

How Exercise Helps Maintain Healthy Vitamin D Levels in the Wintertime

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STORY AT-A-GLANCE

- › During winter in northern climates, sunlight is too weak to trigger vitamin D production, leaving many people — especially those with excess body fat — at risk for deficiency
- › A 10-week randomized controlled trial in inactive adults with overweight or obesity found that exercise alone, without supplements or weight loss, helped maintain levels of active vitamin D
- › In the trial, physical activity was associated with changes in vitamin D-related enzyme activity in fat tissue — a shift the researchers link to better conversion of stored vitamin D into its usable form and slower breakdown of it
- › People with the most fat tissue saw the biggest improvements in vitamin D activation, a subgroup finding that suggests exercise may matter most for people carrying extra weight
- › The findings suggest exercise supports your body's ability to activate and retain the vitamin D it already has — one way to help maintain levels through winter when sun exposure is limited

Your body needs direct sunlight, specifically ultraviolet B rays, to produce vitamin D, but during the winter in northern climates, that sunlight often isn't strong enough to trigger production. If you live in one of these regions, you may go months without making any vitamin D naturally. And if you also carry extra weight, your risk of deficiency climbs even higher.

Vitamin D isn't just for bones. It helps regulate immune function, inflammation, insulin sensitivity and muscle health. The most active form drives these effects by binding to receptors in nearly every organ system in your body. Low vitamin D status has been associated with fatigue, poorer blood sugar control, low mood, chronic pain and reduced resilience to infection.¹

Vitamin D deficiency affects about 1 billion people worldwide.² Those with higher body fat are particularly at risk, since vitamin D gets locked away in fat tissue and becomes harder to access. Vitamin D dysfunction appears to be common among people with overweight or obesity year-round, and tends to worsen in winter.

A randomized controlled trial examined an approach that requires neither supplements nor weight loss.³ Let's explore how exercise, even without shedding pounds, changes the way your body handles vitamin D and helps keep your active levels stable through the darkest time of year.

Exercise and the Conversion of Stored Vitamin D

In the study, published in *Advanced Science*, researchers set out to answer an important question: Does regular exercise during the winter months preserve **vitamin D metabolism** in people with overweight or obesity — even without supplements or sun exposure?⁴ The team ran a 10-week trial to measure the effect of physical activity on various forms of vitamin D in the body. Forty-one participants completed the protocol.

- **Participants were inactive adults with overweight or obesity** — The study included adults who were largely sedentary and had a body mass index in the overweight or obese category. None of them were taking **vitamin D supplements**, and the study took place during winter — meaning there was virtually no sunlight capable of triggering vitamin D production in the skin. This allowed the researchers to isolate the effect of exercise alone.

- **Only the group that exercised preserved their active vitamin D levels** — While both groups — those who exercised and those who stayed sedentary — experienced some decline in vitamin D, only the exercise group was able to maintain their levels of the active form that actually affects your health. This is the version that interacts with receptors throughout your body to control calcium balance, immune response and cellular repair.
- **Sedentary participants lost 15% of their active vitamin D** — The people who didn't move saw a measurable drop in their active vitamin D levels over just 10 weeks. Meanwhile, those who followed a moderate-intensity indoor cycling and resistance training program were able to keep their levels steady, despite not losing any body fat during the study.
- **Even with no weight loss, exercise changed vitamin D status** — One of the most surprising findings was that participants didn't need to lose fat in order to gain this benefit. This is significant, because obesity is known to trap vitamin D in fat cells and reduce its availability. Yet physical activity appeared to override that effect by improving the body's internal vitamin D regulation.

Exercise Influenced How Fat Tissue and Muscles Manage Vitamin D

The researchers found that physical activity was associated with increased expression of vitamin D-related enzymes in fat tissue and muscle. These enzymes help turn stored vitamin D into its active form — the kind your body actually uses — and also help keep that active form from being broken down too fast. In other words, exercise didn't just slow vitamin D loss; it appeared to shift how the body processes and conserves it.

- **The biggest benefits were seen in those who had high fat tissue levels** — Researchers found that individuals with the highest fat mass had the most to gain. Their fat tissue was less efficient at converting stored vitamin D to the active form

at baseline, but after the intervention, that dynamic shifted. The more a person exercised, the better their conversion rates became, even though the fat tissue volume didn't decrease.

- **Two key enzymes controlled how vitamin D was used** — Researchers looked at two important enzymes: one that turns vitamin D into its active, usable form, and another that breaks it down. In people who didn't exercise, the helpful enzyme went down while the one that destroys vitamin D went up. But in those who exercised, the body did the opposite — it boosted the enzyme that activates vitamin D and reduced the one that breaks it down.
- **Muscle tissue likely plays a supportive role in vitamin D balance** — While the study focused on fat tissue, exercise is known to influence muscle metabolism as well. Although researchers didn't measure changes in muscle gene expression directly, the overall improvements in vitamin D activation suggest that better whole-body metabolic health, including muscle function, helps preserve vitamin D during winter.
- **Exercise reshapes how your body handles vitamin D** — By changing the activity of specific enzymes in fat tissue, regular exercise helped participants maintain more of their active vitamin D, even without losing weight or taking supplements. This challenges the common belief that supplements or sun exposure are the only solutions, offering a new path for people with higher body fat to help maintain their vitamin D levels during the winter.

