

Severe Vitamin D Deficiency Causing Kyphoscoliosis

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ABSTRACT

Vitamin D deficiency is common among Indian population. Women are especially at risk for severe vitamin D deficiency. The risk is higher for those who are multiparous and postmenopausal. Poor exposure to sunlight, higher latitude, winter season, inadequate diet, older age, obesity and malabsorption are also important risk factors. Symptoms of hypovitaminosis D, including diffuse or migratory pain affecting several sites (especially the shoulder, pelvis, ribcage and lower back) have also been misdiagnosed as musculoskeletal disorders, including fibromyalgia, polymyalgia rheumatica and ankylosing spondylitis. Here, we report two cases presented with kyphoscoliosis, diagnosed to have severe vitamin D deficiency.

Keywords: Kyphoscoliosis, musculoskeletal disorder, vitamin D

Introduction

Vitamin D is important for calcium homeostasis and for optimal skeletal health. The major function of vitamin D is to increase the efficiency of calcium absorption from the small intestine. Vitamin D also enhances the absorption of phosphorus from the distal small bowel. Adequate calcium and phosphorus absorption from the intestine is important for proper mineralization of the bone. The second major function of vitamin D is involvement in the maturation of osteoclasts, which resorb calcium from the bones. Vitamin D deficiency in children can manifest as rickets (it is the most common cause of nutritional rickets), which presents as bowing of the legs. Vitamin D deficiency in adults results in osteomalacia, which presents as a poorly mineralized skeletal matrix. These adults can experience chronic muscle aches and pains. However, for many people, the symptoms are subtle and they consult their primary care physician for same. Since Glisson gave the first authoritative description of rickets in 1650 and McCollum and co-workers described its cause as vitamin D deficiency in 1922,^[1] clinical descriptions of hypovitaminosis D have become more variable, making the condition less recognizable.^[2] At the same time, the condition remains highly prevalent world-wide, yet is preventable therefore, primary care physician should have a low threshold for suspicion of vitamin D deficiency.

Case Report

A 30-year-old obese female patient presented with a history of difficulty in walking and getting up from the sitting position. She also complained severe pain in chest and limbs and had to crawl in the house to do routine activities. She had three children and her symptoms worsened after the last child delivery (2 years ago). On examination, she was normal built with body mass index 34, pulse 78 beats/min, blood pressure 120/80 mmHg. She had tenderness in ribcage, pelvic girdle and thigh area. She had proximal muscle weakness with power 3/5 in the shoulder girdle and power 2/5 in the pelvic girdle. She also had mild dorsal kyphosis, walking with stooped forward gait [Figure 1]. Routine investigations showed Hb 10.5 g/dl, white blood cell count 8400/mm³, fasting blood sugar 88 mg/dl, serum creatinine 0.80 mg/dl, serum sodium 140 mEq/L, serum potassium 4.1 mEq/L, serum calcium 7.8 mg/dl, phosphorus 4.3 mg/dl, alkaline phosphatase 1000. Serum vitamin D (25-hydroxy [OH] cholecalciferol) level was undetectable (desirable level 30-70 ng/ml). Thyroid function tests were within normal limits. X-ray spine showed anterior wedging of thoracic vertebrae [Figure 2] and computed tomography scan of spine showed severe osteoporosis with anterior wedging [Figure 3]. After all investigations, diagnosis of severe vitamin D deficiency causing severe osteoporosis made. Patient was treated with injectable vitamin D3 (600,000 units weekly for 5 weeks) followed by oral vitamin D3 sachets containing 60,000 units vitamin D3 weekly. After 6 weeks of therapy, her power improved to 4/5 in the shoulder and

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pelvic girdle. Pain subsided gradually and she started walking with support. On follow-up, she continued to improve, but her gait never improved.

