

REVIEW ARTICLE

Chiropractic: Is it Efficient in Treatment of Diseases? Review of Systematic Reviews

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ABSTRACT

Chiropractic is a complementary medicine that has been growing increasingly in different countries over recent decades. It addresses the prevention, diagnosis and treatment of the neuromusculoskeletal system disorders and their effects on the whole body health. This study aims to evaluate the effectiveness of chiropractic in the treatment of different diseases. To gather data, scientific electronic databases, such as Cochrane, Medline, Google Scholar, and Scirus were searched and all systematic reviews in the field of chiropractic were obtained. Reviews were included if they were specifically concerned with the effectiveness of chiropractic treatment, included evidence from at least one clinical trial, included randomized studies and focused on a specific disease. The research data including the article's first author's name, type of disease, intervention type, number and types of research used, meta-analysis, number of participants, and overall results of the study, were extracted, studied and analyzed. Totally, 23 chiropractic systematic reviews were found, and 11 articles met the defined criteria. The results showed the influence of chiropractic on improvement of neck pain, shoulder and neck trigger points, and sport injuries. In the cases of asthma, infant colic, autism spectrum disorder, gastrointestinal problems, fibromyalgia, back pain and carpal tunnel syndrome, there was no conclusive scientific evidence. There is heterogeneity in some of the studies and also limited number of clinical trials in the assessed systematic reviews. Thus, conducting comprehensive studies based on more reliable study designs are highly recommended.

KEYWORDS: Alternative medicine; Chiropractic; Complementary medicine; Systematic review

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INTRODUCTION

Chiropractic is a type of complementary medicine with various definitions in different articles and other scientific resources. According to the World Health Organization's (WHO) definition, chiropractic is "a health care profession concerned with the diagnosis, treatment and prevention of disorders of the neuromusculoskeletal system, and the effects of these disorders on general health". Chiropractic treatment procedures emphasize the manual techniques, including joint adjustment and/or manipulation, with a specific focus on subluxation.¹

The basis of chiropractic approach to restoration and protection of health is the relationship between structure, specifically the spine and musculoskeletal system, and function, particularly as coordinated by the nervous system. In other words, based on the chiropractic approach, the body is regarded

as a neuromusculoskeletal system in which disorder in one part of the system disturbs the other parts. Therefore, disorders in the body structure are removed so that stresses on the body's nervous system can be alleviated and the general health of the body can be restored.¹⁻⁵

Chiropractic was founded by Daniel David Palmer in the United States of America (USA), in 1895, and it gradually attracted its proponents among doctors and other healers. Nowadays, chiropractic is taught in at least 40 universities and colleges, in 16 different countries (Table 1). Moreover, most of these are located in the USA as it is the birth place of chiropractic (Figure 1). Chiropractic is practiced worldwide and is regulated by law in 40 countries such as the USA, Australia, Germany, France, Brazil, Japan, England, and Denmark.^{1,6-8} Moreover, at least 17 journals with the exact name 'chiropractic' publish chiropractic related articles worldwide⁹⁻¹³ (Table 2).

Table 1: Chiropractic Universities and Colleges

Continent	Country	Chiropractic Institution	Web site
Oceania	Australia	Macquarie University, Department of Chiropractic	Website Address: http://www.chiro.mq.edu.au/
		Murdoch University, School of Chiropractic and Sports Science	Website Address: http://www.murdoch.edu.au/School-of-Chiropractic-and-Sports-Science/
Royal Melbourne Institute of Technology (RMIT) University, Discipline of Chiropractic		Website Address: http://www.rmit.edu.au/chiropractic	
	New Zealand	New Zealand College of Chiropractic	Website Address: http://www.chiropractic.ac.nz/chiropractic-education/index.php
South America	Brazil	Anhembi Morumbi University	Website Address (in Portuguese): http://portal.anhembi.br/index.html
		Feevale Central University	Website Address (in Portuguese): http://www.feevale.br/home/
		Canadian Memorial Chiropractic College	Website Address: http://www.cmcc.ca/
Asia	Japan	Murdoch University International Study Centre Japan	Website Address (in Japanese): http://chiropractic-edu.jp/
		Tokyo College of Chiropractic	Website Address: http://www.chiro.jp/english
		Royal Melbourne Institute of Technology (RMIT) University Chiropractic Unit Japan	Website Address: http://www.chiro.co.jp/english.html
	Malaysia	International Medical University	Division of Traditional and Complementary Medicine (IMU) Website Address: http://www.imu.edu.my/pro-un-chiro.html
	South Korea	Hanseo University	Graduate School of Health Promotion (Hanseo University)
Africa	South Africa	Durban University of Technology, Department of Chiropractic and Somatology	Website Address: http://www.dut.ac.za/pages/22613
		University of Johannesburg, Department of Chiropractic	Website Address: http://www.uj.ac.za/EN/Faculties/health/departments/chiropractic/Pages/default.aspx

