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Rainer Thiele

Chiropractic Treatment for Headache and Lower Back Pain

Systematic Review of Randomised Controlled Trials

Springer

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Systematic Review of Randomised Controlled Trials

With a Foreword by PD Dr. Paul Ackermann

Springer

Rainer Thiele
Chiropraktik/Osteophathie
Gemeinschaftspraxis
Munich, Germany

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Foreword

Chronic pain is one of the most common diseases worldwide. In Germany, more than a third of the population suffers from back pain or headaches. About 70 % have back pain at least once a year and thus account for 15 % of all working days.

The cause of back pain can be divided into structural and functional disorders. Structural disorders include degenerative changes such as arthrosis. Functional disorders are accompanied by malpositions and limited mobility. 90 % of patients suffer from functional disorders such as unspecific back pain. Statistical studies show that less than 2 % of patients who attend primary care appointments do not have experience serious structural changes.

A functional disorder is indicated by pain symptoms of less than two weeks, back pain independent of exercise, no pain radiation distally of the knee and a functional induced difference in leg length.

Evidence-based guidelines show that manipulation and mobilization in combination with exercise therapy show the best results in acute and chronic functional back pain.

However, research on chronic back pain is still far behind manual clinical knowledge. Therefore, I am particularly pleased that my friend of many years, Rainer Thiele, has dealt with this topic in his doctoral thesis.

Paul Ackermann

Acknowledgement

At this point, I would like to thank all those who helped me during my studies and the preparation of my doctoral thesis. Special thanks to my family, especially my wife Ruth Thiele. Without my practice team, in particular, Mrs. Nadine Krampf, who kept the practice running and thus gave me the freedom to study in Liechtenstein, it would hardly have been possible in terms of time. I would also like to thank the UFL team for their always friendly and helpful support during these three years. Furthermore Dr. Gant and Mrs. Müller, who always took care of all problems reliably and quickly. I would like to thank Prof. Dr. Christoph H. Saely in particular for the excellent technical and human support. It was a particular pleasure that my long-standing lecturer and friend, PD Paul Ackermann, MD, Ph.D., agreed to supervise my doctoral thesis outside of university.

Rainer Thiele

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Abstract

Introduction

Headaches and lower back pain constitute one of the world's most common prevalences and cause severe pain and functional limitations to those affected. This results in a reduction in quality of life as well as in a significant public health cost, as patients benefit from various expensive types of therapy. It is accompanied by taking painkillers and loss of working hours. This thesis deals with the question: Is chiropractic, in comparison to other therapies, a clinically relevant and sustainable treatment method for head and lower back pain, and thus representing a standard therapy?

Methods

The research for the articles on the topic was carried out in the PubMed database. In the overview, the evidence level of the studies was determined using the PEDro scale. Core data of the studies involved are summarized in table form. A tabular evaluation According to the Pico model follows for the studies with the evidence level I. Investigated endpoints are headache frequency, headache intensity and medication intake.

In the case of lower back pain, endpoints such as pain, functional restriction and patient satisfaction are examined, and the results of the intervention and control groups compared.

Results

21 results were found in the case of a headache. Eleven times, chiropractic treatments showed best results. Three times the combination therapies were ahead, twice with chiropractic and physiotherapy, and once chiropractic and massages. Best results were obtained three times by using physiotherapy. Four times, the results showed no differences when comparing the intervention groups with the control groups. With chiropractic treatment for lower back pain, the best results were obtained eight times through chiropractic and once through physiotherapy.

Three times and no differences could be found within the groups. In two studies in which chiropractic was compared with chiropractic plus physical treatment, there were also no differences in results. In the general overview, all results differed only slightly from one another.

Conclusions

In the results, chiropractic treatments, as well as other treatments such as physiotherapy or even combination therapies, such as chiropractic and massages show the most significant improvements. On the other hand, about a third of the results show no differences between chiropractic treatment and other treatment methods. The differences in results between intervention groups and control groups are low. The studies examined showed methodological weaknesses. The results of the examined articles show that chiropractic treatment is not a clinically relevant and sustainable treatment for head and lower back pain, and therefore not standard therapy.

