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SERVICES FOR SCIENCE AND EDUCATION

Are All Forms of Blood Clotting a Result of Vitamin D Deficiency? A Hypothesis and Short Review

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ABSTRACT

In a previous study I showed low levels of Vitamin D correlate not only with the occurrence of Ischemic Stroke but also with a rise in Parathyroid Hormone (PTH) secretion. This hormone is responsible for transference of Calcium from the bones to the blood stream which as I explained is a result of Vitamin D deficiency, this I hypothesized could be causing the blood clot leading to the aneurism in Stroke. Herein I take this hypothesis a step further and suggest that all forms of blood clotting could perhaps be traced back to the calcification of the blood stream caused by PTH because of Vitamin D deficiency. I will bring forward a few studies that all share the observation of Vitamin D deficiency in non-stroke life threatening blood clotting like Deep Vein Thrombosis, Venous Thrombosis and Pulmonary Embolism. I will raise the need to further examine this connection between Vitamin D levels and Thrombosis, as a possible preventive and perhaps therapeutic.

INTRODUCTION

In a previous essay I explained why the connection between Vitamin D deficiency and the odds of encountering an Ischemic Stroke could be the result of the negative correlation between Vitamin D levels and Parathyroid Hormone secretion. Parathyroid Hormone (PTH) his job is to dismantle Calcium from the bones into the blood stream, supposedly in an effort to control blood calcium levels, but this transference of Calcium to the blood I hypothesized is causing the blood clot that is responsible for the brain aneurysm in Ischemic Stroke[1], this Calcification of the blood stream I later thought, could be responsible for all blood clots and blood clotting, not just in Ischemic Stroke but also in deep vein thrombosis (DVT) and Pulmonary embolism (PE), there's a vitamin d deficiency which leads to a glut of Parathyroid Hormone that then transfers calcium to the blood causing most if not all types of Clotting.

Herein, I would try to do my best to describe some of the studies concerning Vitamin D levels in deep vein thrombosis and pulmonary embolism and try to bring forward a strong case for Vitamin D deficiency to be a basic feature of both diseases. The question I will then raise is (a) can sufficient vitamin D levels be protective against blood clotting and (b) can Vitamin D be effective as a 1st line treatment not just against stroke but against most if not all life threatening blood clotting. This hypothesis can't be complete without reading the previous essay I wrote on the subject and as I'm not going to repeat it word for word I recommend those who are interested in this study to also examine that previous essay [1].

Results: "85.7% of patients with unprovoked DVT had a low Vitamin D level." Report Farooqui and co. in their study "Role of Vitamin D Levels in Venous Thrombosis" (Venous Thrombosis is also referred to as VTE)[2] "elevated expression of VDR was associated with decreased risk of

VTE (OR = 0.81; 95% CI, 0.65–0.998; p = 0.047) and PE (OR = 0.67; 95% CI, 0.50–0.91; p = 0.011)" report Zhang et al. in 2023[3].

Khademvatani et al. compared 82 patients with DVT with 85 age matched contols: "The concentration of 25(OH)D was significantly lower in the DVT group compared to that of the control group (17.9±10.3 versus 23.1±12.5 ng/mL, P=0.004). The prevalence of participants with deficient 25(OH)D levels was significantly higher in the both DVT and control groups than those with sufficient 25(OH)D levels (68.3% versus 13.4%, and 49.4% versus 28.2%, respectively, P=0.027)"[4] Tao et al. report in their results section: "Females showed a higher proportion of DVT than males (60.7 vs. 42.5%, p < 0.001), and lower serum vitamin D levels than males (53.44 ± 16.45 vs. 69.43 ± 23.14, p < 0.001). Moreover, serum vitamin D levels were lower in the DVT group than in the non-DVT group (59.44 ± 19.61 vs. 66.24 ± 23.86, p < 0.001). Besides, the DVT group showed a lower proportion of vitamin D sufficiency than the non-DVT group (21.2 vs. 32.9%, p < 0.05)."[5] Cosgun et al. report. First their methodology: "Eighty-one patients over 18 years of age who underwent CT angiography with a pre-diagnosis of pulmonary embolism were included in this case-control study. Groups 1 and 2 consisted of 45 patients with pulmonary embolism (PE), and 36 patients without pulmonary embolism, respectively."[6] Their Results: "No significant difference was observed between the groups in terms of age, gender, and body mass index values (P>0.05). 25(OH)D level was significantly lower in the pulmonary embolism group (7.2(3.3) vs. 8.7(7.0), P=0.028)."[6]

