fortune Journals

Review Article

JOURNAL OF PEDIATRICS, PERINATOLOGY AND CHILD HEALTH

ISSN: 2641-7405



Misconceptions and Gaps in Research into Night-time Crying in Infants (Infantile Colic, Three-month Colic, Crying Babies)

Ekkehart Paditz[1*], Kanchan Upreti[1,2,3], Oleksandr Shevchenko[4], Serge Brand[5]

Abstract

The issue of sleep disturbance caused by intense crying in infants has not been given sufficient consideration since the introduction of the so-called Wessel criteria [1]. By using the term 'colic' (infantile colic), Wessel et al. [1] induced an over-emphasis and focus on abdominal complaints and therapeutic approaches that persist to this day. However, this tradition can be traced back to antiquity and to medieval writings that are still cited today. In the present review, we describe the sources documented since antiquity and Wessel 1954 [1], in order to clear the way for greater consideration of sleep in research into the phenomenon of increased crying in infants.

Keywords: Infantile colic; Lactobacillus; Bifidus; Sleep; Melatonin; Chronodisruption

Introduction

Crying is an infant's behavioral signal to increase parents' attention, care, nurturance, and proximity [2]. However, when crying surpasses a threshold of duration, frequency, intensity, and high-pitched tone, parents' behavior is trialed, as the infant's crying appears to be equivocal and difficult to read [3]. As such, excessive crying is considered a part of the trias of regulatory problems (RPs), including excessive sleeping and feeding problems [4], which in turn might increase the odds of childhood behavioral problems [4]. Unsurprisingly, mothers of infants with excessive crying, including sleeping and eating disorders, tended to express less appropriate and more non-attuned comments on their infants than mothers of the control group [3]. While typically infants' excessive crying resolves within the first three to six months [5], on the spectrum of parents' available coping strategies [6], infants' distressing behavior may lead to infant abuse [7], neglect, or even infanticide. In this context, infantile colic (IC) describes an infant's status of excessive crying and is considered to represent the upper end of the range of early developmental crying behavior. Further, neuropsychoendocrine evidence showed that, mothers of infants with IC had lower hair cortisol concentrations than those with infants without IC [8], where a continuously lowered hair cortisol concentration is considered a generalized downregulation of the mother's organism [9]. Similarly, laughter in mothers was associated with higher concentrations of melatonin in breast milk [11]. Weissbluth hypothesised that postnatal melatonin deficiency in infants [11] was associated with an increased incidence of intestinal colic [12], because melatonin—which acts as an antagonist to serotonin—would be lacking in this situation; serotonin, in turn, would intensify intestinal contractions [13]. Ucuncu Egeli et al. [14] also found evidence to suggest that infant colic should be understood as a circadian disruption linked to postnatal melatonin deficiency [14]. Intervention studies involving the administration of night-time milk with elevated melatonin concentrations or the short-term administration of melatonin

Affiliation:

[1]Zentrum für Angewandte Prävention (Center for Applied Prevention), D-01307 Dresden, Blasewitzer Str. 41, Germany

[2]Dr Kanchan Cures, Delhi, India, https://www.drkanchancures.com/

[3]New European Surgery Academy (NESA), D-10117 Berlin, Unter den Linden 21, Germany

[4]Center for Children and Adolescents Inn-Salzach-Rott, D-84503 Altoetting, Vinzenz-von-Paul Str. 14, Germany

[5]Center for Affective, Stress and Sleep Disorders (ZASS), Psychiatric University Hospital Basel, Basel, Switzerland

***Corresponding author:**
Ekkehart Paditz, Zentrum für Angewandte Prävention (Center for Applied Prevention), D-01307 Dresden, Blasewitzer Str. 41, Germany.

Email: praxis@paditz.eu.

Citation: Ekkehart Paditz, Kanchan Upreti, Oleksandr Shevchenko, Serge Brand. Misconceptions and Gaps in Research into Night-time Crying in Infants (Infantile Colic, Three-month Colic, Crying Babies). Journal of Pediatrics, Perinatology and Child Health. 10 (2026): 245-253.

Received: October 26, 2026
Accepted: November 03, 2026
Published: November 10, 2026

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

confirm that an improved supply of melatonin is associated with better sleep and less crying [15] and with improved weight gain [16].

Further, typically, sleep duration among infants with IC is shortened and interrupted, which poses an additional challenge to the caregivers [17].

In this regard, the question of whether and which interventions could improve sleep issues among infants suffering from IC has not been addressed systematically. For the following reasons, this is surprising:

First, it is known that significant changes and developments in sleep patterns [18-24] and sleeping duration [25-31] occur during the first few months of life [28,32].

Second, there are already numerous studies on the fundamental importance of undisturbed sleep for the infant's postnatal development: ´The evidence to date suggests that Roffwarg's ontogenesis hypothesis of sleep and brain development is correct and that alterations in sleep and sleep-wake cycling are associated with a range of neurodevelopmental and neurodiverse conditions, including prematurity" [32,33]. This fundamental finding from 1966, which was confirmed in 2024, is relevant, according to current knowledge, to multiple organ systems, the autonomic nervous system, endocrine and circadian rhythms [17,34], and cognitive functions [19,35-41], as well as their structural basis [20, 27].

Third, the increased night-time crying, as one of the leading symptoms of infant colic, constitutes a significant risk factor for shaken baby syndrome (non-accidental injury) [42-49]. Excessive crying or irritability of the baby was associated with shaken baby syndrome or death in 88.5 percent (23/26) of cases [47]. Fujiwara et al. [50] showed in a cluster randomized controlled trial that watching an educational video on infant crying and the dangers of shaking and smothering within one week after delivery at maternity wards significantly reduced self-reported shaking at one month of age by 88% (adjusted odds ratio 0.12, 95% confidence interval 0.03-0.54) [50].

