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SHORT COMMUNICATION

PERSISTENT LIMB PAIN AND RAISED SERUM ALKALINE PHOSPHATASE THE EARLIEST MARKERS OF SUBCLINICAL HYPOVITAMINOSIS D IN KASHMIR

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Abstract : The present study was an attempt to assess the cause of persistent pain in lower limbs among children from Kashmir. The study was conducted on one hundred children attending Paediatric out-patient department of Sher-i-Kashmir Institute of Medical Sciences, Srinagar. All the children were in the age group of 5 to 14 years. They showed markedly raised levels of serum alkaline phosphatase, whereas serum phosphorus, serum calcium levels and antistreptolycin O-titres were normal in 93% cases. None of them had any rheumatic or rheumatoid pathology. Among 15 suspected clinical rickets only three were established radiologically. Dietary and socio-economic history revealed deficient vitamin D intake and less exposure to sun. It was hypothesized that sub-clinical vitamin D deficiency could be a major cause of persistent pain in lower limbs and raised serum alkaline phosphatase could be the earliest marker of vitamin D deficiency. It was confirmed by injecting single dose of vitamin D (3 lac I. U.) which relieved bone pain and lowered the levels of serum alkaline phosphatase to normal within 14 weeks of initiation of therapy.

Key words : persistent bone pain
raised serum alkaline phosphatase
sub-clinical vitamin D deficiency

INTRODUCTION

Persistent or recurrent bone pain is generally due to generation of abnormally high stress in bone, possibly leading to trabecular fractures and hence to vascular engorgment. There can be either disease or benign syndromes with no obvious organic etiology. Rickets (Vitamin D deficiency) is an important nutritional problem of young children contributing more than five percent among nutritional deficiency disease. It is accompanied by hypocalcemia, hypophosphatemia, raised alkaline phosphatase, hyperaminoaciduria and elevated serum levels of prothrombin hormones (1).

In India, critical role of sunshine in preventing rickets is well established. The spontaneous correction of vitamin D deficiency in Asian's in Britain during the Summer months has been documented (2). There is still no objective means of measuring vitamin D deficiency. Although its ultimate effects are reasonably fully understood,

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there is still room for debate as to how vitamin D deficiency should be defined. A relationship between chronic renal disease and the development of rickets is well established (3, 4).

It is well known that calciferol or some anti-rachitic substance is synthesized in the skin following ultravoilet activation of precursors. Since 7-dehydrocholesterol exists in abundant supply in the skin, its irradiation product is cholecalciferol. In all animal species, the degree of exposure to sunlight is the most important single factor determining the need of vitamin D in the diet. Deficiency of vitamin D is likely to be common in Kashmir as, during winter season, children remain indoors and sunshine is rare. The present study is an attempt to evaluate the persistent bone pain in the lower extremities among Kashmiri children.

METHODS

One hundred children with persistent 'I imb pain' in the age group of 5-14 years were included in the study by adopting purposive sampling procedure. Children with less than five years age and from rural areas were excluded due to natural communication problem and non-cooperation for follow up.

The complete hist thorough clinical examination (with emphasis on a commonest causes of bone pain) nutritional assessment and complete dietary history with special stress on vitamin D intake was recorded for each child. In addition to routine Haemoglobin, peripheral blood smear urine examination and liver function tests, serum sugar, urea, creatinine, other laboratory investigations reported in the present work included biochemical estimation of serum calcium (5), phosphorus (6) and alkaline phosphatase (7), Antistreptolysine O-titer (using ASLO kit from Behring Workes, West Germany) and Rheumatoid factor.

All children were injected vitamin D (Stereogyl, 3 lac I U single dose) after thorough clinical and biochemical evaluation to see its effect on bone pain in the legs. All the blood tests (calcium, phosphorus and alkaline phosphatase) and clinical examination were repeated on alternate week upto 14 weeks after therapy.

