

An Orange Baby: Benign Carotenemia in an Infant: A Case Report

Zon EM^{a,b}, Ahmad Khairudin SN^c, Haidar Hazlan SH^d

^aDepartment of Obstetrics & Gynaecology, School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

^bDepartment of Obstetrics & Gynaecology, Hospital Universiti Sains Malaysia, Kelantan, Malaysia

^cDepartment of Paediatrics, Hospital Tuanku Ampuan Afzan, Pahang, Malaysia

^dDepartment of Paediatrics, School of Medical Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

Keywords

carotenemia, xanthoderma, infant feeding, lycopenemia, infant jaundice

Corresponding Author

Dr. Erinna Mohamad Zon
Department of Obstetrics & Gynaecology,
School of Medical Sciences,
University Sains Malaysia, Jalan Raja
Perempuan Zainab II, Kubang Kerian,
16150, Kelantan, Malaysia.
Email: erinna@usm.my

Received: 27th April 2022; Accepted: 24th
October 2022

Doi: <https://doi.org/10.31436/imjm.v22i4>

ABSTRACT

Carotenemia is a clinical condition characterized by yellow skin pigmentation (xanthoderma) and increased blood beta-carotene levels due to various causes. Diet-related carotenemia is common but usually underreported. We report here a case of carotenemia in a male infant caused by over ingestion of the high-carotene diet by the infant and his mother. Recognizing this condition will avoid unnecessary referrals and investigations.

INTRODUCTION

Carotenemia is a clinical condition characterized by yellow skin pigmentation (xanthoderma) and increased blood beta-carotene levels. Diet-related carotenemia is frequently seen in infants and young children and is mistakenly interpreted as jaundice. However, this condition can raise worries among parents, although it is a benign condition. We report here a case of benign carotenemia in a male infant due to the infant's feeding habits and his mother.

CASE PRESENTATION

A 1-year-old boy was brought to clinic for regular follow-up and vaccination. However, the mother claimed that the baby has a different skin complexion compared with his siblings and parents (Figure 1). The infant was born full-term normal vaginal delivery. He was then diagnosed with breast milk jaundice in the early neonatal period. Additionally, other investigations were normal, including thyroid status, glucose-6-phosphate dehydrogenase status, urine, and liver functions.



Figure 1: Family photo of the patient. The patient had a different skin complexion (yellow-orange) compared to other family members.

His milestone was normal, and he was thriving well. Upon review in the clinic, the boy was active. His growth was in the 50th centile with generalized yellowish to orange skin discoloration mainly over his palms, soles, nasolabial fold, and pinna (Figure 2).



Figure 2: Left: Yellowish discoloration of the palm and wrist. Center: Yellowish discoloration of the soles. Right: Orange-yellowish discoloration of the pinna.



Figure 3: Whitish sclera with yellowish discoloration over the root of the nose and cheek.

The sclera was spared (Figure 3). There was no hepatomegaly or splenomegaly. The dietary habit of the infant and mother was explored, and this revealed that the infant was exclusively breastfed and weaned at six months old. He was given fruit and vegetable puree (apple, pear, carrot, banana, mango, pumpkin, and sweet potato) in the earlier part of his weaning. After one month, he was given blended (homogenous) porridge consisting of one-third rice, one-third carrots, and one-third chicken or fish fillet. He consumed approximately six ounces of porridge three times a day. He was on breast milk in between meals, and direct breastfeeding during nighttime. Further evaluation revealed that the mother took "colourful" fruits and vegetables.

She frequently ate cherries, berries, pomegranate, papaya, mangoes, and red dragon fruit (pitaya). Carrot, red spinach, broccoli, green vegetables, and tomatoes were in the mother's meal almost on a daily basis. The infant's blood investigation was planned to adjunct the diagnosis; however, the mother did not give consent as there were no concerning and warning symptoms except for the skin discoloration. However, the mother agreed to visit our clinic for regular monitoring or report any new symptoms. The mother was advised to reduce the high-carotene food intake for the baby and herself. The infant was under regular review, and his milestone was normal. The skin discoloration fully recovered after six months of diet modification.

