Title Page

Dietary variety and food group consumption in children consuming a cows' milk exclusion diet

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Running title: Dietary variety and cows' milk exclusion

Word count: 2485

Number of tables: 1

Number of figures: 2

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Abstract page

Dietary variety and food group consumption in children consuming a cows' milk exclusion diet

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Background: Dietary variety is defined as the number of different foods or food groups consumed over a given reference period, the consensus being that dietary variety and dietary quality are positively correlated. Recently there has been considerable interest in the association between infant dietary variety and atopic disease.

Methods: This was a cross sectional study of 8- to 30-month-old children from the Isle of Wight, UK, including two groups: a group of children consuming a cows' milk exclusion (CME) diet and a control group of children consuming an unrestricted diet. Parents completed a validated food frequency questionnaire, from which dietary variety and consumption of food groups was calculated. Growth measurements were recorded.

Results: 126 participants of mean age 13.0 months were recruited. As well as expected differences in dairy and soya consumption, the CME group consumed sweet foods 1.6 times less frequently, non-water drinks 7 times less frequently ($p < 0.05$) and readymade baby foods 15 times more frequently ($p < 0.01$) than the control group. Overall dietary variety was significantly lower in the CME group ($p < 0.01$) as was variety of meat and sweet foods consumed. There was a greater concern with healthy eating in the CME group ($p < 0.05$).

Conclusions: Children consuming an exclusion diet for cows' milk allergy have an overall less varied diet, including a less varied consumption of meat and sweet foods. Efforts should be made to ensure exclusion diets are as varied as possible to optimise nutritional intake.

Key words: dietary variety, cows' milk allergy, infant diet

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Introduction

'Dietary variety', synonymous with 'dietary diversity' or 'food diversity', is defined as the number of different foods or food groups consumed over a given reference period. In theory, consumption of a varied diet should reduce the risk of developing a deficiency or excess of any particular nutrient. Therefore the consensus is that dietary variety and dietary quality are positively correlated (1). Additionally, a varied diet may protect from allergies. It is hypothesised that exposure of the infant gut to different food antigens might influence the development of immune tolerance (2). Two notable publications investigating the diversity of the infant diet and risk of later allergy using prospective birth cohort data have recently been published (2,3).

Unfortunately neither of these two studies differentiated between homemade and commercially produced infant foods. This is important as there is debate whether commercially produced infant food increases or decreases infant food variety (4,5). Of note, data from a UK birth cohort suggests that an infant diet high in fruit, vegetables and home prepared foods, with only occasional use of commercially produced infant food, is associated with less food allergy at age two years (6,7). However the authors did not rule out "reverse causation" i.e. that increased consumption of home prepared foods a *result* of food allergy (i.e. being unable to access allergen free readymade baby food), rather than the cause of the food allergy.

In recent years, it has become more common to analyse childhood dietary intakes according to *patterns* of food or food groups, rather than analysis of specific nutrients separately (8–10). Although several studies have investigated the nutritional consequences of children consuming both single and multiple food exclusion diets with broadly similar results (11–14); to date, no published research has specifically investigated dietary variety in children consuming an exclusion diet for food allergy. It appears logical that children prescribed an exclusion diet will have a less varied diet as they are limiting a whole food or food group. Paradoxically, it may be that parents of children consuming exclusion diets are forced to widen their normal food patterns to include alternative foods and recipes, potentially resulting in a broader variety of foods consumed. Therefore, the aim of this study was to investigate this matter, given the recent literature regarding dietary variety and atopic disease.

Methods

Study design

This was a cross sectional study of 8- to 27-month-old children from the Isle of Wight, UK. This study included two groups: an experimental group, composed of children consuming a cows' milk exclusion (CME) diet and a control group of children consuming an unrestricted diet. Children were eligible for inclusion in the experimental group if they were currently consuming a hypo-allergenic formula and/or a CME diet, had consumed this diet in the first year of life for a period of 3 months or longer and/or if they were excluding other foods (e.g. egg or soya).

Children were excluded from the study if they had any medical condition requiring a special diet (e.g. diabetes, cystic fibrosis). This applied to both CME and control group.

Recruitment took place between July 2013 and December 2014. Participants eligible for the experimental group were identified via routine allergy clinics. Diagnosis of CMA and indication for an exclusion diet was conducted via positive clinical history, skin prick testing and/or improvement in symptoms with dietary exclusion and recurrence of symptoms with reintroduction of cows' milk. The clinic follows the diagnostic pathway in the Milk Allergy in Primary care guidelines (15). Due to resources, children did not undergo formal physician supervised oral food challenges.

