CASE REPORT

Nutritional implications of selective eating in a child with autism spectrum disorder

Karen Keown,¹ Janice Bothwell,¹ Sonya Jain²

¹Department of Community Paediatrics, Belfast Health and Social Care Trust, Belfast, U K
²Department of Dietetics, Royal Belfast Hospital for Sick Children, Belfast, U K

Correspondence to
 Dr Karen Keown,
 karen.keown@gmail.com

Accepted 23 February 2014

SUMMARY

A 4-year-old boy attending the autism assessment service was identified to have a restricted diet. His food diary documented that he ate a narrow range of foods and consumed excessive quantities of carrot juice (excess 2.5 L daily). Physical examination showed that the boy had a florid orange discolouration of his skin, growth parameters were <91st centile for weight, >50th centile for height and head circumference. Blood investigations showed a raised serum carotene level and vitamin D deficiency. He was referred for urgent specialist input from dietetics and the other disciplines within the autism intervention team.

BACKGROUND

This case presentation illustrates the importance of addressing dietary issues in children presenting with abnormal eating/drinking choices and restricted diets particularly when autism is the underlying diagnosis. It highlights the importance of assessing the quality rather than just quantity of food intake and demonstrates some of the nutritional implications of a restricted diet in children.

CASE PRESENTATION

A 4-year-old Polish boy attending the autism assessment service was identified as having a restricted dietary intake with excessive amounts of carrot juice taken—excess of 2.5 L/day. His diet was limited to chocolate bars and wafers, battered chicken breast and dry bread. All foods were of specific type or brand.

He was otherwise well with no significant family history. Birth history was unremarkable. He took no regular medications.

His autism assessment identified significant speech and language deficit with occasional single words spoken and extremely poor social skills. Aberrant sensory behaviours were identified which included smelling foods and inanimate objects such as socks. There was evidence of repetitive hand washing and head banging. His play was abnormal and played only with kitchen utensils, lined items in rows and would spin himself repeatedly. The autism diagnostic schedule (ADOS) scores reflect the severity of difficulties:

1. Communication 8 (2 required for autism spectrum disorders (ASD) diagnosis)
2. Social interaction 14 (4 required for ASD diagnosis)

Physical examination: Orange skin colouration, particularly on palms and skin creases (figures 1 and 2). Growth parameters <91st centile for weight, >50th centile for height and head circumference.

Figure 1 Orange skin discolouration.

INVESTIGATIONS

Electrolytes, liver function tests, thyroid function normal. Full blood picture and iron profile normal.

Vitamin/nutritional profile:

- ▶ β -carotene 4.05 $\mu\text{mol/L}$ (NR 0.1–1.6 $\mu\text{mol/L}$)
- ▶ Vitamin A 1.0 $\mu\text{mol/L}$ (NR 1.1–3.5 $\mu\text{mol/L}$)
- ▶ Vitamin D 22 nmol/L (NR 50–100 nmol/L)
- ▶ Vitamins C, E normal
- ▶ Zinc, selenium normal
- ▶ Bone profile normal (calcium, phosphate, alkaline phosphatase)

Wrist X-ray—normal bone age, no osteopenia.

DIFFERENTIAL DIAGNOSIS

- ▶ Hypercarotinaemia.
- ▶ Jaundice.

TREATMENT

- ▶ Immediate dietetic input
 - Consumption of carrot juice weaned gradually to avoid sudden drop in serum carotene level

Figure 2 Orange skin discolouration.

CrossMark

To cite: Keown K, Bothwell J, Jain S. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-202581

- Eating behaviours addressed, for example, structured mealtimes
- Strategies for diet diversification
- ▶ Vitamin D/calcium supplement
- ▶ Specialist input from autism intervention service, speech and language therapy, dietetics, occupational therapy, educational psychology.

OUTCOME AND FOLLOW-UP

Some improvement in child's diet and behaviours with input from autism intervention service with successful weaning off carrot juice. He refuses to take supplement of vitamin D and subsequent blood tests after 6 months show persistent deficiency.

DISCUSSION

ASDs can have a major impact on many areas of daily living, including eating. Children with autism are often described as 'picky' eaters,¹ and a reluctance to try new foods is commonly reported by parents. This case report demonstrates how excessive consumption of carrot juice due to dietary selectivity resulted in hypercarotenaemia with marked orange skin discolouration. The child was found to be consuming over 10 times his daily recommended intake of β -carotene (approx 50 mg/day, recommended daily intake 4 mg/day). He was also found to have vitamin D deficiency.

Hypercarotenaemia is an elevated level of carotene in the blood, causing yellowing of the skin (carotenosis). This results from excessive ingestion of carotenoids, which are present in carrots and some other vegetables. β -Carotene (a carotenoid), also called provitamin A, is converted to vitamin A by β -carotene 15, 15'-monooxygenase; this conversion is inhibited when vitamin A stores are high. Although vitamin A excess is potentially toxic, high levels of β -carotene have not been reported to cause toxicity or result in vitamin A toxicity.² High doses of β -carotene (up to 180 mg/day) have been consumed in adults without toxic side effects.²

In this case, where there has been an extremely narrow variety of foods consumed due to dietary selectivity, it is

understandable how nutritional imbalance and inadequacy has occurred. In a recent review of literature over the past 25 years on food selectivity and nutritional adequacy in children with ASD, only a few studies were found to have assessed the nutritional adequacy of diets of children with ASD.¹

This case highlights the importance of thorough, multidisciplinary assessment and management of children with ASD. Even in an apparently well-grown child there may be significant nutritional inadequacies; therefore, a nutritional blood screen should be considered where dietary difficulties are identified.

Learning points

- ▶ A normal growth chart does not necessarily indicate that a child is adequately nourished.
- ▶ A detailed food intake in relation to both quantities consumed and range of foods taken should be recorded, particularly in children on the autism spectrum.
- ▶ Physical examination is an integral part of the assessment of children presenting to autism services.
- ▶ A full nutritional screen should be carried out in children with autism spectrum disorders where significant dietary difficulties are identified.

Acknowledgements Many thanks to the Department of Nutrition and Dietetics at Royal Belfast Hospital for Sick Children for their contribution.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Cermak SA, Curtin C, Bandini LG. Food selectivity and sensory sensitivity in children with autism spectrum disorders. *J Am Diet Assoc* 2010;110:238–46.
- 2 Institute of Medicine, Food and Nutrition Board. *Beta-carotene and other carotenoids. Dietary reference intakes for vitamin C, vitamin E, Selenium, and carotenoids*. Washington, DC: National Academy Press, 2000:325–400.

Copyright 2014 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow