Dairy Free Diets for Infants & Toddlers: Practical Solutions to Meet their Critical Nutrition Needs

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The role of health professionals becomes pivotal in the management of infants and children prescribed a dairy-free diet to ensure their critical nutritional needs for growth and development are not compromised. Katie Kennedy, Registered Dietitian, explores current best practice and the suitability of plant-based milk alternatives.

Introduction

Accurate figures for the prevalence of lactose intolerance amongst infants and young children are difficult to ascertain, however it is widely understood that approximately 2% of infants and young children in the UK suffer from cow's milk protein allergy (CMPA)[1] making it the most common food allergy amongst children. However, up to 15% of infants may exhibit symptoms typical of CMPA, such as colic, constipation, vomiting and gastro oesophageal reflux (GOR)[2]. There is clearly a need for evidence-based and practical support for families of children with suspected or confirmed milk intolerance.

Suitable milk alternatives - infants

The most common form of lactose intolerance in infants is caused by secondary lactase deficiency, often following gastrointestinal infection precipitating damage to the villi where lactase is produced. This condition is typically transient – normal gut function typically returning 2-4 weeks after infection – and during this time elimination of lactose from the diet is required[3]. Lactose-free formulae and lactose-free whole milk for children over 1 year are widely available as well as lactase drops for addition to formula/ expressed breast milk.

By contrast, CMPA, caused by an inappropriate immune response to cows milk proteins, requires complete and often longer-term elimination of milk and milk products from the diet, thus increasing the likelihood of nutritional deficiencies amongst poorly managed children. It is estimated that approximately 50% of children will outgrow an allergy to milk protein by 1 year of age; 75% by 2 years and 90% by 3 years, less than 1% of children suffer from a life-long milk allergy[4]. The first line choice of milk alternative for formula fed infants diagnosed with CMPA is a hydrolysed formula (eHF) or amino acid based formula (AAF) (Table 1)[5]. Their use should be preceded by consultation and recommendation by a GP, dietitian or health visitor[6]. Hypoallergenic formulae may be used in place of standard formula as a main milk source, in cooking and in food preparation and many manufacturers provide recipe cards, booklets and web-based information for parents.

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Table 1: Formula milks used in the treatment of infants with CMPA [7, 8]

Type	Examples	Comments
Extensively hydrolysed - casein based	Nutramigen 1 - Mead Johnson (birth - 6 months) Nutramigen 2 (over 6 months) Pregestimil – Mead Johnson 54% of total fat = MCT (useful for malabsorptive conditions)	most protein <1.5 kD Distinct taste Lactose free
Extensively hydrolysed – whey based	Pepti – Milupa Contains lactose – more palatable Pepti-junior – Cow and Gate 50% of total fat = MCT	Higher percentage of proteins >1.5 kD
Extensively hydrolysed – non-milk based	Pepdite – SHS (birth - 1 yr) Pepdite 1 + - SHS (over 1 yr) MCT Pepdite – SHS (birth - 1 yr) MCT Pepdite 1 + - SHS (over 1 yr) 75% total fat = MCT	Protein source = hydrolysed pork & soya. May not be suitable for certain religious/ ethnic groups Lactose free
Amino acid based	Neocate – Nutricia (birth – 12 months) Neocate LCP – Nutricia (birth – 12 months) Contains LCPUFA Nutramigen AA – Mead Johnson Neocate Active – Nutricia (1-10 yrs) Better taste, more calcium & iron NeocateAdvance – Nutrica (1-10 yrs)	Contains free amino acids and no peptide chains Lactose free Indicated for CMPA alongside faltering growth, multiple food allergies, and severe/ systemic gastrointestinal symptoms.
Soya based	Infasoy – Cow and Gate Wysoy – SMA Farley's soya formula (Heinz) Isomil (Abbott) Enfamil Prosorbee LIPIL (Mead Johnson)	Whole protein Lactose free Available without prescription

The soya question

Evidence suggests that infants fed soya formula (SF) from birth show normal and comparable growth patterns to those fed milk-based formulas (MF)[9]. SFs are generally agreed to be more palatable than the numerous eHF/AA formulae[10]. Despite this, significant controversy remains surrounding the use of SF, largely due to the presence of soya isoflavones. Isoflavones are referred to as phytoestrogens as their chemical structure is similar to that of

human oestrogen. The potency of isoflavones is however much weaker than that of human oestrogen – up to 400,000 times lower[4]. Despite this, questions have been raised regarding the potential hormonal/reproductive health consequences of feeding isoflavones to infants. However, to date, such concerns have been based on data from *in vitro*/ animal experiments alone, largely involving the administration of high dose purified isoflavones rather than SFs[11]. In 2003 the Committee on Toxicity of Chemicals in Food (COT) published a report highlighting that no adverse affects have been noted in full term infants fed on SF. However, COT highlighted concerns regarding the lack of human studies investigating the health impact of high circulating isoflavone levels in infants fed SFs, particularly those under 6 months of age[12]. The only study to follow up adults fed SF as infants was published in 2001[13]. This study showed no significant difference for men/women fed SF or MF when compared to breast fed infants, for over 30 measures relating to sexual maturation and reproductive history. Authors concluded that there was no evidence for long-term adverse health outcomes amongst adults fed SF as infants. Professor Thomas Badger and colleagues will soon publish the results of The Beginnings Study, a longitudinal, prospective study comparing growth, development and health of SF, MF and breast fed children. Results so far suggest no significant differences between the two formula fed study groups at age 5 years[11].

