

Low Vitamin D Levels Associated with More Asthma Symptoms and Medication Use

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Denver, CO — Low levels of vitamin D are associated with lower lung function and greater medication use in children with asthma, according to researchers at National Jewish Health. In a paper published online this week in the *Journal of Allergy & Clinical Immunology*, Daniel Searing, MD, and his colleagues also reported that vitamin D enhances the activity of corticosteroids, the most effective controller medication for asthma.

"Asthmatic children in our study who had low levels of vitamin D were more allergic, had poorer lung function and used more medications," said Dr. Searing.

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"Conversely, our findings suggest that vitamin D supplementation may help reverse steroid resistance in asthmatic children and reduce the effective dose of steroids needed for our patients."

The researchers examined electronic medical records of 100 pediatric asthma patients referred to National Jewish Health. Overall, 47 percent of them had vitamin D levels considered insufficient, below 30 nanograms per milliliter of blood (ng/mL). Seventeen percent of the patients had levels below 20 ng/mL, which is considered deficient. These levels were similar to vitamin D levels found in the general population.

Patients low in vitamin D generally had higher levels of IgE, a marker of allergy, and responded positively to more allergens in a skin prick test. Allergies to the specific indoor allergens, dog and house dust mite, were higher in patients with low vitamin D levels. Low vitamin D also correlated with low FEV₁, the amount of air a person can exhale in one second, and lower FEV₁/FVC, another measure of lung function. Use of inhaled steroids, oral steroids and long-acting beta agonists were all higher in patients low in vitamin D.

"Our findings suggest two possible explanations," said senior author Donald Leung, MD, PhD. "It could be that lower vitamin D levels contribute to increasing asthma severity, which requires more corticosteroid therapy. Or, it may be that vitamin D directly affects steroid activity, and that low levels of vitamin D make the steroids less effective, thus requiring more medication for the same effect."

The researchers performed a series of laboratory experiments that indicated vitamin D enhances the action of corticosteroids. They cultured some immune cells with the corticosteroid dexamethasone alone and others with vitamin D first, then dexamethasone. The vitamin D significantly increased the effectiveness of dexamethasone. In one experiment vitamin D and dexamethasone together were more effective than 10 times as much dexamethasone alone.

The researchers also incubated immune-system cells for 72 hours with a staphylococcal toxin to induce corticosteroid resistance. Vitamin D restored the activity of dexamethasone.

"Our work suggests that vitamin D enhances the anti-inflammatory function of corticosteroids," said Dr. Leung. "If future studies confirm these findings vitamin D may help asthma patients achieve better control of their respiratory symptoms with less medication."

This study comes on the heels of another paper by National Jewish Health faculty, which showed that low levels of vitamin D in adult asthma patients are associated with lower lung function and reduced responsiveness to corticosteroids.

National Jewish Health is known worldwide for treatment of patients with respiratory, cardiac, immune and related disorders, and for groundbreaking medical research. Founded in 1899 as a nonprofit hospital, National Jewish remains the only facility in the world dedicated exclusively to these disorders. Since 1998, U.S. News & World Report has ranked National Jewish the #1 respiratory hospital in the nation.

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