ISSN: 2306-6091

International Journal of Pharmaceuticals and Health care Research (IJPHR)

IJPHR |Vol.12 | Issue 2 | Apr - June -2024

www.ijphr.com

DOI : https://doi.org/10.61096/ijphr.v12.iss2.2024.84-95

Research/Review

Nutraceutical Management Of Rheumatoid Arthritis

S. Revathy*, N. Sivagurunathan, N. Bharathi Thilagam, S. Aruna, M. Asika

Krishna pharmacy college, Kottai medu, Trichy-621105

*Author for Correspondence: S. Revathy
Email: subanevasenagrotech@gmail.com

Published on:27 Apr 2024

Published by:
DrSriram Publications

Abstract

Rheumatoid arthritis is a multifactorial autoimmune disease of unknown etiology, primarily affecting the joint, and then extra articular manifestation can occur. The people are predominantly affected by rheumatoid arthritis between the age of 20-60 years with an unpredictable course. In 2020, an estimated 17.6 million (95% uncertainly interval (15.8-20.3) people had rheumatoid arthritis worldwide. Womens are highly affected by rheumatoid arthritis when compared to the men. Because of two main reasons-sex hormones and strong evidence to infections, vaccinations and environmental triggers. Rheumatoid arthritis can affect any joint, but it is usually found in metacarpophalangeal, proximal interphalangeal and metatarsophalangeal joint as well as in writsts and knee. It is characterized by persistent inflammation that primarily affects the peripheral joints. Disease modifying anti- rheumatoid drugs, steroids and anti-inflammatory drugs are used to control the symptoms of rheumatoid arthritis. There are range of drugs that can treat rheumatoid arthritis, they can all have significant side effect. The side effects are gastro intestinal tract problems, bleeding, high blood pressure, weight gain, high blood sugar and decreased bone health and liver damage. Food is a rich source of antioxidants and anti inflammatory bioactive constituents including phenolic compounds polyunsaturated ,fatty acids, phytosterol, tocopherols and carotenoids.The majority of nutraceutical studies posses beneficial effect toward chronic inflammatory disease, which might be due to the presence of one or more phytochemical. Anti-inflammatory and Antioxidant nutraceuticals may serve as complimentary medicine for the management of rheumatoid arthritis.

Keywords: Rheumatoid Arthritis

INTRODUCTION

Disease is a particular abnormal condition that adversely affects the structure or function of all or part of an organism and it not immediately due to any external injury. Disease are classified on two basis,

- Acute
- Chronic

Based on its Transmission:

- Communicable Disease
- Non Communicable Disease

Arthritis is the chronic disease which causes swelling and tenderness of one and more joints. The symptoms of arthritis are pain and stiffness, which typically worsen with age. The two common types of arthritis are osteoarthritis and rheumatoid arthritis.

Rheumatoid Arthritis

Rheumatoid Arthritis is a disease in which the immune system attacks the healthy cells in the joints in our body by mistake causing inflammation in the affected part of the body, beginning with the lining of joints. Uric acid crystals deposited on the bone, which form when there's too much uric acid in the blood, can cause gout. Rheumatoid arthritis is a chronic inflammatory disease of unknown etiology and complex multifactorial pathogenesis affecting joint and other tissues. In rheumatoid arthritis, the body immune system attacks the lining of the joint capsule, a tough membrane that encloses all the joint parts. This lining (synovial membrane) in the joint become inflammed and swollen[1]. Morning stiffness in and around the joint, lasting at least 1 hour before maximal improvement is a typical sign of rheumatoid arthritis[2]. In 2020, an estimated 17.6 million (95%uncertainely interval (15.8-20.3) people had rheumatoid arthritis worldwide. Woman's are highly affected by rheumatoid arthritis when compared to men. In mainly of two reasons sex hormones and their strong responses to infections, vaccination and environmental triggers such as stress, exposure to external toxins. Because women produce estrogen, their at a high risk for rheumatoid arthritis, that is estrogen can force a women to go awry and attack itself in a misdirected immune response called autoimmunity[3]. Rheumatoid arthritis is characterized by progressive irreversible damage of the synovial lined joint causing loss of joint space, of bone and of function as well as deformity. Extracellular matrix degradation is a hallmark of Rheumatoid arthritis which is responsible for the typical destruction of cartilage, ligaments, tendon and bone. Rheumatoid arthritis is characteristically a symmetric arthritis, Articular and peri articular manifestations include joint swelling and tenderness to palpation with morning stiffness and severe motion impairment in the involved joints. Although any joint including the circoarytenoid joint, can be affected, the distal intraphalangeal, the sacraitiac and the lumbar spine joints are rarely involved[2]. Treatments vary depending on the types of arthritis. The main goals of rheumatoid arthritis treatment are to reduce symptoms and improve quality of life[1].

History

The first description of rheumatoid arthritis acknowledged by modern medicine is found in the dissertation of Augustine Jacob Landre-Beauvais from the year 1800. Landre-Beauvais was only 28 years old and a resident physician at the saltpetriere asylum in france when he first noticed the symptoms and signs of what we now know to be rheumatoid arthritis. He examined and treated a handful of patient with severe joint pain that could not be explained by other known maladies at the time (such as "rheumatism" or "osteoarthritis")[+]. The next important contributor to the study of rheumatoid arthritis was Alfred Garrod, an English physician during the mid to late 19th century Alfred Garrod was the first to distinguish gout from other arthritic condition[5]. He found an excess of uric acid in the blood of patients suffering from gout, but not in the blood of patients with other forms of arthritis[6]. Archibald Garrod, the fourth son of Alfred Garrod, also conducted research on rheumatoid arthritis. In 1890, he authored the extensive Treatise on rheumatism and rheumatoid arthritis.

