

The Impact of Diet on Psoriasis

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PRACTICE POINTS

- No single food, supplement, or diet has been shown to have a notable positive impact on all variations of psoriasis. However, foods with systemic anti-inflammatory effects may be worth testing and adding to the patient's diet.
- A considerable proportion of patients with psoriasis also have elevated levels of antigliadin antibody. If patients have celiac disease or high levels of antigliadin antibody, switching them to a gluten-free diet could have a positive impact on their psoriasis.
- Elevated body mass index, weight gain, smoking, and obesity are all associated with a higher risk for psoriasis appearance and severity.

Because psoriasis is a chronic and inflammatory disease, many patients seek alternative therapies and lifestyle modifications to supplement their treatments and help relieve symptoms. Both the disease and the modifications are multifactorial, making it difficult to quantify the effectiveness of a single change. A review of the available literature reveals that most diets have mixed impacts on psoriasis, though some individual foods have seen more prominence in studies. Foods and supplements with systemic anti-inflammatory effects seem to have a higher chance of improving psoriasis symptoms. Overall, additional large-population studies with a higher statistical power are needed to review these studies. We suggest web-based national cohort surveys as a possible method to quickly gather a large amount of data for future studies.

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Psoriasis is a chronic cutaneous disease associated with immune-mediated inflammation. The disease has a complex etiology, with factors such as genetics, smoking, alcohol use, diet, and stress all

believed to be implicated in its appearance and severity. Specific factors, including increased body mass index and weight gain, have been associated with a higher prevalence of psoriasis and are risk factors for the disease. Because psoriasis varies in severity and incidence, patients often can experience a substantial negative impact on their quality of life, with increased incidences of anxiety and depression.¹ Because diet is an accessible and controllable variable, many patients choose to alter their diets to help relieve symptoms of the disease. This article aims to review and summarize the existing literature for possible relationships and correlations between diet and psoriasis.

Because diet is a factor contributing to psoriasis, it is a lifestyle change that patients often make. In a 2017 survey of 1206 patients with psoriasis, 86% reported modifying their diets.² Furthermore, when patients were compared with control individuals of the same sex and of similar age, it was shown that those with psoriasis consumed statistically significant lower amounts of sugar, whole-grain fiber, dairy products, and calcium ($P < .001$). The survey also found that patient diets included significantly more fruits, vegetables, and legumes ($P < .01$). Although no single diet was adhered to by patients, 40% did report attempting a specialized diet to improve their psoriasis. The most common diets were gluten free (35.6%), low carbohydrate/high protein (16.6%), and Paleolithic (11.6%). In addition to these diets, the Mediterranean diet and a vegetarian diet were both among those reported to improve psoriatic symptoms. Finally, certain foods stood out as more frequently reported to affect symptoms, particularly fish oil, fruits, vegetables, and water, which were all reported by at least 10% of respondents to positively affect their psoriasis. Reductions in consumption of alcohol, gluten, nightshades, and junk foods were associated with skin improvements in at least 50% of patients.² These

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baseline differences in diet informed our search of the literature and showed that dietary changes can serve as an important adjunct to treatment for many patients.

Mediterranean Diet

The Mediterranean diet consists of a high amount of fruits, vegetables, nuts and legumes, cereals, and olive oil, while restricting consumption of red meats, dairy products, and alcohol (besides red wine) at meals.³ Adherence to the diet has been associated with a reduced risk for cardiovascular diseases,⁴ rheumatoid arthritis, and Crohn disease,³ among others, possibly because the diet contains a high proportion and variety of foods that contain antioxidants and anti-inflammatory compounds, including the monounsaturated fatty acids (MUFAs) in olive oil and the polyphenols in fruits and vegetables. Consumption of both MUFAs and highly anti-inflammatory nutrients has been associated with reduced prevalence of risk factors for chronic inflammatory diseases, and consumption levels of MUFAs in particular have been reported to be a predictive factor in psoriasis severity.³

Recent studies have tried to quantify an association between consumption of the Mediterranean diet and psoriasis. One cross-sectional study in 2015 evaluated 62 patients with psoriasis for their adherence to the Mediterranean diet and psoriasis severity.⁴ Utilizing a 14-question evaluation, the study found that patients with a higher severity of psoriasis, as evaluated by a psoriasis area and severity index (PASI) score and C-reactive protein levels, had a lower adherence to the diet. Notably, consumption of extra-virgin olive oil was found to be an independent predictor of PASI score, and consumption of fish was an independent predictor of C-reactive protein levels.⁴

A second cross-sectional questionnaire study found similar results in a larger population of 3557 patients. The same association between patients with severe psoriasis and low levels of adherence to the Mediterranean diet was reported.³ Although neither study showed a causal relationship between the diet and psoriasis severity, both did report the potential impacts of proinflammatory and anti-inflammatory foods. General foods and nutrients listed by the studies as having anti-inflammatory properties include MUFAs; fish; vitamins A, C, D, and E; and omega-3 fatty acids.³ Because of the large number of confounding factors in dietary studies that rely on questionnaires, it is hard to definitively label the Mediterranean diet as beneficial to psoriasis. However, individual components of the diet may be used as predictors of psoriasis severity, and the diet itself may be used in tandem with other treatments for psoriasis.