The control group was recruited from health visitor clinics in the same locality. Ethical approval was obtained from Berkshire NHS Ethics Committee. All parents completed a consent form.

Data collection

Information was collected on social demographics, family history of allergy, symptoms, infant feeding, healthy eating and growth. Dietary variety was measured using a Food Frequency Questionnaire (FFQ), as per the methodology of Emond et al. (16). A validated FFQ for this age group was adapted (17), by adding substitute foods that are typically eaten in a CME diet. The FFQ consisted of a list of 76 food and drinks, divided into subcategories of non-water drinks, readymade baby foods, cereal based foods, dairy/egg, soya/substitute foods, meat fish and vegetarian

substitute foods, fruits, vegetables and sweet/miscellaneous foods. The frequency of consumption over the previous 28 days of each food and drink were recorded. There was a free text option to document additional items consumed. The parent was also asked the type and volume of infant formula, cows' milk or milk substitute the child drank per day and/or the approximate duration of breastfeeds per 24 hours.

Data analysis

Diet Variety Score (DVS) was calculated as the number of times "never" is selected on the frequency option for each food. The DVS% for each category was calculated as a percentage of the items in each food category that had never been eaten. Therefore a *higher* DVS and DVS% indicate a *less* varied diet. A power calculation for a two-tailed outcome at 80% power indicated that 104 participants were required. Data were analysed using SPSS software (IBM, version 20 Armonk, NY, USA). Descriptive statistics and frequencies were calculated. Differences between the CME and control groups were compared using Mann–Whitney U- or α^2 tests**.** Analysis of Covariance (ANCOVA) was calculated to control for the effect of age. A significance level of $p < 0.05$ was set for all analyses.

Results

Description of sample

One hundred and twenty-six participants were recruited, 66 in the CME group and 60 in the control group. Within the CME group, of the 89 participants who met the inclusion criteria, 20 did not return the questionnaires (22.5%), 1 did not wish to take part (1.1%) and 2 participants were excluded due to other medical conditions (2.2%), indicating an overall response rate of 74.2%. In the control group, no parents who were approached refused to take part, however two (3.2%) did not have time to complete the questionnaire at the time and did not return it.

Demographic characteristics are detailed in Table 1. Participants in the CME group were younger than those in the control group ($p = 0.02$) and had higher levels of maternal food allergy.

Table 1 Demographic characteristics of all participants and by group

	All (*N* = 126)	CME group (*n* = 66)	Control group (*n* = 60)
Age (months) median	13.0 (8-27)	12.37* (8-25)	15.0* (8-27)
Male (%)	67 (53.2)	34 (51.5)	33 (55.0)
Maternal age (years) mean	29.3 (SD 6.5)	29.8 (SD 6.38)	28.6 (SD 6.62)
Number of siblings	1 (0-5)	0 (0-3)	0.5 (0-5)
White British (%)	118 (93.6)	61 (92.5)	57 (95.0)
Maternal education			
None (%)	1 (0.8)	0 (0.0)	1 (1.7)
GCSE /A-level equivalent (%)	80 (63.4)	41(62.1)	39 (65.0)
Graduate / Postgraduate (%)	41(32.6)	23 (34.9)	18 (30.0)
Not stated (%)	4 (3.2)	2 (3.0)	2 (3.3)
Paternal education			
None (%)	3 (2.4)	2 (3.0)	1 (1.7)
GCSE /A-level equivalent (%)	82 (65.1)	43 (65.2)	39 (65.0)
Graduate / Postgraduate (%)	31(24.6)	15 (22.7)	16 (26.7)
Not stated (%)	10 (7.9)	6 (9.1)	4 (6.6)
Family history of food allergy			
Maternal (%)	32 (25.6)	24 (36.4)*	8 (13.3)*
Paternal (%)	12 (9.5)	9 (13.6)	3 (5.0)
Sibling (%)	18 (14.3)	14 (21.2)	4 (6.6)
Birth weight (kg)	3.43 (1.55-4.67)	3.48 (2.08 – 4.67)	3.34 (1.55 – 4.53)
Weight (kg)	9.9 (7.43-14.90)	9.9 (7.59-14.9)	10.1 (7.43 – 14.9)
Length / height (cm)	76.0 (68-90.4)	76.0 (69.0 -90.4)	76.0 (68.0-88.0)
Weight centile (%)	62.2 (5.6-137.0)	65.9 (5.6-137.0)	52.2 (8.1 – 98.2)
Length/height centile (%)	66.9 (3.9-110.0)	67.8 (3.9 -100)	30.8 (11-110)
BMI ($kg/m^{2)}$	17.0 (14-20.6)	17.1 (14-20.6)	17.0 (14.3-19.0)
BMI centile (%)	65.3 (2.6-99.5)	67.4 (2.6 – 99.5)	54.9 (8.2 – 97.1)

