



## Research paper

Efficacy and safety of chiropractic therapy in infantile anorexia: A systematic review<sup>☆</sup>Lili Yang<sup>a</sup>, Yaoyao Bian<sup>b</sup>, Jing Shao<sup>c</sup>, Wei Sheng<sup>d</sup>, Wenlin Li<sup>e</sup>, Li Zeng<sup>e,\*</sup><sup>a</sup> School of Medicine, Nantong University, Nantong, China<sup>b</sup> School of Nursing, Nanjing University of Chinese Medicine, Nanjing, China<sup>c</sup> School of Basic Medical Sciences, Nanjing University of Chinese Medicine, Nanjing, China<sup>d</sup> Department of cardiology, Nantong Hospital of Traditional Chinese Medicine, Nantong, China<sup>e</sup> Jingwen Library, Nanjing University of Chinese Medicine, Nanjing, China

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## ABSTRACT

**Introduction:** Infantile anorexia is clinically characterized by poor or loss of appetite and arises in the first 3 years of life and appears to be increasing. In TCM, chiropractic therapy is used for this condition. A systematic review of the efficacy and safety of chiropractic therapy for the treatment of anorexia in infants was performed in order to provide a scientific basis for its clinical application.

**Methods:** Two review authors independently searched the China National Knowledge Infrastructure, Wanfang databases, Chinese VIP Information, PubMed database and Manual, Alternative and Natural Therapy Index System (MANTIS) from inception to May 2015. Randomized controlled trials (RCTs) of infants or children ( $\leq 14$  years of age) with anorexia were included. The methodological quality of trials was assessed in accordance with the Cochrane Handbook for Systematic Review of Interventions, Version 5.0.1. We used Revman 5.1 software provided by the Cochrane Collaboration for data analyses. In addition, a funnel plot was used to evaluate publication bias.

**Results:** A total of five RCTs and 371 participants were included in the systematic review. The homogeneity of the five trials was very good. Combined effects showed OR = 6.90, 95%CI(3.02, 15.77), and the test of combined effect showed  $Z = 4.58$ ,  $P < 0.00001$ . The differences were statistically significant. These results showed that chiropractic therapy was superior to the control group, and it was effective for the treatment of infantile anorexia. The funnel plot was symmetric, and the study bias was relatively small.

**Conclusions:** Chiropractic therapy in infantile anorexia was superior to traditional Chinese medicine or Western medicine treatment. However, the quality of trials included was low. Therefore, more rigorous studies with high-quality trials and large samples were needed to prove the benefit of chiropractic therapy and provide high levels of evidence.

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## 1. Introduction

Infantile anorexia was first described in a series of case studies by Chatoor and Egan [1], and it was called separation disorder at that time. It is a common chronic disease of disordered appetite, clinically characterized by poor appetite or loss of appetite, and decreased food intake. Children of all ages can have the disease, but it is especially common in children between 1 and 6 years [2]. The morbidity of infantile anorexia has been increasing over the years.

Infantile anorexia is a common disease in children, and its incidence in urban places is much higher than in others, making it one of the feeding problems of children in affluent societies [3]. It arises in the first 3 years of life, most commonly between 9 and 18 months, as infants become more autonomous and make the transition to spoon- and self-feeding. Children with infantile anorexia fail to communicate signals of hunger, but they show a strong interest in exploration, play, and/or interaction with their caregivers. They exhibit extreme food refusal and frequently fail to take in sufficient calories to sustain growth. As a result, these children display acute and/or chronic malnutrition [4]. According to syndrome differentiation in traditional Chinese medicine (TCM), infantile anorexia is caused by the weakness of the spleen and stomach, so that food is not be digested, resulting in indigestion problems. Aside from poor appetite, no obvious discomfort is

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experienced. However, infantile anorexia can cause nutritional disorder, reduced immunity and other illnesses along with vomiting, diarrhea, constipation, abdominal distension, abdominal pain and hematochezia, all of which greatly affect the normal growth and development of infants and children.

According to the report from 35 National Health Service hospitals in England [5], hundreds of preteen children are treated for eating disorders, and almost 600 children below the age of 13 have been treated in hospitals for eating disorders in the past of three years. Recent hospital records have noted an increase in childhood anorexia, leading to estimation that 40% of 9-year-olds have already dieted [6]. In China, the incidence of anorexia among infants and preschool children was 12–34% [7]. The incidence in urban areas was higher than that in rural areas, and the incidence in a one-child family was much higher than that in other families [8].

Numerous methods are currently available for the treatment of infantile anorexia. Conventional Western medicine treatment mainly includes adjusting diet, supplementing with multivitamins or trace elements, and improving nutrition [9]. However, western medicine treatment has many side effects. Vitamins can contribute to nutrient adequacy or excess among US infants and toddlers [10], and recent literature has shown the potentially deleterious effects of low-level chronic lead exposure on a vulnerable population [11]. Lead is a neurotoxicant that can decrease IQ and impair cognition [12]. Zinc is a trace element that may cause copper deficiency when taken in excess, leading to anemia and neutropenia [13]. TCM mainly uses prescriptions based on syndrome differentiation and treatment to improve spleen and stomach dysfunction, and promote intestinal function. However, oral decoctions of TCM are hardly accepted by children [14].