Gluten-Free Diet

Celiac disease is an inflammatory enteropathy caused by an immune reaction to the protein gliadin, which is found in foods containing gluten, such as wheat.⁵ Immune system assault on the intestinal enterocytes leads

to the stripping away of villi, negatively affecting nutrient absorption. Multiple studies have reported an association between having psoriasis and having celiac disease as well as the reverse, including a 3-fold increased risk of celiac disease for patients with psoriasis in a 2017 meta-analysis.⁶ Even if patients with psoriasis did not have celiac disease, studies have found that a notable percentage of patients with psoriasis have elevated antigliadin IgA antibody levels.⁷ Many hypotheses have been proposed to explain this association. One article suggested that the malabsorption associated with celiac disease predisposes patients to vitamin D deficiency, which is a contributing risk factor for psoriasis.⁸ Other explanations involve common immune cells involved in the response to both diseases and a shared genetic background between the 2 diseases.⁸ As a gluten-free diet is standard for patients with celiac disease, it stands to reason that IgA could be used as a serum biomarker for patients who also could see improvements by adopting the diet.

This result could help explain the proportion of respondents to the 2017 survey who experienced improvements to their psoriasis if the gluten-free diet was in fact not triggering the inflammatory effects that a regular diet would, which also may help to explain the mixed results that the gluten-free diet has had as a treatment for psoriasis. One 3-month study of patients who were positive for antigliadin antibodies found that the majority (82%) experienced a decrease in antibody levels and affected skin area after following a gluten-free diet. Only half the patients had been diagnosed with celiac disease prior to the study, lending credibility to the idea that antigliadin antibody could be used as a marker for patients with psoriasis who would benefit from a gluten-free diet.⁹ Other case studies have reported no improvement of psoriasis following implementation of a gluten-free diet,¹⁰ despite the patients having elevated gliadin antibodies or celiac disease. More studies are required to discern the exact nature of the benefits of a gluten-free diet on psoriasis; however, it does serve as a promising option for patients with both psoriasis and celiac disease.

Ketogenic Diet

As obesity and weight gain are factors associated with psoriasis, some patients turn to diets that restrict calories with the goal of losing weight to improve their symptoms. One 2015 case report studied a patient who restored her response to systemic treatment of psoriasis following an intensive 4-week, calorie-restricted ketogenic diet.¹¹ The ketogenic diet is a high-fat, adequate-protein, low-carbohydrate diet. Animal studies have shown the diet to have anti-inflammatory effects, including lowering levels of proinflammatory cytokines and reduced fever.¹² In the 2015 case report, the rapid and consistent weight loss experienced by the patient because of the ketogenic diet was thought to be the cause of the restoration of treatment effectiveness,¹¹ which is interesting, since the role of the ketogenic diet was not to supplement

any deficiencies but to move the patient to a physiologic state that was once again receptive to treatment. This finding suggests that a variety of diets could improve psoriasis symptoms, so long as they do not cause inflammation or reduce overall body mass. One study of patients on a calorie-restricted diet over 8 weeks did see a trend of patients on the diet showing improvement in both their PASI scores and Dermatology Life Quality Index, though the improvement was not statistically significant.¹³ To determine if the ketogenic diet has a significant association with psoriasis improvement, controlled, large-population studies should be performed in the future with age, sex, and weight-matched controls, which may be difficult to do. Further studies looking at the association between weight loss and psoriasis also could be another direction.

Vegetarian Diet

Both vegetarian and vegan diets have been evaluated for their efficacy in relieving symptoms of chronic inflammatory disorders. Although the 2 diets are similar in avoiding consumption of meat, fish, and poultry, vegan diets often have additional food restrictions, including avoiding eggs, honey, and dairy products. One study noted the impact of these diets on patients with a variety of skin conditions following a period of fasting. It was observed that some patients with psoriasis saw an improvement in their symptoms during the period when they were eating a vegetarian or vegan diet, which was attributed to a return to normal levels of activity of neutrophils, extrapolated from serum levels of lactoferrin.¹⁴ Vegetarian diets have been shown to be associated with higher ratios of anti-inflammatory to proinflammatory adipokines compared to omnivorous diets,¹⁵ as well as lower expression levels of proinflammatory genes in the gut microbiota and lower expression levels of IgE.¹⁶ Perhaps the anti-inflammatory impacts of the diet affected the symptoms of psoriasis. The benefits of a vegetarian diet also have been attributed to the high amount of potassium consumed,¹⁷ which is used in the body to synthesize cortisol, a common treatment for psoriasis. Potassium supplementation has been shown to raise serum cortisol levels in patients.⁶ Although additional studies are needed to discern the significance of potassium in the vegetarian diet, both hypotheses are reasonable explanations for the observations seen in these studies.

