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Exploring herbal medication for rheumatoid arthritis : A review of Nyctanthes arbor-tristis and pongamiapinnata

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ABSTRACT :

One interesting direction for therapeutic innovation is the investigation of herbal medications for the treatment of rheumatoid arthritis. The numerous advantages of herbal ingredients, in addition to their capacity to reduce inflammation and improve joint health in general, highlight the need for additional study in this area. Rheumatoid arthritis can be treated using phytoconstituents found in Nyctanthes arbor-thritis and Pongamiapinnata (LINN.) plants. Even if there will be difficulties and extensive testing ahead, the search for herbal substitutes offers a useful addition to current methods. The plant has undergone verification in order to prepare the herbal product. One of the more involved processes in the extraction of phytoconstituents is the soxhlet extraction method. creation of a herbal medicine that might open the door to more individualised and comprehensive rheumatoid arthritis therapy alternatives. The word "herbal" comes from the medieval Latin liber herbalis, which means "book of herbs." It is frequently used in opposition to the word "florilegium," which refers to a book about flowers that places more of an emphasis on the pleasure and beauty of flowers than the herbal does on their practical uses.

Key world: Nyctanthes arbor-tristis, Pongamiapinnata, rheumatoid arthritis therapy, Hearbal medicine

Introduction :

Herbal Drug:

The word "herbal" comes from the medieval Latin liber herbalis, which means "book of herbs." It is frequently used in opposition to the word "florilegium," which refers to a book about flowers that places more of an emphasis on the pleasure and beauty of flowers than the herbal does on their practical uses. Aherbal medication is any plant, or plant portion, that has medical potential and is typically found in raw or unprocessed forms. They consist of various plant elements, such as the entire aerial portion, flowers, fruits, seeds, leaves, roots, rhizomes, and so on. It's possible that the ingredients and their medicinal properties are unknown. The study of pharmaceutical knowledge and the use of therapeutic herbs, which are the cornerstones of conventional medical treatment, constitute herbal medicine, often known as herbal medicine. Numerous ancient treatments have been transformed into modern therapies as a result of worldwide pharmacological study. An illustration of this is found in the artemisinin medication family, which combats malaria and was created from the herb Artemisia annua, the root of which was used to treat fever in traditional Chinese medicine. The safety and effectiveness of plants employed in 21st-century medicinal plants are not well supported by studies conducted by scientists, and the majority of these plants have no suggested dosage or purity levels. Herbal - medicine commonly uses minerals, Shells., fungi, animal parts, and bee secretions. Herbal medicine is also known as phytomedicine. The extraction process has an impact on the precise makeup of a botanical product. A tea will have a lot of polar components because water is a polar solvent. On the other hand, oil is a solvent with no polarity that has the ability to soak up non-polar in nature materials. Alcohol is in the centre. Many herbs can be applied topically to the skin in a variety of ways. Relevant extracts of oils can be used topically to the skin; they are often diluted and dissolved with the carrier oil. Many essential oils can be safely used as topicals by mixing it with olive oil or another food-grade oil, such as almond oil, as many essential oils are either too strong to be used topically or burn the skin when applied directly. Additional topical delivery methods include balms, oils, salves, creams, and lotions. 3 23 The majority of topical treatments require extracting herbs into oil. Herbs can be submerged in food-grade oil for several weeks or months to extract certain phytochemicals. Following that, This oil has the potential to combined into products such as creams, lotions, and remedies or applied topically like an oil. This is the process used to make several antimicrobial salves, massage oils, and substances that aid in wound healing. Herb consumption may have negative effects. Moreover, negative reactions that can occasionally be fatal or life-threatening have been caused by "adulteration, inappropriate formulation, or lack of understanding of plant and drug interactions." It takes appropriate double-blind clinical trials to Prior to using any plant medicinally, ascertain its safety and effectiveness. Despite the fact that many customers think herbal medications are safe because they are natural, there is a chance that they will combine with synthetic drugs and make the user ill. Additionally, herbal therapies have the potential to be fatally contaminated, and unproven herbal medications may be mistakenly taken in place of prescription ones. The United States does not require the standardization of purity and dosage, yet even products manufactured at the same specification may vary due to biochemical changes inside a species of plant.

