

# MEDICAL MANAGEMENT OF INFANTILE COLIC AND OTHER CONDITIONS WITH SPINAL MANIPULATION: A NARRATIVE REVIEW OF THE EUROPEAN MEDICAL LITERATURE

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## ABSTRACT

**Objective:** Strong evidence is found for European medical management of 'infantile colic' by spinal manipulation. This paper identifies and describes this body of evidence. We apply the social research method of document analysis to the European medical literature and report the medical practices regarding the management of infantile colic by manual means including manipulation.

**Data Sources:** Primary data sources were Medline, accessed via PubMed, and the Index to Chiropractic Literature (ICL). Secondary material was sourced from the private collections of the authors. Acceptability criterion included a report of the medical management of infantile colic.

**Data Synthesis:** A range of languages were accepted and either translated or interpreted by clinicians known to the authors. Each retrieved paper was then hand-searched to identify additional citations which were also collected. A total of 69 papers met the acceptance criteria. The statements accepted for appraisal were those of methods descriptive of the clinical assessment and management of patients classified by the practitioner as a child with infantile colic.

**Results:** The medical management of infantile colic by spinal manipulation is well reported in the European medical literature. Triangulation also identified reports of medical management of a range of pediatric non-neuromusculoskeletal conditions. European medical papers report a number of positive outcomes for infantile colic with care broadly considered to be manipulative care. These outcomes parallel those known to be widely reported in the chiropractic literature.

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**Conclusion:** We report strong evidence from the European medical literature related to the management by manipulation of infants with infantile colic and other conditions. (*J Contemporary Chiropr* 2019;2:60-75)

**Key Indexing Terms:** Colic; Chiropractic Manipulation; Medical Manipulation; Adverse events; Safety

## INTRODUCTION

Within Australia there is a government-manufactured controversy regarding the management of infants by chiropractors. The Government of Victoria (Australia) has commissioned its agency Safer Care Victoria to conduct an independent review 'Chiropractic Spinal Manipulation in Children under 12.' (1)

The reason is given as noting "community concerns about unsafe spinal manipulation on children performed by chiropractors and agreed that public protection was paramount in resolving this issue." The panel will undertake a systematic review of the literature, and receive public submissions.

Notwithstanding the evidence-free claim that spinal manipulation is 'unsafe,' we note the discrimination evident in the stated scope of the review to restrict it to practices of chiropractors, thereby exempting medical manipulation and other providers such as physiotherapists, osteopaths, and practitioners of Chinese herbal medicine.

The opinion of the Minister for Health of Victoria contradicts the evidence that the management of infantile colic by manipulation is an established clinical practice described competently in reputable academic textbooks (2,3) with a remarkable record of safety for both medical and chiropractic manipulation. There are several textbooks from major publishers in both disciplines and the matter is taught to a level that ensure patient safety within the curriculum of the five Australasian chiropractic

education programs. (4-8) Through various advisory roles we are familiar with the current curriculum of each.

Miller reports "based on the published literature, chiropractic spinal manipulation, when performed by skilled chiropractors, provides very low risk of adverse effect to the pediatric patient." (9) She found 2 moderate and 4 severe events from an estimated 30 million treatments over a 69 year period. Miller also reports that currently, mild transient symptoms of soreness, irritability or stiffness of a temporary nature may occur in less than 1% of 8,290 pediatric patient treatments. Recently, an entire issue of a chiropractic journal (10) was dedicated to the matter of child safety and included a grand rounds paper on infantile colic. (11) There are positive reports in the chiropractic literature on these cases, a search of the Index to Chiropractic Literature (ICL) with the term 'colic' returned 63 papers on 04 April 2019.

### *The Problem*

The etiology of the clinical presentation commonly known to both medical and chiropractic clinicians as 'colic' or 'infantile colic' remains an enigma. The Royal Children's Hospital in Melbourne refers to colic as 'Unsettled or crying babies' and states that parents receive conflicting advice from health professionals. It lists a variety of possible causes, but no single etiology, nor a definitive avenue for alleviation. (12) The Mayo Clinic states definitively that "The cause of colic is unknown" (13) and both chiropractic (14) and medicine (15) continue to advance our understanding of the disorder.