Vitamin D and Other Nutritional Supplements

Because it is not always feasible for patients to alter their diets, many have turned to dietary supplements as an alternative method of treatment and lifestyle change. Two of the more prominently represented nutritional additives in the literature are fish oils and vitamin D.¹⁸ Supplemental vitamin D is a prohormone that can be endogenously converted to its active 1,25-dihydroxyvitamin D.¹⁹ Vitamin D plays important roles in the regulation of calcium and magnesium in the

bones as well as the maturation and differentiation of keratinocytes in the skin.¹⁶ Topical vitamin D analogues are standard treatments for psoriasis, as they are used to modulate the immune system to great effect.²⁰ Some patients with psoriasis present with vitamin D insufficiency,²¹ and it stands to reason that oral supplementation may be a treatment option. There have been multiple studies assessing the efficacy of oral vitamin D for the treatment of psoriasis; however, in the only randomized and placebo-controlled trial, there was only a slight nonsignificant improvement in the group supplemented with vitamin D.²⁰ Another small, open-label study reported remarkably improved PASI scores in 9 vitamin D-supplemented, dietary calcium-restricted patients.²² The lack of recent, large-sample studies makes it hard to draw notable conclusions from these studies.

The polyunsaturated fatty acids found in fish oils also have been considered as a treatment option for psoriasis.²³ Millsop et al²⁰ conducted an analysis of the literature reviewing the efficacy of fish oil in the treatment of psoriasis. Twelve of 15 compiled trials showed an improvement in psoriasis, ranging from slight improvements from baseline levels of the disease to statistically significant decreases in PASI scores ($P < .05$). It is notable that the amount of fish oil given in these studies varied widely, but the amount given did not necessarily correlate with strength of impact.²⁰ For example, Mayser et al,²⁴ Bittiner et al,²⁵ and Griminger et al²⁶ each performed prospective, double-blind studies with docosahexaenoic acid and eicosapentaenoic acid (the omega-3 fatty acids found in fish oils), and all 3 studies saw improvements in the omega-3-treated group vs the control group. The doses of the oils, however, ranged from as low as 1.2 and 1.8 g daily of docosahexaenoic acid and eicosapentaenoic acid, respectively, to 4.2 g daily of each fatty acid.²⁴⁻²⁶

Studies also have shown little to no improvement in the use of fish oil to treat psoriasis. One such study was conducted by Soyland et al²⁷ in 1993 in Norway. Utilizing a prospective, double-blind, placebo-controlled design over 4 months on 145 patients with moderate to severe psoriasis, researchers evaluated the treatment effectiveness via PASI scores; subjective reports from the patients; clinical manifestations; and factors such as cellular infiltration, desquamation, and redness. The results were mixed, with the placebo (corn oil) group having less redness and cellular desquamation and the fish oil group showing less cellular infiltration. In the other categories, there was no significant difference between the 2 groups, and researchers concluded there was no significant benefit to treating psoriasis using fish oil vs corn oil.²⁷ As with many of the other diets, there have been no recent, large-scale studies performed on the effect of fish oil supplementation on psoriasis; however, of the studies we reviewed, none showed fish oil supplementation to have a significant negative impact on psoriasis.

Conclusion

Dietary modifications have a complex multifactorial effect on psoriasis, often dependent on the variations of psoriasis and the lifestyle of the patient, including level of exercise, activities such as smoking and drinking, and genetic susceptibilities to conditions such as obesity. Thus, it is difficult for one diet to have a significant impact on psoriasis symptoms that applies to the majority of individuals. However, it appears that certain foods or nutritional supplements can be modified from all diets for general improvement. Foods with systemic anti-inflammatory effects, such as olive oil and fish oil, seem to be beneficial in treating psoriasis. As an extension, a gluten-free diet may help psoriasis patients with celiac disease by reducing the inflammatory environment of the body. On the opposite side of the spectrum, proinflammatory foods such as dietary fat and alcohol should be avoided.²⁸

In general, larger and more recent population-based studies are needed to add to the literature on this subject. Nationwide voluntary web-based surveys such as the NutriNet-Santé study in France may be one way to quickly amass large quantities of data (ClinicalTrials.gov Identifier NCT03335644). Participants are recruited through multimedia campaigns and return online questionnaires annually for 1 decade. A subset of participants also contributes biologic samples and participates in clinical examinations. This type of data gathering would capture many variables, provide a large sample size, and perhaps shed light on regional differences in diet and lifestyle that could then be targeted with treatments.

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