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Management of Infantile Colic: A Review

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Infantile colic is an easily identified childhood entity that has no clear treatment guidelines. The management of infantile colic varies among physicians, and families are often frustrated by the medical community's inability to prescribe a cure for colic. This article reviews the

current concepts for management options of infantile colic.

Keywords: general pediatrics; colic; infantile colic; management

Infantile colic was originally defined by Wessel et al¹ in 1954 as "crying for 3 hours a day, on at least 3 days a week, for at least 3 weeks." Although this definition has been since disputed,² the presence of colic and its effect on infants and families persist. Many studies have been conducted to determine the cause and management of colic. This article will review the current concepts for management of colic.

Colic can begin anytime from early infancy to 4 to 5 months of age.³ Crying associated with colic has been described as excessive, tends to occur in the evenings, and has been reported to have a high-pitched quality.^{4,5} At times, colic has been associated with flushing of the face, drawing up of the legs, and passing gas.⁶

A literature search was completed using MEDLINE from 1950 to October 4, 2007. The keywords *infantile colic*, *colic*, and *therapeutics* were combined in the search. Publications were excluded if they were comments, case reports, or letters. Publications were included if they were review articles or randomized control trials. The published literature about the treatment of colic is discussed under the following subheadings: diet change, pharmacologic treatments, alternative therapies, and behavior modification.

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Diet Change

Based on the theory that infantile colic is a gastrointestinal pathologic condition, several groups have examined diet modification to treat infantile colic. The main theory resides in the contribution of whey hydrolysate to infantile colic by causing excessive gas production from poor gut digestion.

A prospective randomized controlled trial among 275 infants looked at substituting standard formula plus simethicone pharmacotherapy with a formula of partially hydrolysed whey proteins, probiotic oligosaccharides (OS), and a high beta-palmitic acid content.⁷ Ninety-six infants who were fed the new formula had a significant decrease in the number of crying episodes per week (mean [SD], 1.76 [1.60] episodes in the treatment group vs 3.32 [2.06] episodes in the control group; $P < .001$). A second trial among 43 infants was a double-blind randomized placebo-controlled trial that demonstrated a significant reduction in crying time when infants were fed whey hydrolysate formula compared with standard formula.⁸ Crying duration was decreased by 63 (95% confidence interval, 1-127) min/d. A third double-blind randomized placebo-controlled trial placed bottle-fed infants on a whey hydrolysate formula vs regular formula, and the mothers of breast fed infants were asked to consume a hypoallergenic diet (free of milk, egg, wheat, and nuts) or a control diet.⁹ Mothers measured infant distress levels using validated distress charts. After adjusting for age and feeding mode, infants receiving the treatment diets had a 39% (95% confidence interval,

26%-50%) reduction in distress vs a 16% (95% confidence interval, 0%-30%) reduction in distress among control subjects ($P = .01$). One study¹⁰ attempted to specifically classify whether bovine whey protein was responsible for infantile colic. Twenty-four infants in a double-blind crossover study were fed capsules of bovine whey protein (treatment) or human albumin (placebo) within a hyperallergenic formula (Nutramigen; Mead Johnson Co, Evansville, Indiana). Daily crying durations were 3.2 hours for the infants receiving whey protein and 1.0 hour for those receiving placebo ($P < .001$).

Based on these studies, physicians recommend changing to formulas containing whey hydrolysate for formula-fed infants, as well as maternal dietary modifications for breastfed infants. However, exclusive hypoallergenic formula feeds should be reserved for children with true allergy to cow's milk protein, and the parents of children with infantile colic should be counseled accordingly.

Pharmacologic Treatments

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.⁶ 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.

A randomized double-blind placebo-controlled trial revisited the concept of administering an alternative anticholinergic to dicyclomine, namely, cimetropium bromide.¹⁰ Ninety-seven infants were included in the study. The mean (SD) duration of crying during crisis was 17.3 (12.6) minutes in the treatment group vs 47.5 (28.5) minutes in the placebo group ($P < .005$). A placebo response was significant at $P < .05$. The main adverse effect noted in the treatment group vs the placebo group was increased sleepiness.