In 2007, Gupta noted that "Infantile colic is a common but poorly defined and understood clinical entity and, while several causative factors have been suggested, a unifying theory of its pathogenesis is still required." (16) Also, in 2009, Underwood wrote "Conventional medicine has manifestly failed to provide satisfactory treatment for infantile colic." (17)

Infantile colic "remains a mystery" with mothers "try(ing) everything." (18) Probiotics "may help some babies" but are "not a cure", so the "capricious nature of conventional care of colic justifies options that may also deliver positive outcomes." (19) This mystery may be resolved by accepting the work of Bunge (20) and Miller and Phillips (21) who have identified sub-groups of colic presentations. These subgroups are:

- Infant colic
- Irritable infant syndrome of musculoskeletal origin, and
- Inefficient feeding crying infants with sleep disorder.

In turn this suggests particular regimens may be more effective for a certain sub-group.

The systematic review of Carnes *et al* (22) "found moderate favourable evidence for reduction in crying time in infants receiving manual therapy." That finding provides an understanding for the Clinical Practice Guidelines for Unsettled and Crying Babies from the Royal Children's Hospital in Melbourne (12) in lieu of any guideline from the multi-discipline Victorian Paediatric Clinical Network (VPCN), (23) which is responsible to the Minister for Health: "medication is rarely indicated" and "formula changes are usually not helpful." It then states without evidence that "Spinal manipulation is no more effective than a placebo." The Mayo clinic website (13) lists parents reporting that chiropractic manipulation has been noted as "soothing crying babies," one of the symptoms of colic.

While medicine's guidelines for the management of colic are vicarious those of chiropractic are specific (24) and based on evidence. (25-27) The University of Maryland (28) notes "there is only preliminary scientific evidence that chiropractic may lessen crying in colicky babies, chiropractors frequently treat colic with a form of gentle spinal manipulation specially designed for infants. Usually treatment requires 3 to 4 visits over a 2 week period".

In the absence of a specific etiological factor and multiple contributing theories, the condition is indeed an enigma to medical eyes and seems to defy consistent positive outcomes with trying different avenues under conventional models of care. (29-31)

A report from the field of Chinese medicine (32) is supportive of manual care as epitomized by conventional chiropractors, "based on the literature, it can be concluded that manual chiropractic therapy is the most successful option for the management of paediatric musculoskeletal health of infants. In addition, few adverse effects have been reported, and these are negligible in comparison to the beneficial accounts of manual therapy."

We see the problem addressed by this paper as being an ignorance of the peer-reviewed, published and indexed evidence for manipulation of infants presenting with colic in the medical literature, specifically from Europe.

The purpose of this narrative review is to present this evidence for the medical management of this condition by spinal manipulative management.

## **METHODS**

Primary data sources were Medline and ICL. Electronic searches were made with the search term 'infantile colic' and 'manipulation.' Secondary material was sourced by hand-searching the private collections of

the authors and included textbooks by authors known to have also published in the peer-reviewed literature. A total of 80 items categorized as ‘manipulation by medical practitioners’ were found, a number of which were excluded as not being peer-reviewed. A total of 45 papers were analyzed for words and phrases reporting the management of infantile colic. A range of languages were accepted and either translated or interpreted by clinicians known to the authors. When necessary, online translation was used for abstracts. These 45 papers are listed in Table 1.

Data extraction of relevant sentences and paragraphs identified by document analysis allowed a range of concepts to be gathered. This process also identified outcomes, the reporting of which became secondary. Twenty-four papers in this category reported effects of

manipulation by medical practitioners and we list these as Table 2.