The symptoms of rheumatoid arthritis (RA), a common immune-mediated inflammatory disease (IMID), include symmetrical pain, swelling, and the progressive degradation of synovial joints throughout the body. It is commonly known that IMIDs can result in chronic, persistent inflammation that affects multiple organs. Recent epidemiological studies have shown that the prevalence of RA has risen worldwide, with industrialized nations having higher rates. There has also been a discernible increase in incident cases and age-standardized incidence rates. In recent decades, the primary conventional medicines (CM) used to treat RA have been non-steroidal anti-inflammatory drugs (NSAIDs), glucocorticoids (GCs), and conventional synthetic disease-modifying anti-rheumatic drugs (csDMARDs).

N. ARBOR-TRISTIS :

Nyctanthes arbor-tristis Linn, Oleaceae family; also known as Harsingar. It is an aromatic plant common in the Indo-Pakistan region with excellent ethnomedicinal properties. It is native to southern Asia and can be found across the sub-Himalayan region and as far south as the Godavari River. This plant is distributed all over the world, not just in northern Pakistan and southern Nepal, but also in northern India, southeast to Thailand, and elsewhere.[1]It is often seen in Indian gardens as a decoration. In Indian medicinal systems, its various components are known to have distinct pharmacological effects. Several phytochemical and pharmacological studies have also been conducted under this plan. The antispasmodic and anthelmintic properties of the leaves of Nyctanthesarbortristis L have been reported.[2]It is used as a decorative plant and has a nice aroma. It is a shrub that can grow up to 10 meters tall and live for up to 20 years. Steppe and arid climates with a pH of 5.6 to 7.5 are its preferred habitats. Its leaves are simple, hairy, and decussately opposite. Flowers are found at the tips of branches, usually in clusters of two to seven. The NAT fruit has a diameter of 1-2 cm and is encapsulated, long, broad, and obcordate orbicular. Exalbuminous, abundant testa, the outer layer of heavily vascularized, substantial, translucent cells, are found in seeds.[3]The herb has long been utilized in folk and Ayurvedic medicine. Because of its purported anti-inflammatory and antioxidant properties, it can be used to treat conditions like rheumatism and respiratory issues. Additionally, Nyctanthesarbor-tristis has been used to treat malaria and fever.[4] Nyctanthesarbortristis has long been used as a tonic, bitter, and expectorant. It has a slight purgative effect. It is used to treat rheumatism, sciatica, and bilious and stubborn recurrent fever. It helps youngsters who are constipated.[5]From this plant, phenylethanoid and iridoid glycosides have been separated. Spleen enlargement, bronchitis, sore eyes, snake bite, diarrhea, piles, and liver and biliary disorders are all traditionally treated with parts of various plants. The pharmacological properties of N. arbor-tristis are well documented and include hepatoprotective, analgesic, antipyretic, antibacterial, antifungal, tranquilizing, and anti-influenza properties. [6] It can withstand light shade as well. Because of its unique and lovely scent, it is frequently grown in gardens. Flowering usually occurs from July to October. N. arbortristis grows best in areas that are partially to totally shaded.

Fig.no.1 Nyctanthes Arbor-Tristis plant.

Common Names:

English: Night jasmine

Hindi: Parjat, Harshing, Seoli, ShefaliNibari.

Tamil: Pavilammali, swetasarasa, paghada, karchia, karuchiya.

Marathi: Purijat, Parijataka,

Taxonomy Category System:

