

# Nutritional Change For Rheumatic Diseases- A Review

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**Abstract:** There are many people who suffer from Rheumatoid Arthritis (RA) which is a condition that affects several joints, most usually the small joints in the feet, hands, along with knees, hips and shoulder joints too. RA is an autoimmune disease which leads to inflammation of the lining of the joints, resulting in destruction & deformity of the affected joints, causing extreme tenderness and pain. Does RA represent a significantly altered physiological condition in which the spectrum and balance of nutrients recommended for normal healthy children and adults are no longer adequate or is it beyond nutrition? In the present article an attempt has been made to unfold the role of bioactive compounds from different foods groups for meeting nutritional requirement in RA.

**Key words:** Rheumatic diseases, lifestyle modification

## 1.0 Introduction:

Most of us complain about persistent pain in our body joints and the medical condition affecting joints is called as **Arthritis**. There are many forms of arthritis, some more painful and unbearable than others. They can affect individuals of all ages and genders. One form of arthritis is rheumatoid arthritis. Rheumatic arthritis is a serious health hazard to a large minority of the adult population. Although the nutritional requirement of healthy humans are described in Recommended Dietary Allowances (RDA) and RDA's forms the basis of nutrient intake from various food groups. But does the rheumatic disease condition represent a significantly altered physiologic condition in which the spectrum and balance of nutrients recommended for normal healthy children and adults are no longer adequate or is this condition beyond nutrition? This review article will explore what should be eaten and avoided when you are suffering from Rheumatoid Arthritis (RA).

**Rheumatoid Arthritis (RA)** is an autoimmune disease which leads to inflammation of the lining of the joints, resulting in destruction & deformity of the affected joints, causing extreme tenderness and pain. In this inflammatory condition the body essentially attacks itself. RA is a 'systemic' (universal) disease which means that it can affect the whole body including the heart, lungs and eyes, but this is less common. RA is a condition that affects several joints; most usually the small joints in the feet, hands, along with knees, hips and shoulder joints too. Several joints can be affected at the same time, usually on both sides of the body, symmetrically. In order to treat this health problem, patients are given medicines that suppress the immune system in hope that the body will "back off!". There is one serious problem, that when the immune system is suppressed down by the drugs to lessen RA symptoms, it also may be less effective in protecting a person from all the sickness they are exposed throughout their daily life.

People with rheumatoid arthritis have twice the risk of dying compared to the general population due to the suppressed immune system and reduced muscle mass contributes to that risk. The average 70-year-old has 30% less muscle than the average 25-year-old, says Roubenoff, and "if a person lose 40%, then he may die." People with rheumatoid arthritis need to consume more protein than normal healthy individuals, said Roubenoff, who recommends eating about 2.7 ounces of protein daily. That's roughly equivalent to one 4 ounce chicken breast or two servings of beans. But by simply eating more protein does not result in increased stores of protein in the body, said Roubenoff. The problem is that the body stores protein as fat, because muscle is not being built. Resistance exercise which involves leg lifts and arm exercises using weights helps build muscle so that protein can be stored. So, it may be suggested that by eating more protein and doing regular exercise a RA patient can feel relieved. It is not that RA only affects adults but rheumatic diseases can even affect the kids. Juvenile rheumatoid arthritis (JRA) is the most common paediatric rheumatic disease and one of the more prevalent chronic diseases of childhood. Protein-energy malnutrition has been identified in up to 50% of patients with JRA. Rheumatic diseases includes few disease conditions which includes Protein-Energy Malnutrition, Cytokine-Mediated, Anorexia, Gastrointestinal related abnormalities associated with Oral Cavity, Esophageal Dysfunction, Malabsorption which may result from bacterial overgrowth of the small intestine, abnormalities of the intestinal absorptive surface, Obesity also aggravates joint dysfunction in patients with rheumatic diseases whose joint function has been compromised by articular damage, Nephrotic Syndrome (a condition characterized by increased glomerular permeability to protein, often resulting in loss of more than 3 g of albumin per day in the urine). The symptoms vary quite a bit from person to person. Some may have symptoms that last only a few months and then disappear; others may have a moderate form of rheumatoid arthritis where symptoms come and go. Finally, there are those who develop a severe form of the disease where it is active most of the time, and eventually leads to joint damage and debilitation. Rheumatic disease include following symptoms:

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- Swollen, warm, painful joints, particularly after awakening or after long periods of inactivity.
- Fatigueness with occasional fever.

- Inflammation occurring in a symmetrical pattern – if one wrist is involved the other will be also.
- Small joints in the hands, fingers, feet, toes, wrists, elbows and ankles will be affected first.
- Other affected joints may include the knees, shoulders and hips.
- Some may develop hard bumps (nodules) under the skin near the affected areas.
- As the disease progresses, the joints will become deformed and may freeze in one position, making it difficult to move them.