Second case 60-year-old female diagnosed case of thyrotoxicosis since last 2 years on carbimazole and propranolol. She presented with pain in ribcage, difficulty in walking. On examination, she had mild dorsal kyphosis, walking with stooped forward gait [Figure 4]. Routine investigations were within the normal limits. Serum calcium level was 7.8 mg/dl, phosphorus 3.4 mg/dl, alkaline phosphatase 330. Her thyroid function tests were normal. Vitamin D3 level was low (10 ng/ml). X-ray spine showed severe osteoporosis with anterior wedging. She was treated with injectable vitamin D3 followed by oral therapy. She gradually improved after therapy.

Discussion

Vitamin D deficiency can result from Inadequate exposure to sunlight,^[3] malabsorption (people who have undergone resection of the small intestine are at risk for this condition; diseases associated with vitamin D malabsorption include celiac sprue,

short bowel syndrome^[4] and cystic fibrosis^[5]), medications (drugs such as phenytoin, phenobarbital and rifampicin can induce hepatic p450 enzymes to accelerate the catabolism of vitamin D).

Vitamin D insufficiency is highest among people who are elderly, institutionalized or hospitalized. Vitamin D status may fluctuate throughout the year, with the highest serum 25(OH) D levels occurring after the summer and the lowest serum 25(OH) D concentrations after winter. A study by Shoben *et al.* demonstrated that mean serum 25(OH) D concentrations can vary as much as 9.5 ng/ml. Factors such as male sex, higher latitude and greater physical activity levels were found to be associated with greater differences in serum 25(OH) D concentrations in winter and summer.^[6]

The high prevalence of hypovitaminosis D mandates early clinical recognition. Widespread pain can be a prominent manifestation of hypovitaminosis D,^[7,8] but the lack of specificity complicates interpretation. Symptoms of hypovitaminosis D, including diffuse or migratory pain affecting several sites (especially the shoulder, pelvis, ribcage and lower back) have also



Figure 1: A 30-year-old female presented with kyphoscoliosis



Figure 2: X-ray spine showed anterior wedging of thoracic vertebrae



Figure 3: Magnetic resonance imaging scan of spine showed severe osteoporosis with anterior wedging



Figure 4: A 60-year-old female presented with dorsal kyphosis

been misdiagnosed as physical illnesses, including fibromyalgia, polymyalgia rheumatica and ankylosing spondylitis by their primary care physician. Associated polyarthralgias and synovitis of the hands and feet have been confused with rheumatoid arthritis and polymyositis and myopathy with proximal weakness has been confused with amyotrophic lateral sclerosis and pseudofractures have been misinterpreted as metastatic bone disease. Although persistent, non-specific musculoskeletal pains and weakness may represent a unifying set of features,^[9,10] this overlap with other rheumatological conditions, as well as depression, necessitates a high index of suspicion in the diagnosis of hypovitaminosis D.

The daily maintenance dose of vitamin D varies by age, but most children and adults generally require 600-2000 international unit (IU) of vitamin D daily. Serum 25(OH) D is the best test to determine vitamin D status. A 25(OH) D level of less than 30 ng/mL is considered vitamin D insufficient.^[11]

Sensible sun exposure, especially between the hours of 10:00 am and 3:00 pm produces vitamin D in the skin that may last twice as long in the blood compared with ingested vitamin D.^[12] Foods thought to contain high amounts of vitamin D3 are oily fish, such as salmon, mackerel and blue fish, as well as fortified milk and other dairy products. Ergocalciferol is the most widely available form of vitamin D. In cases of severe vitamin D deficiency, higher doses of vitamin D are given either daily or weekly (60,000 IU weekly for 6-8 weeks), followed by an increase in the daily dose of vitamin D.^[13]

The treatment of vitamin D insufficiency can decrease the risk of hip and non-vertebral fractures.^[14,15] A meta-analysis by Boonen *et al.* of postmenopausal women and of men aged 50 years or older reporting a risk of hip fracture found that oral vitamin D supplementation reduced the risk of hip fractures by 18% when vitamin D and calcium were taken together.^[16]

Conclusion

Vitamin D deficiency is common among Indians particularly among postmenopausal women. Severe vitamin D deficiency can lead to multiple musculoskeletal disorders and if not treated early, this can lead to irreversible deformity. As symptoms are vague, these patients usually visit primary care physicians. This case study will help primary care physicians to recognize Vitamin D deficiency at the early stage.

