

Clinical Presentations of Vitamin D Deficiency in Children at King Abdul-Aziz University Hospital, Jeddah, Saudi Arabia: A Cross-Sectional Survey

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Abstract

Objectives: This study assessed clinical presentations of vitamin D deficiency in Saudi Arabian children.

Methods: This cross-sectional survey was conducted in the Paediatric Clinic at King Abdul-Aziz University Hospital in Jeddah from March to September 2015. This study included 371 healthy children, not known to have any medical illnesses between the ages of 2 and 18 years old discovered to have vitamin D deficiency. The families of the children were asked if they noticed any symptoms of vitamin D deficiency in their children. A diagnosis of vitamin D deficiency was made if blood tests found low levels of 25-hydroxyvitamin D, there is no other test done to them.

Results: Of the population studied, 35 children had a past history of bone fractures, 70 had bone or joint pain, 55 had fatigue, 16 had depression, 28 experienced delayed teething, 7 had a bone deformity, 23 experienced delayed walking, 11 had delayed closure of fontanels, 5 had developmental delays, 4 exhibited rachitic rosary, 8 had bowing of the legs, 2 had kyphosis, and 71 children were asymptomatic.

Conclusion: Joint pain was the most common presentation of the disorder followed by asymptomatic vitamin D deficiency in this population. So, routine screening for preschool children and adolescent is necessary to early detect and provide effective treatment.

Keywords Vitamin D; Children; Deficiency; Presentation

Abbreviations

25-OHD: 25-hydroxyvitamin D

Introduction

Vitamin D is essential for the health, maintenance, and normal development of bone throughout the lifespan [1]. It has a major effect on the growth and development of bones in children, because it affects calcium homeostasis by increasing calcium absorption from the intestines [2-4]. A deficiency of vitamin D may result in decreased serum calcium, which triggers the secretion of parathyroid hormone; this ultimately leads to an increased release of calcium and phosphorus from the bone in order to maintain normal serum calcium levels [2]. The consequence of vitamin D deficiency in children is rickets, which may potentially cause deformities or fractures [2]. Vitamin D deficiency has remained a global health problem among children [4].

Vitamin D deficiency was first described by Glisson and colleagues during the mid-17th century in London, England in association with skeletal deformities [4]. Children with vitamin D deficiency present with bone pain, muscle weakness, bowed legs, rachitic rosary, frontal bossing of the skull, knock-knees, swelling of the ends of long bones, widened wrist and ankle joints, poor growth, delayed or slow motor development, delayed developmental milestones, delayed dentition, fits, and, in severe cases, pathological fractures [2,5]. Children with

life-threatening hypocalcemia may present with convulsions, tetany, and paresthesia [2,6,7]. Saudi Arabia has a high prevalence of vitamin D deficiency and most cases are asymptomatic. In children who do have symptoms, these symptoms are often nonspecific, which can make the diagnosis difficult [1,7,8]. Over all, this study highlights need for knowing the commonest symptoms for vitamin D deficiency.

Subjects and Methods

Subjects

A cross-sectional survey of healthy children and adolescents, not known to have any medical illnesses, aged 2-18 years old was conducted at King Abdul-Aziz University Hospital in Jeddah. Male and female patients who attended the paediatric clinic between March and September of 2015 were randomly selected to participate. The participants were unknown to have vitamin D deficiency until we investigated them. Participation was voluntary, and written informed consent was obtained from the parent of each subject. A total of 371 children who found to have vitamin D deficiency provided complete data for the analysis. The ethics review board at King Abdul-Aziz University approved this study.

Data and sample collection

A questionnaire was administered to the families of the children. Demographic data regarding age, gender, and ethnicity were collected.

In addition, we also collected information regarding presenting symptoms, such as a history of bone fractures, bone pain, fatigue, depression, delayed teething, bone deformity, delayed walking, delayed fontanel closure, bowing of the legs, and kyphosis. Participants were also able to report a lack of symptoms.

Biochemical measurements

After enrolment, a blood sample was drawn to assess vitamin D3 levels, there is no other test done to them. When patients reported muscle, bone, or back pain, muscle spasms, or twitches and were found to have concentrations of 25-hydroxyvitamin D (25-OHD) that were <50 nmol/L, they were diagnosed with symptomatic vitamin D-deficiency rickets. The absence of symptoms in conjunction with 25-OHD concentrations <50 nmol/L was defined as asymptomatic vitamin D-deficiency rickets [1].

Statistical methods

Data was entered, coded, and analyzed using Statistical Package for the Social Sciences (SPSS) version 16. The analysis was carried out by finding the correlation coefficients and then testing the significance of the relationships between low levels of vitamin D in children and various symptoms of low vitamin D levels. For the purpose of

statistical analysis, we assumed that the data followed a normal distribution and depended on a normal curve.