*Difference between CME and control group significant < 0.05 using a Mann Whitney U test. BMI: Body Mass Index

Infant feeding and dietary exclusion

Details of participants' infant feeding and symptoms have previously been reported (18). At the time of data collection all participants in the CME group were consuming an exclusion diet for cows' milk allergy and all participants in the control group were consuming an unrestricted diet. In brief, 13.5% of participants were being breastfed at the time of data collection. In the CME group, the most commonly used hypo-allergenic formula was amino acid formula (45.5%). The majority of the CME group was excluding cows' milk only, whilst 28.8% were excluding another food allergen in addition to cows' milk, usually egg. The median volume of cow's milk/cows' milk substitute consumed per day was 480mls (range 0-1080mls). Parents of the CME group were more concerned with healthy eating than the control group ($p < 0.01$).

Food frequency questionnaire results

Frequency of food group consumption

The most frequently consumed food groups overall were cereals, fruit and vegetables. Differences in consumption of different food categories between the CME and control groups are shown in Figure 1. As expected, the CME group consumed dairy/egg foods less frequently and soya/substitute products more frequently than the control group ($p < 0.01$). They also consumed sweet foods 1.6 times and non-water drinks (including baby juice and tea) 7 times less frequently ($p < 0.05$), but consumed readymade baby foods 15 times more frequently ($p < 0.01$) than the control group. ANCOVA indicated that these differences persisted whilst controlling for age ($p < 0.01$). There was no difference in the frequency of consumption of fruit, vegetables, fish, meat or cereals between groups.