Table 1: Chiropractic Universities and Colleges

Continent	Country	Chiropractic Institution	Web site
Europe	Denmark	University of Southern Denmark, Institute of Sports Science and Clinical Biomechanics	Website Address: http://www.sdu.dk/Uddannelse/bachelor/klinisk_biomekanik
	France	Institut Franco-Européen de Chiropratique	Website Address (in French): http://www.ifec.net/
	Spain	Real Centro Universitario Escorial Maria Christina	Website Address: (Spanish): http://www.rcumariacristina.com/
		Barcelona College of Chiropractic	Website Address: http://www.bcchiropractic.es/
	Sweden	Skandinaviska Kiropraktorhögskolan (Scandinavian College of Chiropractic)	Website Address(Swedish): http://www.kiropraktik.edu/
	Switzerland	Universität Zürich (University of Zurich)	Website Address (English): http://www.uzh.ch/index_en.html
	United Kingdom	Anglo-European College of Chiropractic	Website Address (English): http://www.aecc.ac.uk/
McTimoney College of Chiropractic		Website Address: http://www.mctimoney-college.ac.uk/	
North America	Mexico	Universidad Estatal del Valle de Ecatepec	Website Address (Spanish): http://www.uneve.edu.mx/
		Universidad Estatal del Valle de Toluca	Website Address (Spanish): http://www.uvt.edu.mx/
	Canada	Université du Québec à Trois-Rivières, Département de Chiropratique	Website Address (in French): http://www.uqtr.ca/Departement/chiro.shtml
	United States	Cleveland Chiropractic College	Website Address: http://www.cleveland.edu/
		D'Youville College, integrative holistic health studies department	Website Address: http://www.dyc.edu/academics/chiropractic/index.asp
		Life University, College of Chiropractic	Website Address: http://www.life.edu/Chiropractic_College
		Life Chiropractic College West	Website Address: http://www.lifewest.edu/
		Logan College of Chiropractic	Website Address: http://www.logan.edu/
		National University of Health Sciences	Website Address: http://www.nuhs.edu/
		New York Chiropractic College	Website Address: http://www.nycc.edu/
		Northwestern Health Sciences University, Northwestern College of Chiropractic	Website Address: www.nwhealth.edu/
		Palmer College of Chiropractic, Davenport Campus	Website Address: http://www.palmer.edu/
		Palmer College of Chiropractic, West Campus	Website Address: http://www.palmer.edu/
		Palmer College of Chiropractic, Florida Campus	Website Address: http://www.palmer.edu/
		Parker University	Website Address: http://www.parker.edu/Welcome_to_Parker_University.aspx
		Sherman College of Chiropractic	Website Address: http://www.sherman.edu/default.asp
		Southern California University of Health Sciences, Los Angeles College of Chiropractic	Website Address: http://www.scuhs.edu/academics/lacc/
		Texas Chiropractic College	Website Address: http://www.txchiro.edu/
		University of Bridgeport, College of Chiropractic	Website Address: http://www.bridgeport.edu/academics/graduate/chiro
		University of Western States	Website Address: http://www.uws.edu/default.aspx

