

Current Update on Management of Infantile Colic

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Abstract: *Infant colic is a troubling condition for both parents and pediatrician, but it is benign and self-limiting. About 40% infants experience colic and it resolves between 12-16 week of life. ROME III and IV criteria are used for diagnosing infantile colic, but ROME IV is more specific for research purposes. The cause of colic is unknown but some hypotheses were proposed such as bile acid immaturity, microbial alterations and immaturity of gastrointestinal motility. Parental reassurance is the key of management of this condition, other therapies such as dietary modification, pharmacological and other approaches were not proven to be effective. Probiotics (Lactobacillus reuteri DSM 17938) are proven to reduce the symptoms and can prevent the colic. Other strains are still need further studies to be recommended.*

Keywords: infantile, colic, management, update

1. Introduction

Infantile colic is a troubling and stressful condition for parents. Although it is self-limiting, it can cause child abuse. Approximately about 10-40% infants experience colic. Colic usually begins about second week of life and resolves between 12 – 16 weeks. It is a common condition for infants to cry, but in colic they cry excessively and it is known as “rule of three” (>3 hours/day, >3 days/week, >3 weeks in duration) and it is disrupting their sleep cycle, build up anxiety on their parents and it is difficult to console. There isn't any association between racial, gestational age, socioeconomic or gender for this condition.[1]

The etiology of infantile colic is still not known; the possible causes include alteration in microflora, food allergy, cow's milk protein allergy or lactose intolerance, increased on serotonin secretion, poor feeding technique, maternal smoking.[2], [3].

Many treatments were proven to be ineffective such as simethicone or proton pump inhibitors (PPIs).[2]

Specific strain of probiotic like *Lactobacillus reuteri* (strain DSM 17938), hypoallergenic diet, soy based formula, herbal tea, modification of maternal diet, hydrolyzed formula for formula-fed infants also proven to be successful and effective on many researches.[2], [4]–[7]

2. Definition and Diagnosis Criteria

Infantile colic can be diagnosed using ROME IV criteria, when an infant less than five months of age had recurrent and prolonged periods of crying, fussing or irritability reported by caregivers that occur without any obvious cause and cannot be prevented or resolved by caregivers; no evidence of infant failure to thrive, fever or illness.[8], [9]

Additional diagnostic criteria include infant has cried or fussed for three or more hours per day, during three or more days in one week (whether in telephone or face-to-face screening interview with clinician) and total of daily crying >3 hours recorded by a 24-hour cry-record diary.[8], [9]

Apart from the diagnostic criteria, comprehensive history taking and thorough examination should be done to rule out any red flags (abdominal distention, excessive vomiting, fever, poor feeding and lethargy).[9]–[11]

Table 1: ROME III vs ROME IV Criteria

Criteria	Rome III[10]	Rome IV[11]
Age limit	Birth to 4 month of age	5 month of age
Main focus for diagnosis	Duration of crying (at least 3hours/day, 3days/week, at least 1 week	Crying/fussing which cause distress to parents
Additional criteria	Not given	Subjective parental reporting of crying for more 3hours/day, at least 3 days/week, and objective record by a 24 hour cry-record diary

3. Etiology

The cause of colic is unknown, but there are many probable causes (see table 2) and hypotheses proposed for the cause of infant colic, such as:

- Bile acid immaturity.
- Microbial alterations.
- Immaturity of gastrointestinal motility.[5], [12]–[14]

Table 2: Probable causes of infant colic[3], [9], [12]

Category	Causes
Non-pathological causes of crying	<ul style="list-style-type: none"> Lack of sleep Hunger Discomfort from soiled diapers, diaper rash, extreme temperatures, or sudden stimulation of noise or light
Psychosocial	<ul style="list-style-type: none"> Parental variables such as family stress, maternal anxiety
Gastrointestinal	<ul style="list-style-type: none"> Poor feeding technique (underfeeding, overfeeding, infrequent burping, swallowed air) Cow's milk protein intolerance Lactose intolerance Gastro-oesophageal reflux

4. Management

Dealing with infantile colic can be approached with many ways, but there is no evidence-based approach to manage persistent infant crying. [14]

The five maneuvers also known as the five S (swaddling, shushing, stomach position, swinging and sucking) can help to calm the baby through a group of reflexes (vestibular, auditory and tactile). [14]

Parental reassurance is still the main management of this condition. Common approaches focused upon physical treatments to reduce symptoms and with inconclusive effectiveness.[5]–[9], [14], [15] See table 3 to learn the difference in recommendation of treatment of breastfed infants and bottle-fed infants.[9]

Table 3: Evidence-based recommendations[9], [16]

<i>Breastfeeding infants</i>	<i>Bottle-fed infants</i>
Parental reassurance	Parental reassurance
First line : Parentcraft advice	First line : Parentcraft advice
Second line : consider an allergen-restricted diet (excluding cow's milk, eggs, peanuts, tree nuts, wheat and soy) for mothers with a history of food allergies or consider giving <i>Lactobacillus reuteri</i> for infants.	Second line : consider a transition to hydrolysed formula for 2 weeks and revert to the original formula if there is no improvement. For infants with cow's milk protein intolerance, a clinical response usually occurs within 48 hours. It can be continued until 3-6 months of age.

