

# Infant Colic, Distress, and Crying

Peter Hewson, FRACP, Frank Oberklaid, FRACP, DCH, Samuel Menahem, MD, FRACP

The literature regarding infant colic is critically reviewed. Although there have been a number of theories proposed as to etiology of colic, the literature is characterized by difficulties in definition, methodologic problems, and numerous claims as to both etiology and management that are anecdotal. Infant colic is best conceptualized as the end result of a complex transaction between the infant and his environment, with multiple factors responsible for the crying and distress of an infant. The most important factors in appropriate intervention are a physician's receptivity and sensitivity toward the stressed mother, together with an interested and practical approach to providing adequate support while delineating the individual stresses acting on both mother and baby. Future research is needed to delineate markers for those subgroups of infants who may present with crying as a manifestation of specific clinical situations.

INFANT COLIC continues to be an exasperating problem for both parents and medical practitioners. Despite the many theories proposed regarding etiology and a multitude of suggestions as to the most appropriate management, it is still not clear as to what is the underlying process that affects between 20% and 30% of all infants.<sup>1-4</sup>

Although the short-term effect the crying has on the parents and family can be extremely distressing, most families and mothers adjust to the problem and in the small number of follow-up studies performed, there have been few long-term sequelae identified.<sup>4-6</sup> Although there is debate as to whether or not there exist any abnormality in these infants, the condition is sufficiently distressing to warrant serious study and investigation.

This article details the scope of the problem, points out limitations of previous work, outlines possible

subgroups, discusses the credibility of some management regimes, and suggests a conceptual model for the understanding of the pathogenesis of colic.

## Problems of Definition

In the early 1950s, both Illingworth<sup>3</sup> and Wessel<sup>4</sup> defined infant colic as unexplained paroxysms of crying (violent screaming attacks) or fussing occurring usually between 6 PM and 10 PM, beginning between 3 days and 3 weeks of age, subsiding by 13-16 weeks, and lasting for at least 3 hours a day for a minimum of 3 days per week. However, Brazelton subsequently studied the duration of crying in healthy infants,<sup>7</sup> suggesting it may be a normal physiologic function. Of 80 normal infants followed in his pediatric practice and studied at 6 weeks of age, the median duration of crying was 2.75 hours per day. The differences between "colicky" and normal infants thus became either arbitrary or based simply on the existence of sudden paroxysms of crying. The only definite statements one can make is that "normal" babies cry for 2-3 hours per day at 6 weeks of age for reasons that are far from clear; this is not usually relieved by the infant being picked up, and no physical abnormality can be found.

The incidence of severe colic quoted has varied from

---

From the Departments of General and Ambulatory Paediatrics, Royal Children's Hospital, Melbourne, Australia.

Correspondence to: Dr. Frank Oberklaid, Director, Department of Ambulatory Paediatrics, Royal Children's Hospital, Parkville, Victoria 3052, Australia.

Received for publication March 1985, revised May 1985 and May 1986, and accepted June 1986.

21 percent<sup>3</sup> to 30 percent,<sup>2</sup> although there has been no standard criteria applied to define mild, moderate, and severe colic.

It is interesting that in many parts of Africa and Papua New Guinea colic is virtually unknown. This has previously been assumed to be observer error (both parent and medical officer) with crying perceived as being an irrelevant problem in the light of the prevalence of a high infant mortality from other disease, but some workers now believe that infant colic exists only rarely in these areas. One retrospective study also suggested the virtual absence of colic in institutionalized infants.<sup>8</sup> This was based on review of records and needs to be interpreted with caution. However Ironside described a subgroup of apathetic institutionalized infants with the "infant distress syndrome."<sup>9</sup>

A number of studies of infant colic have failed to demonstrate any definite correlation with age of mother, sex of infant, family history of allergy, type of feeding, amount of gas in abdomen, or frequency and nature of bowel actions. Wessel<sup>4</sup> found a significantly higher number of first born infants suffering colic (the others did not). Significant associations also were found with a family history of similar problems in siblings or parents and level of maternal education.<sup>1</sup> These two correlations need to be interpreted carefully in the light of the selection process involved in the studies.

