Incidental diagnosis of combined deficiency of vitamin C and D in a child admitted with bronchiolitis

M Hassan[1], K Chowdhury[2], B H N Yasmeen[3], H Rahman[4], M Khan[5], A Mukti[6], S Roy[7]

Abstract

Several cases from developing countries has been reported either on isolated vitamin C or isolated vitamin D deficiency in the recent past. Though nutritional vitamin C deficiency is rare but recently there is re-emergence of vitamin D deficiency found in developed countries. Combined deficiency of vitamin C and D found in the same patient is very rare both in developed and developing countries.

Our patient was admitted in Ad Din Women's Medical College Hospital, Dhaka with bronchiolitis. She had a history of cough and cold for 5 days. She had fever and respiratory difficulty for the last 2 days. On physical examination, she had low grade fever, fast breathing, chest in drawing. She had also widening of the wrist and ankle joints but her parents were unaware of these changes. They thought these could be a normal phenomenon. We suspect Rickets on physical examination findings. The baby was very much irritable and we thought that it was due to cough, cold and difficult breathing (bronchiolitis). Combined vitamin C and D deficiency was an incidental finding in this case. Her X ray of wrist joints, lower limb including knee and ankle joints showed the features of combined deficiency of vitamin C and D.

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[1]Prof. Mahmuda Hassan
Prof. of paediatrics
Ad-din Women's Medical College
Dhaka

[2]Dr. Kona Chowdhury
Associate Professor of paediatrics
Gonoshasthaya Somaj Vittik
Medical College, Dhaka

[3]Prof. B H N Yasmeen
Prof. and head
Dept. of paediatrics
Nothern International Medical
College, Dhaka

[4]Prof Hamidur Rahman
Prof. and head
Dept. of paediatrics

[5]Dr. Masuma Khan
Assistant prof. of paediatrics

[6]Dr. A Mukti
Assistant prof. of paediatrics

[7]Dr. S Roy
Assistant prof. of paediatrics

4,5,6,7
Ad-din Women's Medical College
Dhaka

Correspondence
Prof. Mahmuda Hassan
Prof. of paediatrics
Ad-din Women's Medical College,
Dhaka
e-mail: mahmudahasan@yahoo.com

Case report

A 1 year 23 days old girl was admitted with the history of cough and cold for 5 days with respiratory distress and fever for 2 days, reluctant to take feed for 1 day. Her temperature was 100.4^{O} F. She was very much irritable and crying on touch, respiratory rate was 70 breaths per minute, chest in drawing and vesicular breath sound with bilateral rhonchi with few crepitations. On arrival SpO_2 was 88% in room air.

Mother was in regular antenatal checkup and antenatal history was uneventful and delivered normally at term in hospital. No significant postnatal history. She was the first issue of a non-consanguineous parent with a poor socioeconomic background. Her father was a garments worker and mother was a housewife. Both the parents were healthy. She was exclusively breastfed up to 9 months of her age. Then complimentary food was started but she didn't like to take vegetables and fruits or normal family diet. She was mainly dependent on mother's milk.

Her weight was 8.6 kg (on 10th centile line), length was 68 cm (below the 3rd centile line), and OFC was 45 cm. (50th centile line)

On physical examination the child also moderately anemic, there was widening of the wrist and ankle joints.

X ray chest was done which showed hyper-translucency and hyperinflation of the both lung fields. X ray wrists joints showed cupping, fraying and widening at the radial and ulnar metaphysis, also wide gap between epiphysis and the metaphysis present at the wrist joint (features of Rickets). X ray lower limb including knee and ankle joints showed that pencil thin cortex, rare factionat metaphysis, small corner fractures (corner spur), and white line /dense zone of provisional calcification (White line of Frankel) and ringing of the epiphysis at the epiphysis of the tibia and femur (features of Scurvy). Features of rickets also present in this X ray.

CBC showed Hb percentage 8.8gm/dl, WBC count was within normal range, MCV reduced, MCH reduced and MCHC normal, RDW was 19%, PBF showed microcytic hypochromic anaemia with anisocytosis and poikilocytosis with few target cells. Serum iron profile was suggestive of iron deficiency.

Her serum calcium was normal (9.8 mg/dl), Serum inorganic phosphorus 11.53 mg/dl, Parathormone level was high, Alkaline phosphatase 1087 U/L, 25 (OH)D or calcitriol was 22ng/ ml and was at insufficient level (21 to 30 ng/ml is insufficient level). Creatinine and S. Electrolytes were in normal range.

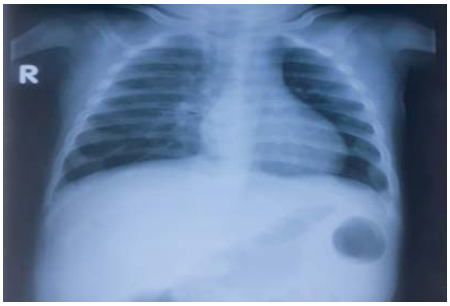

Fig 1: Hyperinflation and hyper translucency of the both lung fields

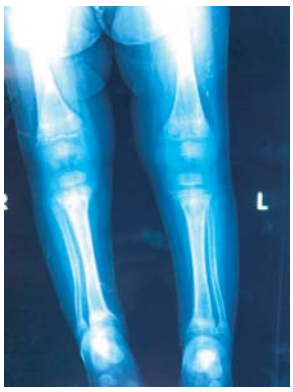

Fig 2: X ray shows pencil thin cortex, rarefaction at metaphysis, corner spur and white line /dense zone of provisional calcification. (White line of Frankel) in both the knee and the ankle joints and ringing of the epiphysis in the knee joint. Also ankle joints showing cupping, fraying and widening of the metaphysis of tibia and fibula.

