

Vitamin C deficiency in a picky eater child

Ahmad Fickrey, MBBCh¹, Muhd Alwi Muhd Helmi, MMed¹, Azian Abd Aziz, MMed², Mohd. Shukrimi Awang, MMed³, Ahmad Fadzil, MMed¹

¹Department of Pediatrics, Sultan Ahmad Shah Medical Centre @ IIUM, Kuantan, Pahang Darul Makmur, Malaysia,

²Department of Radiology, Sultan Ahmad Shah Medical Centre @ IIUM, Kuantan, Pahang Darul Makmur, Malaysia,

³Department of Orthopedics, Sultan Ahmad Shah Medical Centre @ IIUM, Kuantan, Pahang Darul Makmur, Malaysia

SUMMARY

Vitamin C deficiency or scurvy is an uncommon condition that occurs in poorly developed countries or in refugee camps. Nonetheless, in countries where food is readily available, like Malaysia, occasionally there are cases of vitamin C deficiency reported. Although it was primarily reported in children with special needs or learning disability, scurvy is encountered in children with normal development, among the severe picky eaters. We present here case of a nine-year-old picky-eating boy with scurvy. The development of scurvy in this child took several years, especially after he became a very selective eater at the age of five. The child had displayed limping when walking with knee-joint pain before he came to a primary hospital. However, his condition was not diagnosed promptly and progressively worsened until he was unable to walk. Thus, it is crucial to recognize scurvy in children who limps and are severe picky eaters.

INTRODUCTION

Human body does not synthesize and store vitamin C and consequently it depends on exogenous contribution for the requirement. Additionally, Vitamin C in the body depletes rapidly if the oral intake is inadequate.^{1,2} The minimal daily requirement of vitamin C depends on the age and children, between the ages of one and fifteen, their requirement increases from 20mg to 85mg per day.³

The clinical manifestation of Vitamin C deficiency is scurvy, and symptoms usually begin after one to three months of absence of vitamin C in the diet.⁴ Initial symptoms include fatigue, malaise, and inflamed gums.^{2,4} If vitamin C deficiency persists, collagen synthesis will be impaired, weakening connective tissues, causing rupture of capillaries, joint pain, poor wound healing, and corkscrew hairs.^{2,4} Other signs of scurvy include depression, swollen and bleeding gums, and loosening or even fall of teeth. Iron deficiency anaemia may develop because of significant blood loss due to bleeding and decreased non-heme iron absorption.² Children may also experience severe lower limb pain related to sub periosteal bleeding.^{1,5}

One of the risk factors of vitamin C deficiency is picky eating. Picky eating is not an uncommon behaviour among children.⁶ However, it becomes a disorder if this affects growth and development of children resulting in including micronutrient deficiency. Picky eating disorder forms part of

a spectrum of feeding difficulties characterized by the refusal of children to eat familiar foods or try new foods and having strong food preferences.⁷ There is no single universally accepted definition of picky eating and the method of assessment of this condition. This discrepancies made it difficult to estimate the prevalence.⁶ We present a nine-year-old boy who developed scurvy due to being a severe picky eater over several years.

CASE REPORT

MA, a 9-year-old boy was born full-term via caesarian section due to maternal hypertension with a birth weight of 3.3kg. During infancy, he was on formula milk and was weaned at six-month-old with a blended diet consisting of a mixture of vegetables, rice, and fruits. However, when he was about two to three years old, he started to dislike vegetables, fruits, and many other protein sources other than eggs. At the age of five to seven years old, he became very selective of the food he ate. His breakfast mainly consisted of carbohydrates with a malt chocolate drink. In school, he ate plain fried noodles with no vegetables. His lunch consisted of rice with fried eggs and soy sauce; he usually lunch upon returning from school before rushing to a religious school. He ate rice with fried egg and soy sauce or potato-filling curry puff for an afternoon snack. Dinner also consisted mainly of carbohydrates with eggs and soy sauce which he usually ate in front of television. He refused to try any new food. He took very little fruits and vegetables since he was seven years old. His weight and height are both at the 3rd percentiles as charted in the growth chart. However, his developmental milestones were appropriate for his age.

He is the first of two siblings and lives with his extended family. His five-year-old sister was not a picky eater and had average growth pattern. His father did odd jobs in a rubber plantation while his mother was a housewife. At nine years old, he was taken to a primary health clinic for left knee pain and complaint of limping for a week. The left knee pain worsened when he walked and climbed stairs. He had no history of fever or fall and trauma. He was referred to the orthopaedic team at a district hospital and was treated symptomatically as the diagnosis was uncertain. The doctor applied skin traction on him for one day before discharging him with a back-slab the following day. The back-slab was removed a week later, and he continued with physiotherapy. However, his condition worsened, and he had difficulties walking finally requiring a wheelchair to mobilize. He went

This article was accepted: 18 July 2021

Corresponding Author: Ahmad Fickrey

Email: ahmadfickrey@iium.edu.my



Fig. 1: (A) Gingival swelling on admission. (B) Improving gingival swelling post-one-month treatment. (C) Bruises over both ankles. (D) Follicular purpura and corkscrew hairs.