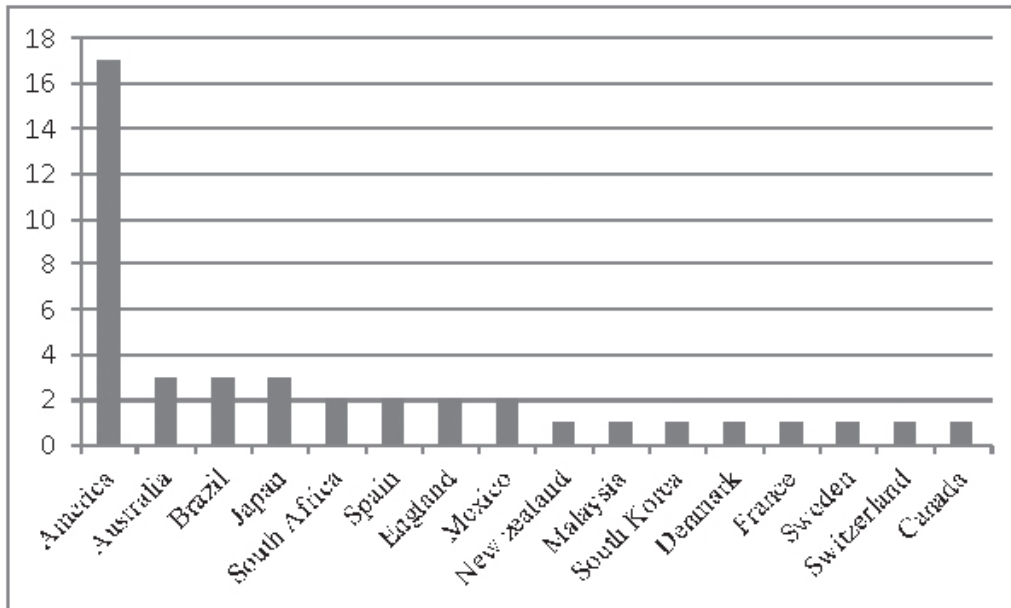


Figure 1: Chiropractic universities and colleges in different countries

Table 2: Chiropractic international scientific journals

Journal email address	Journal name
http://www.historyofchiropractic.org/mc/page.do?sitePageId=53364&orgId=ahc	Chiropractic History - The Journal
http://chiromt.com/content	Chiropractic & Manual Therapies
http://chiropractors.asn.au/AM/Template.cfm?Section=Volume_401&Template=/CM/HTMLDisplay.cfm&ContentID=8123	Chiropractic Journal of Australia
http://chiropracticreport.com/portal/index.php?option=com_content&task=view&id=22&Itemid=45	Chiropractic Report
http://www.sciencedirect.com/science/journal/14792354	Clinical Chiropractic
http://www.dcorthoacademy.com/archived.php	Journal of the Academy of Chiropractic Orthopedists
http://www.acatoday.org/level2_css.cfm?T1ID=34&T2ID=219	Journal of the American Chiropractic Association
http://www.jcca-online.org/IssueIndex.aspx	Journal of the Canadian Chiropractic Association
http://www.journalchiroed.com/	Journal of Chiropractic Education
http://www.journalchirohumanities.com/	Journal of Chiropractic Humanities
http://www.journalchiromed.com/	Journal of Chiropractic Medicine
http://www.icapediatrics.com/reference-jccp.php	Journal of Clinical Chiropractic Pediatrics
http://chiropracticpediatricresearch.web.officelive.com/default.aspx	Journal of Pediatric, Maternal & Family Health Chiropractic
http://www.uppercervicalsubluxation.com/	Journal of Upper Cervical Chiropractic Research
http://www.ncbi.nlm.nih.gov/pmc/journals/321/	Australasian Chiropractic & Osteopathy
http://www.ncbi.nlm.nih.gov/pmc/journals/321/	Chiropractic & Osteopathy
http://www.ncbi.nlm.nih.gov/pmc/journals/321/	COMSIG Review

Applying manual techniques in musculoskeletal disorders has a long history in Iran. Avicenna and other traditional Iranian

healers noted its healing properties in their books and essays. For instance, *ghamz* a term used in traditional Iranian medicine is

equal to reflex therapy, one of the methods applied in chiropractic.¹⁴⁻¹⁶ However, in Iran, chiropractic history using the modern definition dates back to 20 years when a group of Iranian specialists graduated from foreign universities and established the Iranian Doctors of Chiropractic Association (IDCA), as a member of the Universal Chiropractors' Association (UCA). The chiropractic major was approved by the Iranian Ministry of Health and Medical Education (MoHME) in 1992, and the Iranian Chiropractic Association (IrCA) was founded by the license of the MoHME in 2004.¹⁷⁻²⁰

The increasing distribution of chiropractic worldwide, including Iran, demonstrates the importance and necessity of assessment into its effectiveness on the management of diseases. The purpose of this study was to evaluate the effectiveness of chiropractic in treating different diseases, based on the results of systematic reviews.

