

Vitamin D deficiency linked with airway changes in children with severe asthma

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Children with severe therapy-resistant asthma (STRA) may have poorer lung function and worse symptoms compared to children with moderate asthma, due to lower levels of vitamin D in their blood, according to researchers in London. Lower levels of vitamin D may cause structural changes in the airway muscles of children with STRA, making breathing more difficult. The study provides important new evidence for possible treatments for the condition.

The findings were published online ahead of the print edition of the American Thoracic Society's [American Journal of Respiratory and Critical Care Medicine](#).

"This study clearly demonstrates that low levels of [vitamin D](#) are associated with poorer lung function, increased use of medication, worse symptoms and an increase in the mass of airway smooth muscle in children with STRA," said Atul Gupta, MRCPCH, M.D., a researcher from Royal Brompton Hospital and the National Heart and Lung Institute (NHLI) at Imperial College and King's College London. "It is therefore plausible that the link between airway smooth [muscle mass](#) and lung function in severe [asthma](#) may be partly explained by low levels of vitamin D."

While most children with asthma can be successfully treated with low doses of corticosteroids, about 5 to 10 percent of [asthmatic children](#) do not respond to standard treatment. These children have severe therapy-resistant asthma, or STRA, experience more asthma episodes and asthma-related illnesses, and require more healthcare services, than their treatment-receptive peers.

Although previous studies of children with asthma have linked increases in airway smooth muscle mass with poorer lung function and in vitro studies have established a connection between levels of vitamin D and the proliferation of airway smooth

muscle, this is the first study to evaluate the relationship between vitamin D and the pathophysiology of children with STRA.

"Little is known about vitamin D status and its effect on asthma pathophysiology in these patients," Dr. Gupta noted. "For our study, we hypothesized that children with STRA would have lower levels of vitamin D than moderate asthmatics, and that lower levels of vitamin D would be associated with worse lung function and changes in the airway muscle tissue."

The researchers enrolled 86 children in the study, including 36 children with STRA, 26 with moderate asthma and 24 non-asthmatic controls, and measured the relationships between vitamin D levels and lung function, medication usage and symptom exacerbations. The researchers also examined tissue samples from the airways of the STRA group to evaluate structural changes in the airway's smooth muscle.

At the conclusion of the study the researchers found children with STRA had significantly lower levels of vitamin D, as well as greater numbers of exacerbations, increased use of asthma medications and poorer lung function compared to children with moderate asthma and non-asthmatic children. Airway muscle tissue mass was also increased in the STRA group.

"The results of this study suggest that lower levels of vitamin D in children with STRA contribute to an increase in airway smooth muscle mass, which could make breathing more difficult and cause a worsening of asthma symptoms," Dr. Gupta said.

The findings suggest new treatment strategies for children suffering from difficult-to-treat asthma, he added.

"Our results suggest that detecting vitamin D deficiency in children with STRA, and then treating

that deficiency, may help prevent or reduce the structural changes that occur in the airway [smooth muscle](#), which in turn may help reduce asthma-related symptoms and improve overall [lung function](#)," Dr. Gupta said.

Before any widespread treatment recommendations can be made, however, larger studies will

"The determination of the exact mechanism between low vitamin D and airway changes that occur in STRA will require intervention studies," Dr. Gupta said. "Hopefully, the results of this and future studies will help determine a new course of therapy that will be effective in treating these [children](#)."

Provided by American Thoracic Society

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