Apart from problems of definition, there are two other confounding factors. One is the interactional nature of the problem and the often spontaneous improvement in the affected infants at 12–16 weeks. A crying infant frequently causes stress and anxiety in the parents, which may then distort their observations, perception, and interpretation of their infant's behavior. A validated observation crying diary needs to be used to provide more objective data to define colic. This would result in a more reliable methodology for defining and studying colic than relying solely on parental description of duration and severity of symptoms.

Secondly, the fact that the acute distress is self-limited makes analysis of any management protocols difficult to evaluate and results in many suggested cures obtaining unjustified pre-eminence. A number of reviews suggest that the paroxysms of crying begin in the first 3 weeks. Illingworth found 28 percent of colicky infants began crying by 5 days, 38 percent between 6 and 10 days, and 22 percent between 11 and 15 days. This crying disappeared on average by 9.5 weeks and in all infants by 4 months.<sup>3</sup> Paradise found a mean age of onset for severe colic at 1.8 weeks, and it dis-

appeared on average at 13.6 weeks.<sup>1</sup> Thus any evaluative study of management needs to be mounted at an early age, and intervention needs to be of short duration; many descriptions of treatment of colic have not followed these criteria.

### The Theories

Four main groups of theories have been suggested as being responsible for colic.

1. The transmission of allergens in breast milk<sup>11</sup> or the effect of food substances such as egg or cow's milk.<sup>12–14</sup>
2. Abnormal intestinal peristalsis or excessive amounts of gas in the abdomen causing gaseous distention and colic.<sup>15</sup>
3. The "neurolabile," "hypertonic," or "vago-tonic" infant.<sup>2,16–19</sup>
4. Maternal anxiety leading to increased infant crying.<sup>4,6,7</sup>

It is possible that all these factors are operating in various subgroups of infants who suffer apparently unexplained persistent crying episodes.

### Allergy

A number of studies have associated allergens with infant colic, either in the infants' diet or transmitted via breast milk. Jakobsen and Lindberg have published three recent papers associating cow's milk with infant colic.<sup>20–22</sup> The first<sup>20</sup> was not a double-blind trial and involved small numbers. Of 18 breast-fed colicky babies, 13 became colic free when cow's milk was eliminated from the mothers' diet. Colic reappeared on at least 2 occasions in 12 of the 13 infants when rechallenged. In a second study,<sup>21</sup> Enfamil was compared with soy formula in a double-blind trial with 60 colicky infants. Eighteen percent were relieved by soy formula. However, a further 53 percent were relieved by Pregestimil or Nutramigen. The latter part of this study was not double blind. In the latest study<sup>22</sup> of 66 breast-fed colicky infants, 35 became colic free when the mother's diet was restricted. Colic reappeared on challenge in 23 infants (35%). Evans carried out a randomized controlled double-blind trial with 20 breast fed infants with colic and found no difference between soy milk and cow's milk.<sup>23</sup> However, he did note increased symptoms in infants whose mothers had a greater variability in their diet with cow's milk, eggs, chocolate, fruit, and nuts being implicated in producing symptoms.

Although there are only a small number of these double-blind studies, it seems that 30–35 percent of infants with colic may be helped by cow's milk restriction, although a figure as high as 70 percent has been suggested.<sup>24</sup> Because of the crossreactivity between soy formula and cow's milk (25%),<sup>25</sup> the failure to respond to soy does not mean that the underlying process is not allergenic or milk intolerance.

It should be also noted that none of the above studies recorded the incidence of vomiting or diarrhea in the infants diagnosed as having colic. This information would be necessary before extrapolating the conclusion to all excessively crying infants who had no vomiting or diarrhea.

In accepting that there may be a subgroup of infants with colic who are allergic or milk intolerant, we do not know the actual pathogenesis involved. It may be that cow's milk intolerance is associated with an increase in peristalsis, increasing afferent autonomic input to the central nervous system and reflexly causing increased activity and crying in the infant.

