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Research Article

Serum Calcium Status in Children with Pediatric Rheumatic Disease (pRDS)

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Abstract

Objective: To identify serum calcium status of the children suffering from pediatric rheumatic diseases (JIA, SLE, Primary vasculitis).

Methods: This prospective study is done in the department of pediatrics, Khulna Medical College, Bangladesh for a period of one year. Pediatric rheumatic diseases are diagnosed according to the ILAR, ACR, EULAR criteria. All are new cases without steroid therapy. Blood samples are collected from these patients and sent to the laboratory for calcium estimation. Serum calcium is considered low when the level is < 8.1 mg/dl.

Results: Total 23 new patients of pediatric rheumatic diseases are included in this study. JIA is diagnosed in 15, SLE in 4 and Primary vasculitis in another 4 patients. Among 4 primary vasculitis, HSP is diagnosed in 3 and KD in one patient. Male/Female ratio is 1.6:1. Mean age of the pRDS is 8.5 years. Serum calcium is found at low level in 14 (60.9%) of the pRDS. 9 (60%) JIA, 3 (75%) SLE, and 1 (25%) of primary vasculitis has low serum calcium level. Minimum serum calcium level is 7 mg/dl.

Conclusion: pRDS patients have low serum calcium level which may affect the bone mass thus, risk of fractures and decreased linear growth of these children. Calcium supplementation with vitamin D may be needed to improve the serum calcium status of pRDS thus, preventing from further skeletal complication of these diseases.

Keywords: *Serum Calcium; Pediatric Rheumatic Diseases*

Introduction

Increased risk of fractures and decreased linear growth is observed in children with chronic inflammatory arthritis [1,2]. Serum concentration of calcium in these children are also found low despite the normal levels of intact parathyroid hormone (PTH) and 1,25-dihydroxyvitamin D (1,25[OH]2D). There is also report on decreased levels of bone turn over markers in children with arthritis [3]. Articular disease severity are negatively correlated with measures of bone mass and laboratory markers of disease severity correlated with decreases in levels of bone formation markers. These findings are interpreted as an indication that the activity and severity of the diseases are operative in reducing bone formation [4]. Other report also demonstrated a relationship between disease severity and bone mass [5] and another similar clinical data supporting the concept that deficits in bone mass occurred when the arthritis is active but bone mass returned normal during remission [6,7].

So, this study is carried out to observe the serum calcium status of pRDS and thus might have impact on bone mass of these children.

Methodology

This is a prospective study in the department of pediatrics Khulna medical college, Khulna, Bangladesh. All the new rheumatologic cases Juvenile Idiopathic Arthritis (JIA), Systemic Lupus Erythematosus (SLE), and primary vasculitis (KD, HSP) are included randomly

in this study for a period of one year. These cases are diagnosed according to the ILAR, ACR, EULAR criteria. After the diagnosis of pRDS, written consent from the parents are taken for the collection of blood samples for the study. These samples are sent to the laboratory to estimate the level of calcium in the blood of these patients. Cases are excluded from the study that is on steroid therapy. Serum calcium is leveled low when value < 8.1 mg/dl, normal 8.1 - 10.4 mg/dl and high > 10.4 mg /dl. All the data are compiled and chi-square test is done.

Results

Total 23 new cases of pediatric rheumatic disease (JIA, SLE, Primary vasculitis) are observed during this one year period. Among the pRDS, JIA is diagnosed in 15, SLE in 4, and primary vasculitis 4 as Kawasaki disease (KD) 1, and Henoch- shoenlein purpura (HSP) 3. Mean age of the pRDS are 8.5 years. Age ranges are 2.5 year to 16 years. Total 14 male and 9 are female. Male/Female ratio is 1.6:1. Serum calcium is found normal in 8 (34.8%), low in 14 (60.9%) and high in only one (4.3%) patients among these pRDS cases. Among the 15 JIA cases 9 (60%), 3 (75%) of four SLE and 1 (25%) of four vasculitis has low Serum calcium level than normal. One vasculitis has high serum calcium than normal value. Serum calcium status is shown in table 1.

Serum Calcium	Norma level observed no.	Low level observed no.	High level observe no.	Minimum level	Mean level	Maximum level	Chi-square P Value
pRDS	8 (34.8)	14 (60.9)	1 (4.3)	7 mg/dl	8.15 mg/dl	11.2 mg/dl	.004
JIA	6 (40)	9 (60)	0 (0)	7 mg/dl	8 mg/dl	9.2 mg/dl	.439
SLE	1 (25)	3 (75)	0 (0)	7.8 mg/dl	8.1 mg/dl	8.6 mg/dl	.317
Primary vasculitis (KD, HSP)	2 (50)	1 (25)	1 (25)	7 mg/dl	8.75 mg/dl	11.2 mg/dl	1.000

Table 1: *Showing the serum calcium status of the patients with pRDS and its statistical significance.*

Figure within the parenthesis indicate percentage.

Discussion

This study shows that the male children suffer commonly from pRDS (JIA, SLE, Primary vasculitis). Mean age of the diseases are 8.5 years. This might be due to more care of the male children in our society. Most of the cases present in the late childhood and JIA is the most common pRDS in our observation like other studies [8].

In our observation serum calcium is observed at low level in majority of pRDS. Falcini., *et al*. also found serum calcium concentration at low level despite normal levels of intact parathyroid hormone (PTH) and 1,25- dihydroxy vitamin D ($1.25[OH]_2D$) in children with arthritis [3]. The findings of the study by Laura SH., *et al*. indicate that percent true calcium absorption is low-normal in children with arthritis. Calcium supplementation at a dosage of 1000 mg a day is minimally effective on its own but augmented the effect of vitamin D3. In patient receiving supplementation with both calcium and higher dose vitamin D3 however, careful monitoring of serum and urinary calcium levels will be required [4]. Another study by Pepmueller PH., *et al*. confirm that children with JRA at all ages, particularly those with polyarticular disease have a diminished bone mass. The study group is not vitamin D deficient, is adequately nourished by standard dietary recommendation including Ca and PO_4 and the majority of the children were not taking glucocorticoids. The results indicate that the mechanism of impairment of skeletal growth is one of low bone turnover, particularly depressed formation, instead of increased bone resorption [9]. Our study observed overall lower than normal serum calcium level in pRDS which is statistically significant. This might be a factor for impairment of skeletal growth due to depressed formation, instead of increased bone resorption in patients with pRDS.

Calcium status is low in children with pRDS. Further study is needed whether; bone formation can be stimulated by increase Calcium intake or improved absorption with additional vitamin –D, thus improving the calcium status of these pRDS patients.

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