4.1. Parent training programmes

Parent training program is an alternative approach to provide training, support and psychological intervention for parents to help reduce their infant's symptoms and parents' anxiety level.

The interventional research was conducted in USA, Canada, Netherlands and also Iran. A meta analysis concluded that parent training was more effective than control, but with low certainty evidence.[15]Milk exclusion/soy milk formula also found to be effective in reducing crying time, but it is only one small study with 20 infants.[15] Swaddling (see figure 1) and specialized baby seat were not found to be effective to reduce the symptoms.[15]

Further RCT must be done to conclude whether if parent training programmes are effective to reduce the symptoms.[15]



Figure 1: Swaddling a baby

Source: Swaddling A Baby Pros And Cons ^{ooo} | Wiggly Toes

4.2. Dietary manipulation

The evidence for maternal dietary manipulation is weak. Two systematic reviews from 2012 from small randomized trials suggest that extensive hydrolysate formula may reduce distress in infantile colic.[14]

In atopic families, there may be some benefit, but it is still inconclusive. Partial hydrolysed formula may have some benefit in reducing colic in infants with cow's milk protein allergy. [14]

To summarize, for breastfed infants, a low allergen maternal diet can be considered for two weeks and there is no reason to stop breastfeeding. For bottle-fed infants, the approach is changing the formula to hydrolysed formula. Partial hydrolysed to infants who are not suspected from cow's milk protein allergy, otherwise extensive hydrolysed formula should be used.[4], [9], [14], [16]

A Cochrane study of 15 RCTs that involved 1121 infants aged 2 to 16 weeks concluded there is not enough evidence to recommend any interventions (dietary modification).[4]

4.3. Probiotics

The possibilities of probiotics to cure and prevent functional gastrointestinal disorder are very interesting. Modification of gut microbiota composition by dietary intervention is currently the most researched area.[13]

Lactobacillus and *Bifidobacterium* are the most frequently used organisms in probiotics and considered to be safe and well tolerated. Specific strain of *Lactobacillus reuteri* DSM 17938 (daily dose of 10^8 CFU) has shown promising results to reduce the colic on breastfed infants, but not on bottle-fed infants. [6], [13], [14], [17], [18]

Breastfed infants who received *L. reuteri* DSM 17938 showed an increased FOXP3 concentration and reduction of faecal calprotectin. Different probiotics were also been studied but still inconclusive such as *Lactobacillus rhamnosus GG*. [14]Synbiotic(fructo-oligosaccharides, *Lactobacillus casei*, *L.rhamnosus*, *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Streptococcus thermophilus*, *Bifidobacterium breve* and *Bifidobacterium infantis*) were found to be effective in one trial.[14]

4.4. Pharmacological and other therapies

Some managements include pharmacological approach such as simethicone, sucrose and lactase. Simethicone is often used to relieve the symptoms of infantile colic, although it is reported to be effective, but it is not better than placebo in systematic reviews.[9], [16]

Sucrose given orally suggested to have a calming effect and to help relieve pain but has weak evidence of beneficial effect to reduce the symptoms.[16] Lactase also can be used to treat lactose intolerance infants with colic, but the evidence is also weak to be recommended.

Acupuncture, herbal remedies such as chamomile and fennel, manipulative therapies or massage were found to be not beneficial and still need further studies.[9], [16]

5. Conclusion

Infantile colic is very stressful to parents and can cause child abuse. The criteria by ROME IV is very practical and useful for clinical and research setting. The causes of colic are still unknown but many hypotheses and probable causes were already proposed and identified. Parental reassurance is still the cornerstone of management of infant colic and dietary manipulation were still inconclusive on some studies.

Specific strain of *Lactobacillus reuteri* (DSM 17938) were proven to be effective on breastfed infants, but not on bottle-fed infants. Further studies are still needed to find other modalities to treat this condition.

