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Review Article

Nutritional Treatments in Arthritis Types

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Abstract

Arthritis is a health problem that has different forms, primarily rheumatoid arthritis (RA), Osteoarthritis (OA) and GUT arthritis. It is stated as a degenerative joint disease that affects the cartilage and many of the tissues around it. Arthritis is an autoimmune disease characterized by painful joints, joint stiffness and limitation of movement, and intense inflammatory responses. Factors such as cigarette consumption, infectious agents, environmental pollution and chronic stress have been found to trigger intense inflammatory responses in arthritis. Apart from these factors, the role of nutrition has recently been suggested with increasing evidence. In some studies, fruit, vegetable or meat intake has been associated with diet and disease status, but no definitive conclusion has been reached. It has been observed that the prevalence of arthritis is lower in those who eat the Mediterranean diet while other diet types also have a relieving effect on the symptoms of the disease. Vegetarian diet, gluten-free diet, Mediterranean diet, elimination diet or intermittent fasting diet are some of these diets. Genetics is also thought to have an effect on arthritis. Genetic and environmental factors are thought to play an important role in the pathophysiology and occurrence of the disease. The data identify diet as an environmental factor in the development of arthritis, with diet increasing the inflammatory response in genetically predisposed individuals. Recently, it has been suggested that obesity, diabetes and metabolic syndrome are important risk factors for the development of arthritis. The treatment of arthritis is limited. In general, there is a treatment that reduces the symptoms related to the patient's symptoms or if there is a serious dysfunction in the joint, there are treatment options with total joint replacement. Of the basic pathophysiological mechanisms in the formation of arthritis, increased inflammation and impaired immune system regulation play an important role in the development of comorbidities. It is known that many comorbidities accompany arthritis. Some of these comorbidities are cardiovascular diseases, malignancies, infections, and osteoporosis. In addition, comorbidities can significantly increase the risk of mortality. The aim of this review was to reveal nutritional treatments based on arthritis types according to current approaches.

Keywords: Arthritis; Mediterranean Diet; Elimination Diet; Obesity; Inflammatory Response

Abbreviations

RA: Rheumatoid Arthritis; OA: Osteoarthritis; MD: Mediterranean Diet

Introduction

Arthritis is an inflammatory disease of autoimmune origin that affects joints and causes damage to cartilage and bone [1,2]. Arthritis is a global health problem that affects a large proportion of its population and leads to poor quality of life. Although there are different forms of arthritis, osteoarthritis (OA), rheumatoid arthritis (RA), and partially gout are the most common types of arthritis [3]. Joint damage, bone erosion, and severe pain, which significantly affect the patient's physical function and emotional state, are the effects of the disease [4]. The types of arthritis are: OA, RA and Gut Arthritis (GA). The aim of this study is to compile arthritis types

and their specific nutritional models in the light of current literature.

Osteoarthritis (OA)

