

ARTHRITIS

The information explosion in the science of nutrition very often creates the impression that available information is contradictory. Consequently, it is no longer easy to distinguish between fact, misinformation and fiction. The Nutrition Information Centre of the University of Stellenbosch (NICUS) was established to act as a reliable and independent source of nutrition information.

There are more than a hundred types of arthritis, two of the most common being *rheumatoid- and osteoarthritis*. Other forms of the disease are gout, systemic lupus erythematosus, scleroderma, ankylosing spondylitis and juvenile arthritis.

The cause of most rheumatic conditions remains unknown. It is postulated that several types of arthritis are caused by either a virus or by constant stress (from obesity or inappropriate strenuous exercise) that initiates the inflammatory process. This process normally occurs to protect and repair tissue damaged by infections, sports injuries, toxicity, or wounds. Once the cause is resolved, however, the inflammation usually subsides. With rheumatic disease, the inflammatory response is often not as efficient as it should be, especially in the aged where the major body changes associated with aging inherently affect the inflammation process and may also contribute or partially contribute to the onset and/or progression of arthritis. These changes include: decreased body protein, body fluid, bone density as well as an increased proportion of total body fat and changes in the nervous- and immune system.

Arthritis is usually chronic, but may present as acute episodes. An acute attack is of short duration, but may recur and develop into a chronic condition. Chronic arthritic conditions are associated with alternating periods of remission (absence of symptoms) and flares (worsening of symptoms), which often occur without any identifiable cause.

How do rheumatic disorders influence the nutritional status of individuals?

- ◆ Eating inadequately because of:
 - Reduced appetite caused by medication, fatigue and pain.
 - Taste changes due to dry mouth, dental caries and infection of the gums.
 - Fatigue as a result of anaemia (caused by a decreased intake or medication-induced gastro-intestinal bleeding) and pain.
 - Difficulties in chewing and swallowing.
 - Involvement of the small and large joints may limit the ability to perform activities of daily living, such as shopping as well as preparing and eating of foods. Meals may thus be missed or replaced by nutritionally deficient snacks.
 - Changes in the function of the oesophagus and the gastrointestinal tract may also affect dietary intake, digestion and absorption.
- ◆ Protein-energy malnutrition caused by an increased metabolic rate and inadequate intake.
- ◆ Drug related adverse effects might also have deleterious effects on the nutritional status.

OSTEOARTHRITIS

Osteoarthritis (OA) is a degenerative joint disease in which the cartilage that covers the ends of bones in the joint is damaged, causing pain and loss of movement as bone begins to rub against bone. Inflammation occurs at times, but it is not a primary symptom of the condition. OA can occur in any joint and it is thought to be due to past load impact injuries or from constant friction. It is the most prevalent form of arthritis.

Although OA occurs mostly in the elderly, it is not necessarily age-related. Its onset is usually asymptomatic in the 2nd or 3rd decade of life and is very common by the age of 70 years. The joints most often affected are those of the thumb, knees, hips, ankles and spine. The onset is gradual, usually involving one or multiple joints. Pain is the earliest symptom and is worsened by exercise and relieved by rest. Early stages of the disease are marked by stiffness (especially morning stiffness following inactivity for a period of time), usually when rising from a chair or after standing, but lasts <20-30 minutes and is lessened with movement. As the disease progresses, joint motion diminishes and the joint can enlarge and it progresses to general soreness.

The prevalence of OA is higher among the obese/overweight persons as compared with those of normal body weight. Obesity and injury are the two greatest risk factors for OA. Excess weight impacts adversely on weight-bearing joints; however, weight reduction is thought to improve all affected joints.