Statements of methods descriptive of the clinical assessment and management of patients classified by the practitioner with a diagnosis of infantile colic formed the anchor for synthesis through triangulation with known management protocols of conventional chiropractors published as both reference textbooks and peer-reviewed papers. These sources are not reported but confirm with the actual clinical experience of the authors, which we used as a filter.

## RESULTS

Forty-five papers were accepted as valid clinical reports of the management of infantile colic by medical

**Table 1.** Overview of manipulative medicine in Europe

LEAD AUTHOR	TOPIC	PUBLICATION	COUNTRY OF ORIGIN/ LANGUAGE	STUDY DESIGN OR FORMAT	YEAR
Biedermann H (38)	Colic	Manual therapy – children - textbook	Germany / English	Review / discussion	2004
Biedermann H (39)	Craniocervical	Medical Veritas	Germany / English	Concept presentation	2006
Biedermann H (40)	Unsettled children	Manuelle Therapie	Germany / German	Title only	2000
Biedermann H (41)	SMT newborns	Congress presentation	Germany / English	Narrative	2011
Biedermann H (42)	Colic	Online	Germany / English	Catamnestic	2009
Biedermann H (43)	Colic, etiology	JMPT	USA / English	Proposal	2005
Biedermann H (44)	KISS syndrome	Textbook chapter	Germany / English	Review / narrative	2004
Biedermann H (45)	KISS syndrome	Textbook	Germany / German	Catamnestic	1999
Biedermann H (46)	SMT newborns	J Orthop Med	Germany / English	Abstract only	1995
Biedermann H (47)	SMT infants	Vopr Kurortol Fizioter Lech Fiz Kult	Germany / Russian	Title only	1995
Biedermann H (48)	KISS syndrome	Manuelle Medizin	Germany German	Case reports	1993
Biedermann H (49)	C0/C1	Manual Med	Germany / English abstract	Catamnestic	1992
Colli R <i>et al</i> (50)	Neonatology	Pediatr Med Chir	Italian/English abstract	Narrative	2003
Ernst A <i>et al</i> (51)	C0/C1 dysfunction	PLaryngorhinotologie	Germany/ German	Narrative	2005

Falkenau HA (52)	Cervical syndrome children	HNO	Germany/English abstract	Narrative	1978
Filippkin MA (53)	Digestive	Vestn Rentgenol Radiol	Russia / English abstract	Case reports	1995
Frimodt-Møller N (54)	Infants	Ugeskr Laeger	Denmark / Danish	Title only	1988
Gutmann G (55)	Blocked C1	Manual Medizin (Also ICA Interantional Rev.)	Germany / German English translation	Case study	1987
Gutmann G (56)	Diencephalon/ infant	Man Med	Germany/German	Narrative	1968
Hestback L (57)	Paediatric epidemiology	JMPT	Denmark / English	Narrative/ survey	2009
Hülse M (58)	C0/C1	Text	Germany / German	Narrative?	2004
Kamieth H (59)	C0/C1 articular physiology	Rontgenblätter	Germany / German	Narrative	1988
Karch D (60)	KISS syndrome	Manuelle Medizin	Germany / German	Neuropaediatric statement 695 infants	2005
Koch LE (61)	C0/C1-cardiac	Textbook chapter	Germany/ English	Narrative	2004
Koch LE, <i>et al</i> (62)	VSC/C0/C1/ infants	Forensic Sci Int	Germany/English	Title only	2002
Krasilnikoff PA (63)	Infantile colic	Ugeskr Laeger	Denmark / Danish	Title only	1988
Kubis E (64)	Occiput	Manuelle Medizin	Germany	Narrative	1970
Langkau J, <i>et al</i> (65)	KISS Syndrome	J Clin Chiro Ped	UK	Case series	2012
Lewit K (66)	Cervicocranial/ SMT	Textbook	Czech Repub/ English	Title only	1999
Lewit K (67)	C0/C1 /tonsillitis	Manuelle Medizin Fortschr Geb	Czech Repub / Czech	Title only	1983
Lewit K (68)	C0/C1 headaches	Cesk Neurol Neurochir	Czech repub/ Czech	Title only	1978
Lewit K (69)	Subluxation/ radiology	Rontgenstr Nuklearmed	Germany / German	Title only	1974
Lewit K (70)	Craniocervical hypermobility/ radiology	Cesk Neurol	Czech Repub / Czech		1971
Lewit K (71)	C0/C1 hypomobility	Cesk Neurol	Czech Repub / Czech	Title only	1970
Maigne R (72)	Manual therapy	Textbook	Germany / German	Narrative	1972