#### Abnormal Peristalsis/Excess Gas

The study by Jorup in 1952<sup>2</sup> provided what is probably the best evidence that colic is due to colonic peristalsis. He studied 111 "dyspeptic" breast-fed infants and performed barium meals on 48, barium enemas on 98, and rectal pressures on 16. Jorup found that crying symptoms correlated in time with "convulsive contractions" of the sigmoid colon and that all symptomatic babies had a greatly decreased colonic transit time compared with normal infants. These sigmoid contractions occurred with the mere act of sucking and became less vigorous and less symptomatic within a quieter, darker hospital environment and non-existent after scopolamine therapy. Unfortunately, there were problems with patient selection (older infants with a higher than usual incidence of diarrhea). He also may have just been describing the normal active gastrocolic reflex observed in many babies that may lead to a short period of crying and often to a bowel movement at the commencement of a feed.

An often quoted cause of intestinal colic is excessive amounts of intestinal gas. Illingworth found no difference in the amount of gas evident on abdominal radiographs in normal versus colicky babies.<sup>3</sup> However, Snow found that babies had less gas evident on abdominal radiograph after 24 hours in the prone position on an incline, and this correlated with a decrease in symptoms.<sup>15</sup> The problem that is virtually impossible

to study is whether the supposed increased amount of gas expelled from colicky infants is a cause or a consequence of their crying, the latter occurring because of abdominal muscle tightening. The measurement of bowel contractility before, during, and after crying would be very informative.<sup>26</sup> Breath hydrogen testing may determine whether "occult" lactose intolerance (not associated with frequent fluidy motions) is in fact more common in colicky infants. At present, evidence suggests that lactose intolerance is not a major etiologic factor.<sup>43</sup>

#### Increased Sensitivity—Neuroplability or Hypertonicity

Increased sensitivity to internal and external stimuli has been proposed by many workers as a cause of excessive crying in infants.<sup>16–19</sup> It has often been impossible to delineate any abnormal stimuli, and so an abnormal infant reaction to usual stimuli was proposed.

In 1901, Eppinger and Hess suggested an abnormal sensitivity of the central nervous system and postulated an imbalance of the autonomic nervous system or "vagotonia."<sup>17</sup> Some have categorized the signs and symptoms of these infants behaviorally and also distinguished between smooth muscle and striated muscle signs. Others have suggested that the pattern of hypertonia is inherited from one or both parents.<sup>27</sup>

Thomas and Chess suggested the infant's crying resulted from a combination of parental style and environmental factors interacting with the infant's own temperament.<sup>28</sup> Crying and other behavioral traits (*e.g.*, irritability, sleeplessness, and excessive activity) are subsequently affected by the parents' approach and reaction to them.<sup>29</sup> There has been demonstrated a correlation between an infant's temperament at 4–8 months and the incidence of colic.<sup>30,31</sup> With increasing age of the infant, an increase in stimulation threshold is proposed, with improvement correlating with increasing maturation of the central nervous system.

#### Maternal Anxiety

Maternal anxiety as a precipitating cause of colic has been a controversial issue over the past 40 years. There appears to be two separate issues; first, whether anxiety in the mother can cause colic in itself, and second, whether an infant's colic induces anxiety in the mother, which subsequently potentiates the colic. In recent years, there has been justifiable hostility from many mothers who are angry at being made to feel neurotic, inadequate, and subsequently dependent by what they argue is misinformation concerning the role of anxiety

in causing colic. The books by Farren and Munchen show evidence of this hostility.<sup>24,32</sup>

Paradise found no evidence of increased maternal anxiety in the 146 mothers and infants he followed prospectively.<sup>1</sup> Neither subjective impression nor results on the Minnesota Multiphasic Personality Inventory demonstrated any correlation between colic and maternal anxiety. In fact the subjective impression and psychological test results often gave contradictory results. However on reanalysing his data (as suggested by Carey)<sup>6</sup> mothers who appeared stable in pregnancy had very few infants with colic compared with other mothers.