Kingdom	Plantae
Order	Lamiales-
Family	Oleaceae

Genus	Nyctanthes-
Species	Abortristis

Chemical constituents of Nyctanthesarbortristis Linn: -

It contains different bioactive compounds such as apigenin, anthocyanin, tannin, D-mannitol, glucose, quercetin, carotenoid, glycosides, nyctanthin, kaemferol, etc ,.[7] Since Nyctanthes arbor-tristis flowers are widely accessible in India, they provide a cost-effective source of crocin. Crocin, a carotenoid with conjugated double bonds, is a significant component of N. arbor-tritsis' tubular calyx.[8] Isolate Arbor-A from the seeds of *N. arbor-tristis* L., crystallised it in methanol.[9] Polysaccharides, iridoid glycosides, phenylpropanoid glycosides, ß-sitosterol, ß-amyrin, hentri-acontane, benzoic acid, glycosides, nyctanthoside-a iridoid, nyctanthic acid, friedelin, lupeol, oleanolic acid, 6ß-hydroxylonganin, iridoidglucoside-arborside A, B, and C, alkaloids, phlobatanins, terpenoids, and cardiac glycosides were isolated from this plant.[10] Prior research on the plant identified five iridoids, including arbortrtstostdes A-C (1, 4, and 2, respectively), nyctanthoside (4a), and 6β-hydroxyloganin, in addition to a few triterpenes.[11] .Iridoidglucosides and β-sitosterol were extracted from the leaves of N. arbortristis. The plant's ethanolic floral extract, arbortristoside-A, which was separated from the seeds, is utilized to create gold nanoparticles.[12]

Pharmacological actions and medicinal use of Parijat:

The herb has many therapeutic uses. The leaves of this plant are used in Ayurveda to treat intestinal worms, constipation, coughing, malaria, intractable sciatica, chronic fever, and excessive diuresis. N. arbortristis leaves have hypnotic, tranquilizing, local anesthetic, and antiasthmatic properties, among other CNS effects. Fresh leaf juice has antimalarial properties. The leaves' antifungal properties against Alrernaria alternate were demonstrated. Leaf aqueous extract has been shown to have hepatoprotective properties. [13] Arbortristoside-A and arbortristoside-B have been shown to exhibit leishmanicidal, antiplasmodial, antispermatogenic, antiallergic, anti-inflammatory, antinociceptive, and analgesic properties. The literature and past studies show that N. arbortristis has considerable anti-ulcer properties.[14]This plant is used as an analgesic, anthelmintic, bitter tonic, expectorant, digestive diuretic, immunomodulator, and laxative. It is also utilized in tribal herbal medicine to treat asthma, arthritis, alopecia, hepatic dysfunction, and rheumatism. The plant has numerous applications in Ayurveda and the Integrating System of Medicine. In Ayurveda, the leaves of this plant are used in decoctions to cure arthritis, malaria, and fungal skin infections. Young leaves are used as a female tonic to alleviate gynecological issues.[15] The seeds of this plant are used by the locals in Chhattisgarh, India, to effectively treat piles. Gout can be treated with the leaves and blossoms. N. arbor-tristis'sendophytic fungi from its leaf and stem tissues, and to assess their potential as biocontrol agents against a variety of harmful bacteria and fungi.[16]

Anti-arthritic Action: As arthritis worsens over time, it not only causes joint pain but also has an impact on the bones and joints. A significant part of the aetiology of RA, is played by cytokines. Previous studies have demonstrated that tumour necrosis factor (TNF) expression 6 23 abnormalities in test animals cause crippling arthritis. When interleukin-1 (IL-1) was lacking, the incidence of arthritis in collagen-induced arthritis was much lower (CIA). Animals lacking the interleukin-6 (IL-6) gene were resistant to arthritis caused by antigens and collagen. These investigations demonstrated the involvement of pro-inflammatory cytokines in rheumatoid arthritis and suggested potential therapeutic targets, including TNF-, IL-1, and IL-6.

PONGAMIA PINNATA (LINN.)