Miller JE (73)	SMT efficacy colic	JMPT	England/ English	RCT	2012
Munck LK (74)	Manipulation	Ugeskr Laerger	Denmark / Danish	Single-blind random	1988
Ostby G (75)	Infants	Jorfmorbladet	Norway	Title only	1994
Ritzmann D (76)	Cervical spine / newborns	Textbook chapter	Germany / English	Narrative	2004
Sacher R (77)	Newborn cervical Spine trauma	Textbook chapter	Germany/English	Narrative	2004
Saedt E (78)	SMT / infants/C0/C1	JMPT	The Netherlands/ English	Prospective observational cohort study	2017
Seifert I (79)	C0/C1 sublaxation	Textbook chapter	Czech/English	Title only	1975
Strassburg HM (80)	Neurology/SMT	Kinderkrankens'wester	Germany/German	Title only	2000
Wiberg JM <i>et al</i> (81)	Colic	JMPT	Denmark/English	RCT	2000
Wiberg JM <i>et al</i> (82)	Colic	JMPT	Denmark/English	RCT	1999

The full citation is given for each paper at the point is discussed in the text.

Table 2. Medical management of infantile colic

LEAD AUTHOR	TOPIC	PUBLICATION	ORIGIN	YEAR
Biedermann H (87)	SMT/ERB's palsy	JMPT (Comment)***	Germany	1995
Colli R (50)	OMT neonates	Pediatr Med Chir*	Italy	2003
Decher H (84)	Cervical/ENT	Alduelle Otorhinolo**	Germany	1969
Ernst A (51)	Cranio-cervical	Laryngorhinotogie*	Germany	2005
Figar S, <i>et al</i> (85)	Plethysmography/SMT	Acta Neuroveg**	Germany	1967
Gallyamova AF (86)	Psychological rehabilitation	Мануальная Терапия*	Russia	2005
Gongal'skii VV (87)	Somatovisceral	Neirofiziologija*	Russia	1992
Isaev A, <i>et al</i> (88)	SMT/cardiovascular	Fiziologiya Cheloveka*	Russia	2005
Jung A, <i>et al</i> (89)	Cervico-cephalic synd.	Ann Chir**	France	1972
Köberle G. (90)	COAD/VSC**	Rehabilitácia Suppl	Germany	1975
Krag E (91)	Dyspepsia***	Scand J Gastroenterol	Denmark	1982
Lehmpfuhl W (92)	C1/C2 headaches	Ther Ggw**	Germany	1951
Lehmpfuhl W (93)	SMT/headaches**	Dtsch Med Wochenschr	Germany	1950
Lewit K (94)	C0/C1 headaches**	Cesk Neurol Neurochir	Czech	1978
Liev AA (95)	Cerebrum/cervical spine	Мануальная Терапия*	Russia	2005

Pikalov AA, <i>et al</i> (96)	SMT/duodenal ulcers	JMPT***	Russia	1994
Rychliková E, <i>et al</i> (97)	Somatovisceral, peptic Ulcers	Vnitr Lek**	Czech	1998
Sato A, <i>et al</i> (98)	Somato-autonomic reflexes	Textbook	Japan	1997
Schmorl G & Junghanns H (99)	Subluxations somatovisceral	Textbook	Germany	1971
Seifert I (100)	SMT baby deformities	Man Med**	Germany	1996
Sary O (101)	Vertebrogenic paediatrics	Acta Univ Carol Med**	Czech	1965
Sjaastad O, <i>et al</i> (102)	Cervicogenic headache	Clin Exp Rheumatol***	Czech	1965
Va ásková E, <i>et al</i> (103)	Vertebrogenic dysphagia	Textbook chapter***	Norway	2012
Vitek J (104)	Cervicogenic craniocerebral syndromes	Caz Lek Cesk**	Czech	1956