Potential concerns relating to increased risk of peanut allergy amongst children exposed to soya in early life have been disproven by more recently published work[14,15]. Of more significance is the observed cross-reactivity between cow's milk and soya proteins[16, 17]. The current position statement of the British Dietetic Association's Paediatric Group states that the use of SF to treat CMPA should be discouraged in the first 6 months of life. Certain exceptions to this recommendation are allowed for where clinical need is identified (including refusal to take prescribed eHF/ AAF & vegan families). After 6 months soya formulas may be used where soya products are being considered/ used in the weaning diet[18].

Milk alternatives for toddlers and older children

Other mammalian milks and formulae such as goat, sheep and buffalo are not appropriate for the treatment of CMPA due to the high potential for cross-reactivity between proteins nor are they suitable for lactose intolerance[19]. A variety of plant-based milk alternatives are suitable for children in cooking/ food preparation from weaning onwards and as main milk source from 2 years (Table 2). Parents should be encouraged to select the higher calorie, protein & micronutrient-enriched options**.** The protein quality of plant-based milk alternatives is also a consideration; soya milks are the only plant-based alternatives to contain all 8 essential amino acids and possess a protein digestibility corrected amino acid score (PDCAAS) similar to that of milk[20]. Parents should also be aware that organic milk-free products will not contain added calcium. Food Standards Agency-funded research advised against the

use of rice milk in children aged 1-4 ½, due to the potential risk of arsenic exposure[21].

Table 2: Macro and micro nutrient content of milk alternatives (source: manufacturers data, unless otherwise stated)

Type of milk/ alternative	Example	Energy (kcal/ 100ml)	Protein (g/100ml)	Calcium (mg/100ml)
Whole cows milk[22]	N/A	68	3.4	122
soya milk (calorie & vitamin enriched)	Alpro soya Junior 1+ Milk Alternative*	62	2.6	100
soya milk (calcium-enriched)	Alpro soya Original	38	3	120
Oat milk (calcium enriched)	Oatly Healthy Oat Enriched	45	1	120
Quinoa milk	Ecomil Oat Drink	44.5	1.4	unknown
Almond milk**	Blue Diamond Almond Breeze	60	1	unknown
Hazelnut milk**	Ecomil Hazelnut Drink	50.7	0.8	unknown

Only product available in this category enriched with calcium, iron & vitamins C, D, B2 & B12, plus additional plant-based fats. Suitable as a main milk source from 1 year onwards as part of a balanced weaning diet.
****only suitable if already tolerating nuts***

Weaning and beyond

A great variety of milk-free replacements for key dietary staples such as spreading fats, cheese, yogurts, ice creams and creams are now readily available. The majority of such are based on soya, are extremely palatable, and are easy to use. In addition, soya beans products are offer a high quality protein source[23] and omega 3 and fat and are suitable for incorporation in the whole family's diets.

Dairy is the main source of calcium in the UK diet, especially for infants and children, therefore it is essential to include a variety of calcium-rich dairy-free foods within the diet (Table 3).

Manufacturers of all pre-packed foods are legally obliged to declare any food allergen (including milk and milk products). However, caution is advised when purchasing fresh items without such labelling from outlets such as restaurants, delicatessens and bakeries.

Table 3: Examples of dairy-free calcium- containingfoods[24]

Food	Calcium content
Tinned sardines (eaten with bones)	250mg/ 50g serve incl. bones (2 sardines)
Tofu (soya bean curd)	255mg/ 50g serve
Calcium fortified breakfast cereal (e.g. Ready Brek, Cheerios, Frosties)	140-400mg/ 30g serve
White bread	110mg/ 100g (2 slices)
Soya yogurt (e.g. Alpro soya alternative to yogurt)	150mg/125g pot
Soya custard (e.g. Alpro soya alternative to custard)	120mg/ 100ml serve
Soya desserts (e.g. Alpro soya desserts in chocolate, vanilla or caramel flavours)	150mg/125g pot
Calcium enriched orange juice (e.g. Minute Maid Original Plus Calcium)	146mg/ 100ml serve
Calcium enriched water (e.g. Danone Activ)	75mg/ 250ml serve
Baked beans	80mg/ 150g small tin
Orange	70mg (1 large orange)
Broccoli	30mg/ 90g (3 florets)
Spinach	80mg /50g serve
Dried apricots	26mg/ 35g (4 apricots)

Conclusions

Implementing a dairy free diet for infants and toddlers poses a number of challenges for families and ongoing support and monitoring is needed to ensure successful, safe management which optimises growth and normal dietary behaviours. Health professionals must be familiar with the variety of alternatives and options for substitution of key dairy staples and feel confident discussing their relative merits with parents. Basing advice on current scientific evidence will improve patient confidence and outcomes and help to avoid unnecessary dietary restrictions.

Top Tips

- Infants suspected of or suffering from cow's milk protein allergy (CMPA) or lactose intolerance should be given appropriate and timely dietary counselling from a registered dietitian.
- 90% of children will out-grow CMPA by 3 years of age.
- Lactose intolerance is usually a transient condition in infants and children often following a gastro-intestinal infection.
- Specialised infant formulae are first choice for infants under 6 months with CMPA. Soya formulae may be fed to infants in certain situations where alternatives are deemed unsuitable.

- Soya milk and products and other plant-based dairy-free alternatives can be introduced from 6 months onwards.
- Soya milk and other plant-based milk alternatives can usually be used as a main milk drink from 2 years of age*. Parents should be guided to select those which are higher in fat, protein and calories and which are enriched with vitamins and minerals.
- Dairy-free calcium sources including calcium-enriched soya products, fortified breakfast cereals and green vegetables should be routinely included within the diet.

**** Alpro soya Junior 1+ milk alternative is enriched with key micronutrients plus additional plant-based fats and is suitable as a main milk source from 1 year onwards as part of a balanced weaning diet.***

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