DIET AND OUTDOOR ACTIVITY: KEY FACTORS IN THE AETIOLOGY OF VITAMIN D DEFICIENCY IN A 14 YEAR OLD AFGHAN GIRL

Jodi Newcombe  Ashutosh Joshi  Michelle Pike  Colin Michie
Department of Paediatrics, Ealing Hospital, LONDON UB1 3HW

ABSTRACT

Low levels of vitamin D have been described in a number of studies of adolescents. It has been suggested that a combination of their rate of growth and changing lifestyles that result in deficiency. We present a case in which many factors were carefully investigated in order to identify which were likely to be most relevant. The case suggests that interventions with both sunshine exposure and diet may be successful in tackling the problem in a teenager.

KEYWORDS
Vitamin D deficiency; Adolescent; Sun exposure

1. CASE REPORT

A 14 yr old Afghan girl, LC, was referred from GP surgery with myalgia, fatigue and drowsiness. She was born to non-consanguineous parents in Afghanistan and is the youngest of three siblings. She was born at term by normal vaginal delivery and there were no postnatal concerns. To her knowledge, her mother had an uncomplicated pregnancy and was taking calcium tablets. Her mother was a vegetarian. LC was breastfed for 10 months and received a BCG vaccination. She had normal growth and developmental milestones were achieved in a normal pattern. Specifically there was no history of delayed dentition or dental abnormalities. She immigrated to the UK at three years of age with her family in 2001.

In 2006 LC sustained a wrist fracture after falling off a bed when playing with her siblings. This was treated with a slab, arm sling, and paracetamol. The diagnostic x-ray did not display any evidence of metabolic bony disorder. She was using treatment for acne at the time. Her mother was diagnosed with vitamin D deficiency that year, following investigation of distal arm pain
related to tennis elbow. Her mother also has asthma and type 2 diabetes. LC’s elder brother suffered tuberculosis in Afghanistan prior to her birth. Her father and grandmother (also resident in the UK) have type 2 diabetes.

In clinic LC described daily pain in her back and cramps in her legs most marked after walking. The pain was evident at rest and sometimes woke her at night. The pain was worst during the 2nd or 3rd day of her menstrual cycle; she often missed school at this time. A systems enquiry was unremarkable. Her examination revealed an otherwise healthy girl weighing 62 kg with a height of 166 cm. She had a normal BMI of 22.5. Specifically there was no evidence of any bony malformations or muscle tenderness. There was some tenderness on compression of the sternum, but otherwise she had normal systemic examination. Measures of grip strength were low, at less than 10kg on both right and left using a dynamometer.

Blood samples showed that LC’s 25 (OH)D level was 1.8 nmol/l (normal for lab is 50-80 nmol/L) with normal liver function tests (apart from a raised alkaline phosphatase) and calcium levels. Her PTH was raised. She was commenced on colecalciferol 6,000 units per day for 3 months. She states she has been compliant to her medications. After being treated with 6,000 iu of colecalciferol per day for 4 months LC’s 25 (OH)D levels improved from 1.8 nmol/l to 62 nmol/l; her treatment has continued on half this dose. Her symptoms have improved but she continues to have pain. She can walk farther and for a longer period of time before she feels discomfort.

2. DISCUSSION

Vitamin D deficiency is common in the United Kingdom which has relatively low ultraviolet exposure for much of the year.(1) Low vitamin D levels are particularly frequent in adolescents who are rapidly growing and mineralizing bone; this can influence their athletic activity and performance.(2-4) Cases often present to hospital services with non specific muscle pain.(5,6) This case of a very low vitamin D level prompted specific lifestyle questions to try to determine causation.

LC’s family had lived in the UK for over 10 years; they did not visit any sunny or southern destinations during this time. LC dresses as an English teenager and does not use traditional clothing. She stated she spent approximately 5 minutes outside each day. She does not exercise or take walks and does not frequent the back garden at home. She prefers to be indoors using the computer or drawing. LC rarely used sun protection creams but does use emollients that do not contain any sun protection factors. She does not wear any additional make-up other than products used around the eye.

Her diet consists mainly of pasta and bread: she considers herself non-vegetarian. She eats lamb or chicken approximately twice a month and salmon about once a month. She eats yogurt once a week but does not eat cheese alone, or drink milk often. Her fruit intake was small but regular. A normal
day would include missing breakfast; eating pizza, cornflakes, apples, or pita with vegetables for lunch and having a rice or pasta dish for dinner. She does not take any additional vitamin supplements. Differentiation between vitamins D3 and D2 may be important: the former is derived from sun exposure and animal based products and the latter from plant based foods. Vitamin D2 is less effective in raising blood of 25(OH)D than Vit D3 and may place vegetarians or those that eat little meat at increased risk of deficiency.

LC was aware of Vitamin D deficiency because of her mother’s diagnosis. It is unlikely that deficiency played a role in her wrist fracture as the normal appearance of her bones at the time suggests there were no radiological signs of rickets. LC had heard that the sun was good for her health but did not know that it was a key factor in Vitamin D and calcium levels. She did not think she would be keen to take a regular supplement or fortify her diet, largely because her food intake revolved around other family members. The case of LC demonstrates that lifestyles adopted by immigrants to the United Kingdom can have a significant impact on vitamin D levels. Behavior changes in this age-group and their families, therefore with respect to lifestyle and diet need to be implemented in order to prevent future cases of deficiency.

3. REFERENCES

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