The 'Pongam Tree' is regarded as one of the most vibrant and prosperous trees in India. "Pongamiapinnata" is the tree's scientific name. 'Pongamia' is derived from the Tamil term 'pinnata,' meaning 'Pinnate leaves.'In Tamil, this is called "Ponga," "Dalkaramacha," "Pongam," and "Punku." In Bengali and Hindi, it was referred to as "Kanji," "Papar," or "Karanj." The 'Karum Tree' or 'Poonga Oil Tree' are its English names.[17] *Pongamiapinnata* (L.) Pierre plant, commonly referred to as Karanj (Indian beech) belonging to the *Fabaceae* family recognized for its diverse biological effects both *in vivo* and *in vitro.[18]*Pongamiapinnata, a forest tree in the Leguminosae family, is most widespread in Andhra Pradesh, Tamil Nadu, and Karnataka and has beneficial ecological properties.[19]Australia, the Pacific islands, and eastern and tropical Asia are the native habitats of Pongamiapinnata. It is frequently referred to as the Pongame oil tree and Indian beech. The trees, which are abundant in India, are renowned for their tremendous capacity to transport oxygen to the atmosphere.[20]It is an Indo-Malaysian species of medium-sized evergreen tree that grows from sea level to 1200 meters in alluvial and coastal environments from India to Fiji. Currently found in the Philippines, Australia, Florida, Hawaii, India, Malaysia, Oceania, and the Seychelles. During March and April, the "Pongam Tree" is red crimson for about a week as the buds turn into wilting new leaves. Shortly after the leaves start to mature, the tree turns a beautiful lime-green radiance. The "Pongam Tree," which is being grown in many gardens and along innumerable highways throughout India, is quickly rising to the top of the list of beloved city trees. In India, it grows untamed along the banks of rivers and streams as well as in coastal woods. The "Pongam Tree" is a fast-growing, medium-sized tree.[21]

Fig no.2 Pongamiapinnata (linn.)

Pinnata P. Additional terms by which Linn Pierre is recognized include [synonyms][7]

• Pongamiaglabra vent

• Derris indica(.Lam)

• Millettiapinnata (L.) Panigrahi

Common Names :

English: Indian beech, karum tree, pongam, pongam oil tree, poonga-oil-tree, seashore mempari

Hindi (Bengali, Sanskrit): Kanji, Karanj, karanja, Naktamala

Tamil: Coqueluche, dalkaramcha, pongam, poona, pungai, pungam, punka, punku

Taxonomy Category System:

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Millettia Wight &Arn.
Species	Millettiapinnata (L.) Panigrahi – pongame oil tree

P. pinnata leaves are used to cure piles because of their antiparasitic and hot gastrointestinal laxative qualities. The seeds are being marketed as an alternative fuel source and have become highly valuable commercially because of their high oil output.[22]Pongamiapinnata seeds, also known as Karanja seeds, were chosen as the biomass feed for catalytic co-pyrolysis, the biodiesel of which has previously been used in CI engines in a blend with diesel; however, these seeds have never been used for their application via catalytic co-pyrolytic oil blended with diesel.[23]The tree Pongamiapinnata (L.) Pierre, also known as "Pongamia," has long been used in India and its neighboring nations as a source of wood, fuel, animal feed, fish poison, biopesticide, and traditional medicines. Pongamia belongs to the Fabaceae (Leguminosae) subfamily Papilionoidea, which is distinguished by its capacity for symbiotic nitrogen fixation. [24]Pongamiapinnata has shown promise in increasing capacitance as a precursor for porous carbon electrodes. Chaitra et al.'s noteworthy work included building an asymmetrical supercapacitor with electrodes composed of porous carbon produced from the oil-pressed residue of Pongamiapinnata and $NiCoO_4$-$Ni(OH)_2$ multiwall carbon nanotubes.[25] The plant is used in traditional medicine to

cure a variety of ailments, such as ulcers, liver damage, and snakebite. Many animals have already shown evidence of this plant's immunomodulatory and anti-inflammatory qualities.The anti-arthritic qualities of these plants have not yet been reported by any in-vitro models. This is why the current study was carried out to examine the anti-arthritic qualities of P. granatum and P. pinnata in in vitro models.

Geographical distribution of p. Pinnata

It is widely distributed over South East Asia, Australia, India, the Seychelles Islands, and tropical Asia. It can also be found sporadically along riverbanks in the Indian state of Maharashtra. It is most prevalent near the shore in the Konkan's beach and tidal woods, as well as along Deccan rivers.