A range of European medical papers reporting the wide range of observations and adoption of the model of vertebrogenic relationships with of conditions influenced by spinal manipulation. English abstract \*\*Title only \*\*\*English version. Each entry is cited in ReferencesTwo.

manipulation (Table 1). There are over 60 papers relating to infantile colic on ICL; we do not report these. The Chiropractic Resource Organisation (CRO) website essentially carries the same papers as ICL. Many of these listings are case reports and outcome-based studies. (33, 34) Reference lists were also obtained from indexed papers as well a range of medical and chiropractic textbooks. (35 - 37)

#### Narrative Report

Spinal manipulation as it is known today was brought to European medical doctors by chiropractors and osteopaths, (105) and since then it has become an entrenched medical practice in most European countries, particularly Germany. In Europe, the use of spinal manipulation within the medical profession for the management of infantile colic has been a well-recognised procedure for some decades. (38,43,63,106)

The chiropractic vertebral subluxation is recognised in the medical literature (107) contrary to unsupported claims that it cannot be identified. It is this type of mechanical spinal lesion that has been identified to address as a vertebrogenic factor under this model. Davies notes there are 'common subluxation patterns' in infantile colic. (3, p 65). Biedermann (44,45,48) refers to it as Kinematic Imbalances due to Suboccipital Strain (KISS).

From other countries, Fisher and Ward (108) noted that across all age groups some 48% of Swedish patients seek manipulation (compared to our understanding that the rate is about 36% in the UK, 30% in the US, and ranges from 16% in Australia) and that "manipulation is also

practised by specialist hospital doctors in many European countries ... and 9% of GPs in the Netherlands." (50)

Children and infants are proportionally represented in the case-mix of conventional chiropractors. (109,110) A 2017 parental survey of infants attending health care centers in Norway reported that 10% of the 123 respondents had attended a chiropractor with the most common complaint being infantile colic. (55) Hestbaek *et al* (57) surveyed paediatric patients attending Danish chiropractic clinics over a 1-year time frame. They found that the most common paediatric patient (one-third) were infants between 3 and 4mo of age, and that colic was the most common presenting complaint for this group.

A Swiss study noted that infants younger than 6-months were the third most common paediatric patients attending 144 chiropractic clinics in that country. (111) A 2014 UK survey by Navrud *et al* (112) found that of infants attending chiropractors, the presenting complaint was colic in 41% of cases. We note the overall satisfaction was a rating of 75.1%.

We consider Biedermann to be the leading authority on medical spinal manipulation of infants. In many of his writings Biedermann notes particularly-positive outcomes associated with infant manipulation. He is a credible source and strongly recommends in many of his papers that the manipulative approach deserves a formal trial of care in many infant presentations.

#### Upper Cervical Involvement

The medical manipulative management of infantile colic symptoms identifies the prime area for examination as

the location of biomechanical disturbances of the upper cervical spine, as do conventional chiropractors who term this a subluxation complex. European medical practitioners consider this to be a critical segmental level requiring manual correction by manipulation. (54,58,61,63,75)

In our experience, a gastric element is often associated with colic. Evidence is emerging this may be neurally mediated. (113) Bortolotti *et al* (114) refer to gastric discomfort as functional dyspepsia, dysmotility, or idiopathic dyspepsia. These terms may fit the somato-autonomic-visceral model of the condition. (53)

If the cause is unclear and the treatment indefinite, then the clinical application of a range of established options of safe, effective care is justified. As such, both medical and chiropractic spinal manipulation have been shown to be of benefit to some infants. (115-120)

Biedermann attributes the upper cervical vertebrogenic state in colic to Kinematic Imbalance due to Suboccipital Stress (KISS Syndrome). (41,44,45,48) Infantile colic was once thought to be related to abdominal discomfort, allergy to cows' milk, intestinal muscle spasm, or other gastric conditions (23) and there is growing evidence that symptoms of excessive crying or distressed infants may indeed be attributed to upper cervical irritation.