Dietary guidelines for osteoarthritis

- ◆ Follow a healthy, balanced diet that promotes the maintenance or attainment of ideal body weight.
[For more detailed information on weight management, contact NICUS or a registered dietician].
- ◆ It is essential to maintain a regular exercise program to aid in weight management. Non-loading aerobic exercise (such as brisk walking, cycling and swimming) has been shown to reduce symptoms, increase mobility and lessen continuous damage from the condition. It is important that an exercise programme is introduced gradually and to the capability of an individual so as not to exacerbate an existing problem. Additionally exercise often improves sleep, results in better tolerance of discomfort and promotes a greater sense of well-being. Increased muscle tone and strength as well as general conditioning protect the affected joints during exercise.
- ◆ Weight management (usually weight loss) can be particularly challenging because the disease limits the ability to increase energy expenditure through exercise.
- ◆ Ensure an adequate Calcium and Vitamin D intake. Many persons with osteoarthritis do not consume sufficient calcium and have a poor Vitamin D status. The latter tends to be more common among individuals who do not receive sufficient exposure to sunlight, for example the elderly, who tend to confine themselves indoors, bed-ridden individuals or those who, due to religious reasons, cover most body surfaces with clothes. It has been reported that the risk for progression of the disease is increased three-fold in those individuals with a poor Vitamin D status.
- ◆ Adequate intake of at least the RDA (Recommended Daily Allowance) of all micronutrients (vitamins and minerals) is recommended.
- ◆ Some alternative therapies that have been used to lessen the need for Non-Steroid Anti-inflammatory Drugs (NSAD) and lessen the severity of the symptoms include chondroitin sulfate, glucosamine, avocado pears and soybean oils. These have yielded favorable results when used in conjunction with conventional medical therapy. Consultation with a doctor is always recommended before using *any* alternative therapies.

RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is a chronic, autoimmune systemic disorder of unclear etiology that results in symmetrical joint inflammation. It is a debilitating and frequently crippling disease with overwhelming personal, social and economic effects - even more severe than OA. It occurs more frequently in women than in men with a ratio of 3:1. The onset of RA may occur at any age, but most often affects individuals between the ages of 25 - 50 years.

Any joint may be affected, but involvement of the small joints of the extremities, i.e. hands and feet is most common. It is usually symmetrical, but initially it may occur in any joint. The most frequent complaints are pain, stiffness and swelling with periods of remissions and exacerbations. Stiffness lasting >30 min on arising in the morning or after prolonged inactivity is common; early afternoon fatigue and malaise also occur.

Nutritional requirements in rheumatoid arthritis

ENERGY:

The specific impact of the inflammatory response as induced by RA on the metabolic rate of an individual is unknown and may vary from person to person. In addition, activity levels may vary greatly and should be taken into consideration. Weight should be monitored closely and the energy intake adjusted accordingly so as to achieve or maintain ideal body weight.

In general terms, energy requirements can be increased by 114 - 135 % of the energy requirement of a healthy person during the inflammatory phase of the disease. Upon remission of the disease, energy requirements should be adjusted according to the weight (if over- or under weight) and activity level (if sedentary, receiving physiotherapy or if the person is still very active) of the individual.

PROTEIN:

Protein requirements for individuals who are poorly nourished or who are in the inflammatory phase of the disease are 1.5 - 2 g protein/kg body weight. Well-nourished individuals do not have increased requirements.

FAT:

Fat should contribute less than 30% of the total energy requirement both for the purposes of healthy eating and/or weight management. The type of fat included in the diet is however thought to be important and should be so adapted as to include increased amounts of omega-3 fatty acids (found primarily in marine oils and algae, and to a lesser extent in plant leaves) as compared to omega-6 fatty acids (vegetable oils such as sunflower oil). Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are two fatty acids that form part of the omega-3 fatty acid group. EPA and DHA together with alpha-linolenic acid (found in linseed-, flaxseed and soybean oils, as well as green leaves) have been shown to reduce inflammation in RA. Although omega-3 fatty acids have been shown to be beneficial, in addition to improved dietary habits, they should never replace conventional drug therapies. Nevertheless, a reduced need for some anti-inflammatory drugs has been found with long-term omega-3 fatty acids supplementation. Individuals who wish to consider using such supplements in the long-term should do so in consultation with their doctors.

VITAMINS AND MINERALS:

Common nutrient deficiencies found among people with RA include that of Calcium, Folic acid, Magnesium, Vitamin D, Vitamin B6 and Zinc. However, there is no consistent evidence that supplementation with these nutrients at doses higher than the RDA afford additional benefit.

