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AN ANALYSIS OF A STUDY ON THE ANTI-INFLAMMATORY EFFECTS OF HERBAL REMEDIES FOR THE TREATMENT OF RHEUMATOID ARTHRITIS: A REVIEW

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ABSTRACT

Inflammation is a response in the body in which we feel swelling, irritation, redness, and pain also. Sometimes it becomes worse when acute is converted to chronic inflammation and starts damaging the internal processes which can lead to the destruction of internal organs or even cancer. Rheumatoid arthritis (RA) is one of the inflammatory diseases which causes pain in the joints. The bones and cartilage of the joints are destroyed and other ligaments and tendons become weakened. In India, around seven million patients reported RA which is around one percent of the total population. Although there are several possible treatments and medicine available to cure RA and inflammation-related disorders but they are mostly chemical based and can cause various side effects which will be harmful for us. So, people are coming towards the ayurvedic or herbal treatments of RA which include medicinal plants having anti-inflammatory properties and the potential to treat RA with safer outcomes.

Keywords: Inflammation, Rheumatoid arthritis, chronic, ayurvedic, medicinal

INTRODUCTION

Inflammation is a term used when our body shows a defense mechanism against any unwanted particles which can cause a serious type of harm to our body. When some unwanted foreign material enters our body, it responds to it. The response may occur in the form of redness, swelling, irritation, itchiness, burning sensation, etc. When our immune system is attacked by some foreign material or pathogen, it starts producing some protein molecules which are known as cytokines. The production of these cytokines results in inflammation which when not treated within a certain period may lead to serious disorders like Cancer, Heart Disease, Rheumatoid Arthritis, Asthma, etc. Among those disorders, we are targeting Rheumatoid Arthritis (RA) which is very common and characterized by inflammation, swelling, and pain in the synovial joints. The basic symptoms of the disease include swelling, inflammation, redness, joint pain, fever, fatigue, weight loss, and limited range of motion **[1, 2]**.

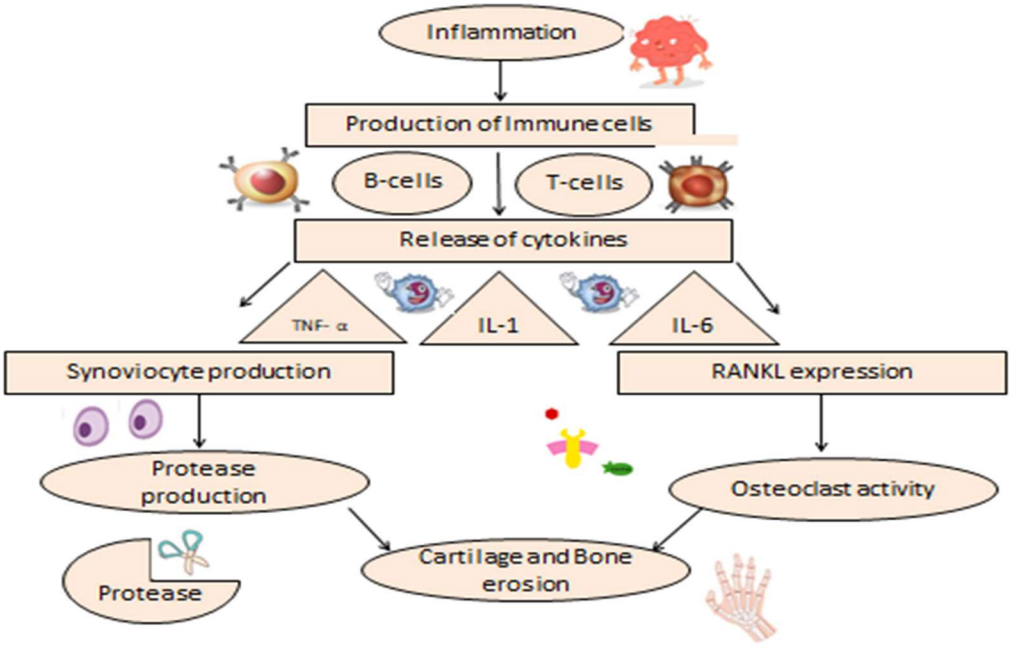

Figure 1: Mechanism of Inflammation

Over many years, natural extracts of plants and their compounds have been used in the possible treatment of rheumatoid arthritis **[3]**. Some of them are *Cinnamomum cassia, Aloe vera, Eucalyptus, Tinospora gulancha, Morning glory,* etc. **[4]**.