The strong emphasis on the hypothesis that abdominal discomfort could be the cause of infant colic – or at least should be given particular attention in treatment – has been circulating since antiquity. The word 'colic', which originated in ancient times, seems to reflect this very assumption. A more psychological, psychosomatic, biological and/or holistic approach to infant colic, focusing on the development of the autonomic nervous system, of course also exists; however, its effectiveness in terms of therapeutic methods has so far been scarcely investigated in randomized trials. Validated questionnaires on sleep in infancy [31,51-54], as well as actigraphic [2,29,31,34,52,54-62], polygraphic and polysomnographic studies [24,28,61,63,64], appear to be largely unavailable in this regard.

The impact of the Wessel study (Pediatrics 1954) [53]

The seminal paper by Wessel et al. in Pediatrics 1954 [53] had been cited 193 times in articles listed in PubMed as of 22 October 2026. Wessel et al. [1] described the phenomenon as a behavioral and regulatory disorder; nevertheless, the use of the term 'colic' was associated with a bias towards, or focus on, abdominal symptoms. The term 'colic' appears in 7 of the 25 references cited by Wessel from the years 1921 to 1952 [65]. Ancient and medieval sources are not cited.

After excluding studies whose titles do not mention the topic of infant colic, 165 out of 193 citations from Wessel's [1] study remain, from which four subject groups can be identified; however, thematic overlaps in the classification into groups B–D cannot be entirely avoided:

A) In 57 out of 165 (34.6%) of the studies citing Wessel [1], the focus is on gastrointestinal aetiology, with investigations into the microbiome and dietary parameters.

B) Further 35 studies examine manual and osteopathic interventions, acupuncture, and pharmacological and enzymatic substitutions.

C) Further 25 studies deal with developmental biology and sensory perception (chronobiological rhythms of cortisol and melatonin, migraine, and the recording of crying).

D) In 48 studies, psychosocial issues such as parental stress, postnatal depression, and traumatic birth experiences are addressed.

The term 'colic' or 'colicky' is used in the title of 92 out of 165 studies. The topic of sleep is mentioned in the title of only 3 studies [17,66,67]. The circadian rhythms of melatonin and cortisol are addressed in only one study [68].

Ancient Sources

This focus on the abdomen and on the concept of (large intestine) colic is not a 20th-century phenomenon. The roots of this abdominal orientation can be traced back to the ancient Babylonian cuneiform literature of Mesopotamia. As early as the *Kuyunjik Compendium*, there are accounts of crying infants, as well as instructions to anoint the child with oils before breastfeeding in order to keep it healthy. To soothe the child, pastes made from fennel, garlic and fish were placed around the child's neck, or compresses made from thyme and wool were applied:

The worldwide first written record of crying babies and of attempts to ensure that babies sleep peacefully can be found in the ***Early Babylonian Kuyunjik Compendium from Mesopotamia, writen in cuneiform: 'Lie still, do not get up!***

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

You shall sleep, not cry!'*[69,70]. Before breastfeeding, the baby should be rubbed with oils to keep it healthy: ´Before it feeds, rub some oil on the baby, and it will stay healthy.´ [69,70]. In addition, the baby should be rubbed with oil, and a paste made of fennel, garlic and fish should be placed round its neck. Compresses made of thyme and wool were believed to help ensure that 'all evil might escape from the baby's body; witchcraft would no longer come near it. [69,70].*

In classical Ayurvedic medicine from India, particularly in the text Sushruta Samhita, which dates to the 6th century BC (specifically in the section on paediatrics, *Kaumarbhritya*), the phenomenon of excessive crying in children is attributed to the condition known as *Udarashoola* (abdominal colic). The affected child expresses this severe abdominal pain, induced by a disturbance of the life energy (*Vata*), through highly specific, observable symptoms: It refuses the breast (*stanam vyudasyate*), cries persistently (*rauti*), seeks to lie on its back (*uttanashchavabhajyate*), displays palpable stiffness of the abdomen (*udarstabdhata*), coldness (*shaityam*) and cold sweat on the face (*mukhaswedacha*) [71].

This early focus on the abdomen can also be found in Greco-Roman antiquity. The *Corpus Hippocraticum* describes, in the *Aphorisms* (Book 3, Chapter 24), insomnia and anxiety (*phobos*) in newborns as distinct clinical entities, whilst the *Prognostikon* (Chapter 34) explicitly links infantile convulsions and whimpering to an inability to sleep and a failure to pass stools. The association of 'colic conditions' with anatomical structures such as the small intestine and the colon was finally established in the 3rd and 4th centuries AD, following in the footsteps of Galen of Pergamon. In the ´Pseudo-Galenic´ work *Introductio sive medicus*, it is postulated that severe pain and colic arise when intestinal contents and wind are retained and become congested. This ancient author, whose name is unknown, had already criticised the fact that Hippocrates' successors had separated the interconnected parts of medical science – an early parallel to modern criticism of the excessive, isolated 'tunnel vision' of purely somatic specialists:

The Corpus Hippocraticum refers to insomnia and frightening episodes in infants: ´As regards the various stages of life, the following illnesses occur in them: ***Newborns and infants suffer from*** *mouth ulcers (aphthe), vomiting, coughing,* ***insomnia,*** *fright (phobos), umbilical inflammation and ear discharge.´ (Aphorisms, Book 3, Chapter 24) [72]. The interplay between motor development and speech, as demonstrated in one of the recent studies cited here [38], has already been addressed in a similar manner in the Corpus Hippocraticum:* ***'The child's nourishment [in the womb] is complete by the seventh, ninth or tenth month; by then it has control of its voice, possesses strength and can use its hands. As the voice is released, all other movements are set free; for the development and release of the voice proceed hand in hand.'*** *(On Epidemics, Book 2, Chapter 6, Section 4); Kapferer & Sticker 1933-1940, p. XI/73)[73]. Bowel obstruction can lead to convulsions: 'Convulsions occur in children when they have a high fever and their bowels are not emptying, when they are unable to sleep, lose consciousness, or cry in a whimpering manner, …' (Prognostikon, Chapter 34, Kapferer & Sticker 1933–1940, p. X/73)[78]. The term 'colic' or 'intestinal colic' cannot be definitively identified in the Corpus Hippocraticum, as the complex of symptoms described, for example, in Chapter 23 of the book ´The Diseases´ does not appear to be clearly translatable as 'colic-like pain' (translatable as 'douleur colique' in French and 'κωλικὴ ὀδύνη' in Greek (Littré 1849)), but also as dysentery (Kapferer 1933–1940; Pilar Pérez Canizares 2024)[74,75], Fever (Potter 1988)[76] or the Ruhr (Fuchs 1897)[77] was translated. 'Colic affections' were not attributed to specific anatomical structures such as the small intestine and the colon until the 3rd or 4th century AD, following the work of Galen of Pergamon (129–216) and Hippocrates of Kos (c. 460–370 BC): 'Severe pain and colic' arise when 'both the intestinal contents and the flatulence are retained, causing them to accumulate in the intestines' (Pseudo-Galen, 'Introductio sive medicus', Petit 2009, XIII 17, p. 54)[78]. This author has previously criticised the fact that Hippocrates' successors separated 'the interconnected parts' of the art and science of medicine (Petit 2010, p. 346) [79], which can be compared to today's criticism of experts' narrow-minded 'tunnel vision'.*

This view was incorporated directly into paediatric literature by Soranus of Ephesus (c. 100 AD). In his work on gynaecology, Soranus explicitly linked infants' crying and screaming to feeding, a distended stomach and intestinal obstructions, which were signalled by the child straining as their body contracted. This Greek physician, who practised in Rome around 100 AD, based his textbook ´Gynaecology´ heavily on Hippocratic medicine. In the German translation published in 1894, Lüneburg added the subtitle 'Obstetrics, gynaecological and paediatric diseases, and the dietetics of newborns':

Soranus emphasized that, alongside other causes, the weeping and crying of infants were associated with nutrition, the bowels, a distended stomach, food that 'weighs down the body' and bowel obstruction. ***Bowel obstructions could be recognised when 'the child cries whilst straining and contracting its body'.*** *The infant's ´frightening´ could cause ´both physical and mental suffering´. (§107–109, Lüneburg 1984, pp. 79–81, Tempkin 1991, pp. 111–113)[80,81].*

The first independent textbook on paediatrics, the ´Liber de morbis infantum´ by the Arab physician Rhazes (865–925) of Baghdad, led to this school of thought becoming widely disseminated throughout the European Middle Ages. Rhazes devoted separate chapters to abdominal distension (´De inflatione ventris puerorum´), childhood insomnia (´De vigiliis

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

puerorum′) and constipation (′De constypatione puerorum′). His proposed treatments included herbal preparations made from myrrh, aloe, saffron, dill and fennel seeds, rubbing oils into the stomach area, and rectal applications using violet oil enemas – therapeutic approaches that bear parallels to modern-day studies on probiotics and diet. In 2015, Uta Kahlert published the first German translation of the Latin edition of this book, which was published in Basel in 1544 [82]. The corresponding Arabic manuscript has not yet been detected but is cited in the so-called Dresden Galen Manuscript (Foliocodex) from the 15th century (Kahlert 2015, p. 9) [82]. In three short chapters, **Rhazes discusses the treatment of abdominal bloating and constipation, as well as 'children's nocturnal wakefulness'. The focus is predominantly on herbal preparations,** which we quote in full here, as they contain, in some cases, astonishing parallels to plants, oils, ointments and rectal applications still in use today:

- *'On abdominal distension in children. De inflatione ventris puerorum: ... The treatment consists of mixing myrrh, aloe and saffron with lettuce water and applying it to the head. And if the body wastes away due to stomach distension and an oversized head, take 5 drachmas of asafoetida, 7 drachmas of hazelnut kernels, almonds and fennel [seeds] [each] 1 aureus. These should be ground and oil extracted from them. Then place up to 4 drachmas into the nostrils, anoint the head with it and drip it into the ears. Give it to the wet nurse to drink with milk as well." (Kahlert 2015, p. 43) [82].*
- *′On children's nocturnal wakefulness. De vigiliis pueerorum. Insomnia afflicts children in early infancy [during infancy] due to spoiled milk. The treatment consists of administering violet oil mixed with saffron into the nostrils, or dill oil [oil prepared with dill] mixed with lettuce juice. Rub these oils into the head and the stomach area. Our concern should be directed towards improving the [wet nurse's] milk. And give the child poppy syrup240 to sip, and rub opium oil and saffron into the temples and forehead.′ (Kahlert 2015, p. 44) [82].*
- *′On constipation in children. De constypatione puerorum. Constipation often occurs in children. The treatment consists of giving the wet nurse a few donkey cucumber [seeds]. She should then [only] breastfeed the child [again] the following day. Or take brick dust, make a wax ointment with it and apply it to the abdomen. Or take the middle part of a shrew's faeces and grind it with kidney fat from a billy goat. Prepare a small tampon with it and insert it [into the child's rectum]. If a two-month-old child becomes constipated and develops a fever whilst unable to vomit, take 1/3 drachma of sarkocoll resin and give it to the child with breast milk. Or administer an enema with violet oil.′ (Kahlert 2015, p. 54) [82].*