Deficient Calcium and Vitamin D intake, decreased physical activity and deficient exposure to sunlight, all play an important role in the development of metabolic bone diseases, such as osteoporosis in individuals with RA, and, therefore, early supplementation with Calcium and Vitamin D is indicated, especially in those individuals who do not get regular exposure to sunlight. Persons with existing bone disease may also benefit from such supplements.

Additionally, the type of medication used can also influence the absorption and metabolism of certain nutrients and should therefore be taken into consideration (see *Dietary concerns associated with the use of commonly prescribed drugs*).

What is the role of exercise in RA?

Regular resistance and aerobic activity, adjusted to the individual's capability, in persons with rheumatoid arthritis does not appear to diminish inflammation, but it:

- ◆ Increases the range of joint motion
- ◆ Improves strength and endurance
- ◆ Preserves bone mass
- ◆ Preserves lean body mass
- ◆ Prevents fatigue
- ◆ Decreases depression
- ◆ Distributes the forces of muscle contraction more evenly over joint surfaces

Dietary guidelines for rheumatoid arthritis

- ◆ Avoid being **overweight**, as it puts undue stress on the joints. Exercise (e.g. swimming, cycling or walking) together with a sensible, low fat diet will help minimize symptoms.
- ◆ Eat oily fish regularly to increase the intake of omega 3 fatty acids in the diet (*Table 1*). Substitute red meat with salmon, mackerel, snoek, trout, sardines, pilchards and shellfish at least three times per week.

Table 1: Food sources of omega-3 fatty acids

Food Source: (150g raw weight)	Total fat (g)	Total Omega-3 (g) (including DHA and EPA)
Sardines in Sardine oil	23.25	4.95
Herring/Butterfish	17.40	3.33
Salmon	19.50	2.79
Mackerel	20.85	2.50
Pilchards in brine	8.10	2.42
Herring	13.50	2.40
Anchovy	7.20	2.10
Smooresnoek (medium fat fish, potato and onion)	7.05	1.04
Tuna in brine	3.75	0.75
Trout	4.05	0.60
Catfish	6.45	0.45
Haddock	1.05	0.30
Lobster	1.35	0.30
Shrimp	1.65	0.45

Source: Kruger M, Langenhoven ML, Faber M. Fatty acid and Amino acid Composition Tables. Supplement to the MRC Food Composition Tables (1991). Parow: Medical Research Council, 1992.

- ◆ **Supplements:**
 - Omega-3 fatty acid supplements can also increase the dietary intake of this nutrient. However, the use of supplementation does come with its own side effects in some individuals, namely increased bleeding time, gastrointestinal discomfort and a fishy taste or odor.
 - If a supplement is taken, do not exceed the supplier's recommended daily dose (see product's package insert) and take the supplement in consultation with your doctor – especially those individuals on anti-coagulation (including aspirin) medication.
 - Be aware of omega-3 fatty acid supplements that also contain large dosages (more than 150% of the RDA) of vitamins A, D and E, especially if the omega-3 fatty acid supplement is taken in combination with other vitamin and mineral supplements, which also contain these vitamins.
 - Any decision to take supplements of any type in large doses should be based on the advice of your doctor or dietitian.
- ◆ Certain foods are thought to exacerbate the disease. It is, therefore, best to identify these foods by following an exclusion diet, which must be done under the supervision of a dietitian. Commonly suspected foods include dairy products, red meat, eggs, cereals, alcohol and chocolate.
- ◆ Include fresh fruit and vegetables, especially those rich in beta-carotene, e.g. carrots, apricots and sweet potato and also those rich in vitamin C, e.g. broccoli, orange, cabbage, potato and guava.
- ◆ Use salt in moderation.
- ◆ Drink at least 6-8 glasses of water per day.
- ◆ If you drink alcohol, do so in moderation.
- ◆ Enjoy moderate intakes of avocados, nuts and sunflower seeds for vitamin E and whole grains, cereals and eggs for selenium.
- ◆ Stress is known to exacerbate disease activity and a stress management programme may prove beneficial.
- ◆ Provision of a walking aid, modifications to the kitchen layout and the use of adapted cutlery may provide renewed self-reliance in maintaining an adequate nutritional status.
- ◆ Eat in a relaxed environment.