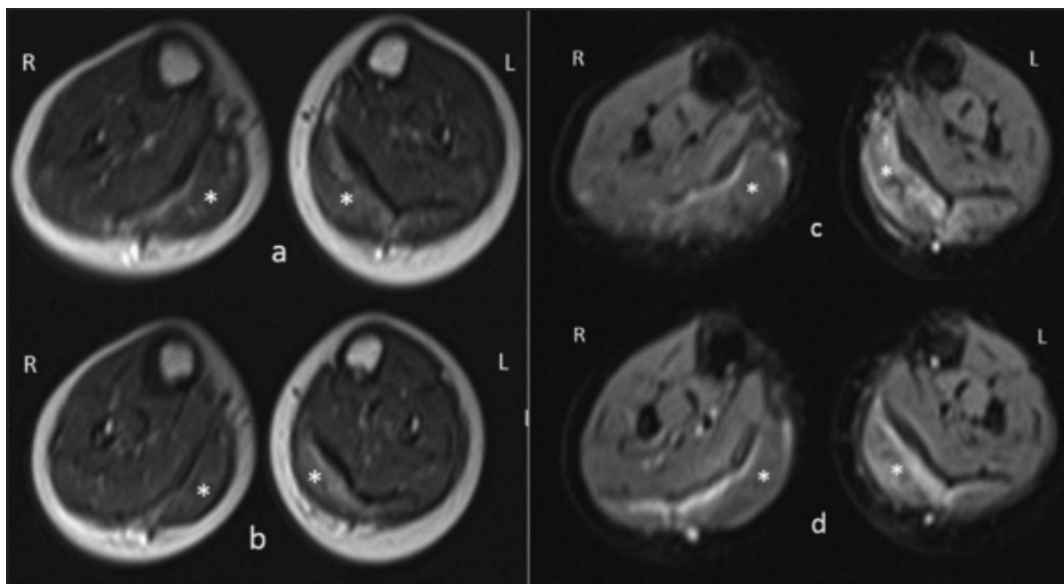


Fig. 2: MRI (Magnetic Resonance Imaging) of both the lower limbs. a & b – axial T2 weighted, c & d – axial T1 fat-suppressed images showing a subtle increased signal within the gastrocnemius muscles (asterisks) most pronounced on the left side. No enhancement observed post IV gadolinium.

to a private hospital and was referred for further management.

On examination, he was alert, conscious, but very fretful. He did not like to be touched or examined. He was pale, but there was no cyanosis or jaundice. He could not walk and laid down with both lower limbs flexed. His weight was 18.2kg (below 3rd percentile), and his height was 122cm (at 3rd

percentile). His oral hygiene was poor, with plenty of caries. The gingiva was swollen and bleed easily (Figure 1A and 1B). He had muscle wasting on both hamstrings with bruises at both ankles (Figure 1C) and follicular purpura with corkscrew hairs over his legs (Figure 1D).

The muscle power, tone and reflex of both upper limbs were normal. However, power in both lower limbs was MRC grade

IV (Medical Research Council). His bilateral knee flexion and extension were restricted, ranging between 120°- 130° due to stiffness and tenderness of the calf muscles. The tone and reflex of both lower limbs were normal with no clonus, and the Babinski sign was negative. There was no spine deformity, and examination his other systems was unremarkable. At this point, a provisional diagnosis of Juvenile Idiopathic Arthritis was made.

The full blood picture showed hypochromic microcytic anaemia. Serum iron was 4.7 µmol/L, and total iron-binding capacity (TIBC) was 56.7 µmol/L. C-reactive protein and creatine kinase were not raised while the erythrocyte sedimentation rate was 78 mm/hour. Serum liver function and renal function tests were normal. Serum calcium was 2.29 µmol/L while serum magnesium was 0.97 µmol/L and serum phosphate was 1.8 µmol/L. Radiographs of both the knees and lower limbs were normal. Magnetic Resonance Imaging (Figure 2) of the lower limbs revealed a very subtle high signal of the gastrocnemius muscles (left > right side), which may suggest a mild inflammatory myositis. The long bones were normal, and there were no appearances to suggest periosteal bleeding.

Due to the limited intake of Vitamin C in the diet, supported with clinical findings of follicular purpura, corkscrew hair, swollen and easily bleed gum, and intolerable to movement and physical contact, a laboratory testing for Vitamin C level was carried out. The vitamin C level was found to be low at <0.1mg/dL. Thus, a diagnosis of scurvy was confirmed and treatment with daily oral vitamin C 300 mg was commenced. He was also referred to dieticians for dietary advice and modification. He was also started on syrup multivitamin and syrup iron and underwent limb physiotherapy.

After a week of vitamin C, his clinical condition improved, and pain became more bearable with both knees having a full range of movement and tolerating a more aggressive physiotherapy. On day ten of vitamin C, he started to bear weight and practiced walking. He was discharged with a vitamin C supplement of 300 mg daily after four weeks whereby, he was able to walk, though with some limping. After two months of vitamin C, he could walk and run and back to his usual cheerful self. His weight increased from 17kg to 19.05 kg within two months. He is currently eating chicken, but still refuses fish, and he eats blended vegetables mixed with fried rice or noodles. He occasionally drinks fruit juices and cordial drinks.