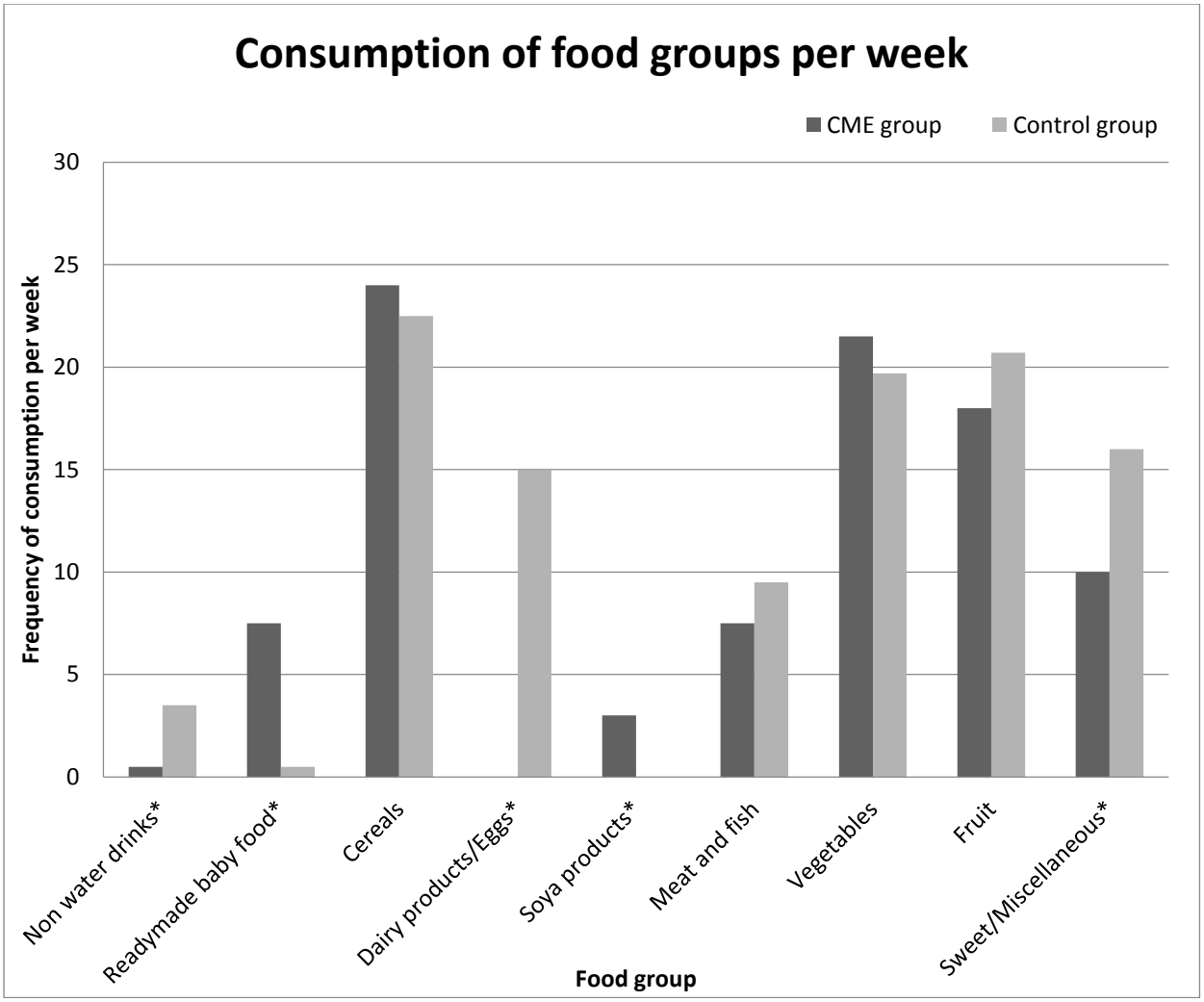

Figure 1. Frequency of consumption of food groups per week. *significantly different consumption between CME and control groups.

Significant differences in frequency of consumption of foods were found between participants during the first year of life compared to older children. To investigate this further, the group was stratified according to age. No difference was found in the consumption of readymade baby food between the two groups in participants under one year, however in older children, the CME group consumed readymade baby food significantly more frequently compared with those in the control group ($p < 0.01$). Similarly, in terms of sweet/miscellaneous foods, there was no difference in consumption between the two groups of infant under one year of age, however over one year, the control group consumed significantly more than the CME group ($p < 0.01$). Differences in consumption of dairy/egg products and soya/substitute foods persisted between groups across both age groups ($p < 0.01$).

Variety of food group consumption

The DVS for food categories is shown in Figure 2. There was no difference in DVS according to gender. Participants > one year old had more varied diets overall ($p < 0.01$).The DVS for all foods was significantly higher in the CME group ($p < 0.01$) meaning those excluding cows' milk from their diet have a less varied diet overall than those consuming a normal diet. This calculation was repeated for all foods without the dairy/egg/soya substitute categories, to control for reverse causality and the same difference was found ($p < 0.01$). As expected, a direct correlation was found between number of foods excluded and increased DVS for total foods ($rho= 0.385$, $p < 0.01$).

Looking at individual food categories, the median DVS% for readymade baby food was significantly lower in the CME group than the control group ($p < 0.01$) (i.e. the CME group consume a greater variety of readymade baby food than those in the control group). The DVS% in the dairy/egg/substitute ($p < 0.01$), meat ($p < 0.01$) and sweet/miscellaneous ($p < 0.01$) food groups were significantly higher in the CME group than the control group (i.e. the control group consume a greater variety of these food groups than the CME group).