Gelfand argues that a type of migraine headache may be a primary cause (121) and his evidence encompasses a manual therapy management approach which addresses relevant neurospinal levels, namely the suboccipital and mid-thoracic regions of the spine. Many authors recognize the potential for vertebral dysfunction in these regions to initiate infant irritability. (20,22,121-125)

Lewit, a well-known Czech manipulator, acknowledged the "primary importance of the craniocervical junction" in infants. He noted that vertebral "blockages may be noted by comparing the ranges of head rotation." He also noted a gastric vertebrovisceral correlation under influence from the segmental thoracic spine. Apart from his text (66), Lewit has published extensively both individually and in collaboration, on mechanical spinal disturbances and its manual management. (126)

### *Birth Trauma*

Ritzmann, (76) an obstetrician, states "As we know today, problems in newborn babies, children and adults can have their roots in pregnancy and birth, and the risk of damage to the newborn brain during birth has been the target of research for many years.....We begin to understand how vulnerable the structure of the newborn cervical spine is". His 2004 textbook concludes a chapter by stating there are a range of areas "...where the work of

obstetricians intersect with the work of those engaged in manual therapy." (76)

In a similar vein to Ritzmann, (76) Kraus (127) noted a cervical spine association between birth trauma and colic, while Munck (74) expounded on chiropractic care of infants in their first year of life. Lewit and Abrahamovic (67) noted that 92% of children had sub-occipital articular hypomobility in association with tonsillitis while Seifert (128) noted 172 (58%) of 298 infants aged 4 to 9 months, had abnormal craniocervical function.

## **Plausibility**

### *Adult Gastric Symptoms*

Schmorl and Junghanns are an authoritative European source regarding vertebrogenic conditions. (99) They acknowledge subluxation as inefficient motor segments, intervertebral insufficiency, vertebral locking, spondylogenic sequelae, as well as noting a gastric association with the autonomic nervous system. This is expressed as spondylogenic functional disturbances in the intestinal tract. They go further in the alleviation of these vertebral locking findings by noting chiropractic and manual manipulative corrections. The original German edition of this text was in its 5th edition by 1968 and their most recent English language iteration is a second edition (1971). (99)

Vertebrogenic gastric symptoms in adults have long been clinically recognised as 'conditions' in medical literature. There is also evidence of positive resolution of clinical outcomes for some cases that are attributed to spinal manipulation. We propose that a similar management model should be applied to restless colicky infants if segmental dysfunction is found to be present as noted by Biedermann and others. (40,129-131)

A Danish paper states that "abdominal pain of spinal origin has been known about for years, but is often overlooked". Krag (132) continues to state that nerve root pain may originate from apophyseal joints but these may be "released by a manipulation producing a characteristic 'click.'"

An example of spinogastric connection via a vertebral-autonomic-visceral association is that by Russian medical authors Pikalov and Kharin (133) who reported positive outcomes in the management of adult duodenal ulcer through spinal manipulation, resulting "in clinical remission with full epithelialisation or cicatrisation in all 11 cases of the experimental group."

In adults, postprandial gastric symptoms attributed to functional dyspepsia can present as nausea, vomiting, abdominal distension and pain, altered motility, sensorimotor dysfunction and early satiety. (134,135)

The sympathetic nervous system influence through a mid-thoracic spinal region may also be involved via the greater splanchnic nerve in relation to dyspepsia. (64,136-138) An electrogastrogram study (139) has confirmed an association. We propose that these findings are helpful to an understanding of the somatovisceral symptomatology in infantile colic.