Carey found that when he followed mothers prospectively from shortly after childbirth, the existence of maternal anxiety made it more likely that infants would be colicky. Forty anxious mothers had 11 colicky babies, while 63 nonanxious mothers had only two colicky babies ( $p = 0.01$ ), the colic being defined as per Wessel.<sup>4</sup> Carey claims that the mothers did not know of the purpose of the research study thus lowering the possibility of bias affecting the results. Even allowing for unvalidated questionnaires and methodological problems, mothers described as anxious after delivery perceived their infants as suffering longer periods of crying. This is not an altogether surprising finding. It does not necessarily mean that anxious mothers caused their infants to be colicky.

Shaver studied 57 mothers from the second trimester until their infants were 6 months old.<sup>33</sup> She found that the mothers of the 12 colicky infants were no more anxious regarding their overall maternal adequacy. They became anxious when their infants were colicky, but their confidence returned once the colic disappeared. Wessel found in retrospectively reviewing his records of 85 infants that 72 percent of tense families had babies with colic compared with 26 percent in families where tension was not prominent ( $p = 0.001$ ), the family tensions being apparent prenatally or in the days after delivery as well as after the colic or "fussiness" settled.<sup>4</sup>

Thus despite protestations to the contrary, the data available suggest at first glance that there is a correlation between colic and maternal anxiety. However, Wessel's findings are based on dubious methodology, while Shaver has only 12 colicky babies from which to draw her conclusions. In Carey's study, 29 of 40 anxious mothers did not have colicky babies. It may be that the anxiety experienced by the mother is specific to the situation of having a dependent baby and that this anxiety does not develop in other situations. One

might question the validity of the reports of crying and colic made by mothers who are anxious. The most appropriate conclusions to draw are that maternal anxiety may indeed affect infant behavior and certainly does affect her perception of the infant's behavior, but that it is simply one added stress on the infant.<sup>34</sup> More careful and precise studies of the relationship of maternal anxiety and infant colic are required; at the present time, there is no evidence that maternal anxiety is the cause of colic.

### Prognosis

In the few follow-up studies that have been performed, few long-term sequelae of infant colic have been identified.<sup>4-8</sup> It is the exceptional case, where other stressful circumstances and experiences are operating on the family, that damaging sequelae eventuate. Bishop and Moore when analyzing the identifiable factors common to parents who inflict nonaccidental injury on their children found a high incidence of unexplained crying in the infants. However, this was not an isolated factor but also associated with other variables such as parental deprivation and lack of nurturing, previous loss of a child, loss of spouse or *de facto*, lack of support and resentment of, or ambivalence to, the pregnancy.<sup>35</sup> It has been suggested that severely disturbed older aged children have often been persistently crying infants, although it is uncertain whether this is a causal or coincident association. It is possible that where additional stresses are operating then persistent crying in infancy can precipitate a number of more serious sequelae, including child abuse and subsequent behavioral disturbances.<sup>9</sup>

### Management

The literature on management of colic is even more confusing and fragmented than on etiology. Anecdotes and unsubstantiated claims abound. None of the studies have used validated crying diaries to assess pre- and posttherapy crying times. The evaluations of any proposed management regimes is contaminated by the fact that colic tends to improve with time and usually disappears spontaneously by 4 months of age.

Medications are frequently prescribed for colic.<sup>36</sup> However, one should be aware that there is a very strong placebo effect. O'Donovan treated four subgroups of colicky infants (97 in total) with four different regimes. He found that 67 percent improved with Phenobarb in alcohol, 70 percent improved with



phenobarb and homatropine in alcohol, and 80 percent improved with either alcohol alone or water with coloring.<sup>37</sup> While Jorup found almost universal cure of symptoms and concomitant radiologic evidence of decreased sigmoid contractions with methyl scopolamine, (Skopyl)<sup>2</sup> Illingworth found that infants on placebo did just as well if not better than on Skopyl, although he did not use as large or as frequent a dose as Jorup.<sup>38</sup>

Dicyclomine hydrochloride (Merbentyl) is the only drug shown to give more relief than a placebo.<sup>39,44</sup> Merbentyl helped 60 percent of the infants to a significant degree (compared with 25 percent with placebo) in both Illingworth's and Weissbluth's studies. Publicity was recently given to several reports of apnea and drowsiness following ingestion and Dicyclomine. These were usually associated with the taking of the undiluted preparation in a greater than recommended dose. Undiluted, the preparation has a low pH and is quite hypertonic. The recommendation for the prescription of Merbentyl by the drug company has been withdrawn for infants under 6 months of age for legal reasons although it is still being prescribed by some clinicians.

