

# QUARTERLY MEDICAL REVIEW

Vol. 68, No. 4

October - December 2017

Review:

**Practical approach to the  
management of infantile colic**

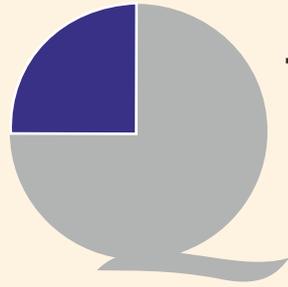


Published and issued by :

**RAPTAKOS, BRETT & CO. LTD.**, 21 A, Mittal Tower, A Wing, 210, Nariman Point, Mumbai 400 021. INDIA.  
[www.raptakos.com](http://www.raptakos.com)

*For the use of Registered Medical Practitioners only*

*For private circulation*



# QUARTERLY MEDICAL REVIEW

---

Vol. 68, No. 4

October - December 2017

---

Review:

## **Practical approach to the management of infantile colic**

---

**Prof (Dr.) Anil Kumar Jaiswal**

MBBS, MD (IMS, BHU), Phd (Pediatrics)

Professor and Head Department of Pediatrics  
PMCH, Patna, Bihar, India.

---

<b>Contents</b>	<b>Page No.</b>
Introduction	- 1 -
Definition	- 1 -
Etiology	- 2 -
Diagnostic Evaluations	- 3 -
Investigations	- 4 -
Probiotics	- 5 -
Glucose	- 6 -
Manipulative Therapies	- 6 -
Behavioral interventions	- 7 -
Burping	- 7 -
Herbal remedies	- 7 -
Digestive enzymes	- 8 -
Massage Therapy	- 8 -
Conclusion	- 9 -
References	- 9 -

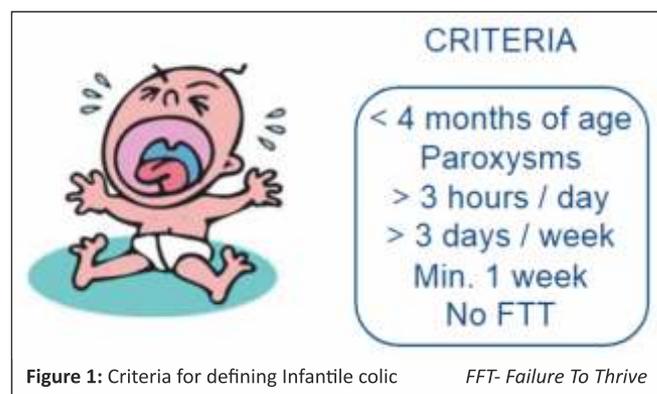
# Infantile Abdominal Colic

## Introduction

Infantile colic is a common problem in otherwise healthy thriving infants around the world. It is associated with excessive, paroxysmal crying over a regular period during the day during early infancy. (Anabrees, Indrio et al. 2013) Colic is most likely to occur in the evenings, and it occurs without any identifiable cause. During episodes of colic, infants are difficult to console and they stiffen, draw up their legs, and pass flatus. About one in five infants younger than three months develops colic. It is one of the common reasons parents seek the advice of a pediatrician or family practitioner during their child's first 3 months of life. (Anabrees, Indrio et al. 2013) Although colic affects 5% -19% of infants and is self limiting, it is often a stressful problem for parents and a challenging condition to manage for pediatric consultation. (Castro-Rodriguez, Stern et al. 2001),(Gelfand, Thomas et al. 2012), (Lucassen, Assendelft et al. 2001)

## Definition

The most widely used definition of colic was coined by Wessel et al., which is based on the amount of crying. (Wessel, Cobb et al. 1954) Infantile colic is defined as episodes of inconsolable crying in an otherwise healthy infant younger than three months of age, that last at least three hours a day and occur at least three days per week over the course of at least three weeks in a month. Because of the natural course of infant colic, it can be difficult to interpret trials that do not include a placebo or have no treatment group for comparison. (Lucassen 2010) As per the more recent definition colicky infants otherwise healthy, cry constantly during the evening at about the same time each day on at least one week. (Hyman, Milla et al. 2006)



## Pathophysiology

The term colic originates from the Greek word *kolikos* or *kolon*, implying that some disturbance is occurring in the GI tract. Infantile colic is poorly understood phenomenon occurring equally in both breastfed and formula-fed infants. It is hypothesized that infant's nervous or digestive system may be immature. Excessive intestinal gas in infants could be the reason for colic as a result of crying which may result in large amounts of air entering the gastric lumen or colonic fermentation proposed source of excessive intestinal gas. However, no experimental evidence supports either theory. (Lehtonen and Rautava 1996).

Increased levels of ghrelin and motilin were observed in infants affected by colic, suggesting their role in aetiopathogenesis of this disorder. However further studies are required to clarify their role in infantile colic. (Savino, Grassino et al. 2006) Calprotectin is a calcium-binding protein produced by immune system cells. Its levels are used as an index of intestinal inflammation if measured in fecal samples. It is helpful to differentiate inflammatory bowel disease (higher level) from functional abdominal pain in school-age children. (Kostakis, Cholidou et al. 2013) However its usefulness in younger children is unclear because the physiological levels of calprotectin in infants are higher than in older children. (Savino, Castagno et al. 2010)

Infants with colic have associated increased levels of certain biochemical markers, such as motilin, alpha lactalbumin, and urinary 5-hydroxy-3-indole acetic acid (5-OH HIAA). Data from one study suggested that psychosocial stress during pregnancy is associated with babies who develop colic. (Sondergaard, Olsen et al. 2003) Further research is needed to establish a causal relationship of these factors to colic.