In addition to the gastric symptoms, Gutmann (56) found that irritable infants may also experience disturbance at the suboccipital region of the cervical spine with resultant parasympathetic disturbance via the vagus enervation to the abdomen. (59,140,141)

The evidence for the efficacy of the spinal manipulative model of care for infantile colic symptoms is at least as strong if not more so, than for conventional care. (38,42,43,63,73,81,82,142-145)

### Neurophysiology

The somatic (spinal) influence on internal physiology is significant. The medical reports by Sato *et al* (141) outlined principles through which chiropractic (also manual medicine and osteopathic) hypotheses may affect a range of somatovisceral dysfunctions. They state "In contrast to the impressive body of knowledge concerning the effects of visceral afferent activity on autonomic functions, there is, generally speaking, much less information available on the reflex regulation of visceral organs by somatic afferent activity from skin, the skeletal muscle and their tendons, and from joints and other deep tissues. The elucidation of the neural mechanisms of somatically induced autonomic reflex responses, usually called somato-autonomic reflexes, is, however, essential to developing a truly scientific understanding of the mechanisms underlying most forms of physical therapy, including spinal manipulation and traditional as well as modern forms of acupuncture and moxibustion." (141)

### Somato-Autonomic Phenomena

A somato-autonomic reflex factor has at times been evident in colicky patients under European medical care - where that somatic factor is recognised as a functional biomechanical vertebral lesion (a vertebral subluxation). Medical literature indicates that the visceral function may be influenced by the intervention of vertebral manipulation through somatosensory autonomic reflexes. (141)

### Safety

The authors could not identify any original research study report that rejected spinal manipulation of infants for colic on the grounds of being unsafe or with negative clinical outcomes. By way of emphasis, the parental feedback was most positive for outcome efficacy. (111,146)

The criticism of commentators seems to be that chiropractic care for infantile colic is no better than a placebo (147), the same finding for a common colic medication. (148) In other words, chiropractic care is equal to or just as effective as placebo and medication and therefore becomes the preferred clinical option on the basis of safety and the absence of potential adverse effects. (63,149-151)

While it was acknowledged by Fox that, "Drug treatment generally has no place in the management of colic, unless the history and investigations reveal gastroesophageal reflux" (152), Miller noted the safety of chiropractic manipulative care in 2009. (9)

Gleberzon *et al* (149) reviewed chiropractic care of infants and reported that "no adverse events were encountered." Three years later, an extensive review by Todd *et al* (150) found that "Published cases of serious adverse events in infants and children receiving chiropractic, osteopathic, physiotherapy, or manual medical therapy are rare." We reject any notion that chiropractors do not report adverse events (AE) on the basis the most reliable data are derived from malpractice actions.

Some reviews call for further research or conclude that there is inadequate data. Such conclusions are not negative findings nor do they contraindicate the provision of care of infants with colic, but merely the unavailability of evidence. Adverse events with chiropractic are very few (129) and of such small prevalence they are difficult to study accurately. Vohra *et al* (153) acknowledged "Serious adverse events may be associated with pediatric spinal manipulation; neither causation nor incidence rates can be inferred from observational data". Errata are noted. (154)

A critical review (155) of Vohra's paper by Alcantara found "cases attributing direct adverse events associated with pediatric spinal manipulation as a result of chiropractic care were inappropriate and cases leading to a delayed diagnosis and/or inappropriate provision of chiropractic care were unsubstantiated". Our comment is that only two of the AEs involved infants (3mo and 4mo), with 1 being intervention by a physiotherapist using techniques that are specifically contraindicated in infants, and 1 by a chiropractor, again using a treatment the authors understand is contraindicated.

A third AE of 'midback soreness' was related to intervention by an 'academic chiropractor' and not an experienced chiropractic clinician, and again using a variety of manipulation contraindicated in infants and applied for an unknown reason to the full spine.