In the 20th century, the American physician Charles short challenged Archibald Garrod's paleapathological claims and sought to discredit the ancient origin hypothesis as presented by Archibald Garrod in his Treatise[7].

The most convincing case of rheumatoid arthritis in renaissance is a depiction of the temptation of St Anthony by an anonymous painter (Mid-15th to early 16th century) from the Flemish Dutch School, as reported by Drs. Dequeker and Rico in 1992[8].

Two preliminary paleopathological studies independently carried out by Professor Flinders Petric and

Sir Armand Ruffer in the late 19th and early 20th centuries discuss human remains from Egypt that demonstrate skeletal damage similar to rheumatoid arthritis[9].

S.no	Year	Groups	Drugs	Effect of drugs on rheumatoid arthritis
1	1948	Glucocorticoids	Steroids (hydrocortisone, methylprednisolone)	To relieve rheumatoid arthritis symptoms and lower inflammation
2	1957	Antimalarial Drugs	Hydroxychloroquine	To treat joint inflammation
3	1988	Disease modifying Anti Rheumatoid Drugs	Methotrexate	These drugs can slow the progression rheumatoid arthritis
4	1998	Biologic Agents	Tumor necrosis factorα Inhibitor (etnarcept, anakinra)	Tumour Necrosis Factor (TNF)
5	2012	Janus Kinase inhibitors	Tofacitinib	These drugs can slow the progression rheumatoid arthritis

According to the historical evidence

Cold water therapy

This entails taking cold showers or ice baths. Some people still use this approach to relieve symptoms, using ice packs or pads on painful joints. Research from 2017 found that whole-body cold water therapy may reduce pain from inflammatory arthritis, but more studies are necessary.

Hot water baths

This refers to taking a long bath in hot water. An older 2015 review investigating the value of hot baths and minerals baths did not find evidence that it is effective.

Counter irritants

This involves the use of a cream that produces surface irritation and reduces underlying pain, according to an older 2010 study[10].

Symptoms:

- **Pain Areas:** Joints, Back, or Muscles.
- **Joints:** Stiffness, Swelling, Tenderness, Weakness.
- **Whole body:** Fatigue, Anemia or Malaise.
- **Skin:** Lumps or Redness.
- **Hand:** Bump on the finger or swelling.

Patients with rheumatoid arthritis commonly suffer from pain and fatigue and progress to physical disability as a result of joint destruction. Depression and anxiety are often reported by rheumatoid arthritis patients, with a prevalence of up to 43% and 89% for depression and anxiety, respectively. Anxiety is believed to occur more frequently among rheumatoid arthritis patients suffering from depression compared with non – depressive patients. It has been noted that depression in rheumatoid arthritis patients can arise from complex interaction between clinical, demographic and psychological factor. Early rheumatoid arthritis tends to affect the smaller joints first- particularly the joints that attach the finger to the hands and the toes to the feet.

As the disease progresses, symptoms often spread to the wrists, knees, ankles, elbow, hips, and shoulders. In most cases, symptoms occur in the same joints on both sides of the body.

About 40% of people who have rheumatoid arthritis also experienced signs and symptoms that don't involve the joints. Areas that may be affected include:

- Eyes
- Lungs
- Kidneys
- Salivary glands
- Nerve tissue
- Bone marrow
- Blood vessels
- Skin

Rheumatoid arthritis signs and symptoms may vary in severity and may even come and go. Periods of increased disease activity, called flares, alternate with periods of relative remission-when the swelling and pain fade or disappearr. Over time, rheumatoid arthritis can causes joints to deform and shift out of place.

Diagnosis

Rheumatoid arthritis is the most commonly diagnosed systemic inflammatory arthritis. Criteria for diagnosis include having joint with definite swelling that is not explained by another disease.

Rheumatoid nodules

Nodules are one of the most typical diagnostic features of rheumatoid arthritis. Subcutaneous rheumatoid nodules found are in 20-30% of the patients with a positive test for rheumatoid factor.

Laboratory test

Although there is no laboratory test to diagnose, laboratory abnormalities can be detected. Abnormal values of systemic inflammation test are the most typical humoral feature of rheumatoid arthritis. They include erythrocyte sedimentation rate, acute phase proteins(C - reactive protein, fibrinogen, heptoglobin, alpha-1-acid glycoprotein, and 3-amyloid-Aprotien) and plasma viscosity.

Imaging techniques

Plain radiography is the standard investigation to assess the extent of anatomic changes in rheumatoid arthritis patients. The radiographic feature of the hand joints in early disease are characterized by soft tissue swelling and mild juxta-articular osteoporosis. However, conventional radiology is of limited value in soft tissue studies even though mammography may markedly improve the resolution of the radiologic images.

A detailed history, the careful assessment of joint and periarticular soft tissue structure, and laboratory and imaging findings are all needed to diagnose rheumatoid correctly[2].