A recent meta-analysis indicated that colic may be a form of migraine headache rather than, as has been proposed, a gastrointestinal condition. The data from 3 studies (891 subjects total) was analysed, one of which indicated that there is a greater likelihood of colic in infants whose mothers have migraine headaches and the

other two of which indicated that infants with colic are more likely to experience migraine in childhood and adolescence. Using a pooled random effects model in their analysis, Gelfand and colleagues found the odds ratio for an association between migraine and colic to be 5.6. (Gelfand, Goadsby et al. 2015), (Qubty and Gelfand 2016)

Generally Colic diagnosis is made by exclusion. Crying by infants with or without colic is mostly observed during evening hours and peaks at the age of 6 weeks. The cause of this diurnal rhythm is not known. The amount of crying is not related to an infant's sex; the mother's parity; or the parents' socioeconomic status, education, or ages. Increased susceptibility to recurrent abdominal pain, allergic disorders and certain psychological disorders may be seen in some babies with colic in their childhood. (Douglas and Hill 2011) On acoustic exploration, colicky crying is variable in pitch, more turbulent or dysphonic, and has a higher pitch as compared to regular crying. Mothers of infants with colic, unlike mothers of infants without colic, rate the cries as more urgent, discomforting, arousing, aversive, and irritating than usual.



Figure 2: Symptoms of Infantile colic

Detailed history about the timing, the amount of crying, and the family's daily routine is essential for diagnosis. The benign nature of colic should be kept in mind and rule out causes of excessive crying in an infant, such as strangulated hernia, hair in the eye, otitis, and sepsis. Physical examination should be carried out to confirm normalcy.

## Etiology

### *Gastrointestinal (GI) conditions:*

GI causes which may contribute to infantile colic include gastroesophageal reflux, overfeeding, underfeeding, milk protein allergy, and early introduction of solids.

### *Maternal Smoking:*

Recent epidemiologic evidence suggests that exposure to cigarette smoke and its metabolites may be related to colic. Maternal smoking and exposure to nicotine replacement therapy (NRT) during pregnancy may be associated with colic. In one study, prenatal nicotine exposure was associated with an elevated risk for infantile colic in offspring.

This was true both in women who smoked during pregnancy and those who used nicotine replacement therapy compared with unexposed women. Partners' smoking was not associated with infantile colic after adjustment for maternal smoking.

### *Parental behavioral:*

Issues such as family tension or inadequate interaction between parents and infant have been considered, but these issues are really controversial. Postpartum depression may lead to stress in parents, which may be transferred to the infant, resulting in excess crying.

### *Food allergy:*

This may contribute to colic in infancy. Infants with food allergy often respond to hypoallergenic formula or a maternal elimination diet. Some evidence has linked persistent crying in young infants to food allergy. (Heine 2006) An association between colic and cow's milk allergy (CMA) has been postulated. (Taubman 1988) Elimination of cow's milk from the mothers' diet is not beneficial for infants with a negative skin test. Infants with a positive skin test may benefit from this management. (Moravej, Imanieh et al. 2010)

### *Low birth weight:*

This may be associated with infantile colic, and further research will be aimed to focus on fetal growth and infantile colic. The cumulated incidence of infantile colic was 10.9%. Low birth weight babies (< 2500 g) had more than twice the risk (odds ratio = 2.7, 95% confidence interval 1.2 to 6.1) of infantile colic when controlled for gestational age, maternal height, and smoking. (Sondergaard, Skajaa et al. 2000).

### *Intestinal microflora:*

It is observed that the intestinal microbiota in colicky infants differs from that of healthy controls. A study involving microarray revealed that infants with colic showed lower microbiota diversity and stability than control infants in the first weeks of life. (de Weerth, Fuentes et al. 2013) Another study with culturing approach found a low amount of lactobacilli and an increased amount of coliform bacteria in the intestinal microbiota. This could be a possible cause of gut dysmotility and increasing of gas production (Savino, Cordisco et al. 2009) *L. reuteri* improved colicky symptoms in breastfed infants within 1 week of treatment, compared with simethicone, which suggests that probiotics may have a role in the treatment of infantile colic. (Savino, Pelle et al. 2007) Lower counts of intestinal lactobacilli were observed in infants with colic compared with infants without colic. (Savino, Pelle et al. 2007, de Weerth, Fuentes et al. 2013) Bifidobacterium and Lactobacillus may help in reducing colic induced crying and fussing. (Partty, Kalliomaki et al. 2012)

The results of a Dutch study that followed the temporal development of intestinal microbiota from birth to approximately 100 days in 24 infants suggested that early differences in the development and composition of gut flora may be at the root of infant colic. (de Weerth, Fuentes et al. 2013) At 2 weeks, babies later diagnosed with colic had significantly less microbial diversity and stability than their healthy counterparts, as well as more than twice the abundance of proteobacteria and significantly reduced levels of Bacteroidetes. These differences were all seen in the first month of life, before the colic peak, and usually disappeared by 3 to 4 months of age, when colic usually resolves.

### *H pylori infection:*

Infection with *H pylori* is associated with infantile colic and may be a causative factor. This was determined in a study where in of the 55 infants presenting with infantile colic, 45 (81.8%) tested positive for *H pylori*; of the 30 healthy controls, 7 (23.3%) tested positive for *H pylori* (odds ratio, 15.3 [95% CI, 17.9-29.8]). (Ali 2012)

### *Inexperienced parenting:*

Inexperienced parents or incomplete or no burping after feeding. Incorrect positioning after feeding may contribute to excessive crying. Note that colic is not limited to the first-born child, casting doubt on the theory about inexperienced parenting as the etiologic factor.