An unattributed 2002 review (156) of controversies and issues in chiropractic care for children and while noting an incidence of AEs in adults of one in 5.85 million

manipulations and reported none from chiropractic management of infants. The review was published by the Canadian Paediatric Society and noted the responsibility of chiropractors to provide advice. (156) We note also that Durant *et al* found that 35% of colic patients received concomitant care from their chiropractors and their conventional health practitioners. (157)

Our final observation regarding the safety of manipulation by trained and registered health providers compliments the findings in this paper that medical manipulation appears safe. We also acknowledge medicine's reporting system is evolving (12), and a chiropractic initiative by Funabashi and colleagues of a similar nature. (158)

Chiropractic has been examined with rigour and found safe. Our interpretation of this evidence is that there is virtually no danger to infants from carefully applied manual methods by qualified providers and perhaps the best of both worlds is concomitant care among chiropractors and medical practitioners.

Considering all forms of evidence, we conclude there is broad support for the provision of manipulation for infantile colic (159) and that chiropractic manipulation is demonstrably safe under comparative risk/benefit ratios.

#### Comment

A dichotomy exists when evidence that appears in European medical literature is not recognised and is seemingly ignored in English language journals. On this basis, one can understand the falsity of any claim 'there is no evidence to support the model of chiropractic treatment of colic. A similar unjustified claim was made decades ago regarding the chiropractic manipulative management of lower back pain. Pikalov (160) stated 'that in the thirty years since the mid-1960's some 5,000 to 6,000 medical doctors have become certified in manual therapy which is practiced in all hospital in the field of vertebroneurology' in Russia.

Recent non-European literature appears hesitant to recommend spinal manipulation for infantile colic but still lists it as a possible management while focussing more on dietary changes and psychological considerations. A recent paper by Deshpande and Caffari cites only two chiropractic studies almost 20-years old while no mention was made of the numerous medical papers from European literature, nor the chiropractic papers listed on the medical index PubMed. Of the chiropractic papers cited, 1 was positive (161) 1 other neutral (82) and the third, biased. (162)

## CONCLUSION

It is difficult to reconcile the positive evidence for manipulative management of infantile colic recorded in

the European medical literature and the known safety of chiropractic management with the need for the 2019 Safer Care Victoria inquiry into Chiropractic manipulation of infants. We consider there is no reasonable evidential basis for this inquiry.

The evidence is that "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." (163)

Infantile colic remains a medical enigma with no evidence of safety for medical management, in fact the determination of terminology for reporting such adverse events is relatively new. (164) On the other hand the remarkable safety of chiropractic management is known and the finding that European medical literature strongly indicates manipulative management of infantile colic as a safe and effective practice, places conventional chiropractic as a safe evidence-based choice to meet parental demand.

Alcantara *et al* (165) show support for this position by stating "chiropractic care is a viable alternative to the care of infantile colic and congruent with evidence-based practice, particularly when one considers that medical care options are no better than placebo or have associated adverse events."

In the absence of consistently effective management options, accepting the evidence of the European medical literature shows the benefit of manipulative care for infantile colicky patients and the wider collateral beneficial effect on parents. (166,167)

We consider it important to report the uncertainty of medical management of infantile colic and to recognize manual therapy as a legitimate management option as actively utilized by mostly European medical doctors. Multiple case reports document the efficacy of manual therapy of infants. There is a distinct absence of original evidence contradicting the efficacy of spinal manipulative management of infantile colic and an absence of evidential contraindications for its implementation.

This paper reports considerable material in the European medical literature on the manipulative management of infants, particularly infantile colic. Although supportive in safety (150,158) and efficacy (145), the chiropractic literature on these topics was not the primary focus at this time. However in relation to safety, Funabashi and colleagues noted providers of spinal manipulation have similar or better dimension scores compared to the 2016 medical data base of the Agency for Healthcare Research and Quality. (158)

On balance we can state with confidence that the published, indexed evidence places conventional chiropractic management of infantile colic as safe and effective in the manner clearly documented as clinical methods in the European Medical literature.

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