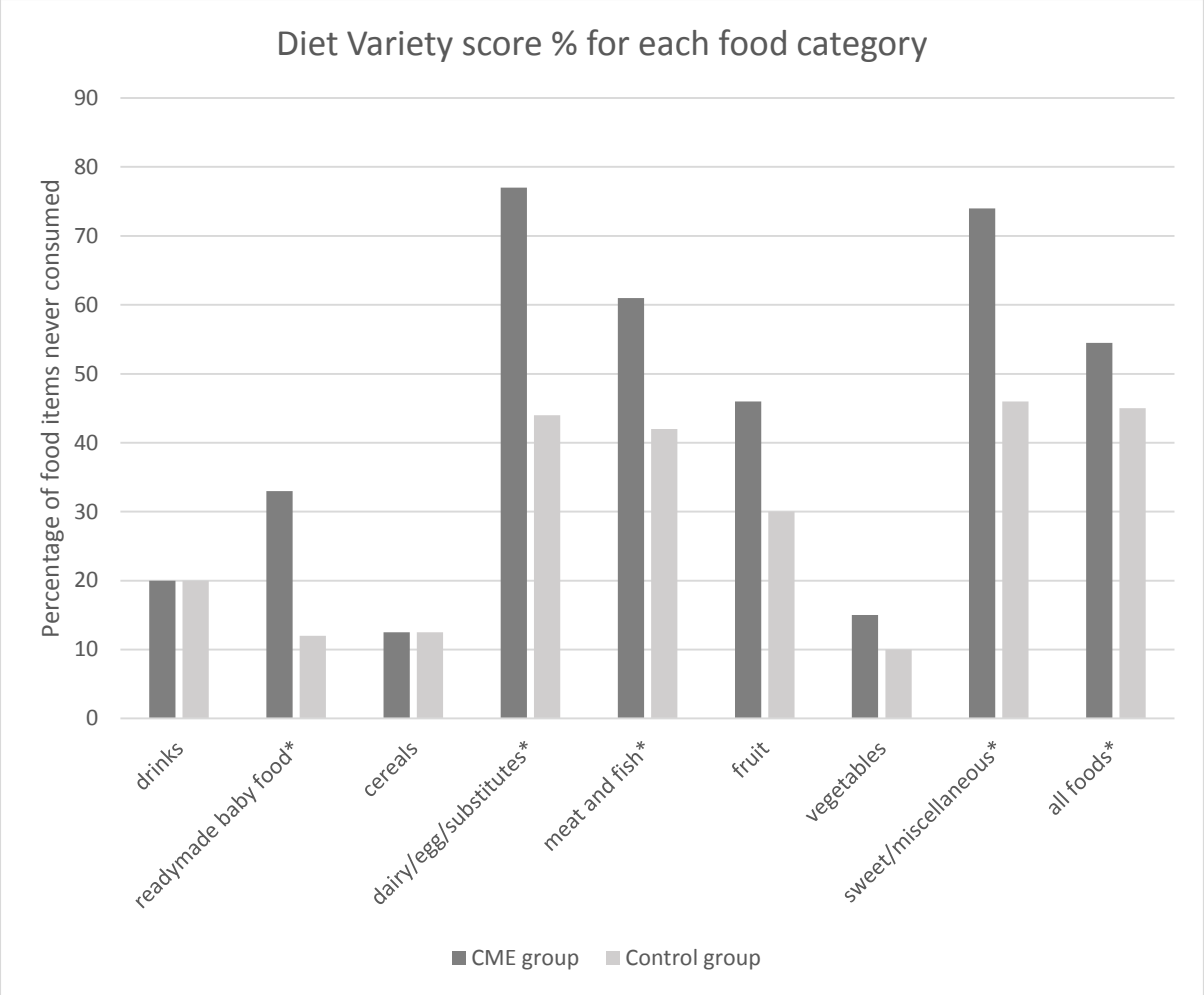

Figure 2. Diet variety score % of food groups. *significantly different DVS% between CME and control groups.

Association with anthropometric measurements

BMI centile was moderately inversely correlated with DVS% for all foods (rho -0.305, $p < 0.01$), indicating that children with a more varied diet overall had a higher BMI. BMI centile was also positively correlated with frequency of soya (rho = 0.304), meat (rho = 0.294) and fruit consumption (rho = 0.336) ($p < 0.05$).

Discussion

This study set out to measure the dietary variety and food group consumption of a group of children consuming an exclusion diet for cows' milk allergy. Overall, the CME group was found to have a significantly less varied diet than the control group. This was the case whether dairy/egg/soya substitutes were included or excluded from the calculation. Amongst food subcategories, the CME group had a less varied intake of dairy/egg, meat and sweet/miscellaneous foods and a greater variety in the

readymade baby food category. In addition it does not appear that children consuming CME diets are fed a greater variety of other food categories (e.g. fruit, vegetables, or starchy carbohydrates) to compensate for the restriction of dairy products. However the CME group also had some dietary practices that were more favourable than the control group, such as consumption of less baby juice and tea, which is a positive finding from a healthy eating perspective.

Whilst it may be expected that the CME group have a less varied diet overall and a less varied intake of the dairy/egg foods, the lower variety in the meat and sweet/miscellaneous categories are of more interest. It is perhaps an indication that parents are over-restricting the diets of children with CMA, or it may be a reflection of the ubiquity of milk in processed foods. For example, lower consumption of the sweet/miscellaneous foods category is likely attributed to the fact that some of these foods contain milk powder (e.g. biscuit), or possibly due to the higher concern with healthy eating the CME group had. Looking at beverages, the “healthy eating” aspect may also explain the less frequent consumption of non-water drinks (e.g. tea, baby juice) in the CME group, which may be due to the dietetic advice the CME group received as part of routine clinical care and a greater awareness of food ingredients. This is in disagreement with the theory that children with a restricted diet develop a strong preference to calorie-dense “safe” foods resulting in increased juice consumption (19).