MATERIALS AND METHODS

In this study, the search strategy focused on systematic reviews in the field of chiropractic treatment in improving and removing any disease. The searching period was between July and November 2014. We applied a systematic approach to reviewing the chiropractic systematic reviews by following a sequence of online searching strategies as follows:

- Searching in the Cochrane Database of Systematic Reviews for systematic reviews and meta-analyses for chiropractic treatment.
- Direct searching in the following English databases: Medline, AMED (Allied and Complementary Medicine), Google Scholar, and Scirus.
- Direct searching in the following Persian databases: Iranmedex, Irandoc, and Scientific Information Databases (SID).

The keywords applied in our search strategy included the following terms: chiropractic systematic reviews, chiropractic meta-analysis, and relevant literature published in the English language. No time restriction

was applied. After the primary search, several secondary searches were performed based on "related links" and also additional publications by the authors identified in the primary search. Lastly, citation reviews were done manually to recognize any other appropriate studies. The full text versions of identified studies were obtained and studied. The articles were excluded if:

- they were concerned with a combination of chiropractic and other treatments (not specifically chiropractic treatment);
- they lacked at least one clinical trial;
- they lacked at least one randomized study;
- and they studied chiropractic in the treatment of multiple diseases.

The included articles were studied intensively and research data including article's first author's name, condition treated, chiropractic intervention type, number and type of researches studied, meta-analysis, number of participants, and overall results were extracted and analyzed (Figure 2).

RESULTS

There were 23 chiropractic systematic reviews found, and the 11 articles that met the defined criteria were included. The conditions included back pain, neck pain, upper extremity conditions, infant colic, autism spectrum disorder, asthma, gastrointestinal conditions, fibromyalgia, sport injuries and carpal tunnel syndrome. Among the studied articles, only one had a meta-analysis (Table 3).

DISCUSSION

According to the results of the systematic reviews, the effectiveness of chiropractic in treatment of each disease is as follows:

Asthma

Chiropractic effectiveness in treatment of patients with asthma was determined in a systematic review carried out by Kaminsky.²¹ The methodological quality of the articles was assessed using a 27-item scoring checklist