Simethicone is an alternative pharmacologic agent that acts as a detergent to facilitate gas bubbles within the gut to coalesce, as well as to decrease abdominal

distension and discomfort due to excessive gas production. Although the principle of reduction in discomfort makes inherent sense, studies^{11,12} demonstrated that simethicone was not superior to placebo in reducing symptoms of colic.

Alternative Therapies

Probiotics, Glucose, and Herbal Remedies

Several alternative pharmacologic agents have been assessed for their ability to decrease symptoms of infantile colic. A recent prospective randomized study¹³ assessed the effectiveness of *Lactobacillus acidophilus* vs simethicone in reducing colic in 90 breastfed infants. Daily median crying durations were reduced from 159 minutes to 51 minutes in the probiotic group and from 177 minutes to 145 minutes in the simethicone group. No adverse effects were reported.

Another study¹⁴ assessed oral hypertonic glucose solution vs sterile water for the treatment of colic in 25 infants in a randomized double-blind crossover trial; results were measured using parents' scores. The group receiving glucose, 30%, had significantly less colic than the placebo group ($P = .03$).

Two studies assessed whether herbal remedies were superior to placebo. In a study¹⁵ of 93 breastfed infants, a significant reduction in crying time of 85.4% in the treatment group was observed vs 48.9% in the control group ($P < .005$). A randomized placebo-controlled study¹⁶ assessed whether fennel oil was superior to placebo and found that 63% of infants in the treatment group had a response to treatment vs 23.7% of infants in the control group ($P < .01$). There were no reported adverse effects in these 2 trials.

Spinal Manipulation

Evidence for the efficacy of spinal manipulation in treating infantile colic is inconclusive. A randomized controlled trial demonstrated that 32 of 46 infants (69.6%) in the treatment group and 24 of 40 infants (60.0%) in the control group demonstrated a response to treatment, but the effect of spinal manipulation was statistically nonsignificant.¹⁷ Another study¹⁸ of 50 patients randomized to spinal manipulation or dimethicone study groups demonstrated a reduction in crying duration by 1 hour in the dimethicone group

vs 2.7 hours in the spinal manipulation group ($P = .004$). Physicians should be cautious about spinal manipulation in infants and should discourage families from treating infantile colic with spinal manipulation.

Behavior Modification

Behavior modification for infantile colic is largely based on intervening with parents to provide reassurance and to offer alternative behavioral methods for treating colic. A study¹⁹ examined the effectiveness of instituting a home-based nursing intervention to decrease parental stress invoked from having an infant with colic. One hundred twenty-one infants were placed in intervention vs control groups. Parents in the treatment group reported significantly decreased stress than parents in the control group based on the parent-child dysfunctional interaction subscale ($P = .04$).

Investigations of infant intervention have compared infant massage vs a crib vibrator for the treatment of colic.³ Fifty-eight infants were randomly assigned to each study group. Reductions in colic symptoms at 3 weeks were 67% in the massage group and 61% in the crib vibrator group, a statistically nonsignificant difference. A randomized controlled trial of 3 interventions (counseling, car ride, and control groups) were conducted among 38 infants.²⁰ The study groups had a combined reduction of maternal anxiety by 18%, with no statistically significant effect in improving infantile colic.

Conclusion

In conclusion, infantile colic is an easily identified childhood problem that has no clear treatment guidelines. Health care providers should exclude underlying medical conditions relative to excessive crying and focus on a holistic treatment strategy for infantile colic. All infants should have a complete medical assessment, including assessment of growth variables and development, as well as a detailed examination to exclude other medical conditions. If an infant has blood in the stool, the maternal diet should be modified to exclude cow's milk. Calcium supplementation to the mother should be recommended for breastfed children. Formula-fed infants should receive hypoallergenic formulas. The families of children with infantile colic should receive education about the disease (including

the self-limiting nature, the perceived pathogenesis, and the concept of altered perception to normal stimuli), as well as a discussion of the different treatment options (including dietary modifications). All parents should be counseled and encouraged to try behavior modification, which would help reduce maternal stress. Other treatment options such as probiotics, glucose water, or herbal remedies could be considered in nonresponders with severe symptoms.

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