OA is the most common form of arthritis and the fastest growing cause of disability in the world. OA is a degenerative joint disease involving cartilage and most of the surrounding tissues [5]. OA is a degenerative joint disorder frequently seen in adults and is a disabling condition of increasing severity. The knee is the most common site of OA, accounting for approximately 85% of total human body weight. It is predicted to be the fourth leading cause of disability worldwide by 2020. In the near future, the incidence will increase steadily due to increasing life expectancy and obesity in the modern Western world [6]. Among the changes that occur in OA, the cartilage matrix appears to be altered and several pathological changes occur. When mechanoreceptors sense the physical load, chondrocytes respond with harmony. One of the first differences caused by excessive mechanical loading is the loss of glycosaminoglycan and the destruction of proteoglycans, and the increase in water content on the articular cartilage surface. As OA progresses, this swelling expands and reaches deep [7]. OA is a complex and multifactorial disease characterized by irreversible structural and functional changes in the joints. In joints with OA, friction is much more than in healthy joints, and this causes patients to experience severe pain [8]. There is no approved cure-all drug for OA. Currently, only treatments are applied to improve symptoms and slow the progression of the disease. Modifiable risk factors are emphasized to slow the progression of the disease [9]. Due to the higher asymptomatic prevalence of OA, it is estimated that 250 million individuals worldwide are negatively affected by OA. The prevalence of knee OA appears to have increased significantly in recent times and continues to rise, due to the proliferation of obesity and other risk factors, while simultaneously being independent of other factors. The prevalence of knee OA in adults aged 60 years and over is estimated to average 13% in women and about 10% in men [7]. There is currently no definitive cure for OA, and most studies to date have focused on treatments to alleviate pain levels and prevent loss of function. The recommended drug treatments and treatments other than drug treatment have short-term benefits, but their effects are not great. In addition, the drugs used can cause negative consequences in the long term [10]. Studies have found a strong relationship between obesity and OA and have been documented with evidence. In one study, it was reported that 83% of women with OA were obese compared to 42% of women in the control group [11]. Since the presence of obesity is closely related to the incidence of OA, weight loss is presented as a viable step for the treatment process of OA patients in the obese group. It has been shown in studies that weight loss provides a significant reduction in pain and improvement of functions as a clinical picture. In another recent study, it was found that for every 1 kg delivered, the knee load decreased by 2.2 kg [12]. Obesity is generally accepted as a risk factor for OA and every 5 kg weight gain increases the risk of OA by 36%. There is evidence that people with a high BMI during adulthood are at risk. In addition, body weight determines the severity level of OA. Obese individuals are known to have significantly more severe joint degeneration compared to normal weight or underweight individuals [13].

Nutritional therapy in OA

Evidence is beginning to emerge from higher-quality scientific studies documenting both the efficacy and limitations associated with various nutritional treatments for OA. Dietary macronutrients include lipids (fatty acids), protein (amino acids), and carbohydrates (sugars, starchy and fibrous carbohydrates). In some studies, it has been supported by experiments that ω-3 (n-3) LC PUFA obtained from fish can significantly modulate inflammatory signals, thereby reducing joint pain and improving joint function [14]. Features of the traditional Mediterranean diet (MD), increased daily consumption of fresh, seasonally grown fruits and vegetables, increased daily consumption of legumes, seeds, unprocessed grains and products, hazelnuts, olives, moderately recommended poultry, dairy products, moderate fish and seafood It is a nutrition model that recommends the consumption of meat and meat products less frequently, and the main source of fat is olive oil. These factors lead to an increase in the intake of monounsaturated and polyunsaturated fatty acids, as well as a decrease in the intake of saturated and trans fats. High dietary fiber also contributes to the intake of antioxidants such as minerals, b-carotene, tocopherols, vitamin C and phenolic compounds [15]. Although some aspects of the Mediterranean diet's methods have not been fully clarified, it is believed that patients with OA may benefit if they adhere strictly to the MD. Recently, it has been documented that the traditional MD has positive effects against OA. In a study, the relationship between the MD and OA was examined, and it was emphasized that patients who adhered to the MD had a 17% lower incidence of knee MD on cartilage destruction and inflammatory responses in OA patients, and positive results were observed in the dietary habits of the participants who followed the MD, and it was shown that this resulted in weight loss. It has been reported that weight loss causes pain reduction and improvement in joint range of motion in patients with OA [15].

Rheumatoid arthritis (RA)

It is a systemic, autoimmune disease of unknown etiology characterized by progressive cartilage and bone destruction and joint involvement. It is a disease that initially affects the joints, and later on, extra-articular symptoms may occur [16,17]. RA, which is in the group of rheumatic diseases, is the most common inflammatory, chronic disease affecting the musculoskeletal system and connective tissue. It is a debilitating, chronic autoimmune disease that affects approximately 1% of the world's population. RA is considered to be a heterogeneous and complicated disease in which both genetic and environmental risk factors contribute to the disease [18]. RA is not limited to affecting the joints, it can cause some

