

Vitamin D and Asthma:

A patient friendly summary



What is asthma?

Asthma is a lifelong lung disease that makes it difficult for you to breathe sometimes. There are tubes, called airways, which carry air to and from your lungs to your mouth and nose. If you have asthma, these airways can become swollen, clogged with mucus and tightened by surrounding muscles.

When your symptoms get worse and more intense, you have what is called an asthma attack. Asthma attacks can sometimes be so bad that you need emergency care. You can have an asthma attack if you are exposed to things like allergens, smoke, extreme air temperatures and air pollution, or if you get sick or get an infection.

Asthma is treated using medicines that you breathe in (called inhalers) or take as tablets. These help to relax the muscles that surround your airways, or reduce the swelling of your airways. Two common medicines are inhaled steroids and β -agonists.

If you have asthma, it's important to try and avoid coming into contact with the things that trigger your attacks, like allergens and smoke. Most of the time, you manage asthma yourself, taking inhalers regularly and avoiding things that trigger your attacks, to help keep your condition under control.

How common is asthma?

Three-hundred million people have asthma worldwide, making it the most common long lasting disease in children. In the United States, 1 out of every 10 people will have asthma at some point in their life. Most of the time, doctors diagnose asthma in children before they turn six years old, but sometimes they can diagnose asthma in people later in life.

Around half of all people with asthma will have an asthma attack every year.

What does asthma feel like? What does an asthma attack feel like?

People with asthma may experience chest tightness, wheezing, and a long-lasting cough.

If you have asthma, these are some of the main symptoms:

- chest tightness, where you feel like you have difficulty moving air in and out of your lungs.
- wheezing, where you hear a whistle like sound as you breath in or out.
- long-lasting cough, where your airways force you to cough a lot, especially at night.
- difficulty breathing, where sometimes you have shortness of breath.

When you have an asthma attack, you experience the above symptoms, but some of them are more intense, like you experience:

- more chest tightness than usual.
- very noisy breathing, especially when you breath out.

To manage an asthma attack, it's important to follow the instructions of your doctor and have a plan to deal with your asthma attack. Doctors often setup a set of rules for you to follow depending on how severe your asthma attack is. If you're having a mild attack, your doctor might have created a plan for you to take medications. If your attack is more severe, your doctor likely created a plan for you to seek emergency care. More severe attacks may have symptoms like:

- not feeling better after use of medication.
- bluish fingers and lips.
- low scores on your device that measures your lung function, if you have one.
- exhaustion and confusion.

Again, be safe and always work with your doctor and have a plan to follow to manage asthma attacks.

What causes asthma?

Doctors and scientists don't yet know exactly what causes asthma. The number of people diagnosed with asthma has increased a lot since the 1960s. This increase is too big, and has happened too quickly, for it to be genetics alone that is causing it.

So, doctors and scientists think that a change in our diet, behavior

and environment may cause asthma. Some think that not getting enough sun exposure and vitamin D may be one cause of asthma, but we don't know yet if this is the case.

What is the link between vitamin D and asthma?

One theory is that vitamin D helps reduce inflammation in your airways caused by asthma.

Vitamin D is a nutrient that your body produces when you expose your skin to the sun, and you don't get enough of vitamin D unless you get enough sun exposure. Doctors and scientists believe there is a link between vitamin D and asthma because you're more likely to get asthma if you live in a city, are obese or African American. People that are obese, African American or live in a city are more likely to be deficient, or lacking, in vitamin D.

If you have asthma, your airways swell, clog with mucus and tighten because they become inflamed. Inflammation is your body's response to an injury, infection or irritation. Doctors and scientists are interested in vitamin D because it reduces inflammation⁵, so in theory it may make your airways healthier, by building better airways in early childhood, making day to day symptoms better for people with asthma, and by making it less likely to get an asthma attack for people with asthma.

Doctors and scientists are also interested in vitamin D because it makes your immune system smarter, by helping your body make the right amount of cells involved in your immune system and helping to produce defenses to fight off infections. A smarter immune system may reduce inflammation. A smarter immune system may also reduce your chances of getting an infection and then an asthma attack⁵.

Scientists are looking into whether, if you're pregnant, getting enough vitamin D during your pregnancy can reduce the chances of your child developing asthma. They are also looking at whether, if children get enough vitamin D when they are 0 to 3 years old, it can reduce their chances of getting asthma.

For asthma treatments, scientists are looking into whether getting enough vitamin D can help to make your medicines more effective. They also want to know if getting enough vitamin D can reduce the likelihood of you having an asthma attack.

Can getting enough vitamin D during pregnancy and early childhood prevent asthma in children?



Several research studies have looked at how much vitamin D mothers get during pregnancy and whether or not their children get asthma later in life.

Two studies measured the amount of vitamin D in women's blood during pregnancy:

- **One study** found that there was no link between vitamin D levels in the mother during pregnancy and the chances of a child developing asthma. Another study found that if a mother had high vitamin D levels in their blood, their child was more likely to develop asthma.