Chiropractic therapy is an ancient and practical *tui na* therapy. It has been used for treating infantile anorexia for thousands of years in China. It originates from meridian-collateral theory of TCM [15]. Meridians and collaterals regulate the physiological function of internal organs and carry *Qi* and blood, they also connect the whole body from exterior to interior, top to bottom and internal to external. *Du* meridian circulates along the middle line of the spine, and 1.5 *cun* (acupuncture body inches) beside it at both sides are the urine bladder meridians of foot *taiyang*. In the human body, the lower body (waist) is divided into two parts: abdomen (*Yin*) and back (*Yang*). Therefore, the *Du* meridian governs the whole *Yang Qi* of the body, whereas many back-shu acupoints of internal organs distributed along the urine bladder meridians. Diseases of internal organs influence meridians, and vice versa [16,17]. Different from chiropractic in the west, TCM chiropractic therapy is a common massage method. Chiropractors pinch the skin and subcutaneous tissues with the thumb and other fingers by the strength to make a quick pinching, squeezing and lifting movement from the bottom of the spine to acupoint *Dazhui* (the seventh cervicals). The technique is often performed by lifting the skin once after three times of pinching to stimulate the acupuncture points on the two above meridians. And it is performed once a day and 6 days make up one course. It can stimulate spinal nerve roots, coordinate the sympathetic and parasympathetic functions, promote blood and lymphatic circulation of the stomach and intestine, and improve the function of the digestive system [18], which has a particularly good effect on infantile anorexia treatment.

TCM chiropractic therapy is safe when employed skillfully and appropriately [19]. Although chiropractic therapy is easily accepted by children and their parents, we still lack the related systematic review about the efficacy and safety of this therapy. Accordingly, this review systematically evaluates the efficacy and safety of TCM chiropractic therapy in infantile anorexia to provide a scientific basis for the clinical application of this therapy.

## 2. Methods

### 2.1. Search strategy

Two review authors (Lili Yang and Yaoyao Bian) independently searched the following databases from inception to May 2015: China National Knowledge Infrastructure, Wanfang databases, Chinese VIP Information, PubMed database and Manual, Alternative and Natural Therapy Index System (MANTIS). We used the following search terms: child, infant, baby, chiropractic, anorexia.

The website addresses: China National Knowledge Infrastructure (<http://www.global.cnki.net>), Wanfang databases (<http://www.wanfangdata.com>) and Chinese VIP information (<http://en.cqvip.com>).

### 2.2. Inclusion and exclusion criteria

The inclusion criteria were as follows: (1) Randomized controlled trials (RCTs): include randomised studies, semi-randomised studies and studies that mentioned random allocation, but did not illustrate a randomised method; (2) study subjects include infants or children ( $\leq 14$  years of age) with anorexia; (3) interventions include treatment group with chiropractic therapy alone and control group with Western/Chinese medicine or other therapy; and (4) outcomes that consider the total effective rate as the main outcomes. Both English and Chinese articles were included.

The exclusion criteria were as follows: (1) infantile anorexia caused by other diseases; (2) duplicates within and among the databases; (3) reviews, case reports, viewpoints, or studies of animals; (4) the evidence did not meet the inclusion criteria; (5) chiropractic therapy with acupuncture or other therapies as treatment group.

### 2.3. Data extraction and quality assessment

Two reviewers (Lili Yang and Yaoyao Bian) read the trials and extracted data independently in accordance with the search strategy and the inclusion/exclusion criteria. Data regarding patient characteristics, interventions, outcomes and treatment course were extracted. When the information was incomplete, we contacted the author to obtain the complete data. A third author (Jing Shao) was consulted for resolution of disagreements.

The methodological quality of trials was assessed independently by two reviewers using criteria from the Cochrane Handbook for Systematic Review of Interventions, Version 5.0.1 (Qinghua Shang, Hao Xu) [20]. The items included random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and personnel (performance bias), blinding of outcome assessment (detection bias), incomplete outcome data (attrition bias), selective reporting (reporting bias), and other bias. We judged each domain from three levels ("L" for a low risk of bias, "H" for a high risk of bias, and "U" for an uncertain risk of bias). We assessed the trials and categorized them into three grades. namely, low risk of bias (low risk of bias for all key domains), high risk of bias (high risk of bias for 1 or more key domains), and unclear risk of bias (unclear risk of bias for 1 or more key domains).

### 2.4. Statistical analysis

Revman 5.1 software provided by the Cochrane Collaboration was used for the data analyses. Before merging statistics, heterogeneity tests were performed for all trials. The Chi-square test for heterogeneity test ( $P=0.1$ ) was used and  $I^2$  calculated to test for size of heterogeneity. When  $I^2 > 50\%$ , it indicated that

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