Causes and risk factors

Causes

The causes of rheumatoid arthritis are unknown. It is believed that the tendency to develop rheumatoid arthritis may be genetically inherited (hereditary). It is suspected that certain infections or factors in the environment might trigger the immune system to attack the body's own tissues; resulting in inflammation in various organs of the body such as the lungs or eyes. Environmental factors also seem to play some role in causing rheumatoid arthritis. For examples, scientists have reported that smoking tobacco increases the risk of developing rheumatoid arthritis. The cause of rheumatoid arthritis is not fully understood but appears to be mulifactorial. It is considered on autoimmune disease in which the body loses its ability to distinguish between synovial and foreign tissues. Other factors involved in rheumatoid arthritis are as follows:

Environmental influences

Environmental influences, such as infections or trauma, are thought to trigger the development of rheumatoid arthritis.

Genetic markers:

Genetic markers, such as human leukocyte antigen – death receptor4, have been associated with triggering the inflammatory process in rheumatoid arthritis. Such markers, however, or not considered diagnostic because 30% of people with HLA-DR4 never develop rheumatoid arthritis.

Antigen-dependent activation of t lymphocytes:

It leads to proliferation of the synovial lining, activation of pro-inflammatory cells from the bone marrow, cytokine and protease secretion, and autoantibody protection.

Anticitrullinated protein:

Anticitrullinated proteins and peptides are high specific for rheumatoid arthritis.

Tumour necrosis factor, interleukin 1, 6, 8, and growth factors

It propagates the inflammatory process, and agents found to alter those cytokines shown promise in reducing pain and deformity.

Inflammed synovium:

Inflammed synovial is a hallmark of the pathophysiology of rheumatoid arthritis. Synovium proliferates abnormally, growing into the joint space and into the bone forming a pannus. The pannus migrates to the articular cartilage and into the subchondral bone leading to destruction of cartilage, bone, tendons, and blood vessels[11].

Risk factors

Genetic risk factors

Rheumatoid arthritis affects approximately 0.5 to 1% of the population. Ample research has been performed on risk factors for this disease, since it is hoped that this might provide more insight into the involved inflammatory process and possible opportunities for prevention or treatment of rheumatoid arthritis. Several environmental and genetic risk factors increasing disease susceptibility have been identified twin studies have shown that genetic variation accounts for 50 to 60% of the risk on rheumatoid arthritis development.

The HLA-DRB1*01, *04, AND*10alleles are the strongest genetic risk factor for rheumatoid arthritis development, in particular for Anti-Citrullinated Protein/Peptide Antibody -positive rheumatoid arthritis. most HLA-DRB1 alleles associated with rheumatoid arthritis share on identical amino acid sequence in the peptide – binding groove , which has been termed the shared the epitope . The risk of lymphoma is increased among patients with rheumatoid arthritis and is strongly associated with inflammatory disease activity; sustained disease activity confers the highest risk[23].

Smoking

Among the risk factors for diseases, smoking represents the widest spectrum of outcomes and the heaviest burden in terms of disability and mortality. since information on smoking is therefore essential in many clinical and epidemiological studies, it is surprising that the close associations of smoking with rheumatoid factors and rheumatoid arthritis were not realized until the 1990. The association between smoking history and the prevalence of false positive rheumatoid factors was first observed in the Mini-Finland Health Survey and subsequently replicated in Iceland. The association prevails in both sexes and is strong enough to have biological significance. Among women, the association is stronger after menopause; this has led to speculation that hormonal factors could play a role in such interactions. The risk of developing rheumatoid arthritis seems to occur above threshold of about five to ten cigarettes each for about 20-30 years[24].

The microbiome

Recently, the microbiome has received much attention as a possible important player in the pathophysiology of a wide variety of disease . Also, in rheumatoid arthritis, a role for the oral and gout microbiome has been indicated. Rheumatoid arthritis patients can be distinguished from healthy controls based on alteration and dysbiosis of the microbiome, for examples, regarding clostridium, lactobaccilus, and bifidobacteria species in the gout microbiota. some bacterial cell wall components might molecularly mimic human auto antigens, triggering an immune response also directed against the joint[25].

Diet

There has traditionally been a strong belief that specific diets influence the course of rheumatoid arthritis. A recent randomized trail indicator the favourable effects of a Mediterranean diet on inflammatory activity and physical function in rheumatoid arthritis patients. Free oxygen radicals have been implicated as mediators of tissue damage in rheumatoid arthritis[13].

Complication

Rheumatoid arthritis is a systemic autoimmune disease with symmetrical peripheral polyarthritis, predominantly involving the small joints. The typical manifestation of rheumatoid arthritis include pain in one or more joints over several weeks to months and morning stiffeness lasting for more than 1 hours, which usually improves with exercise[14].

Pulmonary complication

In 1948, lung disease in association in with rheumatoid arthritis was first described, and since then, various lung involvement such as pleural disease, parenchymal disease, pulmonary nodules, airway disease, and vasculitis have been reported. Among the various pulmonary manifestation, interstitial lung disease is known to associated with substantial morbility and mortality rates in rheumatoid arthritis patients. The well-known airway disease in rheumatoid arthritis patients are bronchiolitis and bronchiectasis, occurring in 10-30% of patients. Rheumatoid nodules are generally asymptomatic, often multiple, and varying in size from a millimeters to several centimeters, and the prognosis is mostly good, with spontaneous resolution and few complications[14].