DISCUSSION

First described in 1919 by Hess and Meyers, carotenemia is a medical terminology that describes yellow-orange skin pigmentation due to high-carotene levels in the blood.¹ In most cases this condition follows prolonged and excessive carotene-rich food consumption. Carotenemia in infants or children is rare. Epidemiology data for the incidence of carotenemia is not available in Malaysia, probably due to inadequate reporting² about the said condition or the signs and symptoms that are not critical for parents to seek healthcare attention. A study in India reported a 2% incidence of carotenemia among children on high-carotene diet.²

The peak age is approximately 12 months old.^{2,3} However, it can also occur in adults.^{3,4} The most common cause of carotenemia is dietary (excessive intake of a high-carotene diet) rather than secondary causes. Carotenes are found in all pigmented vegetables and fruits, such as carrots, asparagus, spinach, and broccoli, mainly with β -carotene. The green colour of chlorophyll often masks the yellow colour of carotene in the vegetables. Generally, the deeper the green or yellow of a vegetable or fruit, the more carotene it contains. Malaysian palm oil is well known for its high carotene content, which includes α - and β -carotene, and the α -carotene does not affect the bioavailability of β -carotene from palm oil compared to synthetic β -carotene.⁵

Excess carotenes deposited in the lipophilic stratum corneum can result in deep yellow-orange colour, typically in areas of thicker skin, such as the tip of the nose, nasolabial fold, forehead, palm, and soles of the body.⁶ The corneum has a high affinity to carotene while the mucosa is not. Hence, the sclera and oral mucosa in carotenemia are spared from discoloration. Lycopopenia is a spectrum of carotenemia conditions caused by excessive ingestion of red foods that contain lycopene. Lycopopenia is caused by lycopene deposition, mainly in the stratum corneum, which has a high lipid content and an affinity for lycopene.⁷

Clinically, the colour seen in lycopenemia is deeper red-orange than that of carotenemia and can involve the soft palate, and in both conditions, the sclera is spared.⁶ The patient, in our case, was fed with an excessive high-carotene food and was breastfed by a mother who also had a high-carotene diet. Food preparation determines the carotene level as homogenization and pureeing of foods increase the bioavailability of these carotenoids.⁸ One study determined the carotene level in breastmilk and its associations with dietary intake from healthy mothers in the first six months of lactation and revealed a positive correlation between carotenoids in breastmilk and dietary intake. Lycopene was a carotenoid with the highest content in breast milk.⁹

However, although carotenemia is usually benign, it is associated with other medical conditions, such as hypothyroidism, diabetes mellitus, hyperlipidemia, and porphyria.¹⁰ Additionally, carotenemia is associated with a genetic predisposition. Blood investigations and imaging are not recommended in healthy children with positive dietary histories.⁸ Dietary carotenemia is conservatively managed by reducing the amount of carotene in the person's diet, which eventually leads to resolution of the skin pigmentation. Parents should be reassured regarding this benign condition and that it is without associated serious complications.

CONCLUSION

Dietary carotenemia is a benign condition associated with excessive carotene-rich food intake and is not associated with any serious complications. Recognizing this condition will avoid unnecessary referrals and investigations. Parent should be educated regarding good feeding habits, such as taking various food and not focusing on a specific diet.

REFERENCES

1. Congdon PJ, Kelleher J, Edwards P, Littlewood JM. Benign carotenemia in children. *Arch Dis Child*. 1981;292e294.
2. Priyadarshani AMB. Insights of hypercarotenemia: A brief review. *Clin Nutr ESPEN* [Online]. 2018;:19-24. Available at <https://doi.org/10.1016/j.clnesp.2017.12.002>
3. McGowan R, Beattie J, Galloway P. Carotenemia in Children is Common and Benign: Most Can Stay at Home. *Scottish Medical Journal*. 2004;:82e84.
4. Ehizogie Edigin, Iriagbonse R. Asemota, Ezegwu Olisa CN. Carotenemia; a casereport. *cureus*. 2019;592.
5. van het Hof KH, Gärtner C, Wiersma A, Tijburg LB, Weststrate JA. Comparison of the bioavailability of natural palm oil carotenoids and synthetic beta-carotene in humans. *J Agric Food Chem*. 1999;47(4):1582-1586.
6. Soundararajan V, Charny JW, Bain MA, Tsoukas MM. The color of skin: orange diseases of the skin, nails, and mucosa. *Clin Dermatol* [Internet]. 2019;520–527.
7. Reich P, Shwachman H, Craig JM. Lycopenemia: a variant of carotenemia. *N Engl J Med*. 1960;262:263e269.
8. Karthik SV, Campbell-Davidson D, Isherwood D. Carotenemia in infancy and its association with prevalent feeding practices. *Pediatr Dermatol*. 2006;571-573.
9. Zielinska MA, Hamulka J, Wesolowska A. Carotenoid Content in Breastmilk in the 3rd and 6th Month of Lactation and Its Associations with Maternal Dietary Intake and Anthropometric Characteristics. *Nutrients*. 2019; 193.
10. Manolios N, Samaras K. Hypercarotenemia. *Intern Med J*. 2006; 534.