## Diagnostic Evaluations

Underlying serious diseases and feeding disorders must be excluded. A careful patients history needs to be elucidated to establish the relationship between infant's behavior and the episodes of crying, time of day and duration of them. It is important to evaluate if the infant is correctly fed, is gaining weight, has diarrhea, fever or unusual stools. A complete physical examination should be performed signs and symptoms such as eczema or diarrhea should be elicited as these may be suggestive of a common condition such as cow's milk proteins allergy. Moreover gastro-esophageal reflux or more uncommon but life-threatening causes such as bowel intussusception have to be evaluated. A negative physical examination in an infant showing paroxysmal and inconsolable crying indicate no need for biochemical and radiological examination. Since infantile colic diagnosis is made by exclusion it is essential to know the the differential diagnosis of infantile colic. These may include all common and uncommon causes of excessive crying. The following is a partial list of reasons of excessive crying in an infant:

- Corneal abrasion
- Hair wrapped around toes and fingers

- Strangulated hernia
- Torsion of testis or appendix of the testis
- Protein Intolerance
- Pneumonia
- Bronchiolitis
- Acute Otitis Media
- Bacterial Meningitis
- Intussusception
- Aseptic Meningitis

## Investigations

Laboratory evaluation are generally not indicated in colic unless there is suspicion of serious health condition, such as gastroesophageal reflux. In infants with excessively watery stools, testing them for excess reducing substances (Clinitest) may be considered. Positive results suggest of an underlying GI problem, such as acquired (postinfectious) lactose intolerance. Stool examination for occult blood may be carried out to rule out cow's milk allergy (CMA).

## Conservative management

Ruling out common causes of crying is the first step in treating an infantile colic. Dietary advices may differ according the type of feeding.

Breast-fed infants:

Lactating mother should consume low allergen diet avoiding cow's milk and dairy food with appropriate intake of vitamins and minerals. At least two weeks is required to evaluate the effectiveness of the mother's diet and dietary intervention. (Shergill- Bonner 2010) Nocturnal breast milk contains melatonin, which may be helpful in improving infant's sleep and reducing colic. (Savino, Ceratto et al. 2014).

Bottle-fed infants:

Partially hydrolyzed whey proteins based formula with prebiotic oligosaccharides seem to be effective. (Savino, Palumeri et al. 2006). The efficacy of other formulas, for instance containing probiotics, need to be further evaluated. (Sung, Collett et al. 2013) Extensively hydrolyzed formulas based on casein or whey could be helpful in severe infantile colic or additional atopic symptoms. The dietary changes or therapies should be undertaken only under the supervision of the pediatrician. (Gupta 2007)

It is recommended that the parents should not exhaust themselves and consider leaving their baby with other caretakers for short respites. Cornerstones of management consist of constant follow-up and a sympathetic attitude by physician. The natural history of persistent crying of infancy is improvement over time. Specific management techniques or a car-ride simulation proved no better than reassurance and support alone in decreasing daily hours of crying. (Parkin, Schwartz et al. 1993)

## Pharmacological treatment

Several trials have examined pharmacotherapy as a treatment of infantile colic. Pharmacologic agents are aimed at reducing gastrointestinal discomfort, which has been theoretically linked with infantile colic. Anticholinergic medications such as dicyclomine hydrochloride and dicycloverine have been shown to be effective in reducing the increased peristaltic cholinergic activity of the gut. (Lucassen, Assendelft et al. 1998) Unfortunately, the adverse effect profile reported for these medications is significantly morbid. Adverse

effects include loose bowel movements, accidental overdose of the medication, and the appearance of patients as dopey, wide-eyed, and excessively sleepy. Because of serious, although rare, adverse effects their use is not recommended.

A randomized, double-blind, placebo-controlled clinical trial investigated the effectiveness and safety of cimetropium bromide in the treatment of infantile colic. It was found that Cimetropium bromide was more effective than placebo in reducing the duration of crying in children with infantile colic. (Savino, Brondello et al. 2002) Comparison of Simethicone with placebo revealed no difference in daily hours of crying at the end of treatment in one small, low-quality study involving 27 infants. A meta-analysis of data from two cross-over studies comparing Simethicone with placebo showed no difference in the number of infants who responded positively to treatment (risk ratio (RR) 0.95, 95% confidence interval (CI) 0.73 to 1.23; 110 infants, low-quality evidence). One small study (30 participants) compared Simethicone with *Mentha piperita* and found no difference in crying duration, number of crying episodes or number of responders. (Biagioli E, 2016) Considering the side effect profile drug treatment generally has no place in the management of colic, unless the history and investigations reveal gastroesophageal reflux. (Cohen-Silver and Ratnapalan 2009), (Iacovou, Ralston et al. 2012).

## Complementary and alternative medicines

In the absence of safe and effective pharmacological interventions, complementary and alternative medicine therapies have assumed an increasingly important role in the management of infantile colic. Some nutritional studies reported favourable results for the use of hydrolysed formulas in bottle-fed infants or low-allergen maternal diets in breastfed infants but not for the use of additional fibre or lactase. Behavioural studies on the use of increased stimulation gave unfavourable results, whereas results from the use of decreased stimulation and contingent music were favourable. These studies demonstrated poor methodological rigour. (Hall, Chesters et al. 2012)

## Probiotics

The use of probiotics in infantile colic is based upon the hypothesis that atypical intestinal microflora could cause gut dysfunction and gas production, contributing to symptoms. Some studies have shown that administration of *Lactobacillus reuteri* ATCC 55730 and its variant daughter strain *Lactobacillus reuteri* DSM 17938 to breastfed infants is well tolerated and improves symptoms of infantile colic compared with simethicone or placebo. The possible mechanism of action of *Lactobacillus reuteri* include improvement in gut function and motility as well as a possible effect on visceral pain. The improvement of colic effect may be related to induced changes in the fecal microbiota, since a reduction of *E. coli* colonization has been observed.