Cardiovascular complication

Cardiac vascular manifestation of rheumatoid arthritis vary widely, including cardiovascular disease, heart failure, arrhythmia, valve disease, pericarditis, and myocarditis. Among the various disease , cardiovascular disease is the leading causes of mortality in rheumatoid arthritis, with a mortality rate 1.5 to 3.0 fold higher than that in the general populations. Traditional risk factors that accelerate atherosclerosis- such as smoking, high blood pressure, and hyperlipidermia or important but insufficient for explaining the full extent of cardiovascular

disease risk. In addition, increasing evidence indicates that oocurence of congestive heart failure arterial fibrillation, and valvular thickening have become more frequent in rheumatoid arthritic patients. Ednocarditis, myocarditis, and amyloidosis are relatively rare of rheumatoid arthritis[14].

Neurological complications

Neurological abnormalities in rheumatoid arthritis encompass the peripheral nervous system and central nervous system, with symptoms ranging from sudden death to mild conditions. Most complications are a consequence of articular inflammation that compresses are invades the adjacent spinal cord, peripheral nerve, or neural tissue. Disorders of Central Nervous System include cervical myelopathy, vasculitis, rheumatoid meningitis, rheumatoid nodules located within the central nervous system and progressive multifactorial leukoencephalopathy[14].

Musculoskeletal involvement

In rheumatoid arthritis- associated systemic and local inflammation includes many changes in skeletal health. In early disease, periarticular, oestopenia, and juxta-articular bone erosions occur adjacent to inflamed and swollen joints. High disease activity and long disease duration can lead to joint ankylosis. It is widely agreed that reducing disease activities using conventional or biologic disease modifying anti rheumatoid drugs during the early may retard or prevent the progression bone erosions chronic inflammation caused by rheumatoid arthritis that is not adequately treated at an early stage or does not respond to treatment can induce joint fusion, generalized bone loss, osteoporosis, and fractures. Muscle disorders in rheumatoid arthritis include myositis and myopathy and have been mostly attributed to active disease, increase body fat mass, reduced lean body mass (sarcopenia) and immobilization[14].

Infection

Rheumatoid arthritic patients are widely known to have a higher risk of infection then general population, and serious infection is one of the main causes of death in rheumatoid arthritis. The lower respiratory system is the most commonly involved site, and the other frequently involved site are the skin, soft tissue, blood stream, bone, joint and urinary tract. The risk of tuberculosis or opportunistic infections also appears to be higher in Rheumatoid arthritis patients. The relationship between rheumatoid arthritis and infections is a challenge that rheumatologists and permanently solved with the development of immuno-suppressants[14].

Pathogenesis

Stage 1

Immunogenetics

Antigens present in cells (Macrophages or Dendritic cells in the synovial membrane) are the first to be involved in human immune response. They ingest process and present foreign protein antigens to T-Lymphocyte, which initiate a cellular immune response and stimulate the differentiation of B-Lymphocytes into plasma cells that secrete antibody. The relevant receptors on antigen-presenting cells are the class II Major-Histocompatability- Complex molecules. Processed Antigen bind to Major Histocompatability Complex Glycoprotein's and is then recognized by helper-T-cell receptors complementary to the Major Histocompatability Antigen Complex. A majority of patients with rheumatoid arthritis carry human leukocyte antigen –death receptor 4, human leukocyte antigen –death receptor 1 or both[20].

Stage 2 and 3

The stage 2 and 3 of rheumatoid arthritis are similar to nature and differ primarily in their severity and amplitude.

Accumulation of lymphocytes to the synovial membrane

In the early of rheumatoid arthritis coincide with the neovascularisation of the synovial membrane; circulating lymphocytes adhere to the endothelium in post capillary synovial venules that are marked by endothelial cells with particularly tall walls. After adherence, the lymphocytes migrate through the walls of the blood vessels and aggregate in characteristic microenvironments around the blood vessels below the synovial surface. Certain cytokines that are integral to the mediation of rheumatoid inflammation in (e.g., Interferon γ, interleukin-1, and tumor necrosis factor) enhance the adhesiveness of endothelial cells for lymphocytes. The proteins on the post capillary venules that encourage adhesion are referred to as vascular adhesions[21].

