

# Management of infantile colic

## an update



Colic often causes significant problems beyond just infant discomfort and parental distress. Specialist dietitian **Dr Lisa Waddell** provides an expert assessment and also suggests how the effective management of dietary and feeding methods can play a key role in easing symptoms

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Infantile colic causes significant suffering, to more than just baby. Parents and carers are usually stressed and sleep deprived, their relationships with each other and their baby may be affected. Breastfeeding may be stopped earlier or infant formula frequently changed and weaning on to solid foods may begin sooner than originally planned<sup>1</sup>. These babies are also at increased risk of physical abuse<sup>2</sup> and may demonstrate longer term behavioural problems such as temper tantrums<sup>3</sup>, hyperactivity and academic difficulties<sup>4</sup>.

Many babies tend to suffer from a period of discomfort at some point during the day, which is often attributed to colic. True infantile colic however, which was first defined in 1954<sup>5</sup>, is considered to be “inconsolable crying with limb flexure, lasting for at least 3 hours a day (often in the evening), at least 3 days a week, in otherwise healthy, thriving infants, starting in the first weeks of life and ceasing between 3–6 months of age”<sup>5</sup>. There appears to be no association with feeding method, gender, socioeconomic status or family history of food allergy or atopy<sup>6,7</sup>. Colic is perceived by mothers to be one of the most common problems of infancy<sup>8</sup> and is thought to affect up to 28% of babies<sup>6,7</sup>.



The underlying cause of infantile colic is unknown, although it is likely to be due to multiple factors (Box 1). Diagnosis is made by a process of exclusion, ruling out underlying organic causes and acute onset conditions such as infections<sup>1</sup>.

## Management of infantile colic

The management of infantile colic should be based on the underlying suspected cause (Fig 1). General feeding and management advice should be offered to all parents first, covering tips on how to reduce aerophagia and modify behaviour, alongside what is considered to be the most single useful intervention of all; that of parental reassurance<sup>1</sup>. This should be followed by medical assessment and a treatment trial for any suspected organic cause i.e. transient lactose intolerance, cows' milk protein allergy, constipation or gastro-oesophageal reflux disease (GORD). Alternatively, strategies to improve gut microflora and reduce hyperperistalsis and hyperalgesia may be more appropriate. These will be considered in turn below.

## General advice

The general feeding advice as detailed in Box 2 should be offered to every first-time parent as part of antenatal classes. Correct feeding and winding techniques must be established within the first week of life, particularly in a breastfeeding mother, where a poor latching-on technique is likely to result in breastfeeding cessation. In addition, as infantile colic is a common condition, the advice detailed in Box 2 specific to the management of colic could be provided as part of the health promotion activities of health visiting teams and children centre health staff.

Smoking cessation advice should be considered, as it has been shown that babies are twice as likely to develop colic if the mother smoked 15 or more cigarettes daily during pregnancy<sup>14</sup> and even the use of nicotine replacement therapy in pregnancy has been associated with an increased risk of infantile colic<sup>19</sup>. Smoking is linked to increased motilin levels which cause hyperperistalsis and gastro-oesophageal reflux<sup>15</sup>.

## Therapeutic interventions

As infantile colic per se is a condition associated with healthy, thriving infants, therapeutic intervention should only be considered in families where infants do not respond to general advice measures, and where parents or carers feel unable to cope<sup>1</sup>.

## Elimination of cows' milk protein

Infantile colic may be one of the first symptoms of food allergy, which is more likely in babies with a personal or family history of eczema, other atopic conditions such as rhinitis, wheeze or asthma and/or other gastrointestinal symptoms such as diarrhoea, constipation, vomiting, mucus or blood in stools, faltering growth<sup>9,20</sup>. If there are concerns/suspicions that the baby may have a food allergy, as determined from a detailed allergy focused clinical history and medical assessment<sup>21</sup>, then a two to four week trial of a hypoallergenic formula in bottle-fed babies, or a cows' milk free diet in breastfeeding mothers would be warranted, alongside appropriate dietetic advice to ensure nutritional adequacy, including provision of

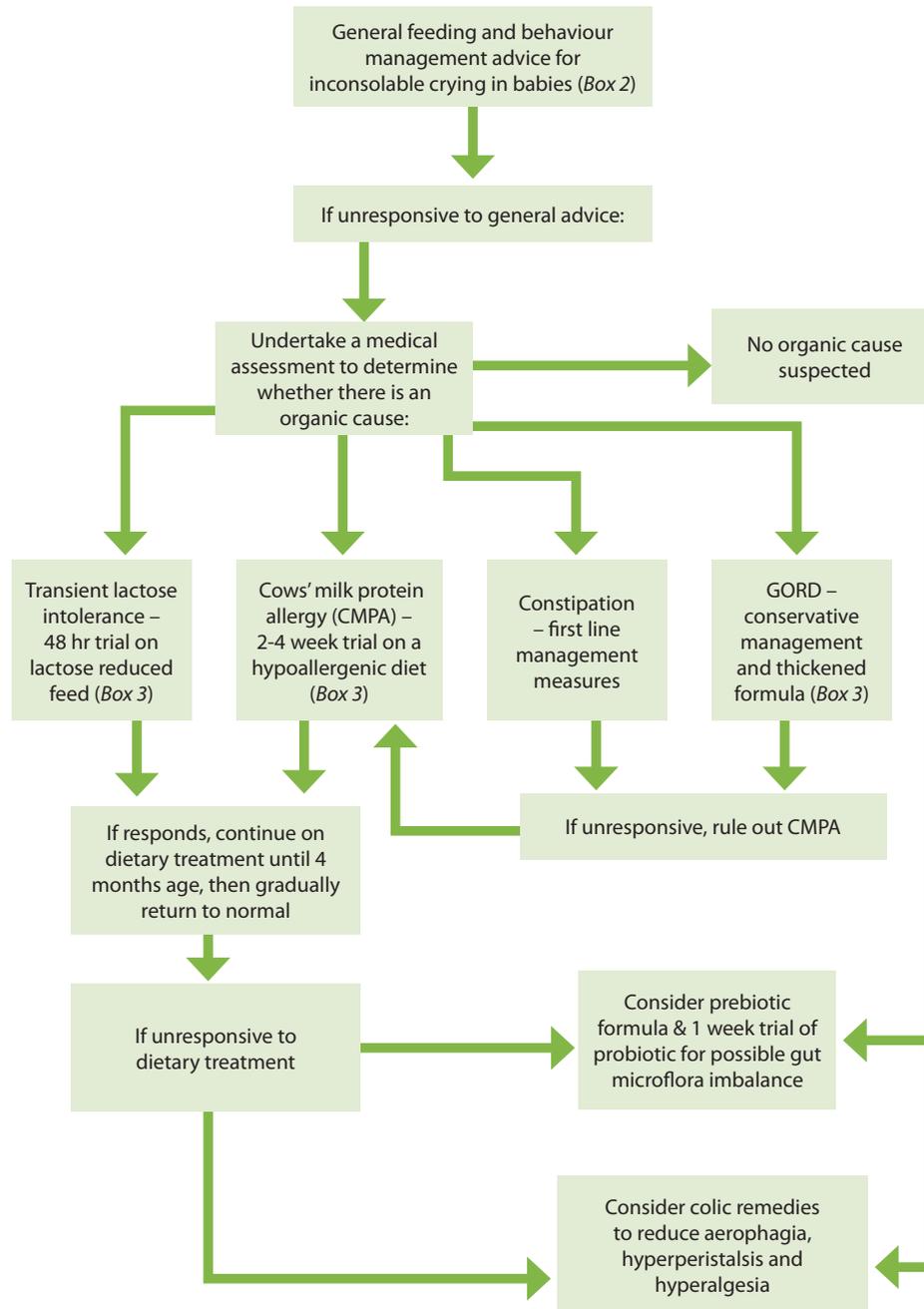
### Box 1: Potential causes of infantile colic