1 Summary

Promotion Topic

Chiropractic Treatment of Headaches and Lower Back Pain

1.1 Introduction

This cumulative dissertation paper deals with the following question: is chiropractic[1] for headaches and lower back pain a clinically relevant, sustainable treatment and, therefore, a standard therapy?

This is why a search for the prevailing article from the PubMed database was performed. The search covered randomised clinical studies and systematic reviews.

The intensity of the pain, the frequency of the pain and the use of medication were used as the endpoints for the systematic review of chiropractic for headaches. This work was published in the Manual Medicine Journal by Springer Publishing.

Endpoints such as pain, functional constraints, patient satisfaction and cost effectiveness were compared for the assessment in the abstract on chiropractic treatment and Lower Back Pain. This type of therapy was consistently followed in the intervention groups in order to focus explicitly on chiropractic. The abstract was presented on a poster at the 16th Congress for patientcare Research in Berlin. It was published on the German Medical Science portal and the interdisciplinary portal of the Germany Association of Scientific Medical Societies (*Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften* - AWMF).

Chiropractic is a treatment form of manual medicine that focuses on functional disorders of the musculoskeletal system and the nervous system, as well as the effects that these disorders have on the patient's general health. Chiropractic is used to treat symptoms of pain in the musculoskeletal system, in most cases.

1 Chiropractic is also referred to in the studies as manipulation treatment, manipulative treatment, manipulation therapy, chiropractic spinal manipulation and spinal manipulation.

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These pains are not limited to back pain, neck pain, joint pain and headaches alone [1].

Headaches are the most common disorder in the world. The International Headache Society (IHS) has provided classification and diagnosis of various forms of headaches and migraines [2].

Those affected suffer massive adverse effects that impair their quality of life. They also have severe economic and psychosocial consequences [3-5]. Worldwide epidemiological surveys of headaches disclosed an average value of 52% in women and 37% in men. 1.9% of men and 4.95% of women experience chronic headaches [6]. Population-based studies [7, 8] show a one-year prevalence rate of 38.3% for episodic tension headaches and 2.2% for chronic tension headaches. A large population-based epidemiological study with 10,000 subjects, carried out by the German Headache Consortium, disclosed a 12.5% prevalence for episodic migraines. 11.9% of subjects were affected by episodic tension headaches, 2.6% by chronic headaches and 1.1% by chronic migraines [9].

Headaches are currently treated with various therapies and types of medication. These include over the counter and prescription pain relievers, physical, cognitive and relaxation therapies and acupuncture, bio resonance methods, detoxification procedures and traditional Chinese medicine. Success rates vary. Prolonged and cost-intensive courses of medication are implemented in many cases [3, 5, 7, 10 and 11]. The data for lower back pain is similar. The lifetime prevalence was estimated at 84%. In America, for example, the average cost of prevention, treatment, rehabilitation and sick leave stands at $13,015 per quality-adjusted year of life. Lower back pain leads to a severe reduction in the subject's quality of life [12]. Treatment costs the USA approximately 33 Billion US dollars a year [13]. Therefore, physical methods, heat therapy, ultrasound therapy and electrical muscle stimulation (EMS) are used alongside medication; however, the desired success is rare [14]. Systematic review papers show that chiropractic is an effective immediate therapy for lower back pain, which provides significant improvement in terms of the alleviation of pain and improvement in function [12 and 15-21]. Today, there is no standard treatment that provides persistent improvement or relief from either of these symptoms.

1.2 Results

A literature search of the PubMed database for "Chiropractic for headaches" in August 2016 provided 219 articles in English. Of these, 15 systematic review papers [22-32, 3, 7, 8, 11] and 12 randomised clinical studies [33-44] produced usable results. Five of these studies [10, 11, 16, 25, and 51] had not been used in a systematic review (see Table 1 in the appendix to the systematic review). A total of 1,015 randomised participants took part in the treatments for these 12 studies.