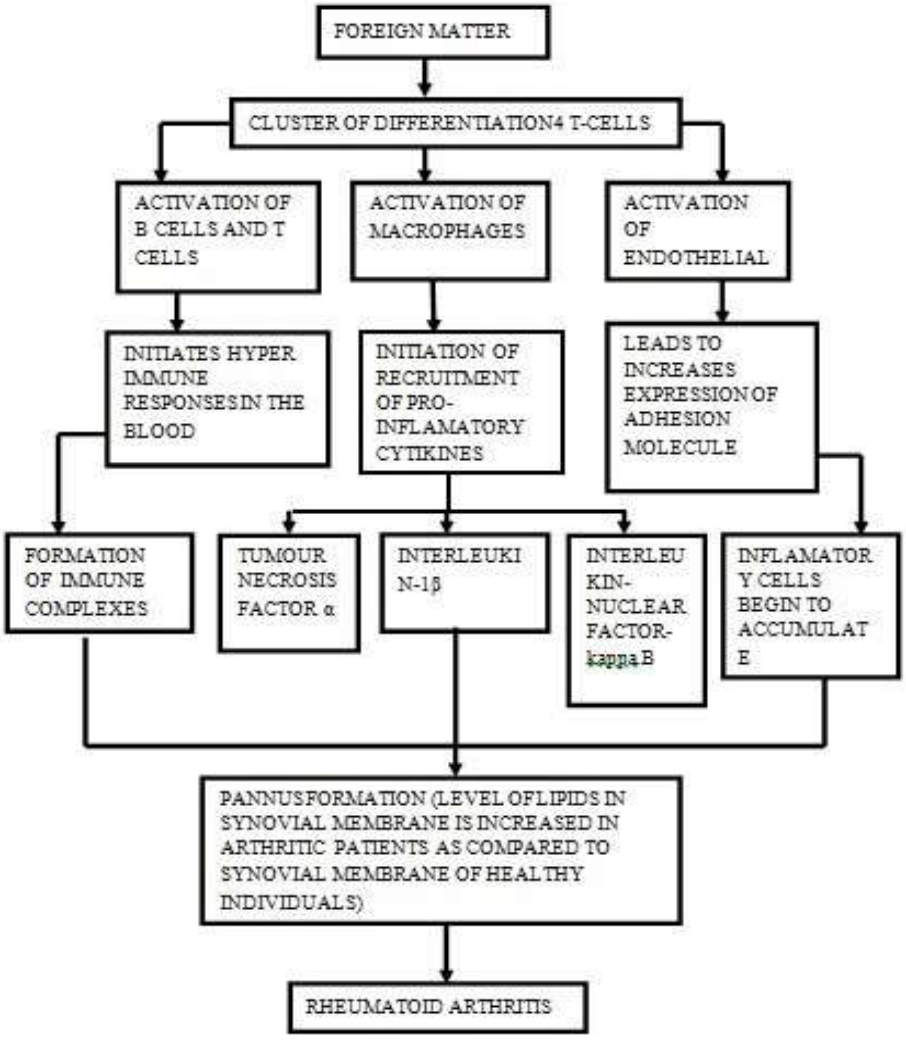
The cell surface structure on the lymphocytes mediating recognition and adherence to activated endothelium in the post capillary venules are called homing receptors. The T lymphocytes that accumulate in the synovial membrane have a crucial role in the development of rheumatoid arthritis. There are more T-lymphocytes than B- cells in the synovial membrane. Helper – inducer T lymphocytes adhere better to endothelial adhesive proteins than do the suppressor-inducer subset, and thus gain access more easily to the extracellular matrix of the synovial membrane.

Activation of b-lymphocytes

T-lymphocytes and antigen initially activate B-lymphocytes in the synovial membrane. The B cells the proliferate, and some differentiate into antibody-secreting cells.

Pathway

Cytokines which are small proteins produced immunocytes, macrophages and fibroblasts that affect gene expression cells with cytokine receptors in rheumatoid synovitis. Cytokines can amplify and perpetuate inflammation in the joints leads to rheumatoid arthritis. Inflammatory cells begin to accumulate and hyper immune responses in the blood leads to pannus formation (level of lipids in synovial membrane in arthritic patients as compared to the synovial membrane as healthy individual)-Rheumatoid arthritis[22].



Allopathic medicine

The treatment of disease by conventional means that with drug having effects opposite to the symptoms. A system of medical practice that aims to combat disease by use of remedies **(as drugs or surgery)** producing effects different from or incompatible with those produced by the disease being treated.

Anti rheumatoid drugs

Anti rheumatoid drugs are the drugs used to control the symptoms of rheumatoid arthritis. These are drugs which can suppress the rheumatoid process, bring about a remission and retard disease progression, but do not have non specific Anti Inflammatory or Analgesic action.

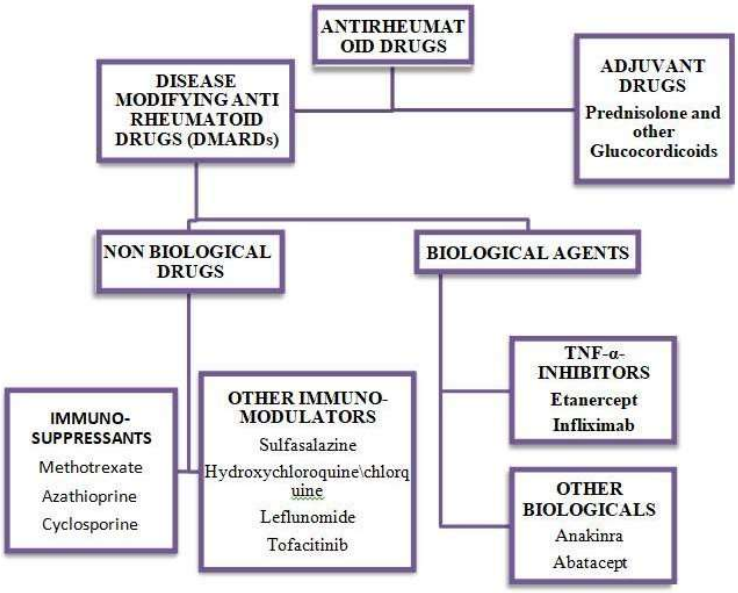
The goals of drug therapy in rheumatoid arthritis

- Ameliorate pain, swelling and joint stiffness.