permanent disability by affecting the internal organs as well as the joints. Currently, there is no definitive treatment for this autoimmune disease. Instead of definitive treatment, the symptoms are handled on an individual basis and individual-specific treatment methods are applied [19]. In recent years, the prevalence and incidence of arthritis has been widely studied by many experts. In these studies, it was concluded that arthritis is a global disease that is not limited to factors such as race, gender, ethnic group, nationality, age. However, the prevalence and incidence of the disease have also been observed to vary according to characteristics in different populations [16]. Osteoporosis is also a common health problem in RA. This situation affects up to 30% of the population [20]. RA is considered a chronic, systematic disease in which we see the immune system attacking different tissues in the body, mostly the joints. The resulting inflammatory state leads to progressive joint damage that is increasingly felt. As the onset of the disease, it manifests itself distinctly with symptoms of pain, stiffness and swelling in more than one joint at the same time. Although genetic factors, hormone levels, infectious agents and environmental factors have been shown to contribute to the development of many diseases, the etiology of RA is still unknown. For example, smoking, which is among the modifiable risk factors, not only causes an increase in the susceptibility to the disease, but also may be a risk factor that will cause the course of the disease to be more severe [21].

Nutritional therapy in RA

In addition to the bad results of nutrition from past to present, there are many studies on the curative role of nutrition on diseases. Recent studies have suggested that nutrition is a risk factor in the development of the disease and has a major role in the progression of the disease. Some types of diets and nutritional supplements are thought to have protective effects. There is an idea that these diet types and nutritional supplements can be used as adjunctive therapy to the normal treatment of RA in the future. Therefore, a healthy lifestyle and diet should be encouraged in patients with RA [21,22]. The ongoing literature argues that diet plays an important role in RA. Because diet is an environmental factor that affects inflammation, antigen formation, antioxidant defense mechanisms and gut microbiota. Patients with RA are presented with a food pyramid that models a diet for disease management [23]. Due to the pharmacological treatment process and drugs used in RA, the need for some nutrients is also increasing. Dietary content can be effective in alleviating the symptoms of the disease, combating the side effects of the treatment applied, and reducing the risk of complications that may occur during the treatment of RA. Increasing the calories and protein in the diet will not be sufficient to balance the increased metabolic rate and increased protein catabolism, but this can be controlled with a balanced diet. 55-60% of the energy in the diet should be provided from carbohydrates, 25-30% from lipids, and 15-20% from proteins [24]. Nutrition can affect the inflammatory process of arthritis. Nutritional routine has a direct or indirect effect on inflammation. A direct effect can be achieved by reducing the immune system response or by slowing and suppressing the inflammatory process. Weight control will also indirectly affect the degenerative joint disease process by reducing the pressure on the joint [25]. Increasing omega-3 fatty acid supplements in the diet, reducing omega-6 fatty acids may result in improved symptoms and, in some cases, a reduction in the use of nonsteroidal anti-inflammatory drugs (NSAIDs). With the help of some antioxidant-containing nutrients such as vitamin A, vitamin C, and selenium, a defense against increased oxidative stress can be formed in patients who are in the treatment process with methotrexate (MTX). Calcium (Ca) and vitamin D may also be beneficial in reducing the loss of bone mass in patients who provide the treatment process with corticosteroid-derived drugs [24]. Genetic and environmental factors are effective in changing the content of the existing gut microbiota. Environmental factors, rather than genetic factors, predominantly affect. Diet is only one of these environmental factors and is an important determining factor for the gut. Dietary modulation of the gut microbiota is on track to become a promising approach in the prevention and management of many different diseases, including RA [26]. Healthy eating habits can be a useful tool that can reduce the risk of RA, comorbidities and disease progression, and activity. The MD is the most directed and recommended diet model because it is an anti-inflammatory diet model. It is recommended that red meat consumption should be reduced and limited (1-2 times a month), daily consumption of extra virgin olive oil, consumption of oily fish 1-2 times a week, consumption of other fish varieties and poultry weekly. It is recommended to consume 5 or more servings of fruit and vegetables per day. Sugar-sweetened beverages, salt, alcohol and coffee should preferably be avoided or the measure should be adjusted. Sugar and salt intake should be reduced, especially in patients receiving glucocorticoid therapy. Vitamin D supplementation is important for bone health in RA [22]. The MD plays an active role in modulating inflammatory pathways and is often recommended to patients with chronic inflammatory diseases due to its anti-inflammatory and antioxidant effects. Polyunsaturated fatty acids (PUFAs), monounsaturated fatty acids (MUFAs), dietary fiber and polyphenols are cited as essential ingredients of the MD [26]. The health benefits of the MD have been largely proven. Although the MD did not have a significant reducing effect on the risk of RA, the MD has been found to have a positive effect on disease activity and ameliorating symptoms in some studies [22]. There are different types of vegetarian diets, but in general, meat and meat products are completely excluded from the diet. However, all animal foods, including eggs, milk, dairy products, and seafood are excluded from the diet, namely vegan diet. These diet types have been used as a potential treatment tool for inflammatory diseases and gained recognition due to the positive results of multiple clinical trials on patients with RA. In a study conducted with 53 patients in 1991, a control group that continued their normal routine diet