At present, growing data are available on the role of probiotics in colic, and there is a great interest within medical research in the understanding of the mechanisms by which probiotic bacterial strains antagonize pathogenic gastrointestinal microorganisms or exert other beneficial effects *in vivo*. Recently the use of 454-pyrosequencing analysis has been shown an increased value of *Bacteroides* in infants responding to probiotics. A recent meta-analysis underlines that *L. reuteri* may be effective as treatment for crying in exclusively breastfed infants with colic, but there is still insufficient evidence to support probiotic use to manage colic, especially in formula-fed infants, or to prevent infant crying. (Sung, Collett et al. 2013, Savino, Ceratto et al. 2014) Indrio et al. had performed a randomised clinical trial (RCT) that showed the efficacy of *L. reuteri* in preventing infantile colic and other functional gastrointestinal disorders. (Indrio, Di Mauro et al. 2014) On the contrary, Sung et al. have described another RCT that shows no effect of *L. reuteri* in treating infantile colic, however study was conducted in a really heterogeneous population of infants with many confounding factors (such as treatment with proton pump inhibitors, types of infant formulas, recruitment at emergency department and outcomes including fussing, that is not an objective parameter.

Moreover, the meta-analysis reported by Sung in the same article confirms the positive effect of *L. reuteri* in reducing symptoms due to infantile colic. (Sung, Collett et al. 2013) *Lactobacillus reuteri* endogenous to the human gastrointestinal GI tract was found to relieve colic symptoms in breastfed infants within one week of

treatment. This was compared with simethicone, which suggests that probiotics may have a role in treatment of infantile colic. (Savino, Pelle et al. 2007) Lactobacillus reuteri possibly increased the effectiveness of treatment for infantile colic and decreased crying time at 2 to 3 weeks without causing adverse events. However, these protective roles are usurped by gradual physiological improvements. Current evidence is limited by the heterogeneity of the trials and should be considered with caution. Higher quality, multicenter randomized controlled trials with larger samples are needed. (Xu, Wang et al. 2015)

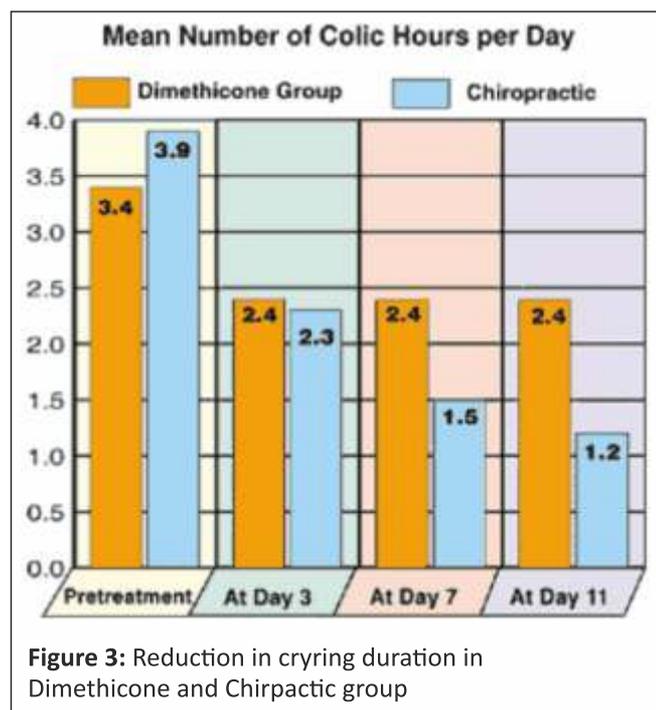
A study evaluated the nutritional adequacy, the gastrointestinal tolerance and the effect on colic of an alpha-lactalbumin-enriched and probiotic-supplemented formula. This double-blind, placebo-controlled study enrolled 66 healthy infants with colic, aged 3 weeks to 3 months, fed during 1 month with the either experimental formula (EF, Modilac Digest 1) or control formula (CF) and evaluated for efficacy and safety parameters at days 15 and 30. An alpha-lactalbumin-enriched and probiotic-supplemented formula guaranteed good weight and length gains in infants with colic and seemed to provide good gastrointestinal tolerance. However Feeding-related' gastrointestinal side effects were significantly lower with EF than with CF (P=0.011). (Dupont, Rivero et al. 2010)

## Glucose

Oral hypertonic glucose and sterile water were compared for treatment of colic in infants in a randomized, double blind crossover trial wherein a total of 25 infants diagnosed as typical infantile colic were given 1 mL of 30% glucose solution or sterile water for 4 days consecutively. In the group receiving glucose, 30% had significantly less colic than the placebo group. (Akcem and Yilmaz 2006) Since oral glucose solution is natural, safe, cheap and easily achievable, it might be considered as an alternative therapy.

## Manipulative therapies

Manipulative therapies, such as chiropractic and osteopathy, have been suggested as interventions to reduce the severity of infantile colic. However metanalysis showed that the results did not reach statistical significance. Further research is required where those assessing the treatment outcomes do not know whether or not the infant has received a manipulative therapy. There are inadequate data to reach any definitive conclusions about the safety of these interventions. (Dobson, Lucassen et al. 2012) Cochrane Database Systematic Reviews and randomized trials published in last years focused on this kind of intervention for infantile colic. Chiropractic treatment may offer short-term relief (reduction of daily hours of crying compared



with no treatment or placebo), but long-term benefits are not demonstrated. The controversial nature of these interventions, their popularity among caregivers and the presence of weak supportive evidence underline how further rigorous researches are needed. (Dobson, Lucassen et al. 2012).

Standardized light stimulation of the acupuncture point LI4 twice a week for 3 weeks has shown reduction in the duration and intensity of crying, with no serious reported side effects. (Landgren, Kvorning et al. 2010) However, a recent study has reported no significant efficacy of acupuncture in the treatment of infantile colic. (Skjeie, Skonnord et al. 2013) Future researches are needed in order to clarify this issue and to investigate the efficacy of other acupuncture points and modes of stimulation for the treatment of infantile colic.

Spinal manipulation has been tried in relieving infantile colic. In a study, by trial days 4 to 7, hours of crying were

reduced by 1 hour in the dimethicone group compared with 2.4 hours in the manipulation group ( $P = .04$ ). On days 8 through 11, crying was reduced by 1 hour for the dimethicone group, whereas crying in the manipulation group was reduced by 2.7 hours ( $P = .004$ ). From trial day 5 onward the manipulation group did significantly better than the dimethicone group. (Wiberg, Nordsteen et al. 1999).

Evidence for the efficacy of spinal manipulation in treating infantile colic is inconclusive. Chiropractic spinal manipulation is no more effective than placebo in the treatment of infantile colic. This study emphasizes the need for placebo controlled and blinded studies when investigating alternative methods to treat unpredictable conditions such as infantile colic. Physicians should be cautious about recommending spinal manipulations in infants. (Olafsdottir, Forshei et al. 2001)

## Behavioral interventions

Some studies demonstrated that behavioral management was effective in reducing excessive crying in infant. Dealing with family problems and extending help to mothers is an integral part of this management. A recent Cochrane Database Systematic Review acknowledges that “there is some evidence of benefits on mother–infant interaction, sleeping and crying, and on hormones influencing stress levels. Further research is needed”. A more recent study describes an approach based on regularity in infant’s daily care and feeding, accompanied by instructions to swaddle during sleep. The aim consists in helping the infant to establish a regular sleep–wake rhythm that can reduce parental distress and improve quality of interaction between parents and child. (Underdown, Barlow et al. 2006, Rosen, Bukutu et al. 2007)

## Burping

Efficacy of burping in lowering colic and regurgitation episodes in healthy term babies lacks evidence in literature. Although burping is a rite of passage, study by Kaur et al showed that burping did not significantly lower colic events and there was significant increase in regurgitation episodes in healthy term infants up to 3 months of follow-up. (Kaur, Bharti et al. 2015)

## Herbal remedies

Herbal supplements: herbs such as fennel (*Foeniculum vulgare*), chamomile (*Matricariae recutita*) and lemon balm (*Melissa officinalis*) may help calming the infant and reducing abdominal distension. However, the administration of herbal products in infants with colic raises some concerns about the potential nutritional effects (these treatments provided for a long time could lead to a decreased intake of milk), the lack of standard dosages and the possible content of sugar and alcohol. In conclusion, parents have to use them with attention and supervision of a doctors.

A randomized, double-blind, placebo-controlled trial investigated the effectiveness and safety of a phytotherapeutic formulation with *Matricariae recutita*, *Foeniculum vulgare* and *Melissa officinalis* in the treatment of infantile colic. After a 3 day observation period, the infants were randomly divided into two groups, one treated with phytotherapeutic agent (PA) and the other with placebo twice a day for 1 week. It was found that the daily average crying time for the PA was 201.2 min/day (SD 18.3) at the baseline and 76.9 min/day (SD 23.5) at the end of the study; for the placebo it was 198.7 min/day (SD 16.9) and 169.9 min/day (SD 23.1) ( $p < 0.005$ ). Crying time reduction was observed in 85.4% subjects for the PA and in 48.9% subjects for the placebo ( $p < 0.005$ ). No side effects were reported. It was concluded that colic in breastfed infant improves within 1 week of treatment with an extract based on *Matricariae recutita*, *Foeniculum vulgare* and *Melissa officinalis*. (Savino, Cresi et al. 2005)

Fennel seed oil has been shown to reduce intestinal spasms and increase motility of the small intestine. A RCT assessed whether fennel oil was superior to placebo. The use of fennel oil emulsion eliminated colic, according to the Wessel criteria, in 65% (40/62) of infants in the treatment group, which was significantly better than 23.7% (14/59) of infants in the control group ( $P < 0.01$ ). There was a significant improvement of colic in the

treatment group compared with the control group [Absolute Risk Reduction (ARR) = 41% (95% CI 25 to 57), Number Needed to Treat (NNT) = 2 (95% CI 2 to 4)]. (Alexandrovich, Rakovitskaya et al. 2003)

## Digestive enzymes

Papain is a proteolytic enzyme derived from papaya and acts over a broader range of pH from acidic to alkaline. Papain ensures digestion of proteins which starts in the stomach and continues in the intestines. Administered along with the infant formula, it would tend to hydrolyze the cow milk casein in the stomach; thus it appears to be equivalent to administering hydrolysed casein to the infant. (Martindale, 2014), (PDR for Herbal Medicines, 2000) Inadequately absorbed carbohydrates lead to gas production and it has been noted that poorly absorbed carbohydrates induced more crying in infants with colic than readily absorbed carbohydrates. Infant formula feeds also contain a good amount of Maltodextrin. Maltodextrin is normally hydrolysed by Amylase. It has been reported that the secretion of pancreatic Alpha Amylase is very limited in infants up to the age of 3 months. (Hadorn, Zoppi et al. 1968, Mobassaleh, Montgomery et al. 1985) Thus, Papain and Alpha Amylase tends to help in the digestion of casein and maltodextrin respectively, helping in reducing the incidence of infantile colic.

