

Anti-arthritic activity of some medicinal plants: A review

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ABSTRACT

Arthritis is a chronic, inflammation, systemic autoimmune disease categorized by swelling and stiffness. In the normal knee joint, the synovium consist of synovial membrane and underlying loose connective tissue. Prostaglandins formed by the cyclo-oxygenase enzyme are important mediators of inflammation in arthritis. Localized bone loss in the form of bone erosion and peri- articular osteopenia constitute important sign for the diagnosis of rheumatoid arthritis. Allopathic medications have been prescribed to elevate symptoms of this disease which results into associated side effects it produced . The herbal medicines are more and more popular because of less side effects due to toxicity of allopathic medicines. The plants are one of the important sources, still maintains its original place in the treatment of various diseases, including arthritis, with minimum side effects. This paper reviews the efficacy of some valuable herbs that have a history of human use and their anti-inflammatory or anti-arthritic properties have been evaluated pre clinically and clinically.

Keywords: Anti-arthritic, Herbal plants, Inflammation.

1. INTRODUCTION

Arthritis is an chronic auto immune disorder principally attack the joints and characterized by pain, swelling and stiffness of the involved joints [1]. It is an inflammation of synovial joint due to immunological response. Rheumatoid arthritis is a chronic, inflammatory systemic autoimmune disease that affects about 1% of the general population. It is two to three times more common in women than in men [2]. It is characterized by both local and systemic inflammation with elevated plasma concentration of pro-inflammatory cytokines, such as interleukin-6 (IL-6) interleukin (IL-1 β) tumor necrosis factor- α (TNF- α) and acute phase of protein recently, it has been reported that microorganism including bacteria, viruses, fungi, parasites, bacterial DNA and bacterial toxin may exacerbate the inflammatory response at the joint and bone [3].

Arthritis can be treated by analgesic, biologics, NSAID, DMARD'S and Corticosteroids. These drugs reduce the patient's pain and joint inflammation and decrease the progression of joint damage. Though allopathy system of medicines are more and more popular for treating arthritis, excessive intake of medications produce many side effect and irreparable loss of mechanism. To minimize the side effects we go for

alternate system of medicine like herbal drugs. Now a days 80% of people are in developing countries they are using traditional system medicine because their safety [4].

1.1. Pathogenesis

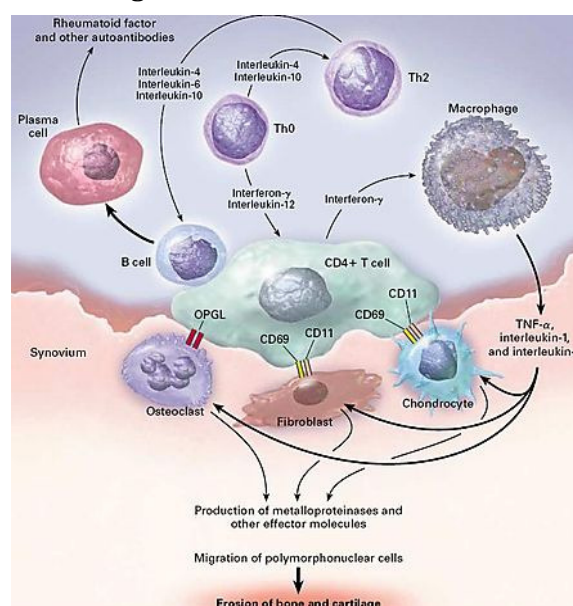


Figure - 1: Pathogenesis of rheumatoid arthritis

1.2. Types of arthritis

- Rheumatoid arthritis
- Osteoarthritis.
- Gout.
- Juvenile idiopathic.

1.3. Antiarthritic plants

1.3.1. *Alangium salviifolium*

The stem barks of *Alangium salviifolium* wang by using in rat model. The barks of *Alangium salviifolium* wang were collected and dried in shade and subjected for successive extraction with petroleum ether, Ethyl acetate, chloroform, methanol using soxhlet apparatus. Each extracts were then subjected for preliminary phytochemical studies and pharma-cological investigation. Study of anti-arthritic activity was carried out by following Freund's adjuvant arthritis model. All the extracts of *Alangium salviifolium* wang showed effective anti-arthritic activity and the strength of the activity follows the order standard > chloroform > ethyl acetate > aqueous > petroleum ether > methanol [5,6].