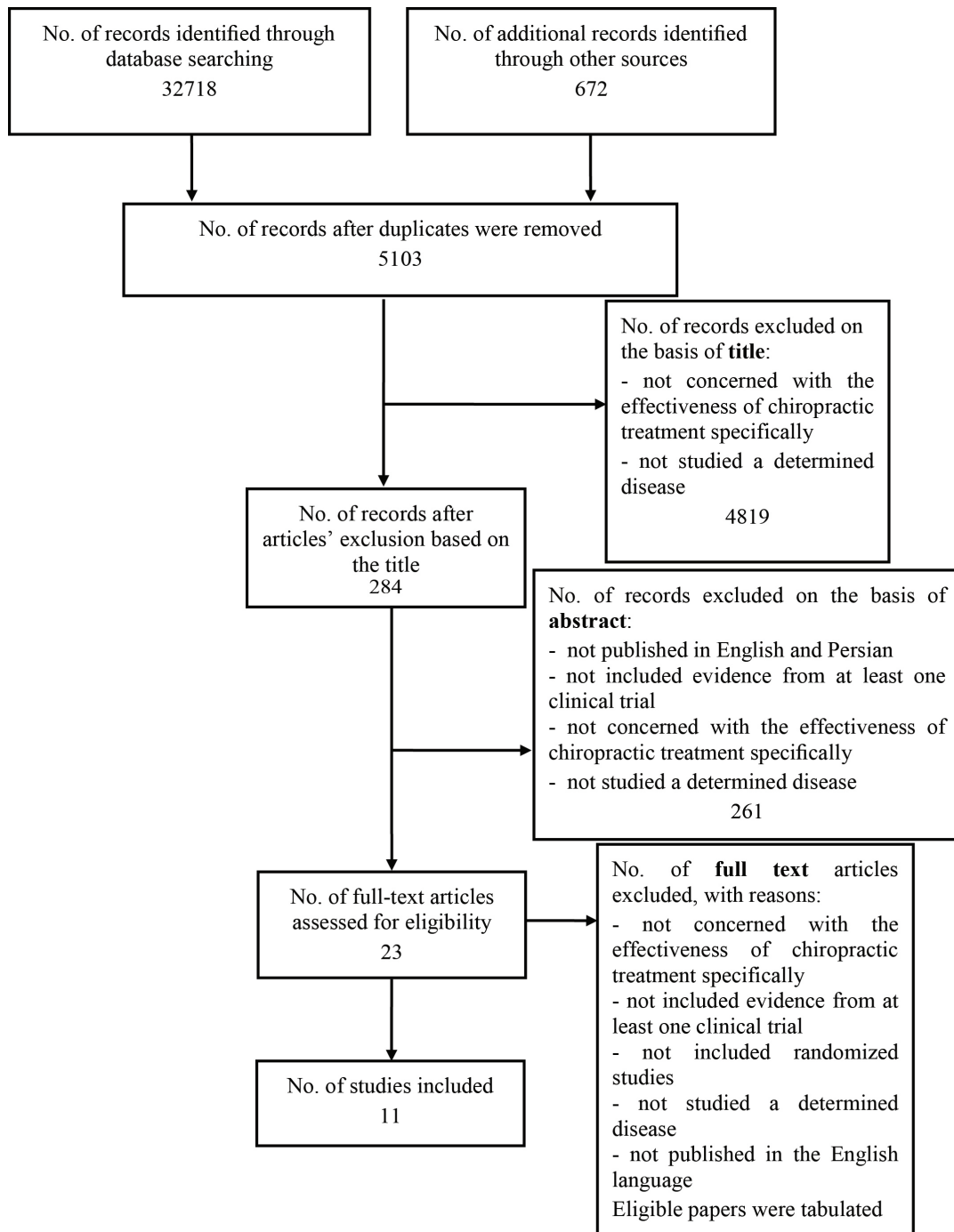


Figure 2: Flowchart of Included Studies

developed by Downs and Black. According to the results of the study, chiropractic had a positive role in improving some subjective measures of treatment effectiveness, like reported number of asthma attacks, use of medication, quality of life and patient-reported changes in asthma symptoms and to a lesser degree improving some objective measures including peak expiratory flow, vital capacity and forced expiratory volume. However, since most of the reported changes in statistical analysis were not significant and

also due to heterogeneity of the study designs assessed in this systematic review, there was not sufficient and suitable evidence at this time to show that chiropractic is effective in treatment of asthma.²¹

Infant Colic

According to the two systematic reviews evaluating chiropractic effectiveness in treatment of infant colic, three randomized control clinical trials were examined. Two of these were single blinded. In all of the three

Table 3: Systematic reviews of chiropractic

No	Condition treated	First author (year)	Interventions	Type of Designs	Meta-analysis	Participants	Results
1	Asthma ²¹	Kaminskyj (2010)	Spinal manipulation, mobilization, soft tissue therapy, respiratory exercises	1 case series, 1 case study, 1 survey, 2 randomized controlled clinical trials, 1 randomized patient and observer blinded cross-over trial, 1 single blind cross study design, 1 survey study	No	190	Patients experience positive subjective and at times positive objective results while under chiropractic treatment; however, the existent evidence is inadequate and heterogeneous in its quality strength.
2	Infant colic ²²	Ernst (2009)	Spinal manipulation	3 randomized controlled clinical trials	Yes	198	Although according to the evidence chiropractic spinal manipulation is not an effective treatment for infant colic, numerous weaknesses of the primary data would prevent firm conclusions.
3	Infant colic ²³	Alcantara (2011)	Spinal manipulation treatment and chiropractic adjustment treatments	3 randomized controlled clinical trials, 2 survey studies, 6 case reports, 2 case series, 4 cohort studies, 5 commentaries, 4 reviews of the literature	No	170	The findings support chiropractic as an alternative approach to infantile colic, despite the infancy of researches on pediatric chiropractic and also the results of the previous reviews contradiction with the results of this study
4	Sport injuries ²⁴	Ernst (2011)	All chiropractic interventions provided by chiropractors	4 randomized controlled clinical trials and 2 controlled clinical trials	No	208	Although the pervious clinical trials almost support the effectiveness of chiropractic in the prevention and treatment of the sport injuries, it is far from conclusive and the future studies of chiropractic should adhere more to accepted standards of trial design and reporting.
5	Neck pain ²⁵	Ernst (2003)	Spinal manipulation treatment	4 randomized controlled clinical trials	No	419	The superiority of chiropractic treatment to conventional exercise treatment and other physiotherapy procedures in the neck pain therapy is not supported by rigorous trial data..
6	Upper extremity conditions ²⁶	McHardy (2008)	Different chiropractic interventions	6 clinical trials (3 shoulder, 1 elbow, 2 wrist) , 36 case reports for shoulder, 8 case reports for the elbow, 14 case reports for the wrist/hand	No	252	There are strong low-level researches to support the chiropractic care of a large number of upper extremity conditions, and this care should be regarded in the decisions of disease management, especially before invasive measures are done.
7	Autism spectrum disorder ²⁷	Alcantara (2011)	Spinal manipulation treatment and chiropractic adjustment treatments	1 randomized controlled clinical trials, 1 cohort study, 3 case reports	No	14	Due to lack of enough supportive evidence, further research for definitive studies on chiropractic effectiveness for autism spectrum disorder is recommended. Nonetheless, given the lack of effectiveness of pharmaceutical agents, a trial of chiropractic care for autism patients is prudent and warranted.