- Prevent articular cartilage damage and bony erosion.
- Preserve joint function and prevent deformity[16].

S.no	Drugs	Mechanism of action	Side effects
1.	Methotrexate	Inhibition of cytokine production, chemotaxis and cell mediated immune reaction	Oral ulceration and Gastrio intestinal upset
2.	Azathioprine	Potent suppressant of cell mediated immunity	Skin rashes, Diarrhoea, Nausea, Dizziness
3.	Leflunomide	Inhibits proliferation of stimulated lymphocytes in patient with active rheumatoid arthritis	Diarrhoea,n Headache, Nausea, Loss of hair
4.	TNF Alpha Inhibitor	Suppress macrophage and T cell function and new erosion are slowed	High blood pressure, High blood sugar, Weight gain
5.	Glucocorticoids	Potent immune suppressants and anti inflammatory activity	Liver damage and causes toxicity
6.	Anakinra	It blocks the biological activity of interleukine-1	Erythema, Itching and discomfort
7.	Indomethicin	Inhibits the generation of prostaglandins (mediator of inflammation and pain) by blocking cyclooxygenase enzymes, COX-1 and COX-2	Gastro intestinal Disturbance include burning and irritation of the lining of the stomach

Classification of anti – rheumatoid drugs



Nutraceutical management

The term Nutraceutical was coined in 1989 by the foundation for innovation in medicine (New York, US) to provide a name for this rapidly growing area of biomedical research. Nutraceutical is the hybrid of 'NUTRITION' and 'PHARMACEUTICAL'.

A Nutrceutical was defined as any substance that may be considered as food or part of food and provides medical or health benefits including the prevention and treatment of diseases. Nutraceutical play a significant role in modifying and maintaining normal physiological function that maintains healthy human beings. Nutraceuticals are diet supplements that deliver a concentration form of a persumed bioactive agent from a food, present in a non- food matrix, and used with the purpose of enhancing health in dosages that exceed those that could be obtained from normal foods(ZEISEL 1990). Nutraceutical are sold in presentation similar to drugs (pills , extracts, tablets etc). The Food and Drug Administration regulate dietry supplement under a different set of regulation than those covering conventional, foods and drug products. The principle reasons for the growth of nutraceuticals in worldwide market to promote the health conditions of the peoples, because the current treatment medications are limited due to their toxicity and side effects.

Nutraceutical include

- ✓ Functional foods
- ✓ Fortified foods
- ✓ Vitamins and minerals
- ✓ Amino acids
- ✓ Fibres
- ✓ Plant extracts

Nutraceutical for rheumatoid arthritis

Pirandai

Synonym: Cissus succulent, horjora, pirandai
Biological Source: Cissus quadrangularis.
Family: Vitaceae.
Chemical Constituents: β-amyrins, β-sitosterol, ketosetostel, phenols, tannins, vitamins, carotene calcium oxalate, calcium ions and phosphorous, ascorbic acid.
Uses: Antioxidant, pain relieving and anti- inflammatory effects cissus quadrangularis is used for diabetes, obesity, high cholesterol, bone fractures, allergies, cancer, stomach upset, painful menstrual periods, asthma, malaria, wound healing, peptic ulcer disease, weak bone,(osteoporosis) and as body building supplement as analternatoin to anabolic steroids.

Black gram

Synonym: Whole black-urad dal/whole black cream with skin.
Biological Source: Vigna mungo l.hopper).
Chemical Constitutions: Carbohydrates, Lipids, Iron and calcium. Protein content in different milled fractions ranged from 4.6% - 47.2% and Fat contents ranging from 1.9% - 22.1%, Glycilein and genistin where the most concentration isoflavones in the cotyledon and germ fraction.
Uses: It is used for excellent diuretics

- ➢ It helps in flushing out toxcins, excess fat and cleances kidney function.
- ➢ A regular intake also prevent formation of kidney stones.
- ➢ Black gram oil used in order to relieve people from pain and inflammation.

Hibiscus

Synonym: Hibiscus rosa-sinensis
Biological Source: Hibiscus rosa-sinensis. It is a major species of hibiscus that is commonly known as Chinese hibiscus, China rose.
Family: Malvaceae
Chemical Constituents: Tannins, Phlobatannins, Saponins, Cardiac glycosides, Flavonoids, Terpenoids, Ergosterol, Citric, Tartaric, and Oxalic acids.
Uses:

- ➢ Hibiscus may be effective at fighting inflammation.
- ➢ This can help to prevent cancer, Alzheimer's, rheumatoid arthritis, asthma and heart disease.
- ➢ It can help inflammation in the body, which, when out of control, can increase the risk of developing cardiovascular disease, diabetes and rheumatoid arthritis.

EGG

Synonym: Bud
Biological Source: Egg or obtained from chicken. It contains egg albumin and egg yolk
Role of egg in rheumatoid arthritis: The relationship between eggs and rheumatoid arthritis is contradictory. Both omega-3 and vitamin D have been shown to have an Anti Inflammatory effect.
Chemical Constituents: 12% **Lipids**, 12% Proteins, small amount of Carbohydrates, Minerals, Phosphorus, Sulfur, Potassium, Sodium and Chloride.
Uses:

- ➢ Eggs are natural sources of Vitamin D and some are fortified with Omega-3's.