Medieval Sources

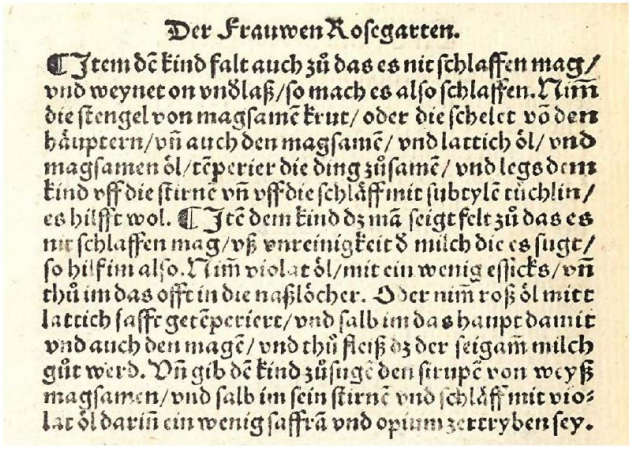
The reception of this abdominal approach can be traced through translations and adaptations from the late Middle Ages right up to the early modern period, as evidenced by the work of Eucharius Rößlin the Elder. His work *Der Swangern Frauwen und Hebammen Rosegarten* (1513) [83] became a bestseller that remained so for centuries. The relevance of this tradition is illustrated by the fact that, as of 2012, textsranging from Sorano to Rößlin had been published in at least 208 editions and 10 different languages. In the 1522 edition of his book, Rößlin deals in detail in the twelfth chapter with the 'various accidents and illnesses of newborn children, and how to come to their aid' (p. 94) and defines the 'blockage of the bowel', the 'illness in the body' and the 'lack of sleep' as the core clinical symptoms. In the event that the newborn 'becomes stiff and hard in the body and is unable to pass stools', Rößlin recommends mechanical rectal treatments:

One should ′make a suppository for him from honey boiled until it hardens, as large and thick as a quill and half a finger's width, and dip it in oil, and then insert it into his bottom; or make a suppository from magolt root′. In addition to oral doses of honey the size of a 'chickpea' and the gentle rubbing of the body with cotton soaked in oil, he advises systemic approaches via the wet nurse's diet ('give the wet nurse a medicine that cures haemorrhoids'). For topical relief, Rößlin suggests complex abdominal poultices, such as a paste made from ′endive juice and flour′, which should be applied in a layer as thick as a quill 'on the navel, and below the navel, and not on the stomach', as well as warm pouches boiled in rose petals, vinegar and blacksmith's quenching water placed on the stomach, or tying butter in a walnut shell directly onto the navel (pp. 94–95) [83].

The description of colic-like pain is further clarified in the section on 'illness in the belly'. In the event that 'the child's tummy aches, and it cries and writhes', Rößlin prescribes the application of cotton moistened with warm water, warm oil and a little wax (p. 102). This description of the writhing and inconsolably weeping child corresponds to the clinical picture of infantile colic, whilst remaining limited to therapeutic approaches that focus on the abdomen. With the statement 'Item, if the child also cannot sleep and weeps incessantly, then make it sleep in this way' in the section on the 'loss of natural sleep' (p. 106), **Rößlin provided, in 1522 according to current understanding, the first description of the causal link between prolonged, persistent crying and a pronounced sleep regulation disorder in early infancy** (Figure 1).

In the reception history of the Book of Soranus of Ephesus, there are clear lines of transmission via his probable pupil or translator Moschion and/or Mustio in the 2nd and 6th centuries AD respectively Caelius Aurelianus in the

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252


Der Frauwen Rosegarten.

Item dē kind falt auch zů das es nit schlaffen mag/ vnd weynet on vndlaß/so mach es also schlaffen. Nim die stengel von magsamē krut/ oder die schelet vō dem häuptern/vñ auch den magsamē/ vnd lattich öl/ vnd magsamen öl/tēperier die ding zůsamē/ vnd leges dem kind vff die stirnē vñ vff die schläff mit subtylē tüchlin/ es hilfft wol. Item dem kind dz mā seigt felt zů das es nit schlaffen mag/vß vnreinigkeit d milch die es sugt/ so hilfft im also. Nim violat öl/mit ein wenig essichs/vñ thů im das offt in die naßlöcher. Oder nim roß öl mit lattich saffr getēperiert/vnd salb im das haupt damit vnd auch den magē/ vnd thů fleiß dz der seigam milch gůt werd. Vñ gib dē kind zůsugē den sirupē von weyß magsamen/vnd salb im sein stirnē vnd schläff mit violat öl darin ein wenig saffrā vnd opium zerrtyben sey.

Figure 1: To the best of our knowledge, this is the first written account of the link between lack of sleep *(´das es nit schlaffen mag´*; ´that it cannot sleep´), constant crying (*´und weynet on undlaß´*; ´that it cannot sleep´) and the efforts to get the baby to sleep (*´so mach es also schlaffen´*; ´so make it sleep´). The comprehensive treatment guidelines, which predominantly focus on the abdomen, have been described in detail above in the main text. From: Eucharius Roesslin (*´Rößlin´*) the Elder, *Der Swangern Frauwen und Hebammen Rosegarten* (1513), an edition from 1522, p. 106) [83].