Two studies, measured the amount of vitamin D in the blood of the placenta right after birth.

- Neither study found a link between the amount of vitamin D in the blood of the placenta, and the chances of the child getting asthma.

One study looked at how much vitamin D pregnant mothers got from their diet and then the chances of their child getting asthma.

- **The study** found that children whose mothers who got the most

vitamin D from their diet during pregnancy were least likely to develop asthma.

Given these mixed findings, it isn't known whether there is a link between the amount of vitamin D a woman gets during her pregnancy and the chances of her child getting asthma.

There is no research about whether getting enough vitamin D during early childhood, up to the age of 6, can lower the chances of a child developing asthma later in life, but there is some research underway looking at this.

Can getting enough vitamin D help improve how well asthma medication works?

Budesonide is a medicine that you inhale (breathe in) or use as a nasal spray and it's sometimes prescribed for people with asthma. In the United States, it is marketed under the names Rhinocort or Pulmicort.

In one study on children with asthma, scientists gave all the children budesonide. Then they gave half the children a dummy pill and the other half 500 IU of vitamin D every day. After 6 months, the children who took vitamin D had fewer asthma attacks than those who took a dummy pill.

Therefore, there is some evidence that vitamin D might help budesonide to work more effectively. However, the study was small, so scientists can't say if vitamin D helps for certain. There have been no similar studies for adults.



Can getting enough vitamin D prevent asthma attacks or make them less severe?

There have been some studies that have looked at whether vitamin D can lower the number of the asthma attacks children have, and how severe the attacks are.

In one study, scientists gave one half of a group of Japanese schoolchildren (aged 6-15) 1,200 IU of vitamin D and the other half a dummy pill every day. Scientists mainly wanted to know if vitamin D could prevent the flu, but they also wanted to know if vitamin D reduced the number of attacks the children with asthma had. The children that took the vitamin D supplement had fewer asthma attacks than the children that took the dummy pill.

Vitamin D might help reduce the number of asthma attacks a child has. However, the study was small, so scientists can't say if vitamin D helps for certain.

There hasn't been enough research to know if vitamin D can reduce the number of asthma attacks for adults. There hasn't been enough research to show whether taking vitamin D can affect how severe an asthma attack is.

Key points from research

- At this time, it isn't known if getting good amounts of vitamin D from sun exposure, or taking supplements when you're pregnant, can affect the chances of your child developing asthma. Research also doesn't show whether, if children get good amounts of vitamin D when they are young, it will affect their chances of developing asthma later on in life.
- In a small study, 500 IU of vitamin D a day taken with a budesonide inhaler like Rhinocort reduced the likelihood of a child with asthma having an attack.
- In another small study, taking 1,200 IU of vitamin D a day reduced the chances of a child with asthma having an attack.
- Further research is underway to see if taking a vitamin D supplement can help pregnant mothers reduce the chances of their children getting asthma. Researchers are also exploring whether taking a vitamin D supplement can reduce the number of

asthma attacks people have, and whether it makes your airways healthier or not.

What does this mean for me?

There is some evidence that getting enough vitamin D may be able to reduce the number of asthma attacks for children.

If you're pregnant or have a young baby, there is currently poor evidence that more vitamin D, through either supplementation or sunshine, will reduce the risk of your child getting asthma. However, taking a vitamin D supplement is helpful for other reasons and important for your baby's development.

If your child takes a budesonide like Rhinocort or Pulmicort, there is some evidence that taking a daily vitamin D supplement may be helpful in reducing the number of asthma attacks your child has.

There is also some evidence that getting enough vitamin D may be able to reduce the number of asthma attacks for children between the ages of 6-15 years old, whether or not they are taking a budesonide.

If you or your child have asthma and want to take vitamin D, it's unlikely to harm you or make your symptoms worse. However, you may not see any improvement in your symptoms either. There is some evidence that vitamin D can reduce the number of asthma attacks in children. You should not take vitamin D in the place of other medications for your condition. Talk to your doctor about taking vitamin D or any other supplement.

How much vitamin D to take?

The Vitamin D Council recommends that healthy children should take 1,000 IU of vitamin D a day for every 25 lbs of their weight. So for example, if your child weighs 50lbs, he or she should take 2,000 IU of vitamin D. This amount is higher than has been used in research studies with children with asthma. So it isn't known if this amount is helpful for children with asthma, though it is unlikely to do any harm.

For adults, the Vitamin D Council recommends taking 5,000 IU of vitamin D a day. This amount hasn't been tested on adults with asthma, though taking up to 10,000 IU of vitamin D a day is unlikely to do any harm.

For pregnant mothers, the Vitamin D Council recommends 6,000 IU of vitamin D a day. How this affects the chances of your child getting asthma later in life isn't known.



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