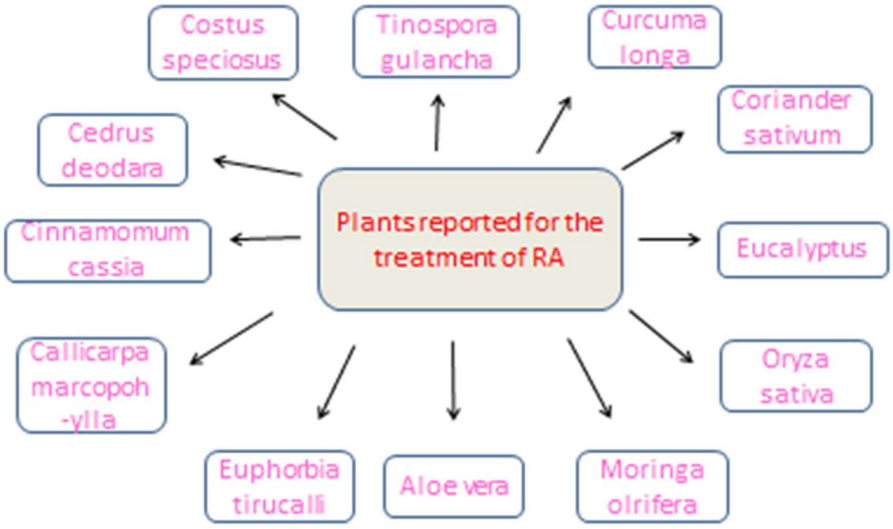

Figure 2: Different herbs reported for the treatment of Rheumatoid Arthritis

Table 1: Plants Reported For Anti - Inflammatory Properties

S. No.	Author Year	Plant	Method	Result	Discussion
1.	Abdullah Al- Nahain *et al* ; 2014	*Zingiber Officinale*	Writhing And Foot Edema Paw Test	Swelling Reduced in Paw.	Suppression In the Frequency of Writhing And Foot Paw Edema Indicated Anti Inflammatory Effect Of *Z. Officinale.* [5]
2.	Alamgeer *et al*; 2017	*Berberis Orthobotrys*	In Vitro Protein Denaturation Method	Showed Inhibition of Albumin Denaturation.	The Result Suggested That for The Treatment of Ra, The Use of *B. Orthobotrys* As A Strong Anti-Arthritic Drug May Be Suggested. [6]
3.	R.K. Gautam *et al*; 2020	*Curcuma Longa*	Oral Supplementation of Plant	Showed Improvement in Swelling, Morning Stiffness.	Alleviate Pain Of Inflammationin Ra, Promote Immune System Response Of Acute And Chronic Inflammation. [7]
4.	Shareen Singh *et al*; 2020	*Alstonia Scholaris*	In Vitro Treatment with Leaf Ethanolic Extract 100-200 Mg/Kg	Reduced Total Leucocyte Movement Was Seen.	Showed The Capability Of Leaf Ethanolic Extract In Minimising The Level Of Pro-Inflammatory Mediators Such As Cox, Lox, No And Pge2. [8]
5.	R.K. Gautam *et al*; 2020	*Cedrus Deodara*	Carageena Induced Paw Edema In Rats	Showed Inhibition In Paw Edema.	Volatile Oil Extract Of Wood Showed Inhibition In Paw Edema When Given At 50 And 100 Mg/Kg Dose. [9]

Apart from these there are also some known medicinal herbs present that can treat arthritis but those are not very much explored for their anti-inflammatory properties like *Datura stramonium* (Dhatura), *Juglans regia* (Walnut), *Catharanthus roseus* (Sadabahar), *Chrysopogon zizanioides* (khus plant), *Nerium oleander* (Kaner) and *Linus usitatissimum* (fl axseeds).