The individual studies were assessed on 11 criteria and assigned a score using the PEDro scale [45]. The studies were divided into evidence levels, I and II, based on this assessment [46]. All 12 studies were analysed in a table format, independent of the evidence level. The following data was determined:

- Diagnosis,
- PEDro scale score,
- Evidence Level
- Study Population,
- Number of Treatments,
- End Points
- Participants Rejected,
- Follow-up times and
- Results.

Data on the duration and intensity of the headaches and medication taken was chosen and analysed as the endpoint for the internal comparison of the studies (see Table 3 of the systematic review).

Nine Evidence Level I studies were identified via the assessment using the PEDro scale [34, 37 – 44]. This group of studies was processed using the PICO model and analysed using the endpoints chosen (see Table 4 in the appendix to the systematic review). Eight studies examined the **frequency of headaches** as an endpoint. The results achieved with combination therapies in two studies [37, 44] – chiropractic combined with massage [44] and chiropractic combined with physiotherapy[2] [37] – were better than those obtained with chiropractic on its own and two combination therapies were compared in one of these studies [44]

2 Therapeutic exercises, physical therapy and physical exercises were identified in the respective summary for physiotherapy.

this means chiropractic combined with massage and chiropractic and acupressure pillows. The first combination proved to be more successful. The therapeutic exercises group in the Jull study [41] achieved the best results. Chiropractic achieved the best results in four studies [39, 40, 42, and 43]. The Bove and Nilsson study [34] showed that there was no difference between soft tissue chiropractic treatments and placebo-laser treatments.

Eight studies examined the **intensity of headaches** as an endpoint. One study showed major improvement for the reduction in the intensity of headaches via physiotherapy [37]. Another one achieved the same thing via a combination therapy of chiropractic and manual treatment [41]. Two Studies [34, 43] did not show any significant difference between the results for the treatment group and the control group. In three studies [39, 40 and 42] significant improvement was obtained on manipulation therapy via the reduction of the intensity of the headache. Haas et al. [38] exclusively investigated the number of chiropractic treatments per week, without a control group. These studies were not counted in the results. Group 2 showed the best result with three treatments per week. Five studies examined the **reduction of medication** as an endpoint. The use of pain relievers was reduced via chiropractic in four studies [40–43]. Physiotherapy had similar success in the Jull et al. study [41]. No difference between the treatment group and the control group was seen in the Bove and Nilsson study [34].

21 results were determined by comparing the treatment and control groups with the following endpoints: eight studies on the frequency of headaches, seven studies on the intensity of headaches and six studies on the reduction of medication. Chiropractic showed the greatest improvement of the endpoint eleven times. Physical therapies gave the best results three times and combination therapies gave the best results three times. There was no effect on the results four times (see Figure 1).

The PubMed database was searched again in February 2017 on the topic of “Chiropractic for lower back pain”. 131 articles in English were chosen. 14 of these [12–21 and 47–50] were randomised clinical studies with usable results. Three new systematic reviews [51–53] were returned for the comparison of results. These comprised 4,578 randomised subjects. The endpoints of pain, functional constraints, patient satisfaction and cost effectiveness of the different treatments compared were assessed. Intervention groups were compared with the control groups for the assessment. Eight studies [12, 15–21] showed that chiropractic improves therapeutic success. No difference between chiropractic and physio-

therapy was found on the comparison of the therapies in three Studies in which the endpoint clearly improved [47, 49, and 50]. Physiotherapy obtained better results in only one study [13]. No therapeutic differences whatsoever were disclosed by the Haas et al. [48] and Hurwitz et al. [14] studies, in which chiropractic was compared with chiropractic in combination with physiotherapy. The endpoints considered in these cases were also clearly improved.