1.3.2. *Ammonia baccifera*

The alcoholic extract of the *Ammonia baccifera* rhizomes were evaluated for their antiarthritic activity by using Complete Freund's Adjuvant (CFA) induced rat model. Application of all the extracts exhibited statistically significant edema inhibition when compared with the arthritic control group. Sub planter injection of Freund's Complete Adjuvant in the rat hind paw lead to the development of arthritis which reached a peak edema on 28 days of the injection.

1.3.3. *Bacopa monniera*

The methanolic extract of *Bacopa monniera* has proved significant arthritic activity at different concentrations and its effect was compared with the standard drug Diclofenac sodium. The maximum percentage reserve of protein denaturation and membrane stabilisation of *Bacopa monniera* was observed as $90.34 \pm 0.83\%$ and $93.67 \pm 1.34\%$ at $2000 \mu\text{g/ml}$ respectively. When compared to standard Diclofenac sodium was found out to be $96.52 \pm 1.25\%$ and $98.76 \pm 1.67\%$ respectively at a dose of $2000 \mu\text{g/ml}$. The production of auto antigen in certain arthritic disease may be due to denaturation of protein and membrane lysis. From the results, it can be confirmed that methanolic extracts are capable of controlling the production of auto antigen and inhibits denaturation of protein and membrane lysis in rheumatic disease [7,8].

1.3.4. *Cleodendron Phlomidis*

The Petroleum ether, Chloroform, Ethyl acetate, Ethanol and water fractions of the leaves of *Cleodendron Phlomidis* were subjected to *in-vitro* anti-arthritic activity by protein denaturation method. From the result of the study, it can be stated that all the extracts of *Cleodendron Phlomidis* leaves is capable of controlling the production of auto antigen and thereby, it inhibits the denaturation of proteins and its effect was compared with the standard drug diclofenac sodium. The percentage protection was found to be 78.94% (Petroleum ether), 88.46 % (Chloroform), 89.25% (Ethyl acetate), 87.10% (ethanol), 82.31% (water) and 92.20% (Diclofenac sodium). All the extracts showed dose dependant response. This effect may be due to the presence of steroids, alkaloids and flavonoids present in various fractions. The effect was represented as follows - Ethyl acetate> Chloroform> Ethanol> Water> Petroleum ether [9].

1.3.5. *Cleome rutidosperma*

The various extracts of *Cleome rutidosperma* were examined for its anti-arthritic activity in male albino rats. The evaluation of anti-arthritic activity was carried out using cotton pellet granuloma method and Freund's adjuvant induced arthritis model. Prednisolone (5 mg/kg bw) was used as a standard drug. The ethanolic extract of *Cleome rutidosperma* exhibited significant anti-arthritic activity as compared to other extracts. The doses of 200 mg/kg bw of the ethanolic extract of *Cleome rutidosperma*, in chronic model of granuloma pouch in rats produced 48.0% and in arthritis model produced 44.0 % inhibition respectively with that of the standard drug Prednisolone (5 mg/kg) which produced 58.5% and 59% inhibition. All the extracts of *Cleome rutidosperma* showed potent antiarthritic activity and the strength of the extracts follows the order - standard>ethanolic extract>petroleum ether extract>di-ethyl ether extract>ethyl acetate extract [10,11].

1.3.6. *Delonix elata*

It is known to be used for joint pains and in flatulence. It was accidentally observed that local people of some regions using the leaves and bark of *Delonix elata* in inflammation. There was some report for anti-inflammatory activity. Antiinflammatory activity of the alcoholic extracts of the leaves and bark of *Delonix elata* was found to be significant [12].

1.3.7. *Hybanthus enneaspermus*

The effect of alcoholic and aqueous extracts of the whole plant of *Hybanthus enneaspermus* on Freund's adjuvant induced arthritis in male albino mice was evaluated. Both

the extracts significantly decrease the paw thickness at the end of 30 days treatment. Though in acute phase inflammation both of them show the same potency, in chronic phase, alcoholic extract exhibit more potency than the aqueous extracts. At the end of the studies the alcoholic extract shows more pronounce effect (59.4%) as comparable to aqueous extract (57.4%). Standard diclofenac sodium significantly decrease the paw thickness from the 1st day after induction of freund's adjuvant, where as the extracts significantly decrease the thickness after 4th day. Standard Diclofenac sodium decreases the paw edema by 72.4%. Standard drug, aqueous and alcoholic extract significantly suppressed the swelling of the paws in both acute and chronic phase which may be due to the suppression of inflammatory mediator released due to induction of freund's adjuvant. Though the actual mechanism of suppressing inflammation is not known but it can be correlated with the presence of alkaloids and flavonoids in suppressing the inflammation and antioxidant activity [13, 14].