There were significant differences in both the frequency and variety of consumption of readymade baby foods between groups. The CME group ate readymade baby food significantly more often than the control group and ate a greater variety of readymade baby food than the control group. In total, these foods were eaten 15 times more frequently in participants > 1 year old in the CME than the control group. This is important as several international studies have reported that readymade baby food is of inferior nutritional quality to home-made baby food (20–23). In addition, food safety requirements lead to a negligible microbiota content (24). However, consumption of readymade baby food is increasing, with qualitative research indicating it is perceived by some mothers as potentially “safer” and composed of superior ingredients (25). On a practical level, it is perceived as more convenient and portable (26), therefore it may be that infants with CME are fed these foods as it is difficult to source guaranteed cows’ milk free meals and snacks when eating away from the home. Previous research has reported that a “healthier eating”

dietary pattern, higher in fruit, vegetables and homemade foods, and lower in commercial baby foods was associated with a reduced prevalence of food allergy (6,7). The authors reported this pattern may have a protective effect on the development of food allergy, rather than be a result of having a food allergy. Although the data generated from the present study is cross sectional and causation cannot be inferred, it is likely that increased consumption of readymade baby food is occurring as a result of the CME diet. This could be explained by the fact that there is now a greater availability of milk free baby foods on sale than before.

Dietary variety in food allergic children has not been specifically investigated to date. One study was identified that measured “dietary monotony” in an Italian study of mothers of food allergic children aged 0-16 years (27). Most of the participants claimed to have a “monotonous diet”. When asked about causes of the repetitive diet, the responses were: strict avoidance, low curiosity about food, a limited choice of food industry safe products and difficulties in making traditional recipes. Similar to this study’s findings, they also found an inverse association between child age and the repetitiveness of the diet. They hypothesised this was due to children outgrowing some food allergies, or that the diet becomes more varied as families become more accustomed to available food products. However Polloni’s study was limited in that the questionnaire was not validated, there was no control group and no dietary data was reported. It may be that individuals who have a history of anaphylaxis consume more monotonous diets, due to stricter avoidance practices. However we did not specifically explore this issue or present data on symptoms as this has previously been published elsewhere (18).

There is no universal criteria for choosing a dietary assessment method in children (28) and in infants it is complicated by the fact that their dietary habits can change rapidly and they typically may not eat all the food offered to them (29). However a systematic review concluded that FFQs are an appropriate measure for this age group (30). Dietary variety has been shown to correlate strongly with dietary adequacy in toddlers (r = 0.74) (31), therefore it provides a quick surrogate measure of the nutritional quality and balance of food groups, without the need to complete a food diary. A limitation of dietary variety and this study is that it focuses on nutritional adequacy and does not necessarily take into account excess consumption. It is possible to consume a limited number of nutrient dense foods and have a narrow dietary variety. Conversely it is possible to consume several different foods of low

nutritional quality and have a high dietary variety (31). Despite these limitations it has been shown to be an indicator of child growth (10), which we have also shown by reporting a moderate correlation with BMI centile.

The mean BMI centile in this study was in the normal range with no difference seen between the CME and the control group. Typically impaired growth in children with food allergy is thought to be related to dietary restrictions and/or the underlying pathophysiology of the allergic disorder (32). However a recent study of patients with suspected food allergies from general paediatric practice reported that children under two years old consuming CME diets did not experience weight impairment (33). This was attributed to prescribed hypo allergenic infant formula providing adequate nutrition to compensate. They also identified that many typical toddler snack foods contain milk. Mehta et al.'s study is one of the few studies to also have been undertaken in a primary care population, and similar to this one the children were following exclusion diets for physician-diagnosed food allergies, rather than challenge-proven food allergies, meaning the population is similar. It is also worth highlighting that participants in the CME group all had dietetic consultations, meaning they would have received individualised nutritional advice and growth monitoring at timely intervals, which has been shown to improve nutritional outcomes (12,34).

Other limitations of this study are that the population was not very ethnically diverse and the exclusion group included both single and multiple exclusion diets. A recruitment bias may exist where those more interested in diet are more likely to take part, however consecutive sampling was used to overcome this. Strengths of the study are that the groups were closely matched for demographic variables, except age and validated questionnaires were used. In conclusion we have demonstrated that children consuming an exclusion diet for CMA have reduced dietary variety that is not limited to just dairy foods. There is a higher concern with healthy eating, a lower consumption of non-water drinks and sweet foods, alongside increased consumption of readymade baby foods, particularly in children above aged 1 year old. These findings are important as they emphasise the need to ensure exclusion diets are as varied as possible to optimise nutritional intake. Future research should address the dietary variety of older children consuming exclusion diets for other allergies.