- Both are used for Anti Inflammatory effect.

Balloon vine spinach (mudakanthan keera)

Synonym: Mudakanthan keera, Love in puff
Biological Source: Cardiospermum Halicacabum
Chemical Constituents: Saponins, Triterpenes, Sterols, Alkaloids, Flavanoids and Tannins.
Uses:

- It gives noticeable relief in patients of Arthritis, Joint pain and even Gout patient.
- It's Anti Inflammatory properties make it and effective home remedies for rheumatoid arthritis and nervous breakdown.
- To treating Lumbago, Cough and some Nervous disorder.

Turmeric

Synonym: Curcuma, Curcuma Domastica
Biological Source: It is obtained from dried Rhizome of Curcuma Longa
Family: Zingiberaceae
Chemical Constituents: Curcumin, Curcuminoid, Germacrone, Vanillylidene acetone, Zingiberene, Bisdemethoxycurcumin, Curcumene.
Uses:

- Curcumin in Turmeric can effectively inhibit inflammatory reaction and reduce the symptoms such as Pain and Swelling.
- In recent year, it was found that curcumin could alleviate some symptoms in some autoimmune disease such as Rheumatoid Arthritis and Inflammatory Bowel Disease.
- Turmeric prevents Joint damage, Arthritis, Heart disease, Liver damage[17].

Dates

Synonym: Date-bearing palm, dactylifera palm.
Biological Source: Dates are a fruit cultivated from phoenix datylifera .
Family: Arecaceae.
Chemical Constituents : dietary fibres, carbohydrates, proteins, fat, minerals, vitamins, phenolic acids and carotenoids.
Uses:

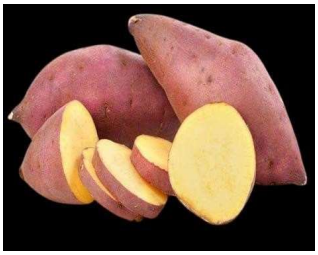
- Dried dates are used to relieve joint pain. It is packed with phenolic antioxidants and vitamins.
- Dried fruits are great source nutrition with healing and anti-inflammatory properties.

Avocado

Synonym: Aguacate, alligator pear, avocado pear.
Biological Source: Persia Americana
Family: Lauraceae
Chemical Constituents: Dietary fibers, carotenoids, alpha and beta carotene, lutein, potassium, sodium, magnesium vitamin A, C, E, K,B6.
Uses:

- Avocado is rich in monounsaturated fats, which may protect joints from inflammation.
- Avocado leaves also contain flavanoids (phytonutrients) such as quercetin and luteolin, which are known to reduce inflammation and fight free radicals.
- Avocado contains several vitamins, minerals and phytochemicals known to support immune health and decrease inflammation.

Sweet potato



Synonym: Yams, batata.
Biological Source: It is obtained from different parts such as tubers, leaves, stems and stalks of Ipomea Batatas linn.
Family: Convolaceae

Chemical Constituents: Protein, carbohydrate, crude fibers, carotenoid, starch, reducing sugar, anthocyanins, conjugated phenolic acids.

Uses:

- Sweet potatoes are good source of antioxidants, polyphenols, fiber, vitamins and minerals.
- The antioxidants activity of nutrients in sweet potatoes is associated with immune function and anti- inflammatory activity.

Salmon fish

- These are the good sources of Omega – 3 – Fatty acids which decrease inflammation and reduce symptoms of rheumatoid arthritis such as swelling and pain.
- Supplementing with Omega – 3 – fish oil capsules, which can potentially reduce inflammation and slow the progression of rheumatoid arthritis.

Olive oil

Synonym: Olive fruit, olive drupe

Biological Source: Oil is obtained from the fresh part of the ripened fruit of the olive tree, Olea Europeae.

Family: Oleaceae

Chemical Constituents: Glycerides

Uses:

- Extra virgin olive oil also been studied for its protective benefits in inflammatory autoimmune disease like rheumatoid arthritis and lupus.
- Olive oil supplements appear to improve inflammatory markers and reduce oxidative stress in individuals with rheumatoid arthritis[18].

Prevention of rheumatoid arthritis by physical activity

The main symptoms of Rheumatoid Arthritis are joint pain, swelling, muscle stiffness. The most important long term problem in the musculoskeletal system in joint damaged due to inflammation that significantly impairs functional capacity and therefore the task of everyday living. Physical activity in the broadest context includes all body movements, produced by skeletal muscles, that result in energy expenditure.

Exercise for acute phase

Performed atleast once a day Gentle assisted movement through normal range (Joint mobilization) Isomeric 'Static muscle contraction" helps to maintain tone without increasing inflammation.

Exercise for the chronic phase

- Postural / Core stability exercise
- Swimming / Walking / Cycling to maintain cardiovascular fitness
- Gentle stretches for areas that become tight, such as knees and calves

Regular exercise

- Maintaining muscle strength is important for joint stability and preventing injury.
- Muscle can become weak following reduced activity.
- Pain signals from the nerves and swelling can both inhibit muscles.
- Muscle length can be affected by prolonged positions and immobilization and tightness can limit daily activities[19].