1.3.8. *Premna serratifolia*

The Anti-arthritis activity of ethanol extract of *Premna serratifolia* Linn., wood was examined for anti-arthritis by Freund's adjuvant induced model in rats . Loss in body weight during arthritis form was corrected on treatment with ethanol extract and standard drug, indomethacin. Biochemical parameters such as hemoglobin content, total WBC, RBC, erythrocyte and sedimentation rate were also estimated. The ethanol extract at the dose of 300 mg/kg body weight inhibited the rat paw edema by 68.32% which is comparable with standard drug indomethacin 74.87% inhibition of rat paw edema after 21 days. From the results it was completed that anti-arthritis activity may be due to the presence of phytoconstituents such as alkaloids, steroids, flavonoids, phenolic compounds and glycosides specifically iridoid glycosides [15, 16].

1.3.9. *Strychnos potatorum*

The study was carried out to assess the effect of the aqueous extract (SPE) and the whole seed powder (SPP) of *Strychnos potatorum* Linn seeds on the Freund's complete adjuvant (FCA) induced arthritic rat paw edema, body weight changes and alterations in haematological and biochemical parameters in both developing and developed phases of arthritis. In FCA induced arthritic rats, there was significant increase in rat paw volume and decrease in body weight increment, whereas SPP and SPE treated groups, showed significant reduction in paw volume and normal gain in body weight. The altered haematological parameters (Hb, RBC,WBC and

ESR) and biochemical parameters (blood urea, serum creatinine, total proteins and acute phase proteins) in the arthritic rats were considerably brought back to near normal by the SPP and SPE treatment at the dose of 200 mg/kg/ in both developing and developed phases of arthritis^[17,18].

1.3.10. *Cocculus hirsutus*

The methanol and aqueous extracts of *Cocculus hirsutus* root (100 and 200 mg/kg) was evaluated using Freund's adjuvant arthritis model in wistar albino rats. Arthritis was induced by injecting 0.1ml of complete Freund's adjuvant below the plantar aponeurosis of the right hind paw. Treatment with the extracts and standard started on the day of initiation of inflamogens and continue up to 21 days. The body weight loss that was found during the arthritic condition was corrected on treatment with methanolic extracts of root of *Cocculus hirsutus* Linn. The swelling of the paw during the secondary lesions was also markedly reduced. Various hematological parameters like total WBC count, ESR and RBC were also estimated. The results of the study support the traditional use of this plant as anti-arthritis drug. Antiarthritic activity of methanolic extract was dose dependant and the dose of 200mg/kg was more effective than 100mg/kg bodyweight whereas methanolic extracts were added effective than aqueous extracts^[19].

1.3.11. *Terminalia chebula*

The Acetone Extract of fruits of *Terminalia chebula* (TCE) was evaluated the anti-arthritis activity by using suitable experimental model in rats of either sex (150-200gm) were randomly split into 7 groups. Arthritis was induced in all animals by intradermal injection of Complete Freund's Adjuvant (CFA) 0.1ml in plantar surface of left hind paw. The vehicle, TCE (graded doses) and indomethacin (reference standard) was administered by oral from day1 to day13. Changes in paw edema, joint thickness and body weight were measured every alternate day till 21stday. Erythrocyte sedimentation rate (ESR) and rheumatoid factor (RF) were measured on day 0 and day 21. In this present study the Acetone Extract of *Terminalia chebula* fruits had a better effect on controlling CFA induced arthritis. TCE showed good reduction in paw edema and joint thickness. It produced a reduction of ESR values and RF values comparable to the dexamethasone treated group. Therefore an Acetone Extract of *Terminalia chebula* fruit has got definite effect in reducing the inflammatory components as well as the above cited results also focus on its immunomodulatory role. The results of the present study empirically indicate that *Terminalia chebula* may be effective in treatment

of rheumatoid arthritis and that it supports the ordinary belief prevailing in traditional medicines worldwide [20].

2. CONCLUSION

Arthritis is one of the leading health problem in worldwide, so many therapies are developed along with the principle of western medicine are often limited in efficiency, take the risk of unfavorable effects, and are often too costly, particularly for the developing world. Therefore, treating arthritis with plant-derived compounds which are accessible and do not require difficult pharmaceutical synthesis seems highly attractive. In this review article, an attempt has been made to compile the reported anti arthritic plants from India and may be useful to the health professionals, scientists and scholars working in the field of pharmacology and therapeutics to develop evidence-based alternative medicine to treat different kinds of arthritis in human.

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