RESULTS

Out of 100 selected cases, there were 46 males and 54 females. The age in male group ranged between 5–14 years with the mean age 7.9 (S E. 0.37) years, whereas in females it was in the range of 5 to 13 with the mean of 7.3 (S.E. 0.26) years. The overall mean age was 7.6 (S.E 0.22) years.

In addition to limb pains, seven cases presented with sore throat. None among the studied cases presented with fever, arthritis or urinary tract infection and no growth retardation was observed as assessed by weight-for-age parameter. Clinical examination revealed bone tenderness of varying degree in all clinical rickets (as judged by suspected widening of wrists and bone deformities).

Laboratory investigations revealed mean hemoglobin levels of males as 12.38 ± 0.26 gm% and of females as 10.43 ± 0.15 gm%. The overall levels ranged between 7.0 to 14.5 with the mean level of 11.34 ± 0.18 mg%. Twelve children had hemoglobin levels less than 10 gm% of which eight showed microcytic hypochronic anemia in their peripheral blood. Antistreptolysin O-titer was raised in seven cases although no Rheumatic pathology could be confirmed and these titers showed a decline without any improvement in limb pains. Serum sugar, urea, creatinine, bilirubin, AST, ALT and proteins were within normal limits in all the cases.

The mean serum alkaline phosphatase levels of males was 939.13 ± 25.26 u/L and of females, it was $944\,44 \pm 20.56$ u/L. The overall level of serum alkaline phosphatase was in the range of 500–1500

with the mean of 942±16.07 u/L. The reference value of our laboratory for this age group is 90–400 u/L

Serum calcium in males and females was 9.28±0.11 and 9.36±0.12 mg/dl, respectively. The overall level ranged between 6.3 to 10.4 with the mean level of 9.32±0.08 mg/dl. Only three cases had lowered serum calcium levels which synchronised clinically with suspected rickets.

The serum phosphorus levels of males ranged from 3.0 to 8.5 with the mean of 5.4±0.15 mg/dl and in females it ranged between 2.7—8.5 with the mean level of 5.28±0.14 mg/dl. The overall mean level was 5.34±0 11 mg/dl.

Out of 15 clinically suspected rickets only three were diagnosed radiologically. The dietary intake of the children in the study showed negligible amount of vitamin D content against recommended intake. In order to account for the extra dietary source of vitamin D all the children were having very little exposure to sun.

After two weeks of therapy 95 cases still complained of bone pain. After 4 weeks 81 cases, after 6 weeks 55, after 8 weeks 32. No case complained of pain after 14 weeks of follow up. For serum alkaline phosphatase, 92 cases had raised levels after two weeks of therapy, 80 cases after four weeks 65 cases after six weeks, 41 after eight weeks, 5 after 12 weeks and no case after 14 weeks. Similarly, serum phosphorus was within normal limits in all the cases after 14 weeks of therapy.

DISCUSSION

Pain as prominant presenting symptom is well documented in vitamin D deficiency of adults (osteomalcia) but no emphasis had been laid to this symptom in children (Rickets). In the present study, 85 percent children did not reveal any clinical feature of vitamin D deficiency. Out of remaining 15 percent clinically suspected rickets, only three percent could be confirmed radiologically and vitamin D intake being less in all the cases both from dietary source and through sunshine. Serum calcium remained normal except in three cases of established rickets. The conspicious finding being raised serum alkaline phosphatase activity in all. It is difficult to label the increased serum alkaline phosphatase activity in our patients purely because of overt vitamin D deficiency. Our observations could fit only in sub-clinical hypovitaminosis D (sub-clinical rickets).

Sub-clinical hypovitaminosis D could be a major public health problem in cold climate areas of North India because of deficient vitamin D intake through diet and less exposure to sun due to long winters as contributing factor. The persistent bone pain and increased serum alkaline phosphatase activity in the presence of reduced intake of vitamin D need no further investigations. Complete clinical cure of bones and limb pain and reduction in serum alkaline phosphatase activity can be achieved through vitamin D therapy.

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