Asthma: Effect of Diet and Supplements

What We Know

› Asthma is a chronic respiratory disorder characterized by reversible, recurrent, and episodic airflow obstruction due to inflammation and narrowing of the airway\(^8\)

› Research findings are inconsistent regarding the level of asthma risk posed by dietary factors and various supplements; ongoing asthma research is focused on the potentially protective effect (i.e., resulting in reduced asthma symptoms from airway inflammation or constriction) of certain supplements, including the following:\(^1,2,3,5,6,7,11,13,14,15\)
  • Antioxidants, which protect cells from damage caused by harmful free radicals. Examples of antioxidants include beta-carotene (i.e., a precursor of vitamin A), selenium, lutein, lycopene, and vitamins C and E. These nutrients are abundant in fruit and vegetables
    – Researchers report that teenagers who consume diets that are low in fruits and insufficient in omega-3 fatty acids and vitamins C and E are more likely to have poor lung function. Similar findings from earlier research revealed that children raised on Mediterranean diets high in nuts, grapes, apples, tomatoes, and other fruits were less prone to develop asthma-like symptoms
    – In general, evidence suggests that good antioxidant status is significantly associated with symptom control in asthma patients; improvement in exercise-induced asthma symptoms following antioxidant supplementation has been reported by a significant number of patients with asthma
    – Results of a study regarding supplementation with zinc (which is believed to have antioxidant properties) 50 mg every other day for 8 weeks did not show significantly improved respiratory function as measured by forced vital capacity (FVC), forced expiratory volume in 1 second (FEV\(_1\)), and vital capacity (VC) in patients with asthma\(^7\)
  • The minerals magnesium and calcium, which work together to regulate nerve and muscle tone. By maintaining relaxation of the nerves and muscles, magnesium contributes to the prevention of muscle spasms, fatigue, and asthma
  • Omega-3 fatty acids, which have powerful anti-inflammatory properties that improve lung function and prevent chronic diseases that are associated with inflammation
    – Results of a systematic review showed there is insufficient evidence to support the use of omega-3 fatty acid supplements in the treatment of asthma. However, in results of individual studies, fish oil supplementation reduced levels of inflammatory cells, the frequency of bronchodilator use, and symptoms associated with exercise-induced bronchoconstriction in patients with asthma\(^5,10\)
  • Omega-3 combined with omega-6 fatty acids strengthens cell membranes and enhances fibrolytic activity
    – Preliminary research results suggest that receiving a combination of gamma-linolenic acid (GLA) and eicosapentaenoic acid (EPA) improves quality of life in patients with asthma and may help reduce asthma symptoms\(^2\)
  • Probiotics, which are microorganisms that positively alter the flora (i.e., beneficial bacteria) of the intestines and provide health benefits when ingested
    – Results of a 2013 systematic review showed that a probiotic supplement containing *Lactobacillus casei*, *Enterococcus faecalis*, *Lactobacillus rhamnosus*, and
"Lactobacillus acidophilus" have no significant effect on asthma symptoms or frequency of medication use for symptoms of asthma.\(^{(12)}\)

- Caffeine (e.g., in beverages or pills), which acts as an antagonist of the adenosine receptor. Adenosine dilates blood vessels, which facilitates sleep. By binding with adenosine receptors, caffeine interferes with the ability of adenosine to slow the body’s physiologic processes and results in increased neural activity.
  - Three cups of strong coffee (or a caffeine tablet equal to 7–10 mg/kg) may temporarily improve pulmonary function in patients with asthma when ingested within 2 hours before exercising because caffeine relaxes bronchiolar smooth muscle.
  - Patients with asthma may not be able to tolerate the amount of caffeine that was used effectively in clinical trials.

Asthma research continues to be conducted on the potentially increased risk for airway inflammation or constriction from ingesting the following nutrients:\(^{(2,3,9,15)}\)

- Omega-6 fatty acids when not balanced in ratio with omega-3 fatty acids
- Trans fats
- Sodium (i.e., salt)
  - Evidence is accumulating that excessive salt intake increases airway symptoms during exercise in patients with asthma.
  - Results of a systematic review showed that a low-salt diet improves respiratory function (as measured by FEV\(_1\)) in patients with asthma, but further studies are required to confirm these findings.\(^{(9)}\)
- Dairy products
- Wheat
- Food additives and preservatives (e.g., sulfites and monosodium glutamate)
- Large amounts of animal protein
  - A diet high in animal protein is associated with increased inflammation.

Although evidence is currently inadequate to establish whether diet improves or worsens asthma symptoms or to recommend specific dietary restrictions or inclusions, clinicians should educate patients with asthma that improved quality of life usually results from following an individualized regimen for self-management of asthma and adopting a healthy lifestyle.\(^{(2,4,6,8,11,12,14,15)}\)

- Patients with asthma should eat a nutritious diet low in animal protein and high in a variety of fruits and vegetables, including plentiful food sources of the following antioxidants:
  - Beta-carotene/vitamin A, which is found in liver, egg yolk, milk, butter, spinach, carrots, squash, broccoli, yams, tomatoes, cantaloupe, peaches, and grains.
  - Vitamin E, which is found in nuts, seeds, vegetable and fish oils, whole grains (especially wheat germ), fortified cereals, and apricots.
  - Vitamin C, which is found in citrus fruits and juices, green peppers, cabbage, spinach, broccoli, kale, cantaloupe, kiwi, and strawberries.
  - Omega-3 fatty acids, which are found in fish and fish oil.
  - Magnesium, which is found in green, leafy vegetables, bananas, dried apricots, avocados, and beans.
  - Omega-3 fatty acids, which are found in fatty fish and flaxseed.
- Patients should take appropriate supplements under clinician supervision if dietary sources are inadequate.
  - Receiving multivitamins before 6 months of age may increase the risk for asthma in childhood.
  - Reducing dietary salt may be helpful.
  - Variation in patient improvement and response is common, but less than 2,400 mg/day of salt is usually effective in reducing asthma-related symptoms.

### What We Can Do

- Become knowledgeable about the latest research on the effect that diet and supplements have on asthma so you can accurately assess your patients’ personal characteristics and health education needs; share this information with your colleagues.
- Discuss symptom frequency and severity with your asthma patients and educate them about individualized dietary and other changes they could make for a healthier lifestyle.
- Encourage your patients with asthma to discuss any dietary changes with their treating asthma clinician.
- Collaborate with your hospital’s continuing medical education department to provide education about the effect of diet and supplements on asthma for clinicians of all specialties.
## Coding Matrix

References are rated using the following codes, listed in order of strength:

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<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>M</td>
<td>Published meta-analysis</td>
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<tr>
<td>SR</td>
<td>Published systematic or integrative literature review</td>
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<tr>
<td>RCT</td>
<td>Published research (randomized controlled trial)</td>
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<tr>
<td>R</td>
<td>Published research (not randomized controlled trial)</td>
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<tr>
<td>C</td>
<td>Case histories, case studies</td>
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<td>G</td>
<td>Published guidelines</td>
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<td>RV</td>
<td>Published review of the literature</td>
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<td>RU</td>
<td>Published research utilization report</td>
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<td>GI</td>
<td>Published quality improvement report</td>
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<td>PGR</td>
<td>Published government report</td>
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<td>CP</td>
<td>Conference proceedings, abstracts, presentation</td>
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<td>U</td>
<td>Unpublished research, reviews, poster presentations or other such materials</td>
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<td>R</td>
<td>Clinical research not randomized (i.e., case series, case reports)</td>
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<tr>
<td>GI</td>
<td>General or background information/texts/reports</td>
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## References


