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Short Communication

Interrelationship between Diabetic Neuropathy and Vitamin D Deficiency

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ABSTRACT

Peripheral neuropathies, diabetic foot ulcers, as well as Cardiovascular Autonomic Neuropathy (CAN) are the most serious complications of diabetes. Recent studies suggest that vitamin D deficiency could have a role in the development and progression of diabetic neuropathy. Furthermore, vitamin D supplementation could improve this condition.

DESCRIPTION

Previous studies have investigated the relationship between vitamin D deficiency and neuropathy, but the exact pathomechanism is still not fully understood [1-3].

Lee et al., found a correlation between low vitamin D levels and Diabetic Peripheral Neuropathy (DPN) [4]. In their study, they investigated 51 patients with Type 2 Diabetes (T2DM) with vitamin D deficiency and painful diabetic neuropathy. Three months of vitamin D administration decreased the neuropathic pain score by 50%. In another study which involved 87 T2DM subjects with neuropathy and 123 without examined the association between neuropathy and low level of vitamin D [5]. Serum levels of vitamin D were lower in patients with neuropathy.

Vitamin D administration significantly improved the signs and the symptoms of DPN as well [6]. The aim of Ghadiri-Aniri et al., was to analyze the safety and effectiveness of vitamin D administration in painful diabetic neuropathy [7]. They involved 66 type 2 diabetic patients with painful DPN in the study. Subjects have been supplemented with 50,000 IU vitamin D3 for 12 weeks. Vitamin D supplementation significantly increased the serum levels of 25OHD and decreased symptoms and signs of diabetic neuropathy. Karonova T et al., examined the effect of vitamin D administration on microcirculation and symptoms of DPN and inflammatory markers in T2DM [8]. Vitamin D supplementation reduced the level of serum Interleukin-6 (IL-6) and increased serum Interleukin 10 (IL-10), which improved the severity of neuropathy and skin microcirculation [8]. In a more recent study, a single intramuscular dose of 600.000 IU vitamin D3 yielded a significant improvement in painful diabetic peripheral neuropathy [9]. Basit et al., enrolled 143; mostly type 2 diabetic patients with a DN4 score of 3.0±1.8, a total McGill pain score of 21.2 ± 14.9, and a SFMPQ score of 2.1 ± 0.9. In a prospective study, the effect of a single intramuscular injection of high dose vitamin D (600.00 IU) was also investigated on quality of life in patients with painful diabetic peripheral neuropathy using the NeuroQoL questionnaire [10]. A significant improvement was seen in neuropathy-specific quality of life after this single high-dose intramuscular treatment.

Zubair M et al., investigated the relationship between diabetic foot ulcers and low level of vitamin D in 162 patients without and 162 with diabetic foot ulcers [11]. Diabetic patients with foot ulcers had lower median 25OHD levels. Their results suggested that vitamin D deficiency plays a role in the development of diabetic foot ulcers. A meta-analysis-including 7 studies-evaluated the association between vitamin D deficiency and diabetic foot ulcers [12]. This work demonstrated significantly decreased vitamin D levels in patients with diabetic foot ulcer. Based on the data of another meta-analysis of 10 studies, vitamin D deficiency appears to have a significant role in the etiology of diabetic foot ulcers [13]. In this study, they found that severe vitamin D deficiency (<10 ng/mL) was significantly higher in ulcer patients.

Todorova A.S. et al., examined cardiovascular autonomic neuropathy and vitamin D status in 163 type 2 diabetic patients [14]. Their findings suggested that low level of vitamin D significantly correlated with heart rate variability parameters. The connection between vitamin D deficiency and presence of CAN in patients with T1DM or T2DM was also corroborated by

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others [15]. In this work, both very high and low levels of vitamin D were associated with cardiovascular autonomic neuropathy. The reasons behind vitamin D deficiency in these patients could be decreased mobility, thus less sunlight exposure, and different diet.

CONCLUSION

Several studies have indicated that low levels of vitamin D have a significant part in the development of diabetic neuropathy. Vitamin D supplementation could be a reliable and cheap option for treating diabetic neuropathy, nevertheless, further studies are needed to confirm these findings.

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