Phytochemical constituents of p. Pinnata

It has been stated that the plant's seeds, which contain the furano-flavonoid chemical karanjin, have insecticidal properties.[26]Alkaloids demethoxy-kanugin, gamatay, glabrin, glabrosaponin, kaempferol, kanjone, kanugin, karangin, neoglabrin, pinnatin, pongamol, pongapin, quercitin, saponin, b-sitosterol, and tannin &syringyl groups (phytochemicals) are among the major chemical components identified in P. pinnata, according to studies.[27]Several components were extracted from this plant's bark, including seven flavonoids: pongaflavone, karanjin, pongapin, pongachromene, Millettocalyxin C, 3,3',4',7-tetrame thoxyflavone, 3,7-Dimethoxy-3',4'-methylenedioxyflavone, two prenylated flavonoid derivatives (pongaflavanol&tunicatachalcone), phenylpropanoids (pongapinone A & B), and cycloart-23-ene-3β,25-diol.[28] This plant also contains steroid chemicals, amino acids, disaccharides, fatty acids, triterpenes, diterpenes, and ester compounds.

Pharmacological actions of Pongamiapinnata (Linn.)

Pharmacological action	Used plant part
Anti-Inflammatory	Seed
Antihyperammonemic	Leaf
Anticonvulsant	leaf
Antiviral	Seed, Leaf, Flower, Fruit
Antioxidant	Root, Seed, Leaf
Antibacterial	Seed oil
Antifungal	Seed oil, Flower
Antidiabetic	Leaf
Cytotoxicity	Leaf

Arthritis :

Arthritis is a common condition that causes joint discomfort and inflammation. It is not a single disease, but rather a phrase for joint discomfort or joint disease, and there are more than 100 types of arthritis and related conditions. The main symptoms of arthritis are joint pain, stiffness, swelling, and soreness, and they get worse with age. Patients with arthritis experience functional limitations as a result of this common chronic illness. An important public health concern is arthritis. In addition to having a significant financial impact, arthritis is linked to a number of chronic comorbidities. The course of arthritis is impacted by metabolic diseases like hypertension (HTN), diabetes mellitus (DM), and hypercholesterolemia (HC).[29]Rheumatoid arthritis and osteoarthritis are the two most common forms of arthritis. While osteoarthritis is brought on by deterioration of the joint cartilage, rheumatoid arthritis is a disorder in which the immune system attacks the joints. Arthritis can cause long-term joint problems and afflict people of all ages, including children. The majority of arthritides also present with extra-articular symptoms, such as chronic anterior uveitis in some types of JIA and interstitial lung disease in RA. As a result, arthritides are correctly identified as systemic immune-mediated disorders, and systemic immune mechanism regulation has been the primary focus of treatment.[30]Numerous therapies are available to control the problem, such as medication, exercise, and, in extreme circumstances, surgery.

There are various kinds of arthritis, such as:

1. Osteoarthritis (OA): Common, linked to gradual joint wear and tear.
2. Rheumatoid Arthritis (RA): An autoimmune disease that results in joint inflammation.
3. Psoriatic Arthritis: Ailments joints and induce inflammation in certain psoriasis sufferers.
4. Ankylosing Spondylitis: primarily affects the spine, resulting in stiffness and irritation.
5. Gout: Causes pain and inflammation in joints due to uric acid crystal accumulation.
6. Juvenile Idiopathic Arthritis (JIA): Arthritis with a variety of subtypes that first appears before the age of sixteen.
7. Lupus Arthritis: Connected to numerous organ-damaging autoimmune illness systemic lupus erythematosus.
8. Infectious Arthritis: brought on by a joint infection, frequently bacterial in nature.

Rheumatoid Arthritis :

Rheumatoid arthritis (RA) is a chronic, systemic, progressive, and idiopathic autoimmune illness characterized by dysregulation of inflammatory mediators, which leads to synovial membrane inflammation and joint damage. RA often begins between the ages of 30 and 50, however it can occur at any age.[31]Roughly 1% of people worldwide suffer from rheumatoid arthritis (RA), an inflammatory form of the disease. Man has been suffering from this illness from the beginning of time. Although RA was not originally described medically until the early 1800s, there are descriptions from ancient Greece and Renaissance artwork that indicate RA has existed since antiquity.[32]Pain, incapacitation, and incapacity are common symptoms of rheumatoid arthritis (RA), a chronic inflammatory disease that damages the synovial joints and is typified by cartilage loss, synovial hyperplasia, and joint destruction.[33]75% of RA patients are women, indicating the relevance of hormones in the disease's etiology. Smoking and stress are considered to contribute to this condition, which causes joint stiffness and swelling on both sides of the body.[34]The hands, wrists, and knees are the most often affected joints, but RA can also damage other regions of the body. Although the exact etiology of RA is unknown, it is believed to be brought on by certain genes that are triggered by external factors such as viruses, bacteria, or physical or mental stress.