and a group that was fed a vegetarian diet for one year were compared. By the end of the year, there were significant improvements in inflammatory markers, erythrocyte sedimentation rate (ESR), and CRP in patients who were fully adhered to the diet [27]. Different dietary patterns have been used and are still used to improve symptoms in patients with RA from past to present. Dietary forms most commonly used by patients with RA or vegan, MD-style nutrition and elimination diets. Elimination diet is a nutritional model created as the removal of one or more food items from the diet that the individual feels uncomfortable when they eat. These nutrients are gradually added to the diet at a later time to see if any of them aggravate symptoms. This form of diet argues that a food antigen plays a role in the pathogenesis of a disease and that when this food is removed from the diet, symptoms should be relieved and improved [28]. Gluten is a protein found in many grains and grain products, such as wheat, rye, and barley, and causes a different immune response than it should in some individuals. Gluten-free diets are normally used and practiced by people who have celiac disease or who have an extra sensitivity to gluten other than celiac disease. To the best of our knowledge, there is no published study using a gluten-free diet alone in RA patients. However, a vegan diet with a gluten-free diet has been reported to improve symptoms of RA [27].

Gout arthritis (GA)

Gout is caused by the accumulation of monosodium urate crystals in the joints and tissues. Gouty arthritis, a painful inflammatory disease caused by urate crystallization, is one of the most common joint and bone diseases in adults [30,31]. Gouty arthritis, which is considered one of the metabolic disorders, is characterized by Hyperuricemia accompanied by severe pain and precipitation and accumulation of inflammatory monosodium urate (MSU) crystals in synovial and other tissues. If the correct and adequate treatment process is not applied, it damages the bone [32]. Gout is a uric acid (UA) metabolism disorder that occurs as a result of hyperuricemia and causes the formation and deposition of monosodium urate crystals in the joints and soft tissues around the joints. It is a very common inflammatory arthroplasty in young male gender, and its prevalence can be underestimated compared to others, since the disease has been asymptomatic for a long time. In fact, the global burden of gouty arthritis is substantial and substantial. Its prevalence has increased in many different parts of the world in the last 50 years [33]. The number of people with gouty arthritis has been increasing drastically in recent years. Considering this increase in recent years, it is an important problem and an increasing public health problem. Gout attacks seriously disrupt the comfort of life created by the individual during the day and drag the individual into negative conditions. The treatment process of gouty arthritis can be tiring and costly due to the comorbidities and accompanying contraindications brought about by the disease [34]. Arthritis caused by gout, i.e., gouty arthritis, is responsible for millions of patients every year and this prevalence is increasing. Gouty arthritis is caused by the accumulation of urate crystals, which causes arthritis in the tissues, mass in the soft tissue, urate nephropathy. The biological precursor of gouty arthritis is high serum uric acid levels, i.e. hyperuricemia. Although asymptomatic hyperuricemia is common, it usually does not progress to the clinical picture of gout [35]. Gouty arthritis manifests as recurrent, severely painful attacks of monoarticular arthritis in men and oligoarticular arthritis in postmenopausal women and men. If the treatment process is not started and treated, the frequency and severity of the attacks may increase. There are two focus points in the management of gouty arthritis. To treat the painful condition and inflammation associated with acute gouty arthritis attacks by using nonsteroidal anti-inflammatory drugs (NSAIDs), colchicine or corticosteroids, or to reduce serum urate (SU) levels below the saturation point of uric acid, 6.8 mg/dl. Long-term urate-lowering therapy (ULT) is applied to prevent gouty arthritis attacks and urate crystal deposition. Chronic anti-inflammatory therapy should also be added during the long-term treatment process [31] Studies have shown that some different factors such as high age, male gender, genetic inheritance, presence of hypertension, presence of some chronic diseases, a diet rich in purines and fructose intake are associated with the development of gouty arthritis. shown to play a role. In addition to these in GA the obesity, insulin resistance, hypercholesterolemia, and heart failure are common comorbidities [36].