Other reviews of management have been brief and often anecdotal. Breslow studied the effect of various manoeuvres in 90 colicky infants enlisting manoeuvres in a cumulative stepwise fashion.<sup>40</sup> Attention to feeding technique improved 2.2 percent, increased milk volume and thickening improved 11.2 percent, eliminating carbohydrate, butterfat, or cows milk (or cows milk formula) improved 43 percent, while 13 percent improved with a combination of factors. Twenty-one percent did not improve with any manipulation and were said to be "psychosomatic." Levine and Bell investigated the usefulness of the pacifier in settling 28 infants with colic. The pacifier was accepted in 26 and colic was relieved in 25 of these infants.<sup>41</sup> Taubman found that crying decreased if parents were counselled on how to respond to their crying infant<sup>46</sup>; although the time crying decreased, the infants remained awake but content.

Lying infants prone and on an incline has been described as improving symptoms in some infants.<sup>15</sup> Paradise noted that in 14 infants who were taken for a drive in an automobile 11 responded well, though transiently.<sup>1</sup> After his study, Paradise concluded that colic was a manifestation of CNS immaturity and was a normal maturational phenomenon. Affected infants settled with sucking, swaddling, rocking, and vibration and this type of input interrupted nerve impulses from belly to brain.

Lipton *et al.*, in a comprehensive review of infant swaddling, showed that in animals such as frogs, guinea pigs, puppies, and kittens some form of restraint increased the amount of sleep experienced. In human infants, studies suggest that gentle restraint increases periods of sleep and threshold to controlled stimuli.<sup>42</sup> Previously practiced swaddling by the Greek, Roman, Japanese, Indian, Mexican, and Eastern European cultures seems to be physiologically justified. These studies suggest that a determining factor of an infant's activity is the nature of the swaddling. The less restricted an infant, the more active he becomes and the more crying he experiences.

From these studies, one can only conclude that there is no single effective intervention strategy that works for all infants. Management is instituted on a trial-and-error basis. Some infants will be relieved or grow out of colic sooner, while in others symptoms will persist for an extended time period. It is uncertain what effect, if any, each of these management regimes has in ameliorating symptoms or hastening a "cure." As yet there has been no prospective controlled study of different management regimes in the care of infants prior to the emergence of colic.

### Conclusions

Although we do not understand definitely what is the basis of early infant crying, the most useful perspective is that there exists a spectrum ranging from the placid to the persistently crying baby. Any definition of a disease along this spectrum is arbitrary. Nevertheless unexplained severe paroxysms of crying (infant colic) occurring in the evening are experienced by approximately 20 percent of infants, with the problem usually disappearing by 4 months of age.

More strictly controlled studies with validated crying diaries are required before it is known what percentage of persistently crying infants settle when their intake of cows milk is restricted. Swaddling, as practiced historically in many cultures, may help the infant to integrate the stimuli that may contribute to the crying. Rocking and vibration also have been used with success, and the use of the pacifier is worth attempting. Maternal anxiety can be one of the significant factors in perpetuating or exacerbating the problems of the crying infant, but is not the primary cause of infant colic.