References

1. Ruel MT. Operationalizing dietary diversity: A review of measurement issues and research priorities. J Nutr. 2003;133:3911S – 3926S.
2. Roduit C, Frei R, Depner M, Schaub B, Loss G, Genuneit J, et al. Increased food diversity in the first year of life is inversely associated with allergic diseases. J Allergy Clin Immunol. 2014;133(4).
3. Nwaru BI, Takkinen HM, Kaila M, Erkkola M, Ahonen S, Pekkanen J, et al. Food diversity in infancy and the risk of childhood asthma and allergies. J Allergy Clin Immunol. 2014;133(4):1084–91.
4. Mesch CM, Stimming M, Foterek K, Hilbig A, Alexy U, Kersting M, et al. Food variety in commercial and homemade complementary meals for infants in Germany. Market survey and dietary practice. Appetite. 2014;76:113–9.
5. Hurley KM, Black MM. Commercial Baby Food Consumption and Dietary Variety in a Statewide Sample of Infants Receiving Benefits from the Special Supplemental Nutrition Program for Women, Infants, and Children. J Am Diet Assoc. 2010;110(10):1537–41.
6. Grimshaw KEC, Maskell J, Oliver EM, Morris RCG, Foote KD, Mills ENC, et al. Diet and food allergy development during infancy: Birth cohort study findings using prospective food diary data. J Allergy Clin Immunol. 2014;133(2):511–9.
7. Grimshaw KEC, Bryant T, Oliver EM, Martin J, Maskell J, Kemp T, et al. Incidence and risk factors for food hypersensitivity in UK infants : results from a birth cohort study. Clin Transl Allergy [Internet]. BioMed Central; 2016;1–13. Available from: "http://dx.doi.org/10.1186/s13601-016-0089-8
8. Golley RK, Smithers LG, Mittinty MN, Brazionis L, Emmett P, Northstone K, et al. An Index Measuring Adherence to Complementary Feeding Guidelines Has Convergent Validity as a Measure of Infant Diet Quality. J Nutr. 2012;142(5):901–8.
9. Grimshaw KEC, Maskell J, Oliver EM, Morris RCG, Foote KD, Mills ENC, et al. Introduction of complementary foods and the relationship to food allergy. Pediatrics [Internet]. 2013;132(6):e1529–38. Available from: http://www.ncbi.nlm.nih.gov/pubmed/24249826
10. Steyn NP, Nel JH, Nantel G, Kennedy G, Labadarios D. Food variety and dietary diversity scores in children: are they good indicators of dietary

adequacy? Public Health Nutr. 2006;9(5):644–50.
11. Flammarion S, Santos C, Guimber D, Jouannic L, Thumerelle C, Gottrand F, et al. Diet and nutritional status of children with food allergies. Pediatr Allergy Immunol. 2011;22:161–5.
12. Christie L, Hine RJ, Parker JG, Burks W. Food allergies in children affect nutrient intake and growth. J Am Diet Assoc. 2002;102(11):1648–51.
13. Berry MJ, Adams J, Voutilainen H, Feustel PJ, Celestin J, Järvinen KM. Impact of elimination diets on growth and nutritional status in children with multiple food allergies. Pediatr Allergy Immunol [Internet]. 2015;26(18):n/a – n/a. Available from: http://doi.wiley.com/10.1111/pai.12348
14. Robbins KA, Guerrerio A, Hauck S, Henry B, Keet CA, Brereton N, et al. Growth and nutrition in children with food allergy requiring amino acid-based nutritional formulas. J Allergy Clin Immunol. 2015;134(6):1463–6.
15. Venter C, Brown T, Shah N, Walsh J, Fox AT. Diagnosis and management of non-IgE-mediated cow's milk allergy in infancy - a UK primary care practical guide. Clin Transl Allergy [Internet]. 2013;3(1):23. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3716921&tool=pmcentrez&rendertype=abstract
16. Emond A, Emmett P, Steer C, Golding J. Feeding symptoms, dietary patterns, and growth in young children with autism spectrum disorders. Pediatrics. 2010;126(2):e337–42.
17. Marriott LD, Inskip HM, Borland SE, Godfrey KM, Law CM, Robinson SM. What do babies eat? Evaluation of a food frequency questionnaire to assess the diets of infants aged 12 months. Public Health Nutr. 2009;12:967–72.
18. Maslin K, Dean T, Arshad SH, Venter C. Fussy eating and feeding difficulties in infants and toddlers consuming a cows' milk exclusion diet. Pediatr Allergy Immunol [Internet]. 2015;n/a – n/a. Available from: http://doi.wiley.com/10.1111/pai.12427
19. Somers L. Food allergy: nutritional considerations for primary care providers. Pediatr Ann. 2008;37(8):559–68.
20. Elliott CD. Sweet and salty : nutritional content and analysis of baby and toddler foods. 2010;33(1):63–70.
21. García AL, Raza S, Parrett A, Wright CM. Nutritional content of infant commercial weaning foods in the UK. Arch Dis Child [Internet].