- Cows' milk protein allergy<sup>9</sup>
- Transient lactose intolerance and excessive gas production<sup>10,11</sup>
- Painful gut contractions (hyperalgesic colonic hyperperistalsis)<sup>12</sup>
- Increased levels of gut hormones (motilin & ghrelin) which cause colonic hyperperistalsis<sup>13</sup>
- Maternal smoking increases hormone motilin<sup>14,15</sup>
- Imbalance in intestinal microflora towards more gas-producing pro-inflammatory coliforms<sup>16</sup>
- Behavioural problems resulting from a less than optimal parent–infant interaction<sup>17</sup>
- Gastro-oesophageal reflux disease (GORD) – a condition in its own right<sup>18</sup>

### Box 2: General advice

- Exclude common causes of crying i.e. discomfort e.g. hunger, extremes of temperature
- Reassure parents: it's not their fault, not harmful, common, will grow out of it by three to six months of age
- Advise parents on feeding as follows:
  - Breastfeeding:**
    - Ensure good breast attachment
    - Complete one breast at a time
    - Position baby at an angle of 30 to 45 degrees
    - Reduce consumption of drinks containing caffeine/ alcohol and avoid suspect foods e.g. cruciferous vegetables, onions, chilli peppers
  - Bottle feeding:**
    - Avoid over-shaking the bottle when reconstituting
    - Ensure teat is always full
    - Control feeding rate by altering teat flow and size
    - Consider anti-colic bottles (with air vent/ collapsible bag) – but expensive
- Avoid over-feeding and check winding technique, ensuring a straight back and regular winding (one to two times during feed and once post feed)**
- Determine whether there is an organic reason for the infant's symptoms
- 'Time out' for parents – i.e. sharing care with a friend/relative

Fig 1: Stepwise approach to the management of infantile colic



sufficient calcium and vitamin D from other sources<sup>21</sup>. Recommended hypoallergenic formulas are listed in Box 3. Soya-based infant formulas are not recommended for cows' milk hypersensitivity or lactose intolerance in babies under six months of age, due to both their high phytoestrogen content, which may pose a risk to future fertility and sexual development,<sup>22,23</sup> and the risk of cross-reactivity in babies predominantly suffering from delayed, non-IgE mediated cows' milk protein allergy<sup>24</sup>.

Depending on age, a baby under six months should gradually be weaned onto an extensively hydrolysed formula over a two to four-day period, using ¼-½ strength daily increments, as these formulas are

generally unpalatable. If successful, the special formula should be continued until weaning, when gradual transition onto a normal infant formula over one week can occur. Failed regrading, however, is indicative of longer term cows' milk allergy, rather than being a transient phenomenon, and the baby will need to be weaned onto a cows' milk free diet.

**Elimination of lactose**

For babies not thought to have an allergic/ atopic constitution, it may be helpful to rule out transient lactase deficiency<sup>10,11</sup>, which occurs in babies who are unable to produce sufficient lactase to match the high lactose load of breast milk or cows' milk-based infant

## Box 3: Specialist products for the dietary management of organic causes of infantile colic

### Cows' milk protein allergy

**Extensively hydrolysed infant formula (< 6mths age)** (MCT options not included)

- Aptamil Pepti 1; whey based, 40% lactose (Milupa, Trowbridge, UK)
- Nutramigen Lipil 1; casein based (Mead Johnson Nutritionals, Hounslow, UK)
- Pepdite (SHS International Ltd)

**Amino acid infant formula (< 6mths age)**

- Neocate LCP (SHS International Ltd)
- Nutramigen AA Lipil (Mead Johnson Nutritionals, Hounslow, UK)

### Transient lactose intolerance

**Lactase drops** (Colief, Crosscare, Dublin)

- Breastfeeding: Express a few tsp of breastmilk into a sterile container & add 4 drops of Colief. Feed to baby using a plastic spoon or cup, before breastfeeding as usual
- Bottle feeding: Make up infant formula as recommended by DH23 i.e. add powder to previously boiled water that is at least 70°C, then cool to body temperature by running under cold water. Add 4 drops of Colief, shake gently and leave for 30 minutes before feeding baby
- If feed is going to be stored in the fridge for 4 hours, only add 2 drops of Colief

**Reduced lactose infant formula - 'Comfort' formula**

- Aptamil & C&G (Trowbridge, UK) – 38% lactose, prebiotics GOS & FOS, structured fats
- SMA (SMA Nutrition, Maidenhead, UK) – 55% lactose, no prebiotics, structured fats