We believe that infant colic is best conceptualized as the end result of a complex set of interactions between the infant and his environment, with environmental stimuli and stresses acting on an infant's im-

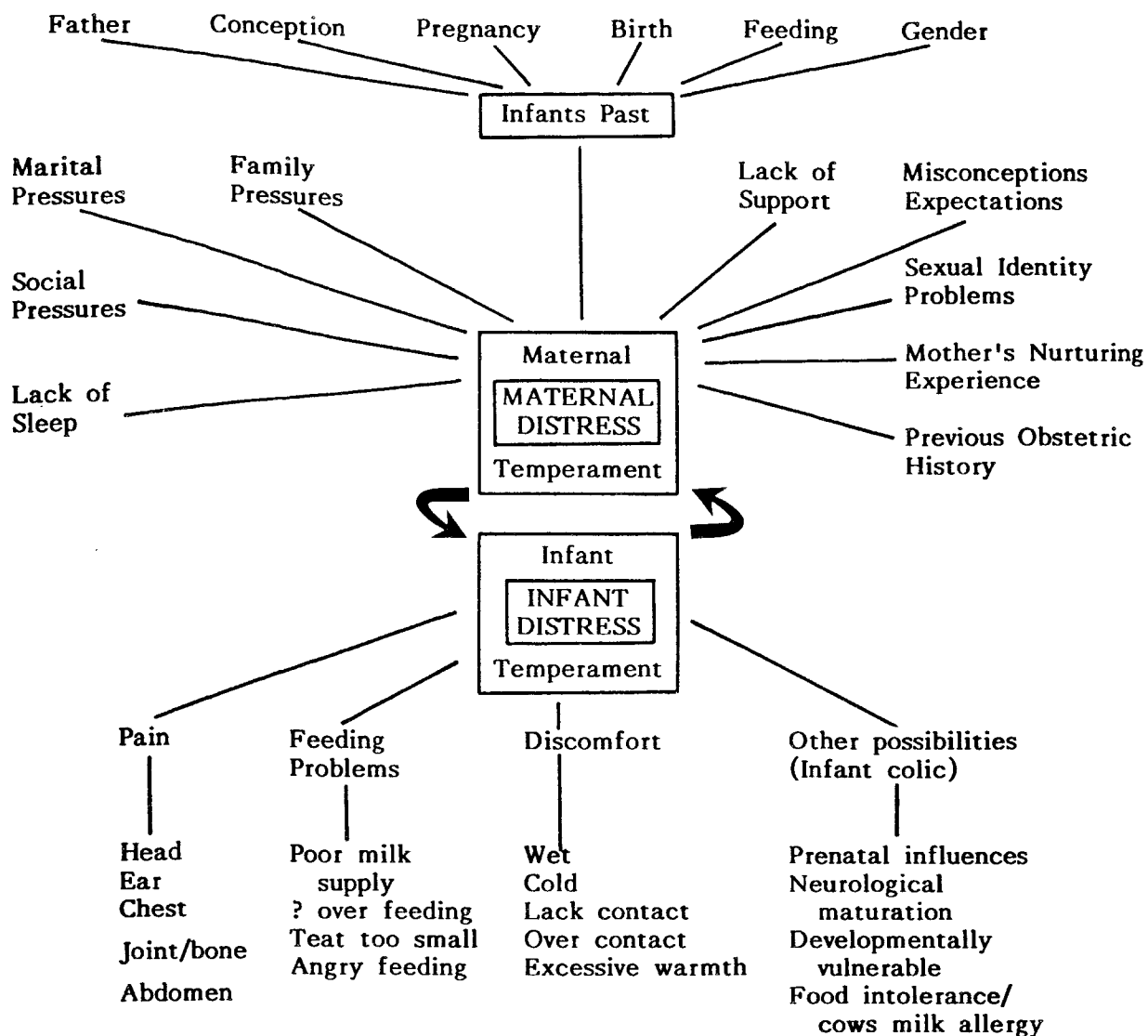


FIG. 1. Schematic representation of interaction of stresses acting on mother and crying infant.

mature nervous system. It is possible to conceptualize infant distress both neurophysiologically and psychodynamically. Both concepts provide a framework for understanding the basis of the problem, its expression and appropriate intervention. On one level, the infant is having difficulty in organizing input from internal as well as external stimuli, with little inhibition, poor integration, and few ways of reacting to the stimuli. Crying then represents the infant's externalization of these stimuli. From the psychodynamic viewpoint, the process in which both the infant and mother are involved is best described as transactional in nature. A

distressed dyad exists with the distress of one being transmitted to the other (Fig. 1). This interaction over time with its resultant cumulative distress necessitates intervention being directed toward both mother and baby individually and as a bonded pair.