References

- [1] G. M. Cohen and L. W. Albertini, "Colic," *Pediatr. Rev.*, vol. 33, no. 7, p. 332, Jul. 2012, doi: 10.1542/pir.33-7-332.
- [2] J. D. Johnson, K. Cocker, and E. Chang, "Infantile Colic: Recognition and Treatment," *Am Fam Physician*, vol. 92, no. 7, pp. 577–582, Oct. 2015.
- [3] R. Nocerino *et al.*, "The controversial role of food allergy in infantile colic: evidence and clinical management," *Nutrients*, vol. 7, no. 3, pp. 2015–2025, Mar. 2015, doi: 10.3390/nu7032015.
- [4] M. Gordon *et al.*, "Dietary modifications for infantile colic," *Cochrane Database Syst Rev*, vol. 10, p. CD011029, 10 2018, doi: 10.1002/14651858.CD011029.pub2.
- [5] R. Dryl and H. Szajewska, "Probiotics for management of infantile colic: a systematic review of randomized controlled trials," *Arch Med Sci*, vol. 14, no. 5, pp. 1137–1143, Aug. 2018, doi: 10.5114/aoms.2017.66055.
- [6] V. Sung *et al.*, "Lactobacillus reuteri to Treat Infant Colic: A Meta-analysis," *Pediatrics*, vol. 141, no. 1, 2018, doi: 10.1542/peds.2017-1811.
- [7] M. M. Garrison and D. A. Christakis, "A Systematic Review of Treatments for Infant Colic," *Pediatrics*, vol. 106, no. Supplement 1, p. 184, Jul. 2000.
- [8] J. M. Sarasu, M. Narang, and D. Shah, "Infantile Colic: An Update," *Indian Pediatr*, vol. 55, no. 11, pp. 979–987, Nov. 2018.
- [9] T. M. L. Lam, P. C. Chan, and L. H. Goh, "Approach to infantile colic in primary care," *Singapore Med J*, vol. 60, no. 1, pp. 12–16, Jan. 2019, doi: 10.11622/smedj.2019004.
- [10] M. A. L. van Tilburg, A. Rouster, D. Silver, G. Pellegrini, J. Gao, and P. E. Hyman, "Development and Validation of a Rome III Functional Gastrointestinal Disorders Questionnaire for Infants and Toddlers:," *Journal of Pediatric Gastroenterology and Nutrition*, vol. 62, no. 3, pp. 384–386, Mar. 2016, doi: 10.1097/MPG.0000000000000962.
- [11] M. J. Schmulson and D. A. Drossman, "What Is New in Rome IV," *J Neurogastroenterol Motil*, vol. 23, no. 2, pp. 151–163, Apr. 2017, doi: 10.5056/jnm16214.
- [12] M. Camilleri, S.-Y. Park, E. Scarpato, and A. Staiano, "Exploring hypotheses and rationale for causes of infantile colic," *Neurogastroenterol. Motil.*, vol. 29, no. 2, p. e12943, Feb. 2017, doi: 10.1111/nmo.12943.
- [13] A. Pärty, S. Rautava, and M. Kalliomäki, "Probiotics on Pediatric Functional Gastrointestinal Disorders," *Nutrients*, vol. 10, no. 12, Nov. 2018, doi: 10.3390/nu10121836.
- [14] S. Daelemans, L. Peeters, B. Hauser, and Y. Vandenplas, "Recent advances in understanding and managing infantile colic," *F1000Res*, vol. 7, 2018, doi: 10.12688/f1000research.14940.1.
- [15] M. Gordon, J. Gohil, and S. S. Banks, "Parent training programmes for managing infantile colic," *Cochrane Database Syst Rev*, vol. 12, p. CD012459, 03 2019, doi: 10.1002/14651858.CD012459.pub2.
- [16] J. Zeevenhooven, P. D. Browne, M. P. L'Hoir, C. de Weerth, and M. A. Benninga, "Infant colic: mechanisms and management," *Nat Rev Gastroenterol Hepatol*, vol. 15, no. 8, pp. 479–496, Aug. 2018, doi: 10.1038/s41575-018-0008-7.
- [17] A. Schreck Bird, P. J. Gregory, M. A. Jalloh, Z. Risoldi Cochrane, and D. J. Hein, "Probiotics for the Treatment of Infantile Colic: A Systematic Review," *J Pharm Pract*, vol. 30, no. 3, pp. 366–374, Jun. 2017, doi: 10.1177/0897190016634516.
- [18] M. Karkhaneh, L. Fraser, H. Jou, and S. Vohra, "Effectiveness of probiotics in infantile colic: A rapid review," *Paediatr Child Health*, vol. 25, no. 3, pp. 149–159, Apr. 2020, doi: 10.1093/pch/pxz007.

Author Profile



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