## 2.0 Role of Nutrients in Rheumatic Diseases

Nutritional imbalance has been observed with the patients with rheumatic diseases. It is known that rheumatic and inflammatory conditions increase demand of :

1. Proteins because of increased turnover,
2. Minerals because of increased mobilization, in particular trace or micro minerals which include iron, zinc, copper and selenium.
3. Vitamins because of altered metabolism and bioavailability. Vitamins of particular importance includes Vitamin A and Retinoids, Vitamin C (Ascorbic Acid), Vitamin B6 (Pyridoxine) , Vitamin D, Vitamin E, Histidine, Vitamin K2 )

At present a diet with moderate protein restriction containing not less than 0.6 g/kg body weight per day of protein of high biological value, supplemented with an amount of protein equal to urinary loss is given to individuals is usually suggested to individuals with rheumatic diseases. Role of individual nutrients is discussed below:

### 2.1 Trace Minerals

**2.1.1. Iron:** Iron plays an important role in diverse functions in the body. Iron is an essential part of two proteins, haemoglobin and myoglobin, that are involved in the transport and metabolism of oxygen. As a component of haemoglobin, iron carries oxygen in the blood from the lungs to all tissues of the body. It also transports carbon dioxide back to the lungs for expiration. Iron forms a part of the myoglobin in muscles which makes oxygen available for muscle contraction. Dietary iron deficiency leads to nutritional anaemia. Anaemia is often observed in patients with chronic inflammatory rheumatic diseases and this may arise from different mechanisms. Numerous investigators have observed deposition of large amounts of iron in the synovial tissue of patients with RA and associated them with the occurrence of persistent joint inflammation. It has been hypothesized that excessive iron deposits may catalyze the formation of reactive oxygen species and thus contribute to inflammation and tissue injury in RA.

**2.1.2. Zinc:** Zinc is an important element performing a range of function in the body as it is a cofactor for a number of enzymes. Plasma zinc levels are reduced in patients with many chronic inflammatory diseases including RA. Significant impairment of lymphocyte and neutrophil functions and a potentially harmful increased LDL: HDL ratio have been observed in healthy adults with excessive

intake of zinc (~150 mg/day, a 10-fold excess of the recommended dietary allowance).

**2.1.3. Copper:** Copper has vital functions as a part of many important proteins and enzymes in the body. Elevated copper levels have been observed in both serum and synovial fluid of patients with RA. Copper, along with zinc, is a constituent in cytoplasmic superoxide dismutase (SOD). Both ceruloplasmin and SOD possess antioxidant properties and have an essential protective role against free radical-mediated tissue damage observed in inflammatory states. Copper bracelets were used by the ancient Greeks to relieve aches and pains and presently are used as a folk remedy for RA.

**2.1.4. Selenium:** Some studies have found that people with rheumatoid arthritis have low levels of selenium in their blood compared to people without the disease. Selenium deficiency might play a role in Kashin-Beck disease, a type of osteoarthritis that occurs in certain low-selenium areas of China, Tibet, and Siberia.

### 2.1.5. Vitamins

- i. Vitamin A and Retinoids :** Both isotretinoin and etretinate have been associated with development of hyperostosis, especially in the cervical spine, and extraspinal calcifications of tendons and ligaments.
- ii. Vitamin C (Ascorbic Acid) :** Vitamin C serves a role as a cofactor in collagen synthesis (the main protein in joint tissue and bone), Vitamin C plays a role in fighting infection and may work to control inflammation which is linked to infection. Ascorbic acid is essential for the synthesis of collagen, the main extracellular protein of connective tissue. Low levels of ascorbic acid, in plasma, blood cells, and synovial fluid have been described in RA patients, irrespective of drug therapy. Researchers say people who had the lowest levels of vitamin C in their diet were three times more likely to develop inflammatory arthritis than people who got the most of the vitamin from fruits and vegetables, such as citrus fruits, strawberries, and raw, red sweet peppers. It has been reported that consumption of foods high in vitamin C seem to protect against inflammatory polyarthritis, a form of rheumatoid arthritis involving two or more joints. The positive effect of vitamin C on rheumatoid arthritis may be because vitamin C is a powerful antioxidant which fight with molecules which trigger rheumatoid inflammation.
- iii. Vitamin B6 (Pyridoxine) :** Vitamin B6 has its role as a cofactor in numerous enzymatic reactions involving aminoacids and proteins, including nucleotide and protein synthesis and cellular proliferation. Low vitamin B6 levels in the circulation is a metabolic abnormality in patients with RA and low plasma levels of pyridoxal-5'-phosphate (PLP), also occur in the patients with rheumatoid and appear to be related to the degree of inflammation and the levels of inflammatory

cytokines. A large dose of vitamin B-6 supplementation (100 mg/day) suppressed pro-inflammatory cytokines in patients with RA.