RA can be effectively treated and controlled with medication and self-management strategies, including biological response modifiers (biologicals), physiotherapy, occupational therapy, and surgery to address any emerging joint abnormalities. In the recent clinical therapeutic treatment of RA, non-steroidal anti-inflammatory drugs (NSAIDs), disease-modifying anti-rheumatic drugs (DMARDs), and immunosuppressants are commonly used. These medications can effectively reduce the disease's joint inflammation, but they can also have serious side effects for RA patients, including cardiovascular diseases, renal infections, and gastrointestinal injury. [35] RA can have detrimental effects that can be lessened with early diagnosis and effective therapy.

Mechanisms of rheumatoid arthritis

Rheumatoid arthritis (RA) is a chronic autoimmune condition that mostly affects synovial joints, causing inflammation, synovial hyperplasia, cartilage degeneration, and bone erosion. Its pathophysiology is complicated, with genetic, environmental, and immunological components.

The disease starts when antigen-presenting cells activate $CD4^+$ T-helper cells, especially Th1 and Th17 subtypes, which release pro-inflammatory cytokines like TNF-α, IL-1β, IL-6, and IL-17.

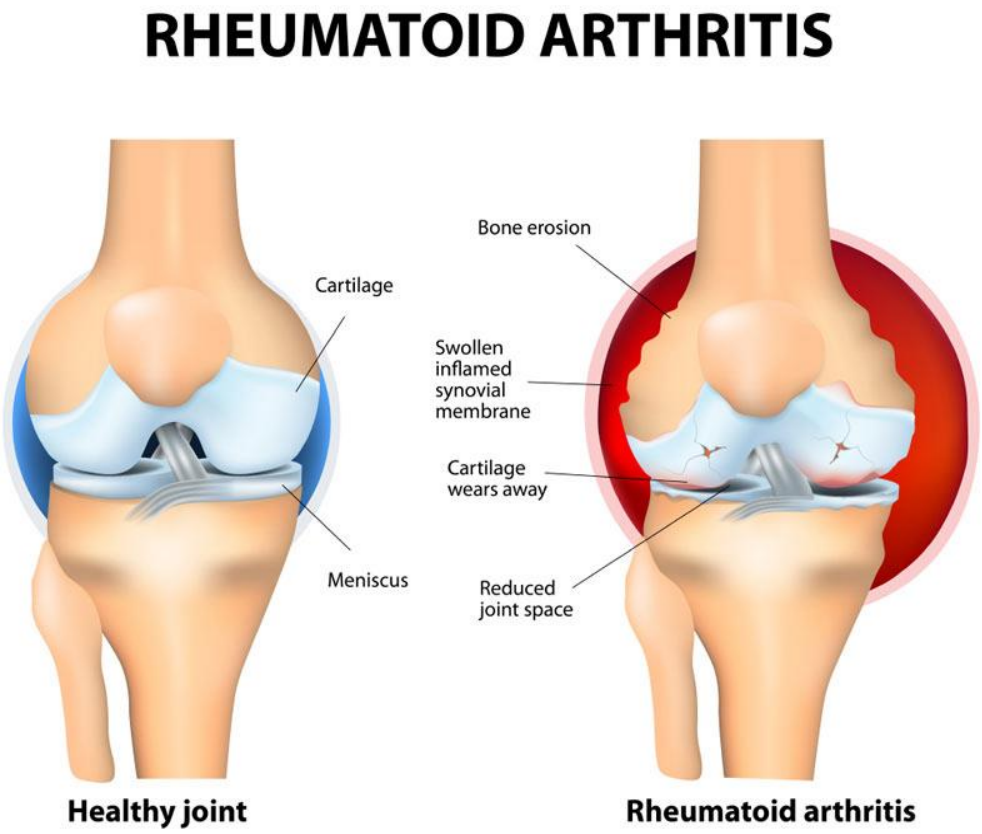
[36]. These cytokines activate fibroblast-like synoviocytes (FLSs), causing pannus development and subsequent joint degeneration.[37].