When, despite these measures, nutrient intake is poor, enteral- (tube feed) or parenteral (administration of nutrient solutions via infusion into a large-diameter vein) nutrition may be necessary. A doctor or dietician should make the decision to initiate this type of specialized feeding.

DIETARY CONCERNS ASSOCIATED WITH THE USE OF DRUGS COMMONLY PRESCRIBED:

Medications used in the treatment of RA can affect the nutritional status of an individual by interfering with the absorption, metabolism and/or excretion of nutrients.

◆ **Non-Steroid Anti-inflammatory Drugs**

Gastrointestinal side effects such as nausea, vomiting, constipation and gastrointestinal bleeding can be experienced which may result in loss of appetite and iron-deficiency due to chronic blood loss.

◆ **Disease Modifying Anti-rheumatic Drugs (such as hydroxychloroquine, sulfasalazine and methotrexate):**

Nausea and loss of appetite may occur.

◆ **Methotrexate**

This drug has been associated with low levels of folic acid. Methotrexate may also cause nausea, abdominal pain and mouth ulcers, which, when severe may impair food intake and require dietary treatment.

DIETARY SUGGESTION:

Eat a diet that includes good sources of folic acid (fresh green leafy vegetables, fruit, organ meats, dried nutritional yeast) vitamin B6 (pork, cereal bran and germ, milk, egg yolk, oatmeal and legumes) and Vitamin B12 (yeast, liver, beef, eggs, kidney). Supplementation should always be practiced under medical supervision.

◆ **Penicillamine**

This drug can cause an altered taste, nausea, vomiting, diarrhoea and loss of appetite. It can bind to iron and may cause iron malabsorption (and thus iron deficiency anemia may result). It should thus always be taken at least 6 hours apart from any iron supplements. This drug is also associated with decreased copper and zinc levels in the blood.

◆ **Corticosteroids**

Corticosteroids may cause nausea and oedema. Obesity with alterations in fat distribution is a common adverse effect that can persist even with reduction in the dosage. It is also associated with accelerated protein breakdown, increased blood fats, glucose intolerance (that can lead to diabetes), an increased loss of calcium in the urine as well as a decreased calcium absorption, which increases the risk of developing osteoporosis. Loss of bone mineral density is proportional to the dose and duration of the therapy.

DIETARY SUGGESTION:

- The amount of weight gained should be closely monitored and the diet and exercise program should be adjusted accordingly.
- Adequate Calcium and Vitamin D intake should be ensured.

◆ **Salicylates (Aspirin)**

Chronic aspirin ingestion is associated with nausea, vomiting, gastro-intestinal bleeding (that can result in iron deficiency anemia), increased bleeding time, as well as low levels of Vitamin C and folic acid.

DIETARY SUGGESTION:

- Never take aspirin on an empty stomach, but always with a meal.

- Focus on increasing dietary intake of Vitamin C by consuming Vitamin C-rich foods such as e.g. broccoli, citrus fruits, cabbage, potato, guava, strawberry and pineapple.
- Dietary intake of folic acid also needs to be increased by consuming more fresh green leafy vegetables, fruit, organ meats and dried nutritional yeast.
- Chronic users of aspirin may be recommended to take a supplement of vitamin C (not exceeding 250 mg per day) under medical supervision.

