, blood urea & total proteins) and haematological parameters (ESR, WBC, RBC &Hb) were significantly brought back to normal after oral administration of aqueous extract of this plant.

Cyperus rotundus

Africa, southern Asia and southern and central Europe are native to this plant. Commonly it is known as java grass, purple nutsedge, coco-grass, nutgrass or red nutsedge. It is used in folk medicine, foods etc. It belongs to family Cyperaceae. There are lots of phytoconstituents of this plant like rotundane, guaine, cadinane, cyperene, protocatechuic acid, p-cymene, verbenone, eudesmane, khellin, triclin, cadinane etc. Several pharmacological activities are reported such as insecticidal, antiparasite, antibacterial, neuroprotective, analgesic, antipyretic, anti-inflammatory, anticancer, antioxidant, antidiabetic, hepatoprotective etc. Biradar S *et al* evaluated the antiarthritic activity of this plant against the formaldehyde induced arthritis in rats. The result showed the significant inhibition in paw oedema.

Bacopa monnieri

It is used in Ayurveda for many years. *Bacopa monniera* is perennial and creeping herb. Natives of this plant are Africa, North & South America, Europe, Asia, Australia, wetlands of southern and eastern India. Herb of grace, water hyssop, thyme-leafed gratiola, brahmi and Indian pennywort are the common names of *Bacopa monnieri*. *Bacopa monnieri* contains many phytoconstituents such as herpestine, nicotine, brahmine, stigmasterol, betulinic acid, jujubogenin, pseudojujubogenin, bacopasides I, II, III, IV, and V etc. Several pharmacological properties of this plant has been observed such as antidepressant, anxiolytic, antiparkinsonian, anticonvulsant, antioxidant, antimicrobial, anti-inflammatory etc. It is reported by Simon JP *et al* that this plant showed the antiarthritic activity of this plant against the MSU induced arthritis in female rats. It showed the inhibition in paw volume and other arthritic symptoms.

Alangium salvifolium

Alangium salvifolium is a flowering plant. Commonly it is known as sage-leaved alangium. It is found in drier areas, low hills and roadsides in India. Several phytochemicals constituents such as alangicine, alamaridines, marckidine, marckine, alangidiol, cephaeline, alangiside, venoterpine, deoxytubulosine, emetine, tubulosine, akoline, lamarkine, alangium A, alangium B. Astringent, antipyretic, expectorant, hepatoprotective, emetic, antimicrobial, anticancer, laxative etc., there are the pharmacological properties of this plant reported. Jubie s *et al* investigated the antiarthritic activity of various chemical extract such as petroleum ether, methanol extract, ethyl acetate, chloroform and aqueous extract of *Alangium salvifolium* against the CFA induced arthritic rats. From the result, we got paw volume inhibition.

Alpinia galanga

It is an important plant. It belongs to family Zingiberaceae. It is also known as blue ginger, lengkuas and greater galangal. It has several phytochemicals such as 8-cineol, galangin, β -pinine, α -pinine, α -bergamotene, β -farnesene, β -bisaabolene etc. There are many pharmacological activities which are reported like antidiabetic, antifungal, immunomodulatory, hepatoprotective, antioxidant, anticancer and antiulcer. The chloroform, petroleum ether and alcoholic extract have the antiarthritic potential, this study was carried out by Chandur U *et al* and they reported these extract showed the significant inhibition in paw oedema against the CFA induced arthritic rats.

Cocculus hirsutus

It is commonly known as patalgarudi and broom creeper. Native countries of this plant are India, Pakistan and tropical Africa. It belongs to family Menispermaceae. It consists of many chemical constituents such as cohirsinine, haiderine, jamtinine, cohirsine, hirsutine, shaheenine etc. It has various types of pharmacological activities such as anti-inflammatory, antimicrobial, antidiabetic and immune stimulant. Tirkey R *et al* evaluated the antiarthritic activity of ethanol leaf extract of this plant against the CFA and formaldehyde induced arthritis in rats. The result showed the effective reduction in paw volume, so it means this plant has the potential of antiarthritic activity. One more study is reported by Bothara SB *et al*, this study was carried out for the antiarthritic activity of aqueous and methanolic extracts of *Cocculus hirsutus*. The result concluded that both extracts showed the inhibition in paw volume and swelling. And the haematological parameters such as RBC, ESR and total WBC count also elevated. Methanolic extract showed better antiarthritic activity than aqueous extract. Another study is reported by Arya D *et al*, in this study they investigated the methanolic extract for anti-inflammatory against HRBC membrane stabilization method and antiarthritic activity against protein denaturation method. Result concluded that this plant has antiarthritic activity and as well as anti-inflammatory activity also.

Anisomeles malabarica

It is native to Bangladesh, Pakistan, Sri Lanka, Indonesia, Malaysia, Thailand, Anman & Nikobar, Mauritius and New Guinea. It belongs to family Lamiaceae. Many pharmacological properties of this plant such as antiepileptic, antioxidant, antibacterial, anticancer, antispasmodic have been reported. Ismail S *et al* revealed the antiarthritic activity of some extracts such as petroleum ether, aqueous extract, ethyl acetate extract and ethanol extract of this plant and these extract showed the antirheumatic potential. And he also reported the methanolic extract showed significant inhibition in paw volume and increase the body weight in another study.

DISCUSSION

From many years, there are various plants are used for different kind of diseases because its natural quality and effectiveness. Various herbs are eliminated as effective & safest treatment for many diseases. Here, we introduced the medicinal plants which show significant antiarthritic activity. We introduced 25 medicinal plants in this review. These plants are

reported and investigated for their antiarthritic activity. We introduced plants which have antiarthritic activity not in India even all over world in this review. And these plants have the potential to inhibition of pro-inflammatory markers such as TNF- α , NF-KB, cytokines and also decreasing the levels of interleukins. There are various plants such *Coriandrum sativum*, *Withania somnifera*, *Boswellia serrata*, *Curcuma longa* etc. have been discussed in this review article.

CONCLUSION

There are various plants which are used in various form in traditional medicine of India. Currently, investigation for antiarthritic activity of various plants leads to the development of different natural therapies for some purpose. So, this review article may be very useful for reveal the information of medicinal plants which have significant antiarthritic property. Totally, we discussed 25 medicinal plants in this review article which have significant anti arthritic activity. Here, the information around the medicinal plants and their extracts are described and may be very helpful for further research on arthritis.

CONFLICT OF INTEREST

None



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