

Acute Vitamin D Intoxication: An Uncommon Reality!

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ABSTRACT

Hypervitaminosis is a condition of abnormally high storage levels of vitamin, which can lead to toxic symptoms. Hypervitaminosis are primarily caused by fat-soluble vitamins (A&D). Here, we present a case of hypervitaminosis D due to careless administration of six sachets of cholecalciferol 60,000 IU a week before. Vitamin D toxicity is rare as the therapeutic range of toxic and therapeutic dose differs widely.

Keywords: Vitamin D Intoxication, Hypervitaminosis D, Cholecalciferol.

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INTRODUCTION

Vitamin D plays an active role in the formation and preservation of healthy bones, skin, teeth, soft tissues, regulates the body immune system, protects against the sun's harmful radiation, and is also responsible for reducing the risk of several disorders such as asthma, multiple sclerosis, and rheumatoid arthritis. If abnormally excess amounts of vitamin D builds-up in the liver, due to a sudden overdose of the substance, or by accumulation of small doses over prolonged periods; it leads to a toxic condition called Hypervitaminosis D. Hypervitaminosis D disorder causes frequent urination, dizziness, vomiting, and could lead to liver damage. Discontinuation of vitamin D intake with symptomatic treatment, are the management measures adopted. Prolonged exposure to sunshine, or regularly consuming vitamin D fortified foods (such as milk products), does not lead to abnormal build-up of body vitamin D levels.¹ Too much vitamin D can cause abnormally high level of calcium in the blood. This can affect bones, tissues and other organs. It can lead to high blood pressure, bone loss and kidney damage if not treated. There has been increase in cases of overall hypervitaminosis D cases in the past few years. It is usually due to taking more than the recommended daily value of vitamin D. Some prescription medications can elevate levels of vitamin D like:

- Thiazide diuretics
- Digoxin
- Estrogen therapy

- Antacid for longer duration
- Isoniazid

Hypervitaminosis can occur if vitamin D is taken along with the following diseases:

- Kidney disease
- Liver disease
- Tuberculosis
- Hyperparathyroidism
- Sarcoidosis
- Histoplasmosis

Excessive amount of vitamin D can cause calcium levels in the blood to rise, leading to hypercalcemia. Symptoms may include:

- Fatigue
- Loss of appetite
- Weight loss
- Nausea and vomiting
- High blood pressure
- Dizziness
- Constipation²

CASE REPORT

A twenty-eight-year-old male patient was admitted in our hospital with complains of fever with chills, generalized weakness and bodyache from last 3 weeks. The patient was occasional alcoholic and smoker. He also gave a significant history of intake of 6

sachet of cholecalciferol 60,000 IU a week before. He self-administered vitamin D supplement without any recommendation. On physical examination, patient was conscious and oriented. Clinical examination indicated a normal blood pressure of 120/90mmHg, pulse rate recorded was 120 beats per minute, SPO₂ was 98% and respiratory rate was 22 breaths per minute. Patient had a temperature of 100F. Abdominal examination was normal. Chest and cardiac examinations were also normal. Laboratory data indicates high level of ESR 44mm/1st hour, total leukocyte count of 15400/cumm, globulin-3.7g/dL, C-reactive protein-55.04mg/dL and neutrophil count 82% indicating infection, platelet count was high-562x10³/L. Serum calcium level was in normal range 9.8mg/dL. Creatinine level was 0.7mg/dL which was also in normal range. Total cholesterol was 80mg/dL and Lactate dehydrogenase was 118U/L which were in lower range than normal. Ultrasound abdomen was also normal. His serum level of vitamin D was more than 150ng/mL which was in toxic range (normal 14.7 to 68.3 ng/mL). The patient also had scrub typhus serology positive. So the diagnosis of hypervitaminosis D with scrub typhus was made on the basis of history of intake of vitamin D supplement and its serum level.

The patient was commenced with normal saline solution and antibiotics (Metronidazole and Azithromycin) were given initially and other drugs were also prescribed like proton pump inhibitor (PPI) and Indomethacin. After scrub typhus was diagnosed, Metronidazole was replaced with Doxycycline. Over the next 5 days, the patient's condition significantly improved and he was discharged.

DISCUSSION

Vitamin D (calciferol) is the precursor of 1,25(OH)₂D (calcitriol), a liposoluble hormone of essential importance for the homeostasis of calcium and phosphorus, bone and tooth mineralization, as well as regulation of cell proliferation, differentiation and apoptosis, immunoregulation, hormonogenesis and other physiological processes in organism.³⁻⁶

Hypervitaminosis D is rare but potentially serious condition. It occurs when you take in too much vitamin D. It is usually the result of taking high-dose vitamin D supplements. The daily requirement of vitamin D is about 200-600 units. The tolerable upper limit, or the maximum daily dose of vitamin D that is unlikely to result in any health risks, has been set at 4,000 IUs per day. Adverse effects have been seen in those taking less than 10,000 IUs per day over an extended period of time.

Recommended Dietary Allowance (RDA) of vitamin D for most adults is 600 international units a day (IU). Higher doses are prescribed to treat medical conditions like vitamin D deficiency, diabetes and cardiovascular disease, for a short period of time. Daily use of high-dose vitamin D supplements for several months is toxic.

First advice to the patient of Hypervitaminosis D is to stop taking vitamin D supplements and also reduce the amount of calcium in your diet temporarily.² In a developing country like India many people suffer from vitamin D deficiency. Nutritional deficiency poses a significant health hazard worldwide especially in developing countries.⁷ Modern lifestyle has led to insufficient sun exposure and due to which people are deprived of natural and basic source of vitamin D, due to which they are forced to take additional supplement of vitamin D.

Vitamin D supplements can be easily purchased over the counter, in the form of ergocalciferol or cholecalciferol, in diverse formulations and dosages. The cases of hypervitaminosis D usually occur in excessive supplementation.⁸⁻¹⁰

As awareness about vitamin D deficiency in India has increased use of vitamin D supplements have increased. The cost of laboratory test of Vitamin D is high that is why vitamin D supplements are prescribed irrationally. Although, significant vitamin D toxicity is uncommon because of wide gap between its therapeutic and toxic doses.¹¹

Clinical presentation of hypervitaminosis D is quite varied and is mainly due to hypercalcemia and hyperphosphatemia.¹² In the absence of symptoms and significant hypercalcemia, an observational policy can be maintained following discontinuation of vitamin D supplements.

A case report by Mansuri ZH et al., concluded hypervitaminosis D in high risk individual i.e. the elderly and those with renal failure or primary hyperparathyroidism who was taking vitamin D supplements for hypovitaminosis. Toxicity occurred by taking empirical and unmonitored high dose of vitamin D supplements.¹³ Tatiana et.al. reported a case, where the patient was suffering from chronic kidney disease and the patient developed hypercalcemia and worsening of renal failure due to ingestion of a dose 2,000-fold higher than what was prescribed.¹⁴

In this case, the patient self-administered cholecalciferol and developed intoxication. This case illustrates toxicity of Vitamin D due to careless and self-administration of Vitamin D.

CONCLUSION

The case discussed above provide significance of taking detailed history, including the history of medications taken. It shows that it is important to consult a Doctor or Registered Medical Practitioner (RMP) even before taking any dietary supplements specifically fat-soluble vitamins like vitamin D, which can be easily purchased over the counter. Although hypervitaminosis D is uncommon but it can cause serious complications which can be resolved by adopting necessary treatment.

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