2013;98(10):793–7. Available from: http://adc.bmj.com/content/98/10/793
22. Cogswell ME, Gunn JP, Yuan K, Park S, Merritt R. Sodium and Sugar in Complementary Infant and Toddler Foods Sold in the United States. Pediatrics [Internet]. 2015;135(3):416–23. Available from: http://pediatrics.aappublications.org/cgi/doi/10.1542/peds.2014-3251
23. Carbonell-Barrachina A, Ramirez-Gondolfo A, Wu X, Norton G, Burlo F, Deacon C, et al. Essential and toxic elements in infant foods from Spain, UK, China and USA. J Environemental Monit. 2012;14:2447–55.
24. Randhawa S, Kakuda Y, Wong CL, Yeung DL. Microbial Safety , Nutritive Value and Residual Pesticide Levels are Comparable among Commercial , Laboratory and Homemade Baby Food Samples – A Pilot Study. 2012;89–96.
25. Maslin K, Galvin AD, Shepherd S, Dean T, Dewey A, Venter C. Maternal and Paediatric A Qualitative Study of Mothers ' Perceptions of Weaning and the Use of Commercial Infant Food in the United Kingdom. 2015;1(1):1–8.
26. Caton SJ, Ahern SM, Hetherington MM. Vegetables by stealth. An exploratory study investigating the introduction of vegetables in the weaning period. Appetite. 2011;57(3):816–25.
27. Polloni L, Toniolo A, Lazzarotto F, Baldi I, Foltran F, Gregori D, et al. Nutritional behavior and attitudes in food allergic children and their mothers. Clin Transl Allergy [Internet]. 2013;3(1):41. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3878898&tool=pmcentrez&rendertype=abstract
28. Livingstone MBE, Robson PJ, Wallace JMW, Livingstone M. B. E. Livingstone PJRJMWW. Issues in dietary intake assessment of children and adolescents. Br J Nutr [Internet]. 2004;92(S2):S213. Available from: http://www.ncbi.nlm.nih.gov/pubmed/15522159\nhttp://www.journals.cambridge.org/abstract_S0007114504002326
29. Andersen LF, Lande B, Trygg K, Hay G. Validation of a semi-quantitative food-frequency questionnaire used among 2-year-old Norwegian children. Public Health Nutr. 2004;7:757–64.
30. Ortiz-Andrellucchi A, Henríquez-Sánchez P, Sánchez-Villegas A, Peña-Quintana L, Mendez M, Serra-Majem L. Dietary assessment methods for micronutrient intake in infants, children and adolescents: a systematic review. Br J Nutr. 2009;102 Suppl :S87–117.

31. Cox DR, Skinner JD, Carruth BR, Moran J, Houck KS. A food Variety Index for Toddlers (VIT): Development and application. J Am Diet Assoc. 1997;97(12):1382–6.
32. Vieira MC, Morais MB, Spolidoro JVN, Toporovski MS, Cardoso AL, Araujo GTB, et al. A survey on clinical presentation and nutritional status of infants with suspected cow' milk allergy. BMC Pediatr. 2010;10:25.
33. Mehta H, Groetch M, Wang J. Growth and nutritional concerns in children with food allergy. Curr Opin Allergy Clin Immunol [Internet]. 2013;13(3):275–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23510952
34. Berni Canani R, Leone L, D'Auria E, Riva E, Nocerino R, Ruotolo S, et al. The Effects of Dietary Counseling on Children with Food Allergy: A Prospective, Multicenter Intervention Study. J Acad Nutr Diet [Internet]. Elsevier; 2014;114(9):1432–9. Available from: http://dx.doi.org/10.1016/j.jand.2014.03.018