**Low lactose infant formula (minimal lactose)**

- Enfamil Lactofree (Mead Johnson Nutritionals, Hounslow, UK)
- SMA LF (SMA Nutrition, Maidenhead, UK)

### Gastro-oesophageal reflux

**Anti-reflux thickened formula**

- Enfamil AR (Mead Johnson Nutritionals, Hounslow, UK) – rice starch, thickens in stomach
- SMA Staydown (SMA Nutrition, Maidenhead, UK) – corn starch, thickens in stomach
- Aptamil AR (Milupa, Trowbridge, UK) – carob seed flour, pre-thickened formula

**Thickeners**

- Instant Carobel (C&G, Trowbridge, UK) – carob seed flour
- Corn starch based thickeners are not recommended for children under one year, unless suffering from faltering growth (therefore not listed).



formula. In breast-fed babies it is important to ensure that the baby empties one breast before feeding from the other, to avoid relying on foremilk (which contains more lactose than hind milk).

A 48 hour trial (24 hours may not be long enough to disprove coincidence) can be considered for infants, where lactase (Colief Infant Drops™) is added to expressed breast milk, or infant formula is incubated with lactase for 30 minutes before it is fed to the baby. The resulting lactose content is approximately 30%. Alternatively, a reduced lactose formula (currently only available as 'Comfort' milks), or low-lactose infant formula can be used (Box 3). All products can be prescribed at the discretion of the GP (as per Advisory Committee on Borderline Substances) or bought over the counter. The presence of some lactose is preferred as it helps to promote colonic adaptation, increase calcium absorption (thereby reducing the risk of constipation and improving bone mineralisation) and renders the feeds more palatable<sup>25</sup>.

If symptoms abate, lactase treatment or use of a reduced/ low lactose formula should continue until the baby is four months old, following which the baby should be gradually weaned back onto a standard infant formula over a one-week period (i.e. substituting 1f/oz/ bottle/ day with a standard formula), to allow the gut to adapt. If using lactase drops, gradually reduce the number of drops added over one week.

Comfort milks are pre-thickened formulas to reduce aerophagia, that also contain partially hydrolysed protein to speed up gut transit, reduced lactose content (38-55%), and certain brands contain prebiotics and structured fats to help produce softer stools and promote growth of beneficial bacteria. They have



been shown to reduce the symptoms of colic and constipation<sup>25</sup>. It may be the reduction in lactose content to approximately 40% that offers benefit to some babies with colic, although it is important to note that not all these formulas are as low in lactose as that used by Savino and colleagues<sup>25</sup>.

### Treating constipation

Constipation in breast-fed babies is rare due to the presence of pre- and probiotics, structured fats and numerous 'other factors' and constipated breast-fed babies should therefore be assessed medically. Breast milk has over 200 human milk oligosaccharides, known as prebiotics, which have been shown to produce softer, more frequent stools<sup>25</sup>. Structured fats, which relate to  $\beta$ -palmitic acid being in position 2 on the glycerol backbone, as predominantly found in breast milk, is absorbed better, and hence free palmitic acid is not available to form calcium-fatty acid complexes in the gut, known as soaps, which can result in constipation<sup>25</sup>. In bottle-fed babies, formulas containing these factors may be beneficial. Correct reconstitution of formula should also be checked, and supplementary water is often needed for bottle fed babies from around two months age. If constipation continues, addition of high sorbitol containing fruit juices e.g. prune, apple, pear may be effective. NICE recommend Movicol Infant (Polyethylene glycol) as first line treatment over Lactulose (which is still most commonly used and can cause flatulence and bloating)<sup>26</sup>. In babies unresponsive to laxatives, cow's milk protein allergy should be considered<sup>27</sup>.

### Conservative management for gastro-oesophageal reflux (GORD)

Conservative management should focus on<sup>18</sup>:

1. avoiding overfeeding, limiting formula to 100-120ml/kg/d
2. careful winding during feeds, keeping upright for 20-30mins post feed
3. bowels open once daily – if not, a laxative should be considered
4. recognising cues – early intervention to avoid excessive crying
5. thickened feeds (preferred to Infant Gaviscon1) (Box 3)
6. avoiding juice.