In RA joints, matrix metalloproteinases (MMPs) and aggrecanases (ADAMTS-4 and -5) are overexpressed, which causes extracellular matrix degradation.[38] Furthermore, the uPA/uPAR signaling system facilitates bone degradation by promoting osteoclastogenesis and inflammatory cascades. [39].

Nrf2, a transcription factor involved in oxidative stress responses, regulates inflammation and cellular defense. Activating Nrf2 signaling can reduce inflammation in RA by lowering oxidative damage and inflammatory cytokine production.

[40]. It has been demonstrated that natural substances like quercetin, curcumin, and epigallocatechingallate (EGCG) efficiently affect this route[36].

Other important pathways include dysregulated microRNAs, SIRT1, and the JAK-STAT system, which affect immune cell function and synovial fibroblast behavior. [37]. Herbal compounds such as triptolide and sinomenine inhibit several targets, including NF-κB, cytokines, angiogenesis, and osteoclast differentiation.[38,36].



Objectives:

1. To prepare of two extract using various solvent like acetone and ethanol by Soxhlet extraction and Microwave assisted extraction (MAE) methods.
2. To formulate and physicochemical evaluation of anti -inflammatory & anti -Rheumatoid Arthritis herbal gel containing Nyctanthes arbor-tristislinn and pongamiapinnata (linn.)''

Plan of work

• To collect the plant species
• To prepare powder of leaves of plants (nyctanthes arbor tristis)
• To authenticate plant species
• To study method of extraction
• Determination of Rf value followed by thin layer chromatography.
• To perform physicochemical evaluation of Nyctanthes arbor -tristislinn and pongamiapinnata.
• Physical characteristics, stability study of herbal gel.
• To evaluate the safety of prepared herbal gel by skin irritation study.
• To formulate herbal gel containing Nyctanthes arbor -tristislinn and pongamiapinnata.

METHODOLOGY:

MATERIALS

Chemicals

• Nyctanthes arbor -tristis (leaves extract)
• Pongamiapinnata(seed oil)
• Carbopol-940
• Propylene glycol
• Methyl paraben
• Propyl paraben
• Triethanolamine

• Ethanol

• Distilled water

Equipment

• Stoppered conical flask

• Chaina dish

• Weighing balance

• Beaker

• Funnel

• Filter paper

• Glass rod

• Heating mantle

• Soxhlet apparatus

• Microwave assisted apparatus

• PH meter

• Brookfield viscometer

Evaluation of Nyctanthes Arbor-tristis plant extract

Characteristics of extracts

The leaves extract (ethanol) of Nyctanthes Arbor-tristis were evaluated for its physicalstate , color, odor, and taste.

Phytochemical investigation of the extract

Preliminary qualitative phytochemical anaylsis was carried out to identify the active constituents present in the leaves extract of Nyctanthes Arbor-tristis. The following producers were adopted to test for presence of various constituent in the Nyctanthes Arbor-tristis extract.

- Test for Alkaloids

1.0ml of plant extract was taken and then add 1.0 ml of saturated solution of picric acid was added.

- Test for Tannins

About 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1 fecl3 was added

- Test for saponins

• 0.5g of extract was added in 5ml of distilled water in a test tube. The solution was shaken vigorously.

• The frothing was mixed with 3 drops of olive oil and shaken vigorously

- Test for tarpenoids

5 ml of extract was mixed with 2 ml of chloroform and 3 ml of conc. H2SO4 was carefully added to form a layer.

- Test for phenol

5 ml of dil. Ammonia solution were added to a portion of the crude extract followed by addition of conc. H2SO4.

- Carbohydrates

➢ Fehling's test :-To 1 ml of the extract, add equal quantities of Fehling solution A and B, upon heating

➢ Benedict's test:- To 5ml of Benedict's reagent, add 1ml of extract solution and boil for 2 minutes and cool

- Thin Layer Chromatography

A small spot of solution containing the leaves and seeds extract sample was applied to a plate, about 1.5 centimeters from the bottom edge. A small amount of an appropriate solvent (elutant) is poured in to a 17 23 glass beaker to a depth of less than 1 centimeter. The container was closed with an aluminum foil and it was left for a few minutes and saturate the air in the chamber

For leaves extract

Mobile phase: Ethanol: Water (7:3)

The Rf value for component is then worked out using the formula: Rf = Distance travelled by extract/Distance travelled by solvent.