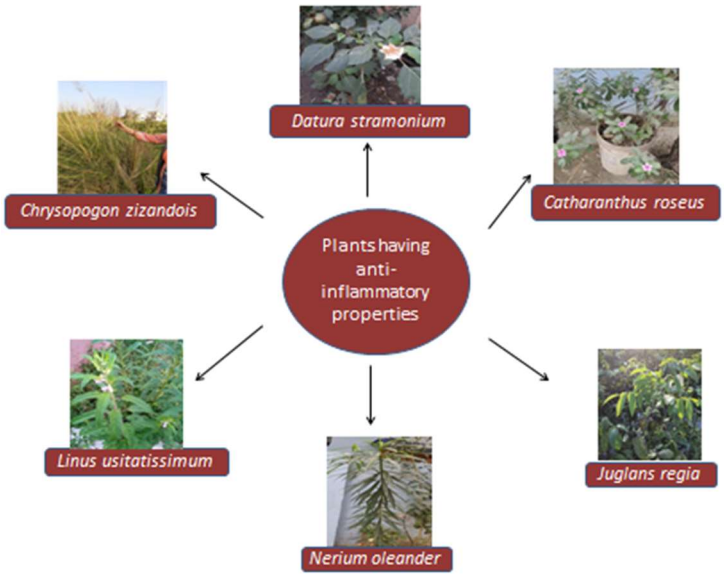

Figure 3: Plants having anti-inflammatory properties helps in treating rheumatoid arthritis

Datura stramonium

Datura stramonium (Dhatura) is a widespread common plant that belongs to the Solanaceae family. Gourav Chandan *et al*. (2021) verified that the Datura plant's datura lactone (D1), 12-deoxywithastramonolide (D23), and daturilin (D27) depicts the nitric oxide inhibition and proinflammatory cytokine release by PLS activated J774A. There in vivo study also showed that D1, D23 and D27 have the potential to reduce pain and inflammation in animal species model **[10]**. By administering a dosage of datura leaf extract along with ethyl acetate to rats, Bakht Nasir *et al*. (2022) examined the non- invasive in vivo test in which the *D. stramonium* leaves ethanol extract (DSL-EA) was tested by determining the edema inhibitory effect in paw edema test induced by carrageenan. DSL-EA shows the reduction in the edema in time and dose dependent manner when subjected to different high and low doses of the extract **[11, 12]**.

Juglans regia

Juglas regia is mainly found in some parts of Asia, Europe and North America **[13]**. Its bark is used as an antihelmintic, to cure tuberculosis, and to treat allergies, wounds, and skin conditions **[14]**. Aisha Mobashar *et*

al. (2022) came to the conclusion that *J. regia* leaf extracts in ethanol and n-hexane had immunomodulatory and anti-inflammatory properties that reduce arthritis and edema in rats **[15]**. The anti-inflammatory and antibacterial efficacy of *J. regia* with methanolic extract was concluded by Asma Eswayah *et al*. (2019) **[16]**. Aeyaz Ahmad Bhat *et al* (2023) have demonstrated that *J. regia* leaves are a useful medication with analgesic and anti-inflammatory effects against rheumatoid arthritis **[17]**. Since studies have revealed that they have an anti - nociceptive action via non-opioid receptors and also have an anti-inflammatory impact against chronic as well as acute inflammation **[18, 19]**.

Catharanthus roseus

Evergreen, erect to spreading, herbaceous, and delicate perennial *Catharanthus roseus* can reach heights of up to four feet **[20]**. As tissue damage in diabetes results from a weakened antioxidant defence system and an excessive buildup of ROS, substances produced from *C. roseus* plants that are high in polyphenols may exhibit improved properties linked to antidiabetic and antioxidant activities **[21]**. In 2016, Mohan VR *et al*. examined the anti-inflammatory effects of *Catharanthus* ethanol extract against carrageenan-induced paw edema in rats and found that the extracts significantly reduce swelling and inflammation. Apart from all the mentioned above characteristics, antifungal, antibacterial, antiviral, and anti-inflammatory properties of *C. roseus* have also been demonstrated in *C. roseus* **[22]**. Sultana *et al* (2023), shows how the silver, copper and iron nanoparticles derived from the leaf extract of *C. roseus* is helpful in the treatment of inflammation **[23]**.