- iv. **Vitamin D:** Recent research shows greater intake of vitamin D is associated with a lower risk of RA.
- v. **Vitamin E:** People with RA have been reported to have an impaired antioxidant system, thus making them more susceptible to free radical damage. Vitamin E acts as an antioxidant, protecting many tissues, including joints, against oxidative damage.

In the joint fluid of people with RA, low vitamin E levels have been reported. Approximately 1,800 IU per day of vitamin E has been found to reduce pain from RA as anti-inflammatory drugs.

- vi. **Histidine:** RA is associated with a condition of hypohistadinaemia. So, by using histidine supplements or diets rich in histidine could help reduce rheumatoid arthritis symptoms.
- vii. **Vitamin K2** has significant antiosteoporotic effects. Therefore Vitamin K2 is used for treatment for patients with osteoporosis in Japan and has been used for more than 10 years.

### 3.0 How does our diet and rheumatic diseases & RA Are Related?

Diet affects rheumatic diseases by two possible mechanisms. First, food-related antigens might induce hypersensitivity responses leading to rheumatic symptoms. Second, nutritional factors might alter inflammatory and immune responses and consequently modify manifestations of rheumatic diseases.

#### 3.1 Food hypersensitivity:

Food-related antigens might incite hypersensitivity responses leading to rheumatic symptoms. Hypersensitivity reaction can be induced by consuming food which might contain antigen:

- Nonprotein amino acid, L-canavanine of alfalfa is responsible for triggering an SLE-like syndrome.
- Canavanine is the principal free amino acid of a number of legumes such as clover and alfalfa, and it has also been reported to be a constituent of several food crops, including onions and soybeans. Interestingly, most of the toxic properties of L-canavanine appear to be destroyed by heating or cooking, this is why humans have not been affected more adversely by its toxicity.
- Azo dyes, particularly tetrazine, has also been occasionally implicated as a cause of purpura in a few patients.
- L-Tryptophan (LT) is an essential amino acid found in meats, dairy products, and some vegetable protein sources. Dietary supplementation with LT is associated with a unique rheumatic disease Eosinophilia-Myalgia Syndrome (EMS).

Therefore, by avoiding the foods which can trigger the antibody and antigen response an individual can reduce the hypersensitivity leading to rheumatic symptoms.

### 3.2 Dietary Therapy

In spite of the progress that in the development of new drugs for the treatment of rheumatoid arthritis (RA), many patients are still interested in alternative treatments like dietary therapy, which include treating the disease by improving the immunity and subsiding inflammation by feeding nutrient supplements or diets rich the deficient nutrient. Dietary therapy for rheumatic diseases can be divided into two modalities: (a) Elimination therapy, which includes both removal of selected foods from the diet and fasting, and (b) Supplementation therapy, in which foods or the food component which are beneficial for treating the disease are added to the diet (for ex.  $\omega$ -3 and  $\omega$ -6 polyunsaturated fatty acids have been most extensively investigated in rheumatic diseases). One important consideration for planning nutritional intervention in pediatric patients with rheumatic diseases, is to consider the potential changes in nutrient requirements for children with a great degree of persistent inflammation; patients with active disease often require increased dietary energy and protein. For example Scandinavian health forums have promoted fasting and vegetarian diets or lactovegetarian diet for patients with rheumatic diseases. Fasting has beneficial effects on both clinical and laboratory variables reflecting disease activity in RA. Few studies in healthy subjects have revealed that fasting decreases mitogen- and antigen-induced lymphocyte proliferative responses, and suppresses interleukin-2 (IL-2) production.

### 4.0 Recommendations

Healthy joints require a balanced diet, physical activity, and an adequate amount of rest. Although there is no established arthritis diet plan but patients with chronic rheumatoid arthritis can improve the symptoms of their disease with proper nutrition and physical nutrition. What works for one patient may not work for someone else. In general, expert's advices to maintain a healthy body weight and eat a balanced diet. Some food intake related recommendations that may help the patient feel better and stay well in spite of Rheumatoid Arthritis. Following are the ways to which can be followed to stay fit and lead healthy life with RA:

#### 1. Supplements :

- Fish oil supplement- fish oil will help to reduce inflammation without suppressing immune system.
- Vitamin Supplement- Vitamins A, C, and D3. Vitamins A and C are anti-oxidants and may help prevent some of the damage to joints that causes pain for those suffering with RA.

**CAUTION:** But be sure to check with your doctor before taking any nutritional supplements to avoid any drug interactions.

## 2. **Eat a balanced diet.**

Plan a healthy diet covering food items all food groups in **moderation**.