Formulation of herbal gel

- **Ingredients Used:**

- Carbopol 940 – gelling agent
- Propylene glycol 400 – humectant
- Triethanolamine – pH adjuster
- Methylparaben&Propylparaben – preservatives

- Extract of *Nyctanthes arbor-tristis* leaves &*Pongamiapinnata* seed oil – active ingredients
- Distilled water – solvent

➢ ***Preparation Method :***

0.5 g 0f carbopol 940 (pure form) in distilled water.it was kept aside to swell, which was further stirred to from a gel. 2.5 ml of distilled water and required quantity of methyl paraben and propyl paraben were dissolved with the aid of heat on water bath. Solution was cooled and propylene glycol 400 was added to it.Further, required quantity of extract of Nyctanthes arbor- tristis leaves & seed oil of pongomiapinnata .at different concentration was mixed to the above mixture and volume made up to 50 ml by adding remaining water. All the ingredient were mixed properly and with continuous stirring. Triethanolamine was added drop wise to the formulation for the adjustment of skin pH (6.8-7) and to obtain a gel at required consistency. Prepared gel was filled in container and stored at a cool and dry place. physical parameters such as color, appearance, and feeling on application were recorded.

➢ **Evaluation test for herbal gel**

A. physical Evaluation

Physical parameter such as color and appearance were checked

B. measurement of pH

pH of the gel was measured by the using pH meter.

C. Viscosity

Viscosity of gel was measured by using Brookfield viscometer

D. stability study

The stability study was performed as per ICH guidelines. The formulated gel was filled in the container and stored at different temperatures and humidity conditions, viz.

E. Homogeneity

The developed formulations were tested for homogeneity by visual inspection after the gel had been filled in the container. They were tested for their appearance and presence of any aggregates.

Discussion :

Rheumatoid arthritis (RA) is a chronic autoimmune disease marked by joint inflammation, pain, and stiffness. While conventional treatments can offer relief, many come with long-term side effects. This has sparked growing interest in herbal alternatives that are both effective and gentle on the body.Among the promising candidates are *Nyctanthes arbor-tristis* (night jasmine) and *Pongamiapinnata* (karanja). Traditionally used in Ayurvedic medicine, these plants offer a rich source of natural anti-inflammatory and antioxidant compounds. *Nyctanthes arbor-tristis* contains iridoid glycosides and flavonoids that help regulate immune responses and reduce joint swelling. Meanwhile, *Pongamiapinnata* is valued for its seed oil, rich in karanjin and pongamol, known for combating inflammation and oxidative stress.Together, these herbs show potential as complementary therapies for managing RA. Their incorporation into topical gels or oral supplements may offer a safer, more holistic path to symptom relief—especially for patients seeking alternatives to long-term pharmaceutical use. Continued research and clinical trials are essential to fully unlock their therapeutic potential.

Conclusion:

Plants have naturally occurring bioactive chemicals that can be used to treat life-threatening diseases. This plant, N. Arbor- tristis and Pongamiapinnata (linn.), has a variety of phytochemicals that can be used to cure disease. The current study comprises the extraction of N. arbor-tristis leaves utilizing soxhlet extraction and a microwave-assisted extraction method using solvent ethanol. The investigation demonstrates that N. Arbor-tristis and Pongamiapinnata (linn.) have significant anti-arthritic effects, supporting their usage in traditional medicine. These results offer a solid scientific foundation for further investigations and possible medicinal uses of these herbs in contemporary medicine. N. Arbor-tristis and Pongamiapinnata (linn.) extracts were physically characterized, including their solubility, which revealed that they were soluble in ethanol and methanol.Leaf extract was discovered to include terpenoids, tannins, phenols, and alkaloids. An extract from Pongamiapinnata (linn.) and N. arbor-tristis has demonstrated strong anti-rheumatoid arthritis properties. It can be concluded that 1% of herbal formulations are effective in treating local inflammation and rheumatoid arthritis.

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