5th century, further translations in the Codex Palatinus in the 13th century, in 1300 by Albucuris, in 1363 by Guy de Chaulic, in 1463 by Bartholomeus Mettlinger, in 1466 by Joh. M. Savonarola, right up to the long-running bestseller 'Der Swangern Frauwen und Hebammen Rosegarten' by Eucharius Rößlin the Elder, published in Strasbourg in 1513 [83-85]. Of these titles, at least 208 editions in 10 languages (German, Dutch, Latin, Italian, English, French, Spanish, Greek, Bohemian and Czech) could be identified from Soranus to Roesslin up to 2012 [84]. In the edition of his book published in 1522, Roesslin addressed the subject of young infants at length, including abdominal constipation, lack of sleep and the associated 'constant crying':

*'How one can help the little child/ ... What one should do' (p. 8); 'Chapter X explains how to treat, carry and protect a newborn child, as well as how to care for it.'; 'Chapter XI explains how to breastfeed a child, including how long the breastfeeding period should last and what the quality of the milk should be.'; 'Chapter XII deals with various ailments and illnesses affecting newborns, and how to come to their aid. ... Newborns suffer from the following illnesses and ailments. ... Constipation ... Illness in the body ... Lack of sleep'; 'On constipation. Should a newborn, however, find that their body becomes stiff and hard and they are unable to pass stools, one should prepare a laxative suppository from boiled honey, left to set until hard, the size and thickness of a quill pen and half a finger's width, soak this in oil and insert it into the child's bottom, or make the suppository from magolt root ... Alternatively, take honey and give the child a little to eat, about the size of a chickpea (one should also place mustard seeds in the child's abdomen, wrapped in cotton soaked in oil) ... Furthermore, another remedy: give the child a remedy made from figs to promote bowel movements ... Furthermore, yet another. Take vinegar juice and wheat flour, make a paste of them in a pan and spread it onto a cloth, as thick as a quill, and place it on the child a hand-breadth above and below the navel, but not on the stomach. Also give the child two handfuls of rose petals in a pouch four fingers wide, soaked in water from the smithy, with a little vinegar; wring the pouch out well and place it warm on the child's abdomen. Furthermore, there is another method: put butter in a walnut shell and tie it to the child's navel. One should also rub the child's body with butter and anoint it." (pp. 94–95). "On stomach ailments. And if the child has stomach ache, is crying and writhing, you should place cotton on their stomach that has been soaked in warm water and warm oil with a little wax." (p. 102). ... ´**Abgang natürlichs schlaffs. Item de kind falt auch zu das es nit schlaffen mag/und weynet on undlaß/so mach es also schlaffen.´ (´A lack of natural sleep. The child doesn't want to sleep and cries persistently, so you're supposed to get them to sleep')** (Figure 1; Roesslin 1522, p. 106) [83]. To the best of our knowledge, this is the first explicit description of the link between persistent night-time crying and disturbed sleep in infancy* (Figure 1).

Conclusion

An analysis of the modern citation network for Wessel [1] reveals a significant paradox in the history of science. Whilst Wessel, through his main title *'Paroxysmal Fussing'*, deliberately sought to relate the phenomenon to the psychosocial context and to behavioral variables of all those involved within the infant's family, the use of the term 'colic' led to an emphasis on abdominal discomfort and, more recently, on the microbiome. The extensive links to disturbed sleep and to the 'physiological' melatonin deficiency during the first few months of life [11,14,86], as suggested in the introduction, have not yet been given sufficient consideration.

References

1. Wessel MA, Cobb JC, Jackson EB, et al. Paroxysmal fussing in infancy, sometimes called colic. Pediatrics 14 (1954): 421-435.
2. Brand S, Furlano R, Sidler M, et al. Associations between infants' crying, sleep and cortisol secretion and mother's sleep and well-being. Neuropsychobiology 69 (2014): 39-51.
3. Licata-Dandel M, Kristen-Antonow S, Marx S, et al. Mind-mindedness in mothers of infants with excessive crying/sleeping/eating disorders. Front Child Adolesc Psychiatry 3 (2024): 1331016.
4. Galling B, Brauer H, Struck P, et al. The impact of crying,

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

sleeping, and eating problems in infants on childhood behavioral outcomes: A meta-analysis. Front Child Adolesc Psychiatry 1 (2022): 1099406.