In short, it can be said that 8 out of 14 studies on the matter substantiate improvement via chiropractic. Two studies compared chiropractic with chiropractic combined with physiotherapy, without distinguishing any differences between the improved results. Chiropractic provided the same good results when compared with physiotherapy three times and physiotherapy produced the best improvement in results in one study. The respective differences between the optimal results and those of the comparison groups were only marginal in both papers on the subject (see Figure 2).

1.3 Discussion

The studies, for the most part, show improvement of the investigated endpoints on chiropractic and on the use of combination therapies such as chiropractic combined with massage and chiropractic combined with physiotherapy and also on the use of physiotherapy on its own. Nine of 35 results evaluated did not show any differences for the results obtained between the intervention group and the control group. This corresponds to a value of 26 %. Chiropractic produced the best results for the reduction in medication in four studies and physiotherapy produced the best results in one study (see Figure 3). On the topic of “lower back pain” for example, chiropractic clearly shows the best results in terms of quantity. Combination therapies must, however, also be considered here. One study showed the best results were provided by physiotherapy. It is becoming clear, that the analysed values on the topic do not provide any substantial difference for the results when comparing chiropractic with physiotherapy or other therapies. Previous subject reviews [7, 16, 28, 37, 51–53] for headaches and lower back pain came to similar conclusions.

The difference with the other reviews for example headaches is that five new reviews that were not previously evaluated have been found [3, 35, 37, 39, and 44]. Only chiropractic treatments were assessed in the intervention group. Older reviews in the intervention group also investigated therapies such as massage or

gymnastic exercises and sceleto-muscular lengthening [8, 23–26, 28]. The Jull et al. study [41] clearly shows very good results on the use of physiotherapy and illustrates that manual techniques can lead to very good results for headaches. All three endpoints considered, headache frequency, headache intensity and taking of medication showed extensive improvement in results. The 2015 Gross et al. review [53] which, in fact, did not only assess headaches, came to a similar conclusion, despite the moderate quality of the studies evaluated and accounted for a certain pre-eminence of the manual techniques, such as manipulation and mobilisation over the other methods, such as massage and independent exercises.

The number of participants in the studies was relatively low, although the number of participants in the studies for lower back pain was significantly higher. Most participants and therapists in the intervention group could not be blinded. It is hard to implement placebo-treatments for manual therapies. Both works were examined with surrogate endpoints. The primary endpoints of remission and recurrent are of major significance for proof of clinical relevance. The Follow-up times, 12 weeks on average, were negligible. One exception was made here by the Jull et al. study [41], with a twelve-month follow-up time for headaches. The taking of pain relievers at the same time as receiving treatment produced a Performance Bias[3], that is to say, without exception, that no results were produced only by the treatments. In the initial investigation's chiropractic investigations, such as pelvic obliquity, should be carried out. By taking care of these shortcomings, the improvements achieved are sustained and primary endpoints such as remission can be achieved.

The papers are from the most recent scientific state of the art, because a search for the most up-to-date article on the topic was performed.

Chiropractic showed the best results for the number-based improvement of the endpoints. Chiropractic is an effective form of therapy for headaches and lower back pain. In most cases, the pain is caused by vertebral blockades and associated muscle pain. This can be palliated via professional, target-oriented, adjustment. Given the methodically improved studies on the topic, repeat analysis of the question was completely reasonable. The results of the research show that based on the studies found and analysed, chiropractic had no sustainable, clinically relevant results for headaches and lower back pain and therefore is not standard therapy.

3 Distortion of the results via different treatments

2 Overview of the Manuscripts

2.1 Systematic Review "Systematic Review of Chiropractic Treatment for Headaches"

Published in the journal „Manuelle Medizin" Springer[4]

Objective of the Journal

Manual medicine is aimed at orthopedic surgeons, general practitioners, rheumatologists, internists and traumatologists, as well as physiotherapists in clinics and practices.

Through its interdisciplinary approach, the journal promotes the scientific, practical and professional development of manual medicine.

Practice-oriented reviews take up selected topics and offer the reader a compilation of current findings from all areas of manual and osteopathic medicine.