DISCUSSION

Scurvy is a disease that is still common in underdeveloped countries. However, in countries where food is readily available or considered developed, scurvy exists almost exclusively in children with autism, developmental and behavioural issues, food malabsorption, iron overload, and swallowing disorders.¹ Conversely, rarely it manifests in normal developmental with severe picky-eating children, as in our patient. Our patient showed selective-eating behavior at preschool age and it worsened till he began to totally refuse food enriched with vitamin C. During this period, signs and symptoms of scurvy started to appear. In the early age, the food was chosen by the parents and thus, the patient still

consumed adequate vitamin C. However, as he grew older and became more independent, he started to become extremely selective to consume only the food that he likes and tolerated. This progressively change of worsening food-selectiveness is characteristic of a certain group of picky eater children.

The diagnosis of scurvy in the patient was suspected after the characteristic physical finding of scurvy was recognised. The radiological investigations were not very helpful in our patient as the findings were non-specific. The expected skeletal radiograph findings in scurvy include subperiosteal hematoma, transverse metaphyseal lines of decrease intensity (scurvy line), metaphyseal beak-like excrescences, sub epiphyseal infraction, and Wimberger's sign of scurvy (circular calcification surrounding the osteoporotic epiphyseal center of ossification).⁵ The confirmatory vitamin C level was finally performed by the treating doctor, driven by the clinical features of the patient. The clinical findings also influenced the initiation of vitamin C treatment prior to receiving the laboratory results. Golriz et. al. identified 32 children with vitamin C deficiency treated in a children's hospital in Texas in over five years.⁴ Almost all of the children with established vitamin C deficiency suffered acute and subacute illnesses. Among these cases, 60% of the children had underlying chronic transfusion, related to iron overload including thalassemia and sickle cell anaemia, 12% had developmental disorder, while another 10% were bone marrow transplant recipients on chemotherapy. Only one of these children had Vitamin C deficiency attributable to being neglected.⁴ Harknett et al. reported a case series of 18 children with scurvy. Only one of the cases was a boy with no developmental problem and a picky eater.⁸ Occasionally, there are isolated case reports of scurvy in normal developmental children.¹

Our case illustrates the importance of preventing and managing picky eating behavior properly. Management of children with picky eating behaviour requires commitment from the whole family member.⁹ Some of the strategies include distraction avoidance (e.g. gadget and toys), a regular feeding interval of between three and four hours with no snacks in between, and maintaining a happy and pleasant environment throughout the feeding session.⁹ The food served should be appropriate in amount and texture according to the developmental age with limited mealtime of 20 to 30 minutes. Parents should also encourage self-feeding by providing personal feeding utensils, allowing an age-appropriate level of messiness, and systematically introducing new food.⁹ In summary, parents and caretakers should ensure that children under their care have a healthy and balanced diet, along with good dietary habits to prevent vitamin C deficiency and scurvy.

CONCLUSION

Vitamin C deficiency in children is still being reported even in Malaysia. Unfortunately, because of infrequency of reports, clinician may still overlook it particularly if the occurrence is not recognized. It needs to be recognized in children who are picky eaters having the relevant clinical findings and can be prevented if adequate vitamin C is taken as per requirement.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

CONSENT

Written informed consent was obtained from the patient for publication of this manuscript.

REFERENCES

1. Nastro A, Rosenwasser N, Daniels SP, Magnani J, Endo Y, Hampton E, et al. Scurvy due to selective diet in a seemingly healthy 4-year-old boy. *Pediatrics* 2019; 144(3): e20183824.
2. Hosen Z, Bipasha SA, Kamal S, Rafique S, Islam B, Fatema K. Dietary supplementation of citrus limon L. (lemon) and evaluation of its role to prevent and cure of vitamin C deficiency diseases. *Int J Food Sci Nutr* 2020; 9(1): 1.
3. German Nutrition Society (DGE). New Reference Values for Vitamin C Intake. *Ann Nutr Metab* 2015; 67(1): 13-20.
4. Golriz F, Donnelly LF, Devaraj S, Krishnamurthy R. Modern American scurvy - experience with vitamin C deficiency at a large children's hospital. *Pediatric Radiol* 2017; 47(2): 214-20.
5. Miraj F, Abdullah A. Scurvy: Forgotten diagnosis, but still exist. *Int J Surg Case Rep* 2020; 68: 263-6.
6. Taylor CM, Emmett PM. Picky eating in children: causes and consequences. *Proc Nutr Soc* 2019; 78(2): 161-9.
7. Thompson C, Cummins S, Brown T, Kyle R. What does it mean to be a 'picky eater'? A qualitative study of food related identities and practices. *Appetite* 2015; 84: 235-9.
8. Harknett KM, Hussain SK, Rogers MK, Patel NC. Scurvy mimicking osteomyelitis: case report and review of the literature. *Clin Pediatr (Phila)* 2014; 53(10): 995-9.
9. Yang HR. How to approach feeding difficulties in young children. *Korean J Pediatr* 2017; 60(12): 379-84.