**Maltodextrin is normally hydrolysed by Amylase. It has been reported that the secretion of pancreatic Alpha Amylase is very limited in infants up to the age of 3 months. Thus, Papain and Alpha Amylase tends to help in the digestion of casein and maltodextrin respectively, helping in reducing the incidence of infantile colic.**

## Massage therapy

Massaging significantly improved colic symptoms during a one-week intervention for all outcomes. One hundred colicky infants aged younger than 12 weeks old were randomly assigned into massage and rocking groups. Infants in the massage group received a massage for 15-20 minutes once during a day and once at night before sleeping for a week. In the control group, mothers rocked their infants gently for 5-25 minutes when the symptoms of colic appeared. Significant differences were found between the intervention and control groups in favor of massaging. (Sheidaei, Abadi et al. 2016) The use of aromatherapy massage using lavender oil was found to be effective in reducing the symptoms of colic. (Cetinkaya and Basbakkal 2012)

## Comparison of complementary therapies

In a prospective, randomised - controlled study, 175 infants were randomly assigned into four different intervention groups (massage, sucrose solution, herbal tea and hydrolysed formula) and control group. Duration of crying following each intervention was recorded in the diary by parents for a one week period. It was found that there was a significant reduction in crying hours per day in all intervention groups. The difference between mean duration of total crying (hours/day) before and after the intervention infants in hydrolysed formula group was found higher than massage, sucrose and herbal tea group. The difference between mean duration of total crying (hours/day) before and after the intervention infants in massage group was found lower than other intervention groups and all groups. (Arikan, Alp et al. 2008)

## Dietary management

- Eliminate cow's milk protein only in cases of suspected intolerance to the protein (eg, positive family history, eczema, onset after the first month of life, association with other GI symptoms such as vomiting or diarrhea).
- The symptoms of allergy to cow's milk protein generally start later than those of colic (mean age, 13 wk), though early onset is also well known.

- In infants with suspected allergy to cow's milk protein, a protein hydrolysate formula is indicated.<sup>(Iacovou, Ralston et al. 2012)</sup>
- Uncommonly, amino acid–based formulas may be needed to manage suspected cow's milk allergy (CMA), although evidence may be lacking for management of infants with colic. Cost and availability of such formulas also tend to be prohibitive for routine use in infants with excessive crying.
- Use of soy-based formula is not recommended because many infants allergic to cow's milk protein may also develop intolerance to soy protein.

## Conclusion

At present, evidence of the effectiveness of pain-relieving agents for the treatment of infantile colic is sparse and prone to bias. The few available studies included small sample sizes, and most had serious limitations. Benefits, when reported, were inconsistent. Inadequate evidence to support the use of simethicone as a pain-relieving agent for infantile colic. Available evidence shows that herbal agents, sugar, dicyclomine and cimetropium bromide cannot be recommended for infants with colic. Consistent follow-up and a sympathetic physician are the cornerstones of management in patients with colic. Parental anxiety can be minimized if the physician discusses colic, offers insight on future expectations, and answers parental questions. Reassure the parents about generally the benign and self-limiting nature of the illness.

## References

- Akcam, M. and A. Yilmaz (2006). "Oral hypertonic glucose solution in the treatment of infantile colic." *Pediatr Int* 48(2): 125-127.
- Alexandrovich, I., O. Rakovitskaya, E. Kolmo, T. Sidorova and S. Shushunov (2003). "The effect of fennel (*Foeniculum Vulgare*) seed oil emulsion in infantile colic: a randomized, placebo-controlled study." *Altern Ther Health Med* 9(4): 58-61.
- Ali, A. M. (2012). "Helicobacter pylori and infantile colic." *Arch Pediatr Adolesc Med* 166(7): 648-650.
- Anabrees, J., F. Indrio, B. Paes and K. AlFaleh (2013). "Probiotics for infantile colic: a systematic review." *BMC Pediatr* 13: 186.
- Arikan, D., H. Alp, S. Gozum, Z. Orbak and E. K. Cifci (2008). "Effectiveness of massage, sucrose solution, herbal tea or hydrolysed formula in the treatment of infantile colic." *J Clin Nurs* 17(13): 1754-1761.
- Biagioli E, Tarasco V, Lingua C, Moja L, Savino F. Pain-relieving agents for infantile colic. *Cochrane Database Syst Rev*. 2016 Sep 16;9:CD009999.
- Castro-Rodriguez, J. A., D. A. Stern, M. Halonen, A. L. Wright, C. J. Holberg, L. M. Taussig and F. D. Martinez (2001). "Relation between infantile colic and asthma/atopy: a prospective study in an unselected population." *Pediatrics* 108(4): 878-882.
- Cetinkaya, B. and Z. Basbakkal (2012). "The effectiveness of aromatherapy massage using lavender oil as a treatment for infantile colic." *Int J Nurs Pract* 18(2): 164-169.
- Cohen-Silver, J. and S. Ratnapalan (2009). "Management of infantile colic: a review." *Clin Pediatr (Phila)* 48(1): 14-17.
- de Weerth, C., S. Fuentes, P. Puylaert and W. M. de Vos (2013). "Intestinal microbiota of infants with colic: development and specific signatures." *Pediatrics* 131(2): e550-558.
- Dobson, D., P. L. Lucassen, J. J. Miller, A. M. Vlieger, P. Prescott and G. Lewith (2012). "Manipulative therapies for infantile colic." *Cochrane Database Syst Rev* 12: CD004796.
- Douglas, P. and P. Hill (2011). "Managing infants who cry excessively in the first few months of life." *BMJ* 343: d7772.
- Dupont, C., M. Rivero, C. Grillon, N. Belaroussi, A. Kalindjian and V. Marin (2010). "Alpha-lactalbumin-enriched and probiotic-supplemented infant formula in infants with colic: growth and gastrointestinal tolerance." *Eur J Clin Nutr* 64(7): 765-767.
- Gelfand, A. A., P. J. Goadsby and I. E. Allen (2015). "The relationship between migraine and infant colic: a systematic review and meta-analysis." *Cephalalgia* 35(1): 63-72.
- Gelfand, A. A., K. C. Thomas and P. J. Goadsby (2012). "Before the headache: infant colic as an early life expression of migraine." *Neurology* 79(13): 1392-1396.

Gupta, S. K. (2007). "Update on infantile colic and management options." *Curr Opin Investig Drugs* 8(11): 921-926.

Hadorn, B., G. Zoppi, D. H. Shmerling, A. Prader, I. McIntyre and C. M. Anderson (1968). "Quantitative assessment of exocrine pancreatic function in infants and children." *J Pediatr* 73(1): 39-50.

Hall, B., J. Chesters and A. Robinson (2012). "Infantile colic: a systematic review of medical and conventional therapies." *J Paediatr Child Health* 48(2): 128-137.

Heine, R. G. (2006). "Gastroesophageal reflux disease, colic and constipation in infants with food allergy." *Curr Opin Allergy Clin Immunol* 6(3): 220-225.

Hyman, P. E., P. J. Milla, M. A. Benninga, G. P. Davidson, D. F. Fleisher and J. Taminiu (2006). "Childhood functional gastrointestinal disorders: neonate/toddler." *Gastroenterology* 130(5): 1519-1526. Iacovou, M., R. A. Ralston, J. Muir, K. Z. Walker and H. Truby (2012). "Dietary management of infantile colic: a systematic review." *Matern Child Health J* 16(6): 1319-1331.

Indrio, F., A. Di Mauro, G. Riezzo, E. Civardi, C. Intini, L. Corvaglia, E. Ballardini, M. Bisceglia, M. Cinquetti, E. Brazzoduro, A. Del Vecchio, S. Tafuri and R. Francavilla (2014). "Prophylactic use of a probiotic in the prevention of colic, regurgitation, and functional constipation: a randomized clinical trial." *JAMA Pediatr* 168(3): 228-233.

Kaur, R., B. Bharti and S. K. Saini (2015). "A randomized controlled trial of burping for the prevention of colic and regurgitation in healthy infants." *Child Care Health Dev* 41(1): 52-56.

Kostakis, I. D., K. G. Cholidou, A. G. Vaiopoulos, I. S. Vlachos, D. Perrea and G. Vaos (2013). "Fecal calprotectin in pediatric inflammatory bowel disease: a systematic review." *Dig Dis Sci* 58(2): 309-319.

Landgren, K., N. Kvorning and I. Hallstrom (2010). "Acupuncture reduces crying in infants with infantile colic: a randomised, controlled, blind clinical study." *Acupunct Med* 28(4): 174-179.

Lehtonen, L. A. and P. T. Rautava (1996). "Infantile colic: natural history and treatment." *Curr Probl Pediatr* 26(3): 79-85.

Lucassen, P. (2010). "Colic in infants." *BMJ Clin Evid* 2010.

Lucassen, P. L., W. J. Assendelft, J. W. Gubbels, J. T. van Eijk, W. J. van Geldrop and A. K. Neven (1998). "Effectiveness of treatments for infantile colic: systematic review." *BMJ* 316(7144): 1563-1569.

Lucassen, P. L., W. J. Assendelft, J. T. van Eijk, J. W. Gubbels, A. C. Douwes and W. J. van Geldrop (2001). "Systematic review of the occurrence of infantile colic in the community." *Arch Dis Child* 84(5): 398-403.

Mobassaleh, M., R. K. Montgomery, J. A. Biller and R. J. Grand (1985). "Development of carbohydrate absorption in the fetus and neonate." *Pediatrics* 75(1 Pt 2): 160-166.

Moravej, H., M. H. Imanieh, S. Kashef, F. Handjani and F. Eghterdari (2010). "Predictive value of the cow's milk skin prick test in infantile colic." *Ann Saudi Med* 30(6): 468-470.

Olafsdottir, E., S. Forshei, G. Fluge and T. Markestad (2001). "Randomised controlled trial of infantile colic treated with chiropractic spinal manipulation." *Arch Dis Child* 84(2): 138-141.

Parkin, P. C., C. J. Schwartz and B. A. Manuel (1993). "Randomized controlled trial of three interventions in the management of persistent crying of infancy." *Pediatrics* 92(2): 197-201.

Partty, A., M. Kalliomaki, A. Endo, S. Salminen and E. Isolauri (2012). "Compositional development of Bifidobacterium and Lactobacillus microbiota is linked with crying and fussing in early infancy." *PLoS One* 7(3): e32495.

Qubty, W. and A. A. Gelfand (2016). "The Link Between Infantile Colic and Migraine." *Curr Pain Headache Rep* 20(5): 31.

Rosen, L. D., C. Bukutu, C. Le, L. Shamseer and S. Vohra (2007). "Complementary, holistic, and integrative medicine: colic." *Pediatr Rev* 28(10): 381-385.

Savino, F., C. Brondello, F. Cresi, R. Oggero and L. Silvestro (2002). "Cimetropium bromide in the treatment of crisis in infantile colic." *J Pediatr Gastroenterol Nutr* 34(4): 417-419.

Savino, F., E. Castagno, R. Calabrese, S. Viola, R. Oggero and R. Miniero (2010). "High faecal calprotectin levels in healthy, exclusively breast-fed infants." *Neonatology* 97(4): 299-304.

Savino, F., S. Ceratto, A. De Marco and L. Cordero di Montezemolo (2014). "Looking for new treatments of Infantile Colic." *Ital J Pediatr* 40: 53.

Savino, F., L. Cordisco, V. Tarasco, R. Calabrese, E. Palumeri and D. Matteuzzi (2009). "Molecular identification of coliform bacteria from colicky breastfed infants." *Acta Paediatr* 98(10): 1582-1588.

