

Effect of Vitamin D Supplementation on Peripheral Neuropathy in Type 2 Diabetes Mellitus

Vitamin D is a fat-soluble vitamin, essential for bone health by increasing the intestinal absorption of calcium. The main natural source of this vitamin is sunlight in addition to many food sources (like fatty fishes, Fortified milk ...). Oral tablet formulation with different doses of Vitamin D is available as a supplement to treat vitamin D deficiency. ⁽¹⁾

Many studies start showing an association vitamin D and reduction of neuropathic pain in diabetic patients.

One of these studies about Vitamin D as an Analgesic for Patients with Type 2 Diabetes and Neuropathic Pain published on 2008, include 51 patients with type 2 diabetes with typical neuropathic pain, all of them had vitamin D insufficiency, were supplemented with cholecalciferol (vitamin D₃) tablets (mean dose, 2059 IU). Then patients were reevaluated in 3 months for pain by questionnaires used at baseline .They found that vitamin D repletion resulted in a significant reduction in pain scores. ⁽²⁾

Another prospective open-labeled study conducted between 2012 and 2013, enrolled 143 participants with predominantly type 2 diabetes, with neuropathic pain measured by different pain scores , 58 of them with vitamin D deficiency (< 25 ng/ml) , the rest of patients with normal levels (31.7±23.3 ng/ml) , receive a single intramuscular dose of 600 000 IU vitamin D , resulted in a significant increase in vitamin D levels (p<0.0001) and a significant reduction in positive symptoms of all pain scores (p<0.0001) .⁽³⁾

Other prospective, nonrandomized, double-blind, placebo-controlled trial was done in 2015-Nov, lasting for 20 weeks, in departments of medicine and pathology at Kuwait University. Enrolled 112 participants, with type 2 diabetes, diabetic neuropathic pain and vitamin D deficiency .Patients were assigned to a treatment group (n = 57) received oral capsules of vitamin D3 (cholecalciferol, 50,000 IU) once weekly for 8 weeks, and placebo group (n=55) received starch capsules, also once weekly for 8 weeks, resulted in significant improvement in vitamin D levels (p <

0.0001) and reduction of neuropathic pain ($p < 0.001$) in the treatment group compared to placebo group. The results confirm that short-term oral supplementation of vitamin D to correct a deficiency improved the symptoms of peripheral neuropathy in patients with type 2 diabetes. ⁽⁴⁾

The mechanism by which vitamin D improve neuropathic pain in diabetic patients is varied ; it modulates brain neurotransmitters, increases the synthesis of several neurotrophins, influences prostaglandin action , affects a number of inflammatory pathways associated with the development and persistence of chronic pain, inhibits the synthesis of nitric oxide synthase , downregulates neutrophil function. ⁽⁵⁾

In conclusion, vitamin D will have a promising future role in treatment protocol of neuropathic pain, but more studies needed to explore the proper dosing as well as the route and duration of treatment, to confirm the efficacy and clinical benefits of vitamin D supplementation on diabetic neuropathy and other neuropathic deficits.

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