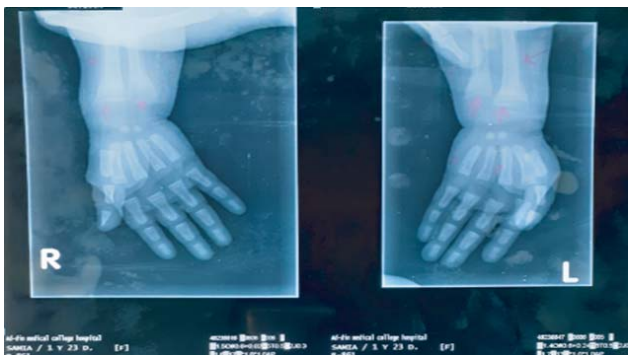

Fig 3 : X ray Wrist joint showing cupping, fraying and widening at the radial and ulnar metaphysis, also wide gap between epiphysis and the metaphysis visible.

In our case radiological features of scurvy was very obvious and we did not go for serum vitamin C level for the diagnosis.

On admission baby was treated with humidified O_2 Nebulization with 3 % NaCl and paracetamol.

Respiratory distress was resolved after 3 days and can maintain normal SpO_2 in room air after 2 days. On 4 the day she was discharged and advised-Oral Vitamin D as Stoss therapy, BON D3 300,000 IU followed by supplementation of 600 IU vitamin D daily per orally for 8 weeks. Chewable tablet Calcium carbonate and tablet Vitamin C also given for 3 months. For Anaemia syrup Iron Hydroxide was given for 3 months. Also advised for exposure to sunlight and to have citrus fruits like lemon, orange and green leafy vegetables with her complementary foods.

After 2 months, during follow up we observed that the baby's condition was improved both clinically and radiologically.

Discussion

Now a days the incidence of scurvy is very rare in pediatric population and where the musculoskeletal manifestations are usually prominent.[1] In fact occurrence of scurvy in children had become a historical footnote, with most radiologists having never encountered a case in developed countries.[2]

The vitamin C pool in the body is usually depleted within 4-12 weeks if any one stops the intake of this vitamin. Scurvy occurs in populations with poor intake of fresh fruit or vegetables. Vitamin C or ascorbic acid is affected by many factors that can impair its absorption and functions. A good way of prevention of vitamin C deficiency is to consume fresh fruits and vegetables regularly.[3]

Initial description of vitamin C deficiency was described in 1550 BC when it was considered as a disease of the sailors. In1497, Portuguese sailor Vasco da Gama set sail with 160 men to discover a new route to India but unfortunately he lost his 100 men due to scarcity of vegetable and fruits which causes severe deficiency of vitamin C in them. This journey (would also lead to) has given the world another important discovery - Scurvy.[4]

From the world's first controlled clinical trial in 1753 to determine the role of citrus in the treatment of scurvy, to the isolation and identification of ascorbic acid in 1931, vitamin C deficiency is an easily preventable and treatable condition now.[5]

In pediatric population musculoskeletal manifestations are present in 80% of patients with scurvy.[6] Dermatological manifestations include petechiae, ecchymoses, hyperkeratosis, and perifollicular hemorrhage.[7] Oral symptoms include gingival swelling, bleeding gums, and loosening of teeth etc.[8] Systemic symptoms of scurvy in children include fatigue, failure to gain weight, loss of appetite, and irritability.[8] Our patient did not

have any dermatological manifestations and did not have primary teeth eruption. In addition to these symptoms, deficiency of ascorbic acid may lead to a hypochromic microcytic anemia because of decreased absorption of iron, bleeding, and dietary deficiencies.[8] Our patient also had loss of appetite, and irritability and severe anemia for which she received vitamin C and oral iron supplementation.

Radiographic findings only become manifest after 3 to 6 months of nutritional vitamin C deficiency.[9] In our case radiological features of scurvy was very obvious which indicate persistence of vitamin C deficiency at least 3 to 6 months in this baby. She had a H/O delayed starting of complimentary food (at 9 months of age) as well as her diet was deficient in vitamin C, vitamin D and calcium.

Initial descriptions of rickets were provided by Daniel Whistler and Francis Glisson in England as early as the 17th century.[10] Vitamin D deficiency rickets is a disease of infancy.[11] It is the most common metabolic bone disease in the world and is easily treatable as well as preventable with sun exposure and dietary supplementation.[12] As because human body can synthesize vitamin D after exposure to sunlight and can get it from dietary sources.

Still rickets is remaining as a nutritional problem in south east Asia including Bangladesh. Rickets has emerged as a public-health problem in Bangladesh during the past two decades, with up to 8% of children clinically affected in some areas. But here calcium deficiency contributing for stunting and rickets in children.[13] Recently there is also re-emergence of vitamin D deficiency in developed countries. Reasons behind this is thought to be multifactorial, secondary to poor dietary intake, popularization of breastfeeding, and living in apartments with lack of exposure to sunlight, use of sun blocks during outdoor activities etc.[14,15]

The diagnosis of any of the forms of vitamin D deficiency rickets is usually established by clinical, biochemical, and radiographic criteria,[16] we also diagnose our patient on this basis.

Conclusion

Several cases of isolated deficiency of vitamin C and D has been reported in the recent past.[17-19] Though nutritional vitamin C deficiency is rare now a days and combined deficiency of vitamin C and vitamin D found in the same patient is also very rare. But this incidental diagnosis of vitamin C and D deficiency indicate that even though it is rare but can be found in children.

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