Savino, F., F. Cresi, E. Castagno, L. Silvestro and R. Oggero (2005). "A randomized double-blind placebocontrolled trial of a standardized extract of *Matricariae recutita*, *Foeniculum vulgare* and *Melissa officinalis* (ColiMil) in the treatment of breastfed colicky infants." *Phytother Res* 19(4): 335-340.

Savino, F., E. C. Grassino, C. Guidi, R. Oggero, L. Silvestro and R. Miniero (2006). "Ghrelin and motilin concentration in colicky infants." *Acta Paediatr* 95(6): 738-741.

Savino, F., E. Palumeri, E. Castagno, F. Cresi, P. Dalmasso, F. Cavallo and R. Oggero (2006). "Reduction of crying episodes owing to infantile colic: A randomized controlled study on the efficacy of a new infant formula." *Eur J Clin Nutr* 60(11): 1304-1310.

- Savino, F., E. Pelle, E. Palumeri, R. Oggero and R. Miniero (2007). "Lactobacillus reuteri (American Type Culture Collection Strain 55730) versus simethicone in the treatment of infantile colic: a prospective randomized study." *Pediatrics* 119(1): e124-130.
- Sheidaei, A., A. Abadi, F. Zayeri, F. Nahidi, N. Gazerani and A. Mansouri (2016). "The effectiveness of massage therapy in the treatment of infantile colic symptoms: A randomized controlled trial." *Med J Islam Repub Iran* 30: 351.
- Shergill-Bonner, R. (2010). "Infantile colic: practicalities of management, including dietary aspects." *J Fam Health Care* 20(6): 206-209.
- Skjeie, H., T. Skonnord, A. Fetveit and M. Brekke (2013). "Acupuncture for infantile colic: a blindingvalidated, randomized controlled multicentre trial in general practice." *Scand J Prim Health Care* 31(4): 190-196.
- Sondergaard, C., J. Olsen, E. Friis-Hasche, M. Dirdal, N. Thrane and H. T. Sorensen (2003). "Psychosocial distress during pregnancy and the risk of infantile colic: a follow-up study." *Acta Paediatr* 92(7): 811-816.
- Sondergaard, C., E. Skajaa and T. B. Henriksen (2000). "Fetal growth and infantile colic." *Arch Dis Child Fetal Neonatal Ed* 83(1): F44-47.
- Sung, V., S. Collett, T. de Gooyer, H. Hiscock, M. Tang and M. Wake (2013). "Probiotics to prevent or treat excessive infant crying: systematic review and meta-analysis." *JAMA Pediatr* 167(12): 1150-1157.
- Taubman, B. (1988). "Parental counseling compared with elimination of cow's milk or soy milk protein for the treatment of infant colic syndrome: a randomized trial." *Pediatrics* 81(6): 756-761.
- Underdown, A., J. Barlow, V. Chung and S. Stewart-Brown (2006). "Massage intervention for promoting mental and physical health in infants aged under six months." *Cochrane Database Syst Rev*(4): CD005038.
- Wessel, M. A., J. C. Cobb, E. B. Jackson, G. S. Harris, Jr. and A. C. Detwiler (1954). "Paroxysmal fussing in infancy, sometimes called colic." *Pediatrics* 14(5): 421-435.
- Wiberg, J. M., J. Nordsteen and N. Nilsson (1999). "The short-term effect of spinal manipulation in the treatment of infantile colic: a randomized controlled clinical trial with a blinded observer." *J Manipulative Physiol Ther* 22(8): 517-522.
- Xu, M., J. Wang, N. Wang, F. Sun, L. Wang and X. H. Liu (2015). "The Efficacy and Safety of the Probiotic Bacterium *Lactobacillus reuteri* DSM 17938 for Infantile Colic: A Meta-Analysis of Randomized Controlled Trials." *PLoS One* 10(10): e0141445.

Dear Doctor,

Infantile colic is a common condition worldwide: about 1 in 5 infants younger than three months develops colic. Although benign, excessive crying or colic in an infant during the first few months of life can be alarming for physicians and parents. The physician's role is to ensure that there is no organic cause for the crying, offer balanced advice on treatments, and provide support to the family. Colic is a diagnosis of exclusion that is made after performing a careful history and physical examination to rule out less common organic causes. Treatment is limited.

It is indeed a pleasure to present to you this QMR issue by **Dr. Anil Kumar Jaiswal**, renowned pediatrician. In this issue, he is enlightening us on **Practical approach to the management of Infantile Colic**.

I sign off by once again reminding you to continue sending in your comments and suggestion regarding the QMR. Do write to me at [balaji.more@raptakos.com](mailto:balaji.more@raptakos.com) with your write ups, notes or tidbits on various topics of interest that can make for informative and interesting reading.

With best regards,

**Dr. Balaji More**

Vice President - Medical



**Feedback form: October - December 2017.**  
**Practical Approach to the Management of Infantile Colic.**

1. Your comments on this issue of Q.M.R.

---

---

2. Please suggest medical topics for our QMR which could be printed in future.

---

---

3. Any other suggestions / comments:

---

---

4. Name : Dr. \_\_\_\_\_ M  F

Clinical Address : \_\_\_\_\_

City : \_\_\_\_\_ State : \_\_\_\_\_ Pin

Tel.: \_\_\_\_\_ E-mail : \_\_\_\_\_

Qualifications : \_\_\_\_\_



Please mail this form to : Medical Director, **RAPTAKOS, BRETT & CO. LTD.**  
21 A, Mittal Tower, 210, Nariman Point, Mumbai 400 021. India  
[www.raptakos.com](http://www.raptakos.com)