Table 3: Systematic reviews of chiropractic

No	Condition treated	First author (year)	Interventions	Type of Designs	Meta-analysis	Participants	Results
8	Gastrointestinal problems ²⁸	Ernst (2011)	All chiropractic interventions	1 randomized controlled clinical trials, 1 pilot study clinical trial	No	86	Chiropractic is not effective in the treatment of gastrointestinal Conditions.
9	Fibromyalgia ²⁹	Ernst (2009)	All chiropractic interventions	4 randomized controlled clinical trials	No	129	Without conclusive evidence, it is impossible to confirm or reject the claim that chiropractic is effective in treatment of fibromyalgia. Hence, more well-developed researches are clearly needed.
10	Back pain ³⁰	Ernst (2003)	Spinal manipulation treatment	12 randomized controlled clinical trials	No	1960	Despite some degree of superiority of chiropractic spinal manipulation over control interventions including sham chiropractic, its effectiveness is not supported by compelling evidence from the majority of randomized clinical trials.
11	Carpal tunnel syndrome ³¹	Hunt (2009)	All chiropractic interventions	1 randomized controlled clinical trials	-	91	There is insufficient evidence to suggest that future treatment of carpal tunnel syndrome should deviate from conventional treatment of carpal tunnel syndrome.

studies, chiropractic was more effective in the intervention group than the control group, but in only one of these studies there were statistically significant differences. In conclusion, although evidence regarding chiropractic effectiveness in the treatment of infant colic is insufficient at this point in time, regarding the positive results of some of the clinical trials, it is recommended that more comprehensive studies should be designed and performed.^{22,23}

Sport Injuries

The systematic review evaluating chiropractic effectiveness in prevention and treatment of sport injuries showed that chiropractic is significantly more effective than conventional treatments in prevention of lower limb muscle strain, hallux abducto valgus (bunion), and lateral epicondylitis (tennis elbow). Therefore, current studies provide some evidence regarding chiropractic effectiveness on the prevention and treatment of sport injuries to a certain extent. However, conducting more comprehensive research on the previously mentioned cases and other sport injuries is essential.²⁴

Neck pain

In a systematic review conducted by Ernst et al., clinical trials regarding the effectiveness of chiropractic treatment were assessed. The comparison between the effectiveness of different methods as chiropractic treatment, exercise therapy, and other physiotherapy treatments indicated that all the three groups were improved and there was no significant difference found between the groups. Thus, the effectiveness of chiropractic was equivalent to these conventional treatments in the management of neck pain.²⁵

Upper Extremity

McHardy et al. assessed six clinical trials and a number of case studies in their systematic review. In the clinical trials, chiropractic effectiveness, in the treatment of shoulder and neck trigger points and also carpal tunnel syndrome, was compared with conventional therapies especially physiotherapy and rehabilitation, and no significant differences were observed. Therefore, the effectiveness of chiropractic was found to be as effective as conventional therapies. The comparison of chiropractic with physical therapy in

treatment of lateral epicondylitis indicated a significant superiority of physical therapy (continuous ultrasound).²⁶