Dehghani et al. in their report "Effect of Vitamin D deficiency in lower extremity and pulmonary venous thromboembolism"[7] explain 1st their methodology: " In the present cross-sectional study, vitamin D was evaluated in the plasma of 42 patients with lower extremity DVT or PE, as well as 42 healthy controls." Then they proceed to the results: "The prevalence of deficiency in vitamin D was higher in the cases than the controls. The two groups were significantly different regarding vitamin D levels (p = 0.024). Based on the vitamin D classification, deficiency was reported in 30 (71.4%) patients and 18 (42.9%) controls."[7]

Ekim et al. report their methodology and results: "In the patient group, there were 42 men and 40 women with a mean age of 56.73±17.06 years. In the healthy control group, there were 30 men and 39 women with a mean age of 53.28±18.42 years. The mean serum 25(OH)D level of the DVT patients (12.58±6.51 ng/mL) was found significantly lower than the healthy participants (18.75±9.16 ng/mL) (p<0.03)."[8]

Moore et al. report that "This study explores the relationship between vitamin D levels and acute deep venous thrombosis (DVT) in the traumatic brain injury (TBI) population. This is a retrospective cohort study that analyzes the relationship between vitamin D levels and the prevalence of DVT during acute inpatient rehabilitation. In this population, 62% (117/190) of patients had low vitamin D levels upon admission to acute rehabilitation. Furthermore, 21% (24/117) of patients in the low vitamin D group had acute DVT during admission to acute rehabilitation. In contrast, only 8% (6/73) of patients in the normal vitamin D group had acute DVT during admission to acute rehabilitation". [9]

This study by Koufakis reports exactly according to my hypothesis that hyperparathyroidism leads to hypercalcemia of the blood stream and therefore to blood clotting. "We have described three uncommon cases of patients who presented with clinical thrombotic events (stroke,

pulmonary embolism and deep venous thrombosis) during the course of a hypercalcemia-induced hypercoagulable state. After thorough investigation, the diagnosis of primary hyperparathyroidism-due to a parathyroid adenoma-was established in all cases. The association between hypercalcemia and venous or arterial thrombosis has been previously described; however, relevant data are still insufficient. The existing evidence in the field was reviewed and the interesting underlying pathophysiologic mechanisms were also discussed. Further studies are required to shed more light on the unusual, still intriguing relationship between calcium and thrombosis."[10] Exactly what I was implying except that they fail to recognize the negative correlation between PTH and Vitamin D levels I explain and bring evidence to in the previous study I wrote. [1]

Another report by Mashavekhi and co. about Hyperparathyroidism and in this case Pulmonaary Embolism: "Two patients aged 82 and 77, with a fractured neck of the femur, were found to have primary hyperparathyroidism, and characterized by hypercalcemia and hypercalciuria. Post-surgery, both developed pulmonary embolism (PE)…"[11]

CONCLUSIONS

To conclude, in a previous study I explained both the connection between deficient Vitamin D levels and the odds of encountering Stroke and also the lower vitamin D levels I showed had a negative correlation to PTH secretion. PTH leads to calcium being transferred from the bones to the bloodstream and this, I hypothesized could lead to the blood clotting in stroke. Herein I examined several studies that show a possible connection of Vitamin D deficiency to other kinds of diseases caused by blood clotting. I again suggest the further examination of Vitamin D as even a 1st line treatment to Stroke (in doses of several dozen drops) and also ask to further examine the role of Vitamin D as protective not just against Ischemic Stroke but against all blood clotting and these results could bring forward a need, to examine Vitamin D not just as protective but as treatment to blood clotting.

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