- Include broccoli in the meal. As per new Arthritis Research, it has been found that a compound found in broccoli could be key for preventing or slowing the progress of the most common form of arthritis (osteoarthritis).
- Eat fresh, whole seasonal foods.
- Drink lots of water, which will help to cleanse body system and facilitate all of the healthy processes in body.
- Limit or avoid processed foods:
  - As they may contain additives which may intensify the symptoms. So it becomes important to read the label of packaged foods and check if the ingredient list has those additives which can exaggerate the symptoms, in that case those foods should not be eaten.
  - Many foods contain excessive salt and other preservatives to promote longer shelf lives. For some people, excess consumption of salt may result in inflammation of the joints. So, it is suggested to reduce the salt intake to as modest quantity as is reasonable.
  - Reduce the consumption of fried and processed foods, such as fried meats and prepared frozen meals, this can reduce inflammation.

## 3. **Carbohydrates in the diet:**

- Cut down on foods rich in sugar. This can include reducing the soft drinks and other sweets with added sugar.
- An **advanced glycation end product (AGE)**, is a toxin that appears when foods are **heated, grilled, fried, or pasteurized**. AGEs damage certain proteins in the body, and the body tries to break these AGEs apart by using cytokines, which are inflammatory messengers. Depending on where the AGEs occur, they may result in arthritis or other forms of inflammation. So, it is suggested to reduce your AGEs (which can result in inflammation) in the diet by reducing the amount of foods cooked at high temperatures in your diet.
- Reduce the intake of processed foods, white flour baked products, candies, and Cold drinks including sodas to reduce arthritis pain.
- Add fiber to your diet by including foods rich in soluble fibers like oatmeal, fiber fortified flour, multigrain flour and products thereof. Don't waste the bran of wheat flour by sieving it, you can make the chapati with whole wheat flour, this will add fiber to the diet.
- Get yourself checked for the hypersensitivity to know if you are gluten sensitive. In that case you can simply refrain from eating processed foods made with wheat and other foods rich in gluten, to avoid aggravating your RA symptoms.

## 4. **Fat in the diet:**

- Eat less saturated fat from meat and dairy products. Focus should be more on including foods rich Omega-3 foods such as salmon, sardines, flax seed and walnuts.
- Avoid foods or fats which are rich in trans fats. As these unhealthy fats encourage inflammation and are found in fried foods, margarine and foods with hydrogenated oils.
- Include extra-virgin olive oil for cooking. This is a better choice for an anti-inflammatory diet than other vegetable oils. It is also rich in omega fatty acids.
- Many baked products and snacks which contain corn or other oils high in omega-6 fatty acids howsoever may be appealing on the taste buds, but they may trigger inflammation. So, replace foods or oils containing omega-6 fatty acids with healthy, anti-inflammatory food or oils rich in omega-3 to prevent this inflammation. Omega-3 rich sources are fish oil, olive oil, nuts, pumpkin seeds, and flax seeds etc.

## 5. **Protein in diet:**

- Eat less protein of animal origin.
- Include vegetable protein sources such as beans. Those with autoimmune disease seem to do better on a low-protein diet.
- Dairy products may contribute to arthritis pain due to the type of protein they contain. According to the Physicians Committee for Responsible Medicine, for some people this protein may irritate the tissue around the joints. Some patients of arthritis pain have felt relief when they have switched to a vegan diet which contains no animal products whatsoever.
- So, Instead of taking protein from meat and dairy, take protein of the diet from vegetable and fruits sources like spinach, nut butters, tofu, beans, lentils, and quinoa.

## 6. **Include anti-**

**inflammatory herbs** like ginger and turmeric in the meal as these are effective. You can continue to take these herbs indefinitely and limiting foods that may trigger joint pain.

## 7.0 **Suggested Lifestyle Changes**

Lifestyle changes can moderate autoimmunity, and other strategies can help to control the symptoms of rheumatoid arthritis. Following are recommendations:

- Maintain a healthy weight. This will lessen the overall inflammation in the body as well as ease your joints by reducing the load on joints especially knee and ankle joints.
- Instead of black tea, drink white or green tea as they have healthy phytochemicals and antioxidant properties.
- Insecticides may intensify the symptoms of RA. So, restrict exposure to insecticides and if possible you can even opt for purchasing organic foods grown without pesticides.
- Doing regular aerobic exercise (swimming) is best for rheumatoid arthritis patients.



- Either eliminate or reduce intake of coffee and tobacco as both have been found to increase the risk of rheumatoid arthritis.
- Reduce or curtail from drinking Alcohol & Smoking. Smokers are more at risk for developing rheumatoid arthritis, while those who consume alcohol have a higher risk for developing gout.
- Take quality sleep.

Hence, the lifestyle and nutrition plays an important role in controlling the symptoms of Rheumatic diseases including RA.

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