5. Indrio F, Dargenio VN, Francavilla R, et al. Infantile Colic and Long-Term Outcomes in Childhood: A Narrative Synthesis of the Evidence. Nutrients 15 (2023): 615.
6. Muller I, Ghio D, Mobey J, et al. Parental perceptions and experiences of infant crying: A systematic review and synthesis of qualitative research. J Adv Nurs 79 (2022): 403-417.
7. Zeifman DM, St James-Roberts I. Parenting the Crying Infant. Current Opinion in Psychology 15 (2017): 149-154.
8. de Kruijff I, Tromp E, Lambregtse-van den Berg MP, et al. Parental Stress and Scalp Hair Cortisol in Excessively Crying Infants: A Case Control Study. Children (Basel) 8 (2021).
9. Sadeghi-Bahmani D, Brand S, Meinlschmidt G, et al. Prepartal Stress, Prepartal and Postpartal Hair Glucocorticoid Concentrations, and Symptoms of Postpartum Depression 3 Days and 12 Weeks After Delivery. Biol Psychiatry Glob Open Sci 5 (2025): 100454.
10. Kimata H. Laughter elevates the levels of breast-milk melatonin. Journal of Psychosomatic Research 62 (2007): 699-702.
11. Paditz E. Postnatal Development of the Circadian Rhythmicity of Human Pineal Melatonin Synthesis and Secretion (Systematic Review). Children 11 (2024): 1197.
12. Weissbluth M, Weissbluth L. Colic, sleep inertia, melatonin and circannual rhythms. Medical Hypotheses 38 (1992): 224-228.
13. Weissbluth L, Weissbluth M. Infant colic: the effect of serotonin and melatonin circadian rhythms on the intestinal smooth muscle. Medical Hypotheses 39 (1992): 164-167.
14. Ucuncu Egeli T, Tufekci KU, Ural C, et al. A New Perspective on the Pathogenesis of Infantile Colic: Is Infantile Colic a Biorhythm Disorder? Journal of Pediatric Gastroenterology and Nutrition 77 (2023): 171-177.
15. Waraich NA, Tufail MO, Abbasi ZA, et al. Efficacy of Melatonin in Treatment of Infantile Colic in Infants Presenting to CMH Quetta OPD. Ann Pak Inst Med Sci 21 (2025): 549-553.
16. Temizsoy E, Uysal G, Karadag N. The Effect of a Chronobiological Feeding Model on Growth Parameters and Length of Hospitalization in Preterm Infants: A Randomized Controlled Study. Breastfeeding Medicine 20 (2025): 432-440.
17. Helseth S, Misvær N, Småstuen M, et al. Infant colic, young children's temperament and sleep in a population based longitudinal cohort study. BMC Pediatr 22 (2022): 163.
18. Wielek T, Del Giudice R, Lang A, et al. On the development of sleep states in the first weeks of life. PLoS One 14 (2019): e0224521.
19. Tarullo AR, Balsam PD, Fifer WP. Sleep and Infant Learning. Infant and Child Development 20 (2011): 35-46.
20. Davinson K, Learmonth AE, Cuevas K. Infant long-term memory: The last quarter century and the next. Infant Behavior & Development 81 (2025): 102136.
21. Mindell JA, Leichman ES, Composto J, et al. Development of infant and toddler sleep patterns: real-world data from a mobile application. Journal of Sleep Research 25 (2016): 508-516.
22. Lenehan SM, Fogarty L, O'Connor C, et al. The Architecture of Early Childhood Sleep Over the First Two Years. Maternal and Child Health Journal 27 (2023): 226-250.
23. Waugh M, Berger SE. Infants' Sleep Supports the Emergence and Mastery of Locomotor and Linguistic Skills. Developmental Psychobiology 68 (2026): e70187.
24. Abouseif N, Papatzikis E. Neuroscience and biomarkers of sleep in preterm and term infants: From state organization to clinical translation. Progress in Brain Research 301 (2026): 93-206.
25. Huang XN, Wang HS, Lu XC, et al. [Development of sleep/wake patterns in infants during the first 12 months of life]. Zhonghua Er Ke Za Zhi 47 (2009): 499-503.
26. Paavonen EJ, Saarenpää-Heikkilä O, Morales-Munoz I, et al. Normal sleep development in infants: findings from two large birth cohorts. Sleep Medicine 69 (2020): 145-154.
27. Pittner K, Rasmussen J, Lim MM, et al. Sleep across the first year of life is prospectively associated with brain volume in 12-months old infants. Neurobiology of Sleep and Circadian Rhythms 14 (2023): 100091.
28. He J, Xiao L, You X, et al. From Cradle to Early-Life Sleep: A Bibliometric Analysis of Global Research on Neonatal Sleep. Nature and Science of Sleep 18 (2026): 581853.
29. Hammad G, Schoch SF, Engelmann M, et al. Charting infant sleep cycle development using actigraphy:

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

longitudinal evidence for ultradian cycle lengthening within the first year of life from 35,000 hours of sleep. Sleep (2026).

30. Bastianello T, Nascimben C, Loschiavo AGA, et al. Infant sleep time: A comparative analysis of assessment methods. Sleep Medicine 136 (2025): 106838.

31. Matzliach O, Horwitz A, Ran-Peled D, et al. A longitudinal study of the bi-directional relations between parental bedtime and nighttime involvement and infant sleep. Sleep Medicine 129 (2025): 55-66.

32. de Groot ER, Dudink J, Austin T. Sleep as a driver of pre- and postnatal brain development. Pediatric Research 96 (2024): 1503-1509.

33. Roffwarg HP, Muzio JN, Dement WC. Ontogenetic development of the human sleep-dream cycle. Science (New York, NY) 152 (1966): 604-619.

34. Thomas KA, Burr RL. Circadian research in mothers and infants: how many days of actigraphy data are needed to fit cosinor parameters? Journal of Nursing Measurement 16 (2008): 201-206.

35. Judge MP, Chang L, Lammi-Keefe CJ. Evidence of developmental continuity from birth to 1 year: sleep, temperament, problem solving, and recognition memory. Advances in Neonatal Care 15 (2015): 125-133.

36. Morales-Muñoz I, Nolvi S, Virta M, et al. The longitudinal associations between temperament and sleep during the first year of life. Infant Behavior & Development 61 (2020): 101485.

37. Foulon S, Pingault JB, Larroque B, et al. Developmental predictors of inattention-hyperactivity from pregnancy to early childhood. PLoS One 10 (2015): e0125996.