In addition, relevant questions of orthodontics and dentistry are addressed. In addition to imparting relevant background knowledge, the focus is on the evaluation of scientific results in consideration of practical experience - the reader receives concrete recommendations for action.

Freely submitted originals enable the presentation of important clinical studies and serve the scientific exchange. Case studies show interesting case studies and unusual disease and treatment courses.

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R. Thiele (1), C. H. Saely (2, 3), P. Ackermann (4)
(1) Joint Practice for American Chiropractic/Osteopathy and Sports Medicine, Munic, Germany
(2) Department of Internal Medicine and Cardiology/VIVIT Institute, Academic Teaching Hospital Feldkirch, Feldkirch, Austria
(3) Private University of Liechtenstein in medical sciences, Triesen, Liechtenstein
(4) Orthopaedic Department/Department of Molecular Medicine and Surgery, Karolinska University, Hospital, Stockholm, Sweden

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Peer Review Process

All manuscripts submitted for "Manual Medicine" will be reviewed. Originals and overviews undergo a peer review process [54].

Abstract

Chiropractic Treatment of Headaches. A Systematic Review of Randomized Controlled Trials

Background. Headache is one of the most prevalent disorders worldwide, causing severe pain and functional impairment in sufferers. Impairments of quality of life, as well as considerable costs due to various expensive treatments are the consequences. This study assesses the following question: Is chiropractic treatment of headaches, in comparison to other therapies, a clinically relevant sustained treatment option, thus does it thus represent a standard therapy? **Methods.** The search was conducted in PubMed. The evidence level of the individual studies was determined using the PEDro scale. Table analysis according to the PICO model was performed for the evidence level I studies. The investigated endpoints were headache frequency, intensity, and medication use. **Results.** The literature search yielded 219 articles, of which 30 prove relevant. These included 15 systematic reviews and 15 randomized clinical studies, of which 12 studies reported evaluable results. In total, 21 improved endpoint values were analysed, of which 11 showed the best results for chiropractic treatments. In 3 cases a combination of chiropractic and physiotherapy was best, in 3 cases physiotherapy, and in 4 cases there were no differences in the results upon comparing the intervention and control groups. **Conclusion.** Similar to physiotherapy and a combination of both treatments, chiropractic treatment yielded the best results in terms of improved outcomes. The differences between the intervention and control group results were small or absent entirely. The investigated studies had methodologic limitations. The results showed that chiropractic is not a clinically relevant sustained treatment for headaches, and thus not a standard therapy based on the analysed studies.

Keywords

Chronic pain, Manipulation therapy, Chiropractic, Physiotherapy, Review

Chiropractic Treatment of Headache – Systematic Review of Randomized Controlled Trials

Additional Material Online

Additional information is available in the online version of this article (https://doi.org/10.1007/s00337-017-0327-8) are included.

Headache is one of the most common human diseases worldwide. The resulting massive impairments of the patient in his everyday life lead to a significant reduction in the quality of life. In addition, there are serious economic and psychosocial effects [1-3]. Worldwide surveys on the epidemiology of headache show average values of 52 % for women and 37 % for men. Chronic headaches affect 1.9 % of men and 4.95 % of women [4]. Population-based studies suggest a one-year prevalence rate of 38.3 % for episodic tension headache and 2.2 % for chronic tension headache [5]. In a large population-based epidemiological study by the German Headache Consortium with 10.000 participants, the prevalence of episodic migraine was 12.5 %. Episodic tension headache affected 11.9 %, chronic headache 2.6 % and chronic migraine 1.1 % [6].

In China, a population-based sample of approximately 5000 participants was investigated. The 1-year prevalence of migraine was 9.3%, of tension headache 10.8% and of chronic headache 1.0%. All 3 types of headache lead to a significant impairment of quality of life and cause total annual costs of 672.7 billion US dollar [6].

