Optimizing Pediatric Psoriasis Management Through Anti-Inflammatory Dietary Interventions

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Background

Psoriasis

- Common, chronic inflammatory skin condition with thick, scaly plaques
- Inflammatory mediators, including TNF-α, IFN-γ, IL-17, IL-22, IL-23, and IL-1β, are key in psoriasis development[1,2]
- Genetics may predispose patients, but lifestyle factors like diet, stress, and infection can elevate inflammation.
- Affecting 2-3% of the population, psoriasis is mostly seen in adults but accounts for nearly one-third of cases in children[3]
- Psoriasis prevalence in children rises quickly until age seven, then continues to increase more gradually[4]
- Pediatric psoriasis presents challenges in diagnosis, treatment limitations, reduced quality of life, and compliance issues.
- Emerging research highlights dietary interventions as a promising complementary strategy to improve outcomes in young patients.

Anti-inflammatory Diets and Psoriasis

- The Mediterranean diet (MD), rich in vegetables, nuts, legumes, and monounsaturated fats, and low in alcohol, dairy, and red meat, offers polyphenols, omega-3s, and vitamins A, D, and E that reduce oxidative stress and inflammation[5,6,7]
- Managing immunomodulatory inflammation through diet could enhance psoriasis treatment, particularly for children who are ineligible for more intensive therapies.

Purpose

Recent studies increasingly explore the effects of anti-inflammatory diets, especially the Mediterranean diet, on pediatric psoriasis severity and progression. This review examines evidence linking dietary patterns—focusing on polyphenols, omega-3s, and vitamins A, D, and E—to clinical outcomes in children with psoriasis. By assessing the safety, feasibility, and adherence to these diets, the review highlights their potential as adjunctive therapies, identifies research gaps, and suggests future directions for optimizing dietary interventions in clinical care.

Mediterranean Diet

- The Mediterranean diet, rich in hydroxycinnamic acids, blocks reactive oxygen species (ROS).
- Adherence to the Mediterranean diet improves psoriasis severity in adults[8]
- It is safe and well-tolerated in children, with benefits beyond psoriasis; physical activity and limited screen time enhance adherence[9]
- The American Academy of Pediatrics recommends screening for diet-related conditions like obesity, type 2 diabetes, and hypertension, with dietary changes as first-line treatment[10]
- The diet may increase the omega-3:6 ratio, inhibiting cyclooxygenase-2 and reducing inflammatory cytokines.
- A low-calorie Mediterranean diet can reduce inflammation by lowering leptin, increasing adiponectin, and decreasing obesity-related pro-inflammatory cytokines.

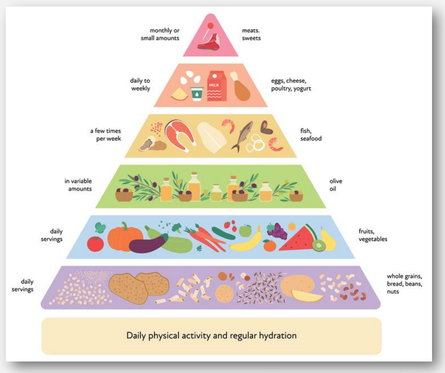

Figure 1. Mediterranean Diet Recommendations

Polyphenols

Immunomodulation

- Inhibit COX, deactivate PPAR-γ, and induce endothelial nitric oxide synthase[11]
- Curcumin reduces key inflammatory cytokines, such as TNF-α and IL-1[12]
- Resveratrol, in grapes and red wine, improves lesions in psoriatic patients using topical ointments compared to controls[13,14]
- Catechins in green tea reduce UV-induced oxidative damage and inhibit IL-22 and IL-18, supporting psoriasis treatment[15,16]

Diet

- Polyphenol-rich foods include apples, berries, broccoli, cumin, cocoa, flax seeds, and ginger.
- Males consume more than females, primarily from non-alcoholic beverages and fruits[17]
- Adherence is low in preschoolers but increases significantly during adolescence[18]

