

MUSCLE PAIN AND HYPOVITAMINOSIS D IN A 10 YEAR OLD GIRL: A CASE REPORT

*Jeremy D.
Whyman*

Colin Michie

Vivien Chan

Stephen Ash

*Richard
Carroll*

ABSTRACT

Hypovitaminosis D is a global nutritional problem with a long history and varied manifestations (1). During the 17th Century, rickets was so frequent in England, it was known as the “English disease”; it was later identified in the majority of autopsies in the early 20th Century (13). Rapid skeletal growth requiring vitamin D is seen in puberty. During this period of life muscle pain is a common presenting symptom: we present a case illustrating this more recent pathology.

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CASE REPORT

A 10 year old Iranian girl, S.A., presented to her GP with a 6 month history of bilateral leg pain with onset after strenuous exercise: most commonly following swimming. She also experienced the pain when cycling or walking long distances. The pain was a dull ache most obvious in her thighs and feet. It would improve and resolve after rest several hours later. There was no pain or cramping at rest or at night. There were no other associated symptoms. She had no previous history of any similar episodes since birth, and denied any recent falls, trauma or injuries. Since birth, her growth had followed normal percentiles.

S.A. was born in Iran at term with a birth weight of 4kg and had no neonatal illnesses. When she was 4 she was treated for meningitis and recovered without complications. She moved with her family from Iran to London two years prior to presentation. She is an active child and participates in various sporting activities several times a week. She spends very little time outdoors, but when she does she wears SPF30 or stronger sun protection on her face to avoid sun damage. Additionally she always wears traditional

Islamic clothing when outdoors, covering her head with a scarf. She does not use facial creams or makeup. She has a varied diet with a small milk intake and rarely eats fish. Her mother explained that SA's first set of teeth were brown and weak, but that her primary teeth are strong and she has no dental caries. She has an 8 year old brother who is healthy; both parents are well. The parents are not consanguineous and there is no history of genetic, rheumatological or musculoskeletal disease in the family.

On presentation to clinic SA had a weight of 41.78kg (75th centile) height of 153cm (91stcentile) She was afebrile and her vital observations were within normal ranges. There was no anaemia, jaundice, lymphadenopathy, rashes, clubbing or dysmorphic features. She had normal findings in the cardiovascular, respiratory and abdominal examinations. Neurological and musculoskeletal examinations were normal (no scoliosis seen) and her tendon reflexes were brisk and intact. She had a normal gait and was right-handed. There was no rubor, calor, dolor, or tumor on joint examination. Her skin and mucosae were healthy, the hair and nails appeared normal. Her general practitioner found her vitamin D level to be very low (15.8nmol/L normal range 50-80nmol/L.)

In a Hospital clinic similar physical findings were recorded: SA was thought to be pubertal and generally well. The PTH was raised at 8.1pmol/L (normal range 1.6-6.9pmol/L), the corrected calcium was low at 2.06mmol/L (normal range 2.15-2.55mmol/L) as was her phosphate (1.15mmol/L normal range 1.45-1.78mmol/L.) The creatine kinase was 107IU/L (normal <170IU/L), celiac screen and thyroid function were normal. SA was prescribed cholecalciferol 6,000 IU once daily. She was encouraged to spend 10-15 minutes outside in the sunshine without clothing covering her arms or limbs several times a week, using sunscreen on her face only. She was referred to a dietician for advice on a diet rich in calcium and vitamin D. She responded to treatment steadily with resolution of her muscle pain and improved exercise tolerance.

DISCUSSION

Several factors contribute to vitamin D deficiency in S.A. Firstly growing adolescents entering the pubertal growth spurt have a higher requirement for vitamin D to support skeletal growth (1). Secondly inherited or genetic determination of vitamin D levels may be as high as 53%, meaning that some individuals require more vitamin D than others (14). There are known to be significant differences in levels of vitamin D receptors among differing ethnic groups too that contribute to varying requirements (19). Thirdly environmental factors may be critical. This patient spends very little time outdoors and when she does, wears dark protective clothing covering most of her skin as well as a powerful sunscreen. Approximately 90% of Vitamin D is derived from exposure to UVB rays in sunlight. Dietary intake of Vitamin D and supplements comprise a smaller input since there are few foods that

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contain large amounts of vitamin D precursors. A hurdle for those who live in northern latitudes is the inadequate amount of UVB rays to maintain vitamin D production between November and March (4, 11). Sunscreen protects against skin damage and malignancies including malignant melanoma. Critically sunscreens decrease vitamin D production in the skin by reducing UVB absorption. Those with a sun protection factor of 15 (SPF15) or greater block 99% of vitamin D synthesis in the skin (2). The combination of northern latitudes, protective clothing and sunscreen therefore severely curtails vitamin D synthesis. S.A's mother's vitamin D level was low (30.7 nmol/L; she wears traditional clothing but not sunscreen); her younger brother's level was >50 nmol/l (he wears western clothing and no sunscreen). These figures demonstrate the impact of different clothing styles, the use of sunscreen and lifestyle behaviours in this family.

A number of epidemiological studies suggest adolescents are at significant risk of vitamin D deficiency.

In a 2008 cross-sectional study of 963 boys and girls aged 7-18 in Iran (424 boys, 539 girls) selected by random sampling, it was found that the prevalence of vitamin D deficiency (< 20 ng/ml) in girls was 53.6% and 11.3% in boys. All the girls in this study wore veils covering their heads when outdoors based on Islamic rules (14-16). In a series of 12-18 year-olds from a wide range of ethnic backgrounds in west London, 43% of adolescents (equal proportions of girls and boys) were observed in 2009 to have vitamin D deficiency by the same criterion (17). In two studies in the US, 52% of Hispanic and black adolescents in Boston, and 48% of white preadolescent girls in Maine were found to have 25-hydroxyvitamin D levels below 20 ng per milliliter (1).

How and why vitamin D deficiency presents in teenagers is less clear. SA suffered muscle pain, we think as a direct consequence of vitamin D deficiency. The levels of calcium that she showed are seen in other patients without muscular symptoms. In the state of Minnesota (USA) a study of 153 children and adults with generalized musculoskeletal pain found that 93% had vitamin D deficiency (16). Children and adolescents in this study had the lowest vitamin D levels. Of the study participants, 90% of whom reported more than 1 year of musculoskeletal pain, none had previously had vitamin D levels tested (16).

CONCLUSION

An active 10 year old girl developed lower limb muscle pain after exercise because she was deficient in vitamin D. Checking for vitamin D levels in adolescent patients with muscle pain may therefore be valuable: this is a common and treatable pathology. Preventing vitamin D deficiency in this group of patients is a challenge because their lifestyles increasingly reduce their exposure to sunlight. There is no data relating to the long-term

implications of this condition and there is currently no public health strategy to deal with it.

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