The commitment of the physician must be to providing a nurturing environment for the infant by supporting the parents, encouraging expression of doubts and anxieties, and the provision of practical hints and information based on the present state of knowledge on the subject and an assessment of the parents' need for that knowledge.

References

1. Paradise JL. Maternal and other factors in the etiology of infant colic. *JAMA* 1966;197:191-9.
2. Jorup S. Colonic hyperperistalsis in neurolabile infants. *Acta Paediatrica* 1952;41:(suppl)596-9.
3. Illingworth RS. Three months colic. *Arch Dis Child* 1954;29:165-74.
4. Wessel MA, Cobb JC, Jackson EG, et al. Paroxysmal fussing in infancy, sometimes called colic. *Pediatrics* 1954;14:421-34.
5. Taylor WC. A study of infant colic. *Can Med Assoc J* 1957;76:456-61.
6. Carey WB. Maternal anxiety and infantile colic. *Clin Pediatr* 1968;7:590-5.
7. Brazelton TB. Crying in infancy. *Pediatrics* 1962;29:579.
8. Levin H. Infantile colic in institutions. *Am J Dis Child* 1950;79:66-72.
9. Ironside W. The infant development distress (IDD) syndrome: a predictor of impaired development? *Aust NZ J Psychiatry* 1975;9:153-8.
10. Gesell A, Kg FL. *Infant and child in the Culture of Today*. New York: Harper Harper and Brothers, 1943.
11. Zahonsky J. Mixed feeding of infants. *J Pediatr* 1901;11:208-15.
12. Shannon WR. Demonstration of food proteins in human milk by anaphylactoid experiments on guinea pigs. *Am J Dis Child* 1921;22:225-7.
13. Rubin M. Allergic intestinal bleeding. *Am J Med Sci* 1940;200:384-90.
14. Shannon WR. Colic in breast fed infants as a sensitization to foods in the mother's diet. *Arch Paediatr* 1921;38:256-61.
15. Snow J. The postural treatment of infant colic. *Am J Roentgenology* 1937;38:779-80.
16. Haas SV. The hypertonic infant: the curative actions of atropine on certain of its manifestations. *Am J Dis Child* 1918;15:323-35.
17. Eppinger H, Hess L. Vagotonia: a clinical study in vegative neurology. *Nerv and Ment Dis Mon Series No. 20*: 1915.
18. Lippman HS. Restlessness in infants. *JAMA* 1928;91:1848-52.
19. Neff FC. Treatment of colic in infants. *JAMA* 1940;114:1745-8.
20. Jakobsson I, Lindberg T. Cow's milk as a cause of infantile colic in breast fed infants. *Lancet* 1978;2:437-9.
21. Lothe L, Lindberg T, Jakobsson I. Cow's milk formula as a cause of infantile colic: a double blind study. *Pediatrics* 1982;70:7-10.
22. Jakobsson I, Lindberg T. Cow's milk proteins cause infantile colic in breast fed infants: a double blind crossover study. *Pediatrics* 1983;7:268-71.
23. Evans RW. Maternal diet and infantile colic in breast fed infants. *Lancet* 1981;1:1340.
24. Munchen MK. *Food for thought: a parents guide to food imbalance*. Alma Publications, Sydney, 1982.
25. Bahna SL, Heiner DC. *Allergies to milk*. New York: Grune and Stratton, 1980.
26. Menahem S. Understanding the management of the child with pain. *Med J Aust* 1983;1:579-82.
27. Bruce TW. Infant colic. *Pediatr Clin North Am* 1961;8:143-5.
28. Thomas A, Chess S. *Temperament and Development*. New York: Brunner/Mazel, 1977.
29. Menahem S. The crying baby: why colic? *Aust Fam Physician* 1978;7:1262-6.
30. Carey WB. Clinical applications of infant temperament measures. *J Pediatr* 1972;81:823-5.
31. Oberklaid F, Prior M, Golvan D, et al. Temperament in Australian infants. *Aust Paediatric J* 1984; 20:181-4.
32. Farren C. *Infant colic*. New York: Charles Scribner's Sons, 1983.
33. Shaver BA. Maternal personality and early adaptation to infantile colic. In Shereskefsky PM, Yarren LJ (eds). *Psychological aspects of a first pregnancy and early postnatal adaptation*. New York: Raven Press, 1974, pp 209-15.
34. Kronstadt D, Oberklaid F, Ferb TE, et al. Infant behaviour and maternal adaptations in the first six months of life. *Am J Orthopsychiat* 1979;49:454-64.
35. Bishop FI, Moore BG. *Maltreating families: report of a Melbourne Study*. Ministry of Health, Victoria, 1978.
36. Cockington RA, Don N, Gilbert L. Use of medications in infancy. *Aust Paed J* 1981;17:216-8.
37. O'Donovan JC, Bradstock AS. The failure of conventional drug therapy in the management of infantile colic. *Am J Dis Child* 1979;133:999-1001.
38. Illingworth RS. Three month colic: treatment by methyl scopolamine nitrate. *Acta Pediatr Scand* 1955;85:596-9.
39. Illingworth RS, Leeds MD. Evening colic in infants: a double-blind trial of dicyclomine hydrochloride. *Lancet* 1959;2:1119-20.
40. Breslow L. A clinical approach to infantile colic. *J Pediatr* 1957;57:196-206.
41. Levine MI, Bell AI. The treatment of colic in infancy by use of the pacifier. *J Pediatr* 1950;37:750-5.
42. Lipton EL. Swaddling and child care practice: historical, cultural and experimental observations. *Pediatrics* 1965;35:521-67.
43. Liebman WM. Infantile colic. Association with lactose and milk intolerance. *JAMA* 1981;245:732-3.
44. Weissbluth M, Christoffel KK, Davis AT. Treatment of infant colic with dicyclomine hydrochloride. *J Pediatr* 1984;104:951-5.
45. Taubman B. Clinical trial of the treatment of colic by modification of parents-infant interaction. *Pediatrics* 1984;74:998-1003.