Various therapies and medications are currently used to treat headaches. These include over the counter and prescription painkillers. Furthermore, physical, cognitive and relaxation therapies as well as acupuncture, bioresonance methods, detoxification and therapies from traditional Chinese medicine are used - with very different successes. The condition of the patient with headaches often requires lengthy and thus cost-intensive drug treatment [1, 3, 7-9]. To date, there is no "gold standard" for headache treatment. Chiropractic is used as therapy especially for functional disorders of the locomotor system. In this review, the latest available studies about chiropractic for headaches are considered. Five studies from this research have not yet been evaluated in reviews [10-14]; (see Table 1 as additional material online).

In the intervention groups, chiropractic treatments were applied throughout. The aim was to analyse the efficacy of the therapy on headaches. The scientific question is: Can chiropractic treatment of headaches be used as a standard therapy? The types of headache investigated in the study are summarised and defined in the International Headache Society (IHS) under the generic term headache. Cervicogenic headache was recognised by the IHS as a classification of headache in 1988 [15].

Abbreviations

CCH	„chronic cervicogenic headache“
CH	„cervicogenic headache“
CTTH	„chronic tension type headache“
ETTH	„episodic tension type headache“
H	„headache“
HIS	International Headache Society
M	„migraine“
PEDro	Physiotherapie-Evidenz-Datenbank
PICO	„population, intervention, comparison, outcome“ model to the research of questions
RCT	randomized clinical trial
TTH	„tension type headache“
VAS	visual analogue scale

Methods

Literature Research

A systematic search in the PubMed database was carried out between June and August 2016 to identify the literature. The search was limited to English-language literature. The search was limited to articles with keywords such as "chiropractic", "manual therapy", "spinal manipulation", "chiropractic care" and "manipulative therapy" combined with "headache", "cer-vicogenic headache", "tension type headache", "episodic tension type heada-che", "migraine" (M), "chronic cervicogenic headache" and "chronic tension type headache". Google Scholar was also used for additional English and German literature.

Comparative analysis an overview (see Table 1 as additional material online) shows which studies have already been evaluated in other reviews and which have not.

Evaluation According to the Physiotherapy Evidence Database Scale

Based on 11 evaluation criteria, studies can be divided into different evidence levels. The PEDro scale is based on the Delphi list developed by Verhagen et al. at the University of Maastricht, Department of Epidemiology. This is a list of criteria for the evaluation of study quality. The Delphi list and the PEDro scale are not based on empirical data, but on expert consensus. Criteria 2 to 9 test the internal validity in order to interpret the results in criteria 10 to 11 using statistical information. Criterion 1 aims at external validity but is not included in the evaluation [16] (see Table 2 as additional material online).

The following criteria of a study are evaluated:

1) Inclusion and exclusion criteria were specified (external validity, no point of emphasis).
2) Subjects were randomized.
3) Assignment to the groups was hidden.
4) Groups were similar in prognostic indicators.
5) Subjects were blinded.
6) Therapists were blinded.
7) Investigators were blinded.
8) In more than 85 % of the assigned subjects, a central result was measured.
9) All volunteers who were available for outcome measurements received treatment after allocation. If not, at least one central result was analyzed by an intention-to-treat method.
10) Statistical group comparison was demonstrated for a central result.
11) For a central result, point measurements and measures of dispersion were reported (standard deviation, standard error, confidence interval).

If one of the criteria, except for criterion 1, is fulfilled, 1 point is awarded. A total of 10 points can be scored. The level of evidence can be derived from the total number of points (see Table 2 as additional material online).

Preparation of the Core Data of all Randomised Clinical Trials

The core data have been summarised in tabular form and contain the following information:

- Study name
- Year
- Design
- Country
- Diagnosis of headache type
- PEDro points
- Level of evidence
- Study population
- Treatment
- Number of patients
- Number of treatments
- Endpoints
- Information as to whether participants have been eliminated
- Follow-up times
- Outcomes

In the further procedure, the studies were evaluated with evidence level I of the PEDro scale