Omega-3 Fatty Acids

Immunomodulation

- EPA and DHA form hydroxylated metabolites that inhibit 5-lipoxygenase, reducing proinflammatory leukotrienes[19]
- Combining oral EPA/DHA (640 mg) with tacalcitol improves psoriatic outcomes, suggesting dietary supplements enhance topical therapies[19]
- Omega-3 fatty acid supplementation reduces Psoriasis Area and Severity Index (PASI) scores, erythema, and scaling[20]
- Males with lower plasma docosahexaenoic and arachidonic acid have worsening psoriasis compared to females[21]

Diet

- Omega-3-rich foods include oily fish and flaxseed.
- Patients need 700-1000 mg of DHA and EPA daily for effective immunomodulation[22]
- Enriched dairy and poultry provide EPA and DHA in pediatric diets[23]

Vitamins A, D, & E

Vitamin A

- Retinol promotes skin regeneration and integrity.
- Increases TLR-2 and TLR-3 expression, boosting antimicrobial proteins and regulating mast cells[24]
- All-trans-retinoic acid downregulates TLR-2, preventing cytokine release[25]
- Psoriatic patients, often deficient in vitamin A, benefit from therapies reducing skin cell hyperproliferation[26]
- Dietary sources: leafy greens, orange/yellow vegetables, tomatoes, fruits, vegetable oils[26]

Vitamin D

- Crucial for immune function, often deficient in autoimmune diseases[27]
- Psoriasis patients have lower vitamin D, correlating with higher PASI scores[28]
- Inhibits keratinocyte and fibroblast proliferation, promoting differentiation and antioxidant genes[27]
- Calcitriol decreases MHC class II on antigen-presenting cells, promoting tolerance[28]
- Reduces Th1 cytokines and enhances anti-inflammatory Th2 cytokines[29]

Vitamin E

- Scavenges peroxyl radicals, protecting cells from oxidative damage[30]
- Found in almonds, hazelnuts, and soybeans[31]
- Limited evidence of deficiency in psoriasis but may offer cellular benefits[26]

Clinical Application

- Gradual diet introduction, vitamin supplements, and pediatric monitoring are recommended to enhance adherence and minimize risks, especially in young children who often resist dietary changes[18]
- Roset-Salla et al. found that educational workshops for parents significantly improved adherence to dietary interventions in preschoolers, covering food groups, diet benefits, physical activity, and gradual diet changes[32]
- Use tools like KIDMED to assess Mediterranean diet adherence.
- Once adherence is established, the PASI score can measure lesion severity and body surface area affected, evaluating dietary management effectiveness.

Figure 2. Foods found in the Mediterranean Diet

Limitations and Future Directions

Barriers to Implementation

- Children may resist specific foods or prefer a limited range that doesn't align with diet plans.
- Access to fresh, healthy foods is challenging, especially in underserved areas; in 2018, 11.2 million children lacked secure access to nutritious foods[33]

Personalized Nutrition

- Advances in nutrigenomics suggest individualized diets based on a child's genetic, metabolic, and microbiome profiles[34]
- Gut-skin research indicates that microbiome-targeted diets could help manage psoriasis[35]

Digital Health Tools

- These tools offer personalized guidance, track intake, and provide feedback, improving diet adherence.
- Enable physicians to monitor and adjust diets effectively.

Supplements

- Future studies should explore nutrient-rich foods and over-the-counter supplements to address dietary gaps in pediatric diets.

Conclusions

Anti-inflammatory diets, especially the Mediterranean diet, show promise as complementary treatments for pediatric psoriasis. Rich in polyphenols, omega-3s, and vitamins A, D, and E, these diets help modulate immune responses, reduce inflammation, and alleviate oxidative stress - key factors in psoriasis. This review underscores the potential for these nutrients to reduce disease severity, offering a gentler approach for pediatric patients unsuitable for intensive pharmacotherapy. However, questions remain about long-term adherence, safety, and nutritional balance. Further research should refine dietary guidance, personalize interventions, and evaluate the long-term impact on disease and quality of life in pediatric psoriasis.

References