References

- Rajakumar K. Vitamin D, cod-liver oil, sunlight, and rickets: A historical perspective. *Pediatrics* 2003;112:e132-5.
- Reginato AJ, Falasca GF, Pappu R, McKnight B, Agha A. Musculoskeletal manifestations of osteomalacia: Report of 26 cases and literature review. *Semin Arthritis Rheum* 1999;28:287-304.
- Liu BA, Gordon M, Labranche JM, Murray TM, Vieth R, Shear NH. Seasonal prevalence of vitamin D deficiency in institutionalized older adults. *J Am Geriatr Soc* 1997;45:598-603.
- Tangpricha V, Luo M, Fernández-Estívariz C, Gu LH, Bazargan N, Klapproth JM, *et al.* Growth hormone favorably affects bone turnover and bone mineral density in patients with short bowel syndrome undergoing intestinal rehabilitation. *JPEN J Parenter Enteral Nutr* 2006;30:480-6.
- Koutkia P, Lu Z, Chen TC, Holick MF. Treatment of vitamin D deficiency due to Crohn's disease with tanning bed ultraviolet B radiation. *Gastroenterology* 2001;121:1485-8.
- Shoben AB, Kestenbaum B, Levin G, Hoofnagle AN, Psaty BM, Siscovick DS, *et al.* Seasonal variation in 25-hydroxyvitamin D concentrations in the cardiovascular health study. *Am J Epidemiol* 2011;174:1363-72.
- Macfarlane GJ, Palmer B, Roy D, Afzal C, Silman AJ, O'Neill T. An excess of widespread pain among South Asians: Are low levels of vitamin D implicated? *Ann Rheum Dis* 2005;64:1217-9.
- Allison TR, Symmons DP, Brammah T, Haynes P, Rogers A, Roxby M, *et al.* Musculoskeletal pain is more generalised among people from ethnic minorities than among white people in Greater Manchester. *Ann Rheum Dis* 2002;61:151-6.
- Goswami R, Gupta N, Goswami D, Marwaha RK, Tandon N, Kochupillai N. Prevalence and significance of low 25-hydroxyvitamin D concentrations in healthy subjects in Delhi. *Am J Clin Nutr* 2000;72:472-5.
- Plotnikoff GA, Quigley JM. Prevalence of severe hypovitaminosis D in patients with persistent, nonspecific musculoskeletal pain. *Mayo Clin Proc* 2003;78:1463-70.
- Hollis BW, Wagner CL. Normal serum vitamin D levels. *N Engl J Med* 2005;352:515-6.
- Haddad JG, Matsuoka LY, Hollis BW, Hu YZ, Wortsman J. Human plasma transport of vitamin D after its endogenous synthesis. *J Clin Invest* 1993;91:2552-5.
- Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, *et al.* Evaluation, treatment, and prevention of vitamin D deficiency: An endocrine society clinical practice guideline. *J Clin Endocrinol Metab* 2011;96:1911-30.
- Chapuy MC, Arlot ME, Duboeuf F, Brun J, Crouzet B, Arnaud S, *et al.* Vitamin D3 and calcium to prevent hip fractures in the elderly women. *N Engl J Med* 1992;327:1637-42.
- Trivedi DP, Doll R, Khaw KT. Effect of four monthly oral vitamin D3 (cholecalciferol) supplementation on fractures and mortality in men and women living in the community: Randomised double blind controlled trial. *BMJ* 2003;326:469.
- Boonen S, Lips P, Bouillon R, Bischoff-Ferrari HA, Vanderschueren D, Haentjens P. Need for additional calcium to reduce the risk of hip fracture with vitamin D supplementation: Evidence from a comparative metaanalysis of randomized controlled trials. *J Clin Endocrinol Metab* 2007;92:1415-23.

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