If the infant does not respond to the above, cows' milk protein allergy should be ruled out before considering GORD medication<sup>1</sup>, as up to 42% of GORD in the first year of life could be due to cows' milk allergy<sup>28</sup>.

### Colic remedies

#### Probiotics

Babies with infantile colic have been shown to have an imbalance in gut microflora, with more gas producing, pro-inflammatory coliforms and less lactic acid bacteria<sup>29</sup>. Probiotics (live micro-organisms that, when consumed, may offer health benefits) e.g. Lactobacillus Reuteri has been shown to:

- Reduce Escherichia Coli colonization, thereby reducing gut inflammation and flatulence
- Reduce hyperperistalsis and hyperalgesia

### Box 4: Other oral remedies

- Oral sucrose appears to act as an analgesic and may therefore help to pacify a colicky baby, but it is only short lived, works in a dose-dependent fashion, repeated doses are more effective and hence it is not considered to be a healthy intervention<sup>35</sup>.
- Herbal drinks containing herbs such as chamomile, fennel and balm-mint which have an anti-spasmodic effect have been shown to be beneficial in small-scale trials<sup>36</sup>, but there are concerns about standardisation of dosage, the nutritional impact of substitution of around 32ml/kg of breast milk or infant formula per day and possible content of sugar and alcohol<sup>37</sup>.
- Non-alcoholic gripe water consists of sodium bicarbonate (antacid) and herbs (anti-spasmodic) and is commonly used by parents and carers, but there is no evidence to recommend its use<sup>1</sup>.
- Homeopathic remedies have been associated with apparent life-threatening events (Gali-col), thought possibly due to overdose of a product that contains potentially toxic components e.g. Vera album and Strychnos-vomica (Strychnine poisoning)<sup>38</sup>.
- Japanese star anise is neurotoxic and looks very similar to Chinese star anise in its dried form<sup>39</sup> and hence is not recommended.



- Exert a positive effect on local gut immunity and subsequent overall immunity by suppressing pro-inflammatory cytokines.

Savino and colleagues compared the use of *L. reuteri* with simethicone in 90 breastfed, colicky babies for 28 days and found that *L. reuteri* reduced crying time within 7 days in 95% of babies, compared with only 7% in the simethicone treated group, which was no better than placebo<sup>30,31</sup>. Evidence to support probiotic containing formula in the treatment of infantile colic has not yet been reported, but they have been shown to reduce the incidence of gastrointestinal infections<sup>32</sup>. These formula however, need to be reconstituted with water no greater than 40–50°C, which currently does not meet with the DH recommendations<sup>33</sup>. A one week trial using a probiotic such as Biogaia™ probiotic protectis drops

(*L. reuteri* protectis) or various Biocare™ powders (Bifidobacterium and Lactobacillus strains, plus prebiotics) may be worth considering in those not thought to have an underlying organic cause. However, parents should be advised that these are expensive to purchase and seemingly only available over the internet.

A cheaper and more readily available option is simethicone (activated dimethicone, e.g. Infacol™, Dentinox™ infant colic drops), which help to disperse wind. However, there is little evidence to support its benefit and it is considered to be no better than placebo<sup>1,6,30</sup>. This is one of the most commonly used treatments for colic and the NHS Choices website<sup>34</sup> states that there is no harm in undertaking a one week trial as it is a cheap and readily available option, with no reported adverse effects.

## Physical therapies

Infant massage has been reported to be no more effective than a crib vibrator<sup>40</sup> although a Cochrane review suggests some benefit to mother-infant interaction<sup>41</sup>.

Chiropractic spinal manipulation and cranial osteopathy is not yet widely performed on infants in the UK and there is insufficient evidence to promote its use<sup>42</sup>.

## Conclusions

Infantile colic is common and distressing, its causes are multifactorial and diagnosis is by a process of exclusion. General advice, reassurance and focused counselling should be offered to all families first. As infantile colic is a condition associated with healthy, thriving infants, therapeutic interventions based on the underlying suspected cause should only be considered following a medical assessment in those who do not respond to first line advice. The prognosis is good for the majority who suffer with transient problems over the first 2 years of life.



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