Dietary guidelines to address disease- or drug-induced nutritional disorders in people with RA

NUTRITIONAL DISORDER	POSSIBLE SOLUTION	REDUCE/AVOID INTAKE OF
Decreased appetite	<ul style="list-style-type: none"> • Small frequent meals (5-6 meals) instead of three main meals • Meals should be appetizing in appearance and taste and provide enough energy and protein 	
Nausea and vomiting	<ul style="list-style-type: none"> • Eat small, frequent meals • Food is best tolerated at cool or room temperature • Eat dry, salty crackers, pretzels, biscuits and cookies • Simple foods such as rice, scrambled eggs, toast, noodles, bananas, mashed potatoes, custards may be better tolerated • Clear, cold non-acidic liquids • Light low-fat foods • Enough liquids • Allow plenty of fresh air in the house • Disperse cooking odours 	<ul style="list-style-type: none"> • Milk products • Cream soups • Fatty / fried foods • Sweet desserts • Avoid lying down immediately after eating
Sore mouth or throat	<ul style="list-style-type: none"> • Eat soft, moist food at cool or room temperature (mashed potatoes, macaroni and casseroles) • Drink through a straw 	<ul style="list-style-type: none"> • Spicy, salty or acidic foods • Carbonated beverages • Juice, especially citrus fruits • Bananas • Crisp or raw foods • Hard / tough meats • Textured or granular foods • Coarse bread products • Extremely hot or cold foods.
Dry mouth	<ul style="list-style-type: none"> • Eat foods with a high moisture content (serve with gravies / sauces, casseroles, chicken, fish, vegetables with sauces) • Have liquids at mealtime with the food • Drink extra liquids between meals • Chewing of sugarless gum or sucking of mints may help • Concentrate on good oral hygiene 	<ul style="list-style-type: none"> • Thick liquids • Thick hot cereals • Dry foods, bread products, tough meats, crackers • Excessively hot foods • Alcohol
Mouth blindness (lack of/reduced taste sensation)	<ul style="list-style-type: none"> • Strongly flavoured / spicy foods and supplements • Emphasis on aroma and texture 	<ul style="list-style-type: none"> • Bland foods • Plain meats • Unsalted foods
Taste alterations	<ul style="list-style-type: none"> • Include many cold foods and milk products • Experiment with foods • Increase use of flavouring and seasoning • Fruit-flavoured supplements 	

Problems with chewing and swallowing	<ul style="list-style-type: none"> • Include favorite foods in the diet by adapting the consistency and making texture changes • Suck a peppermint/ sweet before mealtimes as it stimulates saliva secretion • Very hot/cold foods with a texture stimulate the swallow reflex better than lukewarm, bland foods • Eat foods with a high moisture content (serve with gravies / sauces, casseroles, chicken, fish, vegetables with sauces) • Eat small frequent meals (5-6 meals) instead of three large meals • Avoid washing food down with fluid • Milk and milk products are known to cause phlegm (excess mucus production) and it is recommended that milk is not the last item to take at mealtimes. Milk should not be taken on its own as a snack. • Thickening agents: <i>Maizena</i> or commercial products (<i>Nestarge</i>) can be used to thicken soup, sauces and dishes. 	<ul style="list-style-type: none"> • Thin liquids, coffee and tea • Breakfast flakes, soft white bread and cracker biscuits • Dry cottage cheese and melted hot cheese • Dry mince/ fish with bones and chunky meat • Raw fruit and pineapple • Raw vegetables, chunky vegetables, e.g. beetroot, spinach, corn and firm peas • Thin/very chunky soup • Dry cakes, cookies, dessert with raisins, nuts, coconut, seeds, hard sweets and chocolates • Alcohol
Early satiety	<ul style="list-style-type: none"> • High-calorie diet with calorically dense foods • Meat, fish, poultry, eggs, whole milk, cheese, cream soups, ice cream, whole-milk yoghurt, creamed vegetables, rich desserts • Small, frequent feedings • Use of calorically dense supplements 	<ul style="list-style-type: none"> • Low-fat or nonfat milk products • Broth-based soups • Green salads • Steamed, plain vegetables • Low calorie beverages
Diarrhoea	<ul style="list-style-type: none"> • Eat smaller more frequent meals • Fluid replacement is very important to prevent dehydration. Try and drink water or re-hydration drinks after every loose stool. (Home recipe for oral rehydration therapy (remember hygiene): 1 liter of cooled boiled water, 8 teaspoons of sugar and 1/2 teaspoon of table salt). • A low fat and low dairy diet may be indicated (damage to the surface of the gut may cause intolerance to lactose; drinking milk or eating milk products can cause cramps, abdominal distress and diarrhoea in some people). • Moderate the intake of fibre. Concentrate on soluble fibre (fruit, oats, and legumes). • Eat bananas, potatoes, fish, meat and drink apricot juice, tomato juice to replenish sodium (salt) and potassium. • Eat foods that have been brought to room temperature. 	<ul style="list-style-type: none"> • Avoid gas forming foods and drinks (e.g. peas, lentils, cabbage, cauliflower, broccoli, onion, nuts, cucumber, beans and bran, garlic, beer). • Limit the intake of fructose (fruit sugar) by avoiding apple and pear juice as well as grapes, honey, dates, nuts, figs and soft drinks. • Avoid alcohol and caffeine, since both may have a dehydrating effect.
Constipation	<ul style="list-style-type: none"> • Regular diet with fibre added (whole grains, dried fruit such as prunes - even prune juice, bran, etc.). Fibre-enriched supplements / bulking agents may be beneficial • Extra fluids and exercise can be beneficial 	<ul style="list-style-type: none"> • Gas-forming foods and beverages
Iron deficiency anaemia	<ul style="list-style-type: none"> • The iron present in animal sources is better absorbed than those from plant sources. • Try to include at least one good source of iron that is easily absorbed (e.g. liver, kidney, red meat, fish, chicken and eggs) at each mealtime. • Plant sources of iron include legumes, enriched cereals, dried fruit and nuts. Although these sources are poorly absorbed, the absorption can be increased if eaten in 	<ul style="list-style-type: none"> • Do not drink tea (except rooibos tea) and coffee with meals. The <i>tannins</i> reduce iron absorption. • <i>Phytates</i> and <i>oxalates</i> in certain cereals and vegetables also reduces absorption but should not be excluded from the diet. • It is advised that milk