How to Support Your Vitamin D Levels Through Winter

If you're worried about your vitamin D levels dropping during the winter, especially if you carry extra weight, this research points to an approach worth considering alongside sunlight and, where appropriate, supplementation. According to the study, the root of the problem isn't just low sun exposure or diet. It's how your body processes and activates the vitamin D that's already stored in your fat and muscle tissue. That's where exercise makes a real difference.

You don't need to lose weight or spend hours in the gym. What matters is doing the right kind of movement consistently. The study showed that even without any fat loss, people who exercised regularly were able to maintain their active vitamin D levels all winter long. Here are the general measures that follow from it — they are wellness suggestions, not a treatment for any condition:

- 1. Start moving daily** — Aim for regular moderate-intensity exercise and daily movement. The study used indoor cycling and resistance training, but you could use **brisk walking**, bodyweight circuits or biking. The key is consistency. Your body needs repeated activation to keep converting stored vitamin D into the active form your cells use.
- 2. Combine moderate cardio with strength training** — Don't choose one or the other. Cardio supports circulation and metabolic health, while strength training improves how your muscles handle vitamin D. Together, they reprogram your fat and muscle tissue to activate more vitamin D instead of letting it sit unused. Just don't overdo it.

Too much high-intensity exercise can work against you. **Moderate exercise** is far more forgiving, though if you have been sedentary or have a health condition, build up gradually and check with your healthcare provider before starting a new program.

Treat the darker months as a window to build your health from the inside out. Most people lose vitamin D between October and March, especially in northern regions. By staying active through this stretch, you may blunt that seasonal drop and give yourself a head start on spring energy, immune strength and metabolic function.

- 3. Sunlight is the best option to optimize your vitamin D** — Remember that your skin is designed to make vitamin D from the sun. So, during the summer months — and winter months if you live in a warm climate — spend time in **direct sunlight** with bare skin exposed daily.

If you're still using canola, soybean, sunflower or generic "vegetable oil," you're flooding your cells with **linoleic acid** (LA), a polyunsaturated fat that oxidizes easily, builds up in your skin and increases your risk of skin damage if you get sun exposure during peak hours (10 a.m. to 4 p.m.). Cut these oils from your diet for at least four to six months before getting peak sun exposure.

- 4. If you supplement, combine vitamin D3 with magnesium and K2** — If you're indoors often or live far from the equator, vitamin D3 supplementation is a reasonable strategy to keep your vitamin D levels optimized in the winter. But vitamin D3 works best when combined with **magnesium** and vitamin K2. As a guide, aim for 180 micrograms of K2 for every 5,000 IU of vitamin D — K2 helps direct calcium to your bones and away from your arteries.

In fact, an analysis of self-reported data from nearly 3,000 participants in the GrassrootsHealth cohort found that among those reporting no supplemental magnesium or vitamin K2, 244% more supplemental vitamin D was needed for half the group to reach a blood level of 40 ng/mL, compared to those who usually took both. These are observational findings from a self-selected cohort and may not apply to all individuals.⁵

This trio works as a team, improving absorption, reducing arterial calcification and helping your liver process fat more efficiently.

- 5. Test your vitamin D levels and personalize your approach** — Get your vitamin D levels tested at least twice a year and aim for a level between 60 and 80 ng/mL (150 to 200 nmol/L). Vitamin D status has been studied in relation to insulin sensitivity, liver inflammation and immune function, so the target range matters for more than bone health.

Testing gives you a starting point and helps you keep track of your vitamin D levels year-round. Talk to your healthcare provider about whether this testing is appropriate for you.

FAQs About Exercise and Vitamin D

Q: Why does vitamin D drop during the winter?

A: Your body relies on sunlight, specifically UVB rays, to make vitamin D through your skin. During the winter, especially in northern regions, sunlight isn't strong enough to trigger this process, leading to a sharp drop in vitamin D production.

Q: How does excess body fat affect vitamin D levels?

A: Vitamin D gets stored in fat cells, making it harder for your body to access and activate it. This is associated with lower levels of the form your body actually uses, especially during winter.

Q: Does exercise improve vitamin D levels without supplements?

A: In one 10-week randomized controlled trial in inactive adults with overweight or obesity, consistent moderate-intensity exercise helped participants maintain their active vitamin D levels without weight loss or supplements. This is a single trial, so the finding is promising rather than settled.

Q: What kind of exercise is best for maintaining vitamin D?

A: A mix of moderate cardio and strength training four times a week worked best in the study. You don't need intense workouts — just regular movement to support your vitamin D metabolism.

Q: Should I still take vitamin D supplements?

A: If you live in a low-sunlight area or spend most of your time indoors, vitamin D3 supplements help, but they work best when combined with magnesium and vitamin K2 to support proper absorption and function. However, safe sunlight exposure is the best way to optimize your vitamin D levels.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified healthcare provider before making changes to your health regimen, including before starting a new exercise program.

Sources and References

- ^{1, 2} [National Library of Medicine, StatPearls, Vitamin D Deficiency February 15, 2025](#)
- ^{3, 4} [Advanced Science June 12, 2025, Volume 12, Issue 22](#)
- ⁵ [GrassrootsHealth March 10, 2020](#)