Nutritional treatment in GA

GA has always been associated with abundant food consumption and excessive alcohol consumption. Gout, also referred to as the "king's disease", was one of the discriminators, which in ancient times also symbolized high social status, as only upper-class people could afford to consume wine and meat [37]. The data on the effect of purine-rich foods on urate levels show that the uric acid level in serum will decrease in parallel with the restriction of the amount of purine-rich foods. In the studies, it was shared that the serum uric acid of healthy male individuals decreased from 5.0 mg/dL to 3.0 mg/dL on average by applying a purine-free diet for one day. Reducing purine-rich foods in the diet reduces the urinary excretion of uric acid by an average of 200-400 mg/day and provides a 1-2 mg/dL change in serum urate levels [38]. Today, the most common dietary advice given to people with gout is a low-purine diet, which is basically a low-protein diet to reduce purine intake. Although it is generally accepted and often spoken as a conclusive opinion, the long-term curative effect of such an approach, ignoring the taste criterion, sustainability and its role in preventing gout leave a question mark in mind [39]. It has been observed that lifestyle and diet have a significant effect on the clinical course of gouty arthritis and the level of uric acid in serum. In the recommendations and guidelines made in different parts of the world, the effect of the diet on gouty arthritis is expressed. In recent stud-

ies, it has been shown that vitamin C, alcohol, coffee, tea, milk, and yogurt are associated with serum uric acid content, as well as with gouty arthritis [40]. The data presented in the studies show us that a person's diet and lifestyle clearly have an impact on the development of hyperuricemia and gouty arthritis. Hyperuricemia and gouty arthritis are mostly due to differences in diet plan, lifestyle, and medications. Lifestyle changes are cost-effective, safe, and when combined with drug therapy, better control of arthritis can be achieved [38]. Individuals with GA have reported that the rules of the classic gout diet, that is, a diet restricted from low protein and purine-rich vegetables, as well as the rules of a diet that will not adversely affect their type 2 diabetes, contradict and make it difficult. Increased protein intake in type 2 diabetes and protein restriction in gout are examples of this. In addition, when the intake of a macronutrient group is reduced, an increase in the intake of one or more of the remaining macronutrient groups can be observed in order to provide the necessary energy intake. It can lead to an increase in refined carbohydrate consumption, saturated fat intake and trans fat intake. These changes in diet can increase insulin resistance, causing high glucose levels and high lipid levels. This leads to exacerbation of the metabolic syndrome and the comorbidities of gout resulting from the metabolic syndrome [39]. Treatment of gouty arthritis, which is known to be effective, involves the use of therapeutic modalities based on controlling uric acid levels or dissolving urate crystals. Although the clinical principles of gouty arthritis based on medicine and treatment have been fully implemented, dietary changes and lifestyle changes have also been suggested as recommendations. Because a suboptimal diet content and obesity-based chronic diseases pose a significant risk for the development of gouty arthritis and increase the burden of medical expenses. Today, recommendations on dietary content have been updated, and nutritional science has made important strides in the treatment of gouty arthritis. There must be a balance between food intake and food consumption, when this balance is disturbed, metabolism occurs. Although dietary management is widely recognized as a major proponent of therapeutic modalities of gouty arthritis, a potential dietary mechanism in the development of gouty arthritis is outdated and not comprehensive. It is stated that a more systemic overview of the diet and dietary patterns of gouty arthritis is needed for well-designed dietary practice, however, based on research practice [37]. A diet with a low purine content suggests avoiding foods rich in purine content, and in this way, it reduces the amount of urate, which is theoretically the end product of purine metabolism and which we complain of having too much in the serum. This type of diet recommends avoiding shellfish, offal, alcoholic beverages, and food products with high purine content, such as canned food. Purine-restricted diets can be unpleasant and difficult to sustain. This may lead the individual to consume more carbohydrate and fat sources than they should be [41]. In one study, increased meat consumption, seafood intake, increased alcohol consumption was associated with an increased prevalence