Appendix  
Management Outline

---

General Measures

- Encourage a simple yet nutritious maternal diet with limited intake of cows milk and other possible transmitted allergens.
- Encourage recognition, acceptance, and expression of potential sources of ambivalence toward infant.
- Provide supportive and encouraging environment.
- Investigate possible misconceptions and inappropriate expectations.

Specific Measures

- Ensure adequate feeding technique. Exclude problems such as inadequate breast milk supply, inadequate formula volumes, teats too small on bottles, and inappropriate feeding environment.
- Exclude organic illness, such as otitis media, urinary tract infection, gastroesophageal reflux, constipation with anal fissure, intussusception, malrotation, glaucoma, and nonaccidental injury.
- Recognize factors that mitigate against a close mother–infant relationship, encourage their recognition, expression and acceptance.
- Excess guilt.
- Colic is not caused by the mother.

Most people have irrational fears when stressed by a screaming infant.

Reasons for any maternal ambivalence towards her infant. For example

Mother's own nurturing experience.

Mother's own history in relationships.

History of conception, pregnancy, and birth and previous obstetric history.

The effect the infant has on the relationship between mother and father.

The effect pregnancy, birth, and breast feeding has on mother's body image and sexual image.

Ascertain strength of possible maternal supports: father, family, Infant Welfare Sister, and local agencies, and encourage these where possible.

Provide information on possible solutions: infant and maternal diet, rocking, vibration and swaddling, pacifiers, and medications. Stress that these are prescribed on a trial-and-error basis.

Acute relief. If situation desperate, organize acute relief by providing a way for mother to obtain at least two nights full sleep, or provide mothering in facility where mother's anxiety can be relieved, sleep obtained, and confidence restored.

---