38. Belia M, Vihman M, Keren-Portnoy T. Exploring Developmental Connections: Sleep Patterns, Self-Locomotion, and Vocabulary Growth in Early Childhood. Infancy 30 (2025): e12650.

39. Seehagen S, Konrad C, Herbert JS, et al. Timely sleep facilitates declarative memory consolidation in infants. Proceedings of the National Academy of Sciences of the United States of America 112 (2015): 1625-1629.

40. Hübler A. Influence of Sensory Needs on Sleep and Neurodevelopmental Care in At-Risk Neonates. Children 12 (2025): 781.

41. Ednick M, Cohen AP, McPhail GL, et al. A review of the effects of sleep during the first year of life on cognitive, psychomotor, and temperament development. Sleep 32 (2009): 1449-1458.

42. Sung V. Infantile colic. Australian Prescriber 41 (2018): 105-110.

43. Barr RG. Preventing abusive head trauma resulting from a failure of normal interaction between infants and their caregivers. Proceedings of the National Academy of Sciences of the United States of America 109 (2012): 17294-17301.

44. Lee C, Barr RG, Catherine N, et al. Age-related incidence of publicly reported shaken baby syndrome cases: is crying a trigger for shaking? Journal of Developmental and Behavioral Pediatrics 28 (2007): 288-293.

45. Levitzky S, Cooper R. Infant colic syndrome--maternal fantasies of aggression and infanticide. Clinical Pediatrics 39 (2000): 395-400.

46. Adam-Darque A, Freitas L, Grouiller F, et al. Shedding light on excessive crying in babies. Pediatric Research 89 (2021): 1239-1244.

47. Talvik I, Alexander RC, Talvik T. Shaken baby syndrome and a baby's cry. Acta Paediatrica 97 (2008): 782-785.

48. Reijneveld SA. Re: Age-related incidence curve of hospitalized Shaken Baby Syndrome cases: convergent evidence for crying as a trigger to shaking (Barr, Trent, & Cross, 2006). Child Abuse & Neglect 31 (2007): 601-602.

49. Barr RG, Trent RB, Cross J. Age-related incidence curve of hospitalized Shaken Baby Syndrome cases: convergent evidence for crying as a trigger to shaking. Child Abuse & Neglect 30 (2006): 7-16.

50. Fujiwara T, Isumi A, Sampei M, et al. Effectiveness of an Educational Video in Maternity Wards to Prevent Self-Reported Shaking and Smothering during the First Week of Age: A Cluster Randomized Controlled Trial. Prevention Science 21 (2020): 1028-1036.

51. Bertrais S, Larroque B, Bouvier-Colle MH, et al. [Infant temperament at 6-9 months old: validation of the French version of the Infant Characteristics Questionnaire and factors associated with measurement]. Revue d'Epidemiologie et de Sante Publique 47 (1999): 263-277.

52. Tikotzky L, Volkovich E. Infant nocturnal wakefulness: a longitudinal study comparing three sleep assessment methods. Sleep 42 (2019).

53. Del-Ponte B, Xavier MO, Bassani DG, et al. Validity of the Brief Infant Sleep Questionnaire (BISQ) in Brazilian children. Sleep Medicine 69 (2020): 65-70.

54. Konrad C, Schneider S, Seehagen S. Validation of the German version of the Brief Infant Sleep Questionnaire (BISQ) and associations with infant development. Early Human Development 222 (2026): 106629.

55. Galland B, Meredith-Jones K, Gray A, et al. Criteria for nap identification in infants and young children using 24-h actigraphy and agreement with parental diary. Sleep Medicine 19 (2016): 85-92.

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

56. Adams EL, Master L, Buxton OM, et al. A longitudinal study of sleep-wake patterns during early infancy using proposed scoring guidelines for actigraphy. Sleep Medicine 63 (2019): 98-105.

57. Schoch SF, Kurth S, Werner H. Actigraphy in sleep research with infants and young children: Current practices and future benefits of standardized reporting. Journal of Sleep Research 30 (2021): e13134.

58. Asaka Y, Kondo C. A Longitudinal Study on Parent-Infant Rest-Activity Rhythms Using Actigraphy From Late Pregnancy to Eight Months After Birth. Cureus 16 (2024): e76029.

59. Sazonov E, Sazonova N, Schuckers S, et al. Activity-based sleep-wake identification in infants. Physiological Measurement 25 (2004): 1291-1304.

60. So K, Adamson TM, Horne RS. The use of actigraphy for assessment of the development of sleep/wake patterns in infants during the first 12 months of life. Journal of Sleep Research 16 (2007): 181-187.

61. Insana SP, Gozal D, Montgomery-Downs HE. Invalidity of one actigraphy brand for identifying sleep and wake among infants. Sleep Medicine 11 (2010): 191-196.

62. Brand S, Furlano R, Sidler M, et al. 'Oh, baby, please don't cry!': in infants suffering from infantile colic hypothalamic-pituitary-adrenocortical axis activity is related to poor sleep and increased crying intensity. Neuropsychobiology 64 (2011): 15-23.

63. Gilchrist A, Aylward BS, Laine CM, et al. Maturation of infant sleep during the first 6 months of life: a mini-scoping review. Frontiers in Neuroscience 19 (2025): 1581325.

64. Dera K, Ciebiera M, Dąbrowski F, et al. Practical Application of Polysomnography in Infants. Journal of Clinical Medicine 14 (2025).

65. Sosland JM, Christophersen ER. Does SleepTight work? A behavioral analysis of the effectiveness of SleepTight for the management of infant colic. Journal of Applied Behavior Analysis 24 (1991): 161-166.