Foods	Percentage of patients with symptoms
Sweetcorn	56%
Wheat	54%
Pork fat and pork	39%
Citrus group	39%
Milk	37%
Oat	37%
Rye	34%
Egg	32%
Steak	32%
Coffee	32%
Malt	%27
Cheese	24%
Grapefruit	22%
Tomatoes	22%
Nuts/Peanuts	20%
Butter	17%
Lemon	17%
Lamb meat	17%
Soy	17%

Table 1: Allergic foods thought to be associated with RA [29].

of gout. In addition, an inverse relationship was obtained between increased dairy intake and the incidence of gout [42]. The lifestyle changes offered to treat or prevent gouty arthritis are similar to recommendations for other chronic disorders. Therefore, it is reported that the health benefits of these lifestyle changes should be emphasized even more in patients with gouty arthritis accompanied by insulin resistance, metabolic syndrome, diabetes, obesity and hypertension. In particular, weight control and reduced red meat consumption are important changes for patients with gouty arthritis or hyperuricemia [38]. Hypertension is present in 74% of patients with gouty arthritis. The DASH diet is used to control hypertension in the majority of patients with gouty arthritis. In an analysis, a 0.35mg/dL decrease in serum urate was achieved in patients following the DASH diet compared to the control group. In many ways, the DASH diet is similar to a vegan or vegetarian diet, which is associated with [43]. Although the relationship between the most common metabolic manifestation of gout, hyperuricemia and hypertension is supported by many studies, there are studies showing that it is independent of gout. It remains unclear whether the association between gouty arthritis and hypertension is solely

due to hyperuricemia, whether it is an independent component due to monosodium urate crystals or inflammation induced by monosodium urate crystals. Both modalities are controversial, as drugs used in the treatment of hypertension can alter serum urate levels or cause attacks and complicate the management of gouty arthritis [44].

Conclusion

Arthritis is an inflammatory disease of autoimmune origin that affects joints and causes damage to cartilage and bone. There are different forms of arthritis. In our daily life, osteoarthritis (OA), rheumatoid arthritis (RA) and partially gouty arthritis are the most common arthritis. Joint damage, bone erosion and severe pain, which significantly affect the physical function and emotional state of the patient, are among the effects of the disease. There is no approved cure-all medicine for arthritis. Currently, only treatments are applied to improve symptoms and slow the progression of the disease. Arthritis places a serious burden on society and the economy. Because arthritis is a progressive disease, it is critically important to evaluate the early symptoms of arthritis. Consequences such as pain, limitation of function and decrease in quality of life should be eliminated. Recent studies have suggested that nutrition is a risk factor in the development of the disease and has a major role in the progression of the disease. There is the idea that these dietary treatments could be used as adjunctive therapy to the normal treatment of arthritis in the future. Therefore, a healthy lifestyle and diet should be encouraged in patients with arthritis. Nutrition can affect the inflammatory process of arthritis. Nutritional routine has a direct or indirect effect on inflammation. A direct effect can be achieved by reducing the immune system response or by slowing and suppressing the inflammatory process. Weight control will also indirectly affect the degenerative joint disease process by reducing the pressure on the joint. MD, vegetarian diet, vegan diet, elimination diet, gluten-free diet, intermittent fasting diet are among the diet types used to alleviate the symptoms of the disease.

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