Results

The total sample was 371 regardless of it, the sample of each question is different according to the participant who answered the question.

In our study, (Table 1) 35 (11.6%) out of 295 children had a history of bone fractures and 70 (23.2%) out of 295 children had bone or joint pain. In addition, 55 (17.9%) out of 301 children had fatigue, 16 (5.2%) out of 302 children had depression, and 28 (9.1%) out of 300 children experienced delayed teething. We also found that 7 (2.3%) out of 301 children had a bone deformity, 23 (7.5%) out of 301 children experienced delayed walking, 11 (3.6%) out of 300 children had delayed closure of fontanels, and 5 (1.6%) out of 300 children had developmental delays.

Additionally, 4 (1.3%) out of 300 children exhibited rachitic rosary, 8 (2.6%) out of 301 children exhibited bowing of the legs, and 2 (0.7%) out of 299 children had kyphosis. Finally, 71 (22.8%) out of 304 children were asymptomatic.

Symptoms	Yes	No	Population
Bone fracture	11.6% (n=35)	86.1% (n=260)	295
Pain of bones or joints	23.2% (n= 70)	74.5% (n=225)	295
Asymptomatic	22.8% (n=71)	74.9% (n=233)	304
Fatigue	17.9% (n =55)	79.9% (n=246)	301
Depression	5.2% (n=16)	92.6% (n=286)	302
Delayed Teething	9.1% (n=28)	88.6% (n=272)	300
Bone deformity	2.3% (n=7)	95.5% (n=294)	301
Delay Walking	7.5% (n= 23)	90.3% (n=278)	301
Delay closure of fontanelle	3.6% (n=11)	94.4% (n=289)	300
Developmental Delay	1.6% (n=5)	96.4% (n=295)	300
Rachitic Rosary	1.3% (n=4)	96.7% (n=296)	300
Bowing Of Legs	2.6% (n=8)	95.4% (n=293)	301
Kyphosis	0.7% (n=2)	97.4% (n=297)	299

Table 1: Shows the percentage of each symptom of vitamin D deficiency in children with vitamin D deficiency.

Discussion

Vitamin D deficiency is a common problem that may lead to many life-threatening complications, but it often goes unrecognized [4]. The reported cases of vitamin D deficiency represent only a small number of the total patients with vitamin D insufficiency [3]. The clinical manifestations of vitamin D deficiency are varied and may include seizures, tetany, respiratory infections, knock-knee or bow-legged, abnormalities of the costochondral joints, and frontal bossing of the skull [9]. In a previous study at the King Abdul-Aziz Medical City in Riyadh, bone pain was found in 38% of cases [7], but in our study we

found this symptom in 23.2% of cases. A study in Glasgow found that 1% of cases had fatigue and 2% experienced developmental delays [10]. We found fatigue in 17.9% of our cases; this differs from the findings in the Glasgow study, but we discovered similar results regarding developmental delays, which were found in 1.6% of cases. Rickets and delayed developmental milestones were seen in 7% of cases in a Canadian study, but in our results, we found rickets in 2.3% of cases [4]. Previous study done by Anil Agarwal in 2009 they found reported widening of the wrist in 24% of cases and lower-limb deformities in 37% of cases [8], but this differs from our results in which 2.6% of cases had bowing of the legs. Bone fractures were seen in 7.1% of cases

in a study at King Khalid University Hospital in Riyadh [11], that result is around the range of our result (in which 11.6% of cases had a history of bone fractures).

The second most common presentation of vitamin D deficiency in swat (country) was delayed motor milestones due to defective skeletal maturation and muscles weakness [5]. Other previous studies in Saudi Arabia found that the most common complaint was back pain [1] and acute hypocalcemia manifestations [12]. The least common presentation of vitamin D deficiency was pathological fractures, according to research in another study [7]. Our results differed from these reports, because we found that joint pain was the most common presentation of vitamin D deficiency in our cases. An asymptomatic presentation was the second most common symptom. Other symptoms that we included in our study were not assessed in other studies. Clinically, vitamin D deficiency can be easily diagnosed using inexpensive laboratory tests. If found and treated early, many complications can be easily prevented [5].

Conclusions

In our study, we found joint pain to be the most common presentation of the disease. Asymptomatic vitamin D deficiency, fatigue, a history of bone fractures, delayed teething, delayed walking, depression, delayed fontanel closure, bowed legs, bone deformities, development delays, rachitic rosary, and kyphosis were also associated with vitamin D deficiency in Saudi Arabian and follow these sequence in presentation.

Based on our results, we recommend routine screenings to assess vitamin D levels in preschool children and adolescents.

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