Chrysopogon zizanoides

Chrysopogon zizanioides is a member of the Poaceae family. The perennial grass *Chrysopogon zizanioides* is evergreen and grows in clumps that can reach heights of up to three metres **[24]**. Ramirez Rueda *et al*. (2019) used TLC analysis to identify the antibacterial activity of different root essential oil fractions of the khus plant against the MRSA (methicillin-resistant *Staphylococcus aureus*) and VREF multidrug-resistant (MDR) Gram-positive bacteria (vancomycin-resistant Enterococcus) **[25]**. By isolating the oil's active portion, this analytical technique has allowed the most pertinent chemicals responsible for biological processes to be found **[26]**. Arpana Ashokrao Durge and Utkarsh Ravindra Moon (2021) have stated in their review article the ways to control the expression of inflammatory enzymes such as heme oxygenase-1, inducible nitric oxide

synthase, and cyclooxygenase-2, Tumor necrosis factor, interleukin-1, and interferon expression of this plant. Therefore, the anti-inflammatory properties of Vitever essential oils can help in the production of some plant-based pharmaceuticals and reduce the negative effects brought on by high dosages of

Nerium oleander

An evergreen shrub in the Apocynacae family is Nerium oleander. In 2012, Singhal *et al*. examined the effects of rat liver CCl4 exposure to methanolic floral extracts **[28]**. Serum AST, ALT, ALP, and total bilirubin significantly increased in response to MENO-hepatoprotective F's effects on serum biochemical markers in CCl4-poisoned rats in comparison with control animals. Soundharya *et al* (2019), reviewed that *Nerium oleander* has considerable potency in anti-inflammatory action and has prominent effects by in-vitro anti-arthritic assay protein denaturation method **[29]**. Yousra Shafiq *et al* (2021), experimented that *N. oleander* with ethanolic extract showed highly significant anti-inflammatory activity in cotton-pellet and carrageenan inflammatory model **[30]**. In addition, treatment with *Nerium* also decreased the production of NO, PGE 2, TNF-α and IL-1β in the rat paw after treated with carrageenan **[31]**.

Linum usitatissimum

conventional treatments **[27]**. According to Pawan Kumar *et al* (2020), in Wistar rats and Swiss albino mice, anethanolic extract of *Vetiveria zizainoides* demonstrated analgesic and anti-inflammatory effects that may have been mediated by central and peripheral pathways.

Due to their abundance in alpha-linolenic acid, lignans, and fibre, Flaxseeds are becoming a significant component in functional foods **[32]**. Flax proteins strengthen the immune system and aid in the treatment and prevention of heart disease **[33]**. Mahmoud Rafieian-kopaei *et al*. (2017) demonstrates that linseed extract at different doses of 42, 85, 170, and 340 mg/kg may significantly and dose-dependently reduce the inflammatory response brought by xylene **[34]**. Hamza Mechchate *et al* (2021) demonstrated that the polyphenolic extract of L. *usita tissimum* (PLU) showed reduction in different edema levels induced by carrageenan in the paw of rats **[35]**. As the doses of the PLU extract increased, the anti-inflammatory activity of the extract also increased and showed the significant increase in pain tolerance level as well as decrease in the edema levels **[36]**.

CONCLUSION

After studying the above review and analyzing the data we could conclude that the

anti-inflammatory properties of the studied plants can be essential in the treatment of Rheumatoid Arthritis and further studies and experiments can make the discovery of drugs possible against inflammation and its related disorders.

FUTURE PROSPECTUS

Our aim of finding anti-inflammatory properties against Rheumatoid arthritis will lead to the successful development of medicines and treatment. So far, we were using allopathic and analgesic medicines which were causing us some harmful effects like- stomach upset, heartburn, or an ulcer. Therefore, in this scenario, opting herbal and medicinal plants will lead to body relieving treatments without any side effects. Apart from this it could also be possible to develop different sets or combinations of medicine which may be helpful in curing other types of disorders.

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