CONCLUSION

Rheumatoid arthritis is a chronic inflammatory disease characterized by progressive damage of synovial lined joints and variable extra articular manifestation. The current treatment medications for rheumatoid arthritis are limited due to their toxicity and side effects. The side effects are overcome by growing interest in plant phytochemicals (Nutraceuticals), among people with rheumatoid arthritic patients always look for alternative options. Food is a rich sources of Anti-Oxidant and Anti-Inflammatory activity. Nutraceuticals used in rheumatoid arthritis are Pirandai, Black gram, Egg, Balloon vine, Hibiscus, Avacado, Sweet potato, Dates, Turmeric, Carrot and Olive oil. This nutraceuticals contains secondary metabolites such as Flavanoids, Carbohydrates, Tannins, Alkaloids, Steroids, Fibres, Minerals, Fats and Vitamins, Polyunsaturated fatty acid. In that Flavanoids are already report it have a Anti-Inflammatory activity. Hence flavanoids present in the above nutraceutical may be responsible to reduce or prevent the inflammation of joints in rheumatoid arthritis. Further studies are need to

research the nutraceuticals containing secondary metabolites is responsible for the treatment of rheumatoid arthritis.

REFERENCES

1. https://www.mayoclinic.org/diseases-conditions/arthritis/symptoms-causes/syc-20350772
2. European Journal of Radiology.volume 27, supplement 1, may 1998 pages s18_ s24. The clinical features of Rheumatoid Arthritis *Walter Grassi Rosella D Angelis.*
3. https://www.verywellhealth.com/rheumatoid-arthritis-gender-differences-5070797#
4. *Landre Beauvais Aj*, The First Description of Rheumatoid Arthritis. Unabridged text of the Doctoral Dissemination presented in 1800. Joint Bone spine. 2001;68;130_142
5. *Copeman Wsc*. A short History of Gout. Berkeley and Los Angeles: University of California press; 1964.
6. *Garrod AB*. treatise on Nature of Gout and Rheumatoid Gout. Landon: *Walton and Maberly*; 1859.
7. Short cl. The Antiquity of Rheumatoid Arthritis, Arthritis and Rheumatism 1974; 17(3):193_205
8. *Dequeker j*, *Rico H.* Rheumatoid Arthritis_ like Deformaties in an Early 16th_ Century Painting of the Flemish_ Dutch school, JAMA.1992;268(2):249_251
9. *Bridge ps*. Prehistoric Arthritis in the Americas_Annual Review of Anthropology.1922;21:67_91
10. https://www.medicalnewstoday.com/articles/rheumatoid-arthritis-history#discovery
11. https://www.slideshare.net/angeline777/rheumatoid-arthritis-ppt-by-ann
12. *Derksen VFAM, Huizinga TWJ, van der Woude D*. The role of autoantibodies in the pathophysiology of rheumatoid arthritis. Semin Immunopathol. 2017 Jun;39(4):437-446. doi: 10.1007/s00281-017-0627-z. Epub 2017 Apr 27. PMID: 28451788; PMCID: PMC5486798.
13. *Aho K, Heliövaara M*. Risk factors for rheumatoid arthritis. Ann Med. 2004; 36(4): 242-51. doi: 10.1080/07853890410026025. PMID: 15224650.
14. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7356332/
15. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=pathophysiology+and+implication+of+rheu m atoid+arthiritis+&btnG=#d=gs_qabs&t=1710442385832&u=%23p%3D0epfm54-GZEJ
16. Essential of Medical Pharmacology.*KD Tripathi* (8th Edition).
17. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10264675/#:~:text=Curcumin%20in%20turmeric%20can %2 0effectively,inflammatory%20bowel%20disease%20(16)
18. https://www.healthline.com/nutrition/11-proven-benefits-of-olive-oil.html#:~:text=Olive%20Oil%20Can%20Help%20Treat%20Rheumatoid%20Arthritis&text=Olive%20oi l%20 supplements%20appear%20to,inflammatory%20omega%2D3%20fatty%20acids
19. https://www.slideshare.net/senphysio/physiotherapy-management-for-rheumatoid-arthritisrheumatoid disease Bull Rhueum Dis 1988;38:1_10.
20. *Mc. Dermott. M, Mc. Devitt. H*. The. Immunogenetice. Of rheumatoid disease Bull Rhueum Dis 1988;38:1_10.
21. *Cavender D, Haskard D ,Yu C_L, et al*. pathways to chronic inflammation in rheumatoid synovitis. Fed Proc 1987;46:113.7.
22. *Van Boxel J A, Paget SA*. predominantly T_ cell infiltrate in rheumatoid synovitis membrane. *N Engl J Med* 1975; 203:517-20.
23. *MacGregor AJ, Snieder H, Rigby As et al* (2000) Characterizing the quantitative genetic contribution to rheumatoid arthritis using data from twins. Arthritis Rheum 43(1):30_37. doi: 10.1002/1529_ 0131(200001)43:1<30::aid-anr>3,0.co; 2_b
24. *Makrygiannakis D, Hermansson M, Ulfgren AKet al* (2008) Smoking increase peptidylarginie deiminase 2 enzyme expression in human lungs and increase citrullination in BAL cell. *Ann Rheum Dis* 67(10):1488_1492,doi: 10.1136/ard.2007.075192
25. *Zhang X, Zhang D, Jia H*(2015) the oral and gut microbiomes are perturbed in rheumatoid arthritis and partly normalized after treatment.Nat Med 21(8):895_905. doi:10.1038/nm.3914