Autism Spectrum Disorder

The use of different types of complementary medicine, especially chiropractic, in treatment of autism spectrum disorder, is prevalent due to a lack of effective pharmaceutical treatment. In a systematic review conducted by Alcantara et al., on the chiropractic effectiveness of reducing deficits in social interactions, the impairment of verbal and non-verbal relationships, and the problems of autism spectrum disorder patients were assessed. Although the evaluation of one cohort study, one clinical trial, and three case studies showed the relative effectiveness of chiropractic, the absence of a comparative group and some other issues in the research methodology led to inadequate evidence in confirming chiropractic effectiveness in the treatment of autism spectrum disorder.²⁷

Gastrointestinal Problems

In a systematic review conducted by Ernst et al., chiropractic effectiveness in the treatment of gastroesophageal reflux and duodenal ulcer was examined by assessing two clinical trials. In one clinical trial, spinal manipulation was compared with ischemic compression in the treatment of gastroesophageal reflux and no significant difference was observed. In another study, spinal manipulation accompanied by conventional treatment was compared with mere conventional treatment and again no significant relationship was seen. Nevertheless, the results of these clinical trials are not reliable due to serious methodological defects, including a lack of comparison with conventional therapies in the first study, and no randomization in the second one. Therefore, there is no scientific evidence regarding the effectiveness of chiropractic in treatment of gastrointestinal problems.²⁸

Fibromyalgia

Fibromyalgia is a somatic disease with

chronic muscular pain and other disabling and debilitating symptoms, unknown etiology and poor efficacy of treatment. It is also a noticeable disease in traditional and complementary medicine. In a systematic review regarding the evaluation of chiropractic effectiveness in treatment of fibromyalgia, different chiropractic methods were compared with a waiting list (no treatment and also standard treatment), by assessing four clinical trials. Chiropractic demonstrated no significant difference with any other treatment mode; in general, there is not enough evidence regarding chiropractic effectiveness in treatment of fibromyalgia.²⁹

Back Pain

In a systematic review regarding chiropractic effectiveness in treatment of low back pain, spinal manipulation was compared with pharmaceutical treatment, physical methods, training programs, sham chiropractic and no treatment. According to the results, chiropractic was superior to sham chiropractic and physiotherapy treatments, but it was less effective than pharmaceutical treatment and other therapies. Although the superiority of chiropractic to some treatments was shown in this study, only one of the studied researches was a high quality study based on the Jadad scale (Jadad score=5). Hence, it can be concluded that further researches with high quality research methodology are necessary to provide enough evidence supporting the effectiveness of chiropractic in treatment of low back pain.³⁰

Carpal Tunnel Syndrome

According to the results of a systematic review carried out by Hunt, only the clinical trial conducted by Davis met the inclusion criteria. In this study, 91 patients aged 21 to 45 years were randomly divided into two groups. The first group of patients received chiropractic care accompanied by myofascial massage, ultrasound, and nocturnal wrist supports, while the second group received conservative conventional treatment,

nocturnal wrist supports, and ibuprofen. The results of the study showed that there was no significant difference between the patients in the two groups; however, the reanalysis of between group differences carried out by Hunt in a systematic review revealed a significant difference in favor of the control group on the self reported measures of physical functioning and physical and mental distress. Therefore, there is not sufficient evidence regarding the effectiveness of chiropractic in treatment of carpal tunnel syndrome.³¹

It is also important to note that in the current study, only English chiropractic systematic reviews were evaluated. Therefore, language restriction was one of the study's limitations.

The limitation of this article is that there is heterogeneity in some of the studies and also limited number of clinical trials in the assessed systematic reviews. Thus, conducting comprehensive studies based on more reliable study designs is highly recommended.

CONCLUSION

In conclusion, three points should be emphasized. Firstly, there is a discrepancy between the development of chiropractic in different countries of the world and the quality and quantity of studies regarding the effectiveness and safety of chiropractic in treatment of diseases. Secondly, some of the systematic reviews regarding the effectiveness of chiropractic in treatment of diseases had a minimum quality of research methodology and were not useful for evaluation. Some of the excluded articles are examples of this problem. Finally, a limited number of studies (11 systematic review articles and 10 diseases) had the required criteria and were assessed in the study.

Assessment and analysis of the studies showed the impact of chiropractic on improvement of some upper extremity conditions including shoulder and neck trigger points, neck pain and sport injuries. In the case of asthma, infant colic and other studied diseases, further clinical trials with

larger sample sizes and high quality research methodology are recommended.

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Conflict of Interest: None declared.

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