66. Tanrıverdi D, Karaahmet AY, Bilgiç F. Colic and sleep outcomes of nonpharmacological intervention in infants with infantile colic: systematic review and meta-analysis. Revista da Associacao Medica Brasileira 69 (2023): e20230071.

67. İnce T, Akman H, Çimrin D, et al. The role of melatonin and cortisol circadian rhythms in the pathogenesis of infantile colic. World Journal of Pediatrics 14 (2018): 392-398.

68. Paditz E. "Höre auf mich, mein Kindchen, Säugling du! Schlaf doch! Wer schläft, kommt zur Ruhe!" Die ältesten Babyschlaflieder aus Mesopotamien. In: Quante M, Poets CF, editors. Komm du nun, sanfter Schlummer (Friedrich Hölderlin, 1799) Aktuelle Kinderschlafmedizin 2020 Frühjahrstagung der Arbeitsgruppe Pädiatrie der Deutschen Gesellschaft für Schlafforschung und Schlafmedizin (DGSM), Tübingen 3-4 April 2020. Dresden: kleanthes Verlag für Medizin und Prävention; 2020: 78-86.

69. Farber W. Schlaf, Kindchen, schlaf! Mesopotamische Baby-Beschwörungen und -Rituale. Pennsylvania: Eisenbrauns The Pennsylvania State University Press; 1989.

70. Dash DP, Jain CM. A clinical study on Infantile Colic with Kuberaksha. J Ayurveda Integr Med Sci [Internet] 2021.

71. Paditz E. Schlaf und Traum in der hippokratischen Medizin. Quellen im Corpus Hippocraticum. Dresden: kleanthes; 2017.

72. Kapferer R, Sticker G. Die Werke des Hippokrates. Die hippokratische Schriftensammlung in neuer deutscher Übersetzung. Stuttgart: Hippokrates-Verlag Marquart & Cie.; 1933-1940.

73. Kapferer R. Die Leiden, Kap. 23. In: Kapferer R, Sticker G, editors. Die Werke des Hippokrates Die hippokratische Schriftensammlung in neuer deutscher Übersetzung. Stuttgart: Hippokrates-Verlag Marquardt & Cie.; 1933-1940: XV///37.

74. Perez PC. Hippocratis De affectionibus / Hippocrates, On Affections. Berlin, Boston: De Gruyter Akademie Forschung; 2024.

75. Potter P. Hippocrates, Vol. V, with an English translation by Paul Potter, University of Western Ontario. London: Harvard University Press; 1988.

76. Fuchs R. Die Leiden (de affectionibus). München: Verlag Dr. H. Lüneburg; 1897.

77. Petit C. Galien le Médecin. Introduction. OEvres, Tome III: le médecin. Introduction. Texte établi et traduit par Caroline Petit. Paris: Les Belles Lettres; 2009.

78. Petit C. Hippocrates in the pseudo-Galenic Introduction: or how was medicine taught in Roman times? Studies in Ancient Medicine 35 (2010): 343-359.

79. Lüneburg H. Die Gynäkologie des Soranus von Ephesus. Geburtshilfe, Frauen- und Kinder-Krankheiten, Diätetik der Neugeborenen. Übersetzt von Dr. phil. H. Lüneburg. Commentiert und mit Beilagen versehen von Dr. J. CH. Huber. München: J. F. Lehmann's Verlag; 1894.

80. Temkin O. Soranus, of Ephesus. Gynaecia. English.

Paditz E, et al., J Pediatr Perinatol Child Health 2026
DOI:10.26502/jppch.74050252

Sorabus' gynaecology/translated with an introduction by Owsei Temkin with assistance of Nicholson J. Eastman, Ludwig Edelstein, and Alan F. Gutmacher. Reprint. Originally published: Baltimore: John Hopkins Press; 1956. Baltimore, Maryland: The Johns Hopkins University Press; 1991.

81. Kahlert U. Buch des Rhazes über Kinderkrankheiten. Übersetzung des Liber de morbis infantum in den Opera exquisitiora (Basel 1544) und Sammlung von Rezepturen für zusammengesetzte Arzneimittel im Kontext lateinischer pädiatrischer Wiegendrucke und ausgewählter pharmazeutischer Fachliteratur des 16. Jahrhunderts. Dissertation Dr. rer. nat., Universität Bonn. Bonn: Universität Bonn; 2015.

82. Roesslin E. Der schwangeren frawen und hebammen Rosegarten. Straßburg: Martin Flach; 1522.

83. Paditz E. Babyschlaf und Säuglingspflege seit der Antike bis in die Neuzeit - historische Quellen aus der Herzog August Bibliothek Wolfenbüttel. Dresden: kleanthes Verlag für Medizin und Prävention; 2016.

84. Green MH. The Sources of Eucharius Rösslin´s ´Rosegarden for Pregnant Women and Midwives´(1513). Medical History 53 (2009): 167-192.

85. Green MH. ´Cliff Notes´ on the Circulation of the Gynaecological Texts of Sorano and Musio in the Middle Ages. 2015.

86. Paditz E. Melatonin in infants—physiology, pathophysiology and intervention options. Somnologie 28 (2024): 103-109.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) license 4.0

Citation: Ekkehart Paditz, Kanchan Upreti, Oleksandr Shevchenko, Serge Brand. Misconceptions and Gaps in Research into Night-time Crying in Infants (Infantile Colic, Three-month Colic, Crying Babies). Journal of Pediatrics, Perinatology and Child Health. 10 (2026): 245-253.