	<p>combination with easily absorbed iron sources.</p> <ul style="list-style-type: none"> • Include Vitamin C-rich sources (tomatoes, spinach, guavas, sweet melon, paw-paw, strawberries, broccoli, cauliflower and Brussels sprouts) when eating iron rich meals. 	<p>portions with meals should be kept small as the Casein in milk inhibits iron absorption.</p> <ul style="list-style-type: none"> • Avoid the use of antacids as it leads to a lower absorption of iron.
Individuals with increased energy and protein requirements	<ul style="list-style-type: none"> • Commercially available high energy and protein drinks (balanced in terms of micro- and macronutrients) may be used effectively to meet the increased requirements. • Household ingredients, such as sugar, vegetable oil, peanut butter, eggs and non-fat dry milk powder can be used in porridge, soups, gravies, casseroles or milk based drinks to increase the protein and energy content without adding to the bulk of the meal. • At least 500 - 750 ml of whole milk or yoghurt should be consumed daily (use in porridge and in the preparation of food: custards, puddings, cream soups). • Add generous amounts of sugar, butter, peanut butter, margarine, cheese, mayonnaise and cream to foods (if tolerated). • Use honey or jam on bread • Beans, seeds and peas are good sources of protein and cheaper than meat, eggs and milk products. 	<ul style="list-style-type: none"> • Avoid foods with poor nutrient density / "empty calories" such as crisps, sweets and cooldrinks.

Finally, most chronic arthritic conditions have no known cure. Medication, in addition to physical, occupational, and nutritional therapies is the mainstay of their management. It is essential, therefore, that newly diagnosed individuals undergo close monitoring so as to ensure that their nutritional status is maintained at as an optimum level as possible. Immediate attention to any nutritional disorders that may develop in the course of the disease can minimize nutritional deficiencies and prevent protein-energy-malnutrition. Early detection of nutritional disorders together with individual treatment(s) and monitoring is considered essential.

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For further, personalized and more detailed information, please contact NICUS or a dietitian registered with the Health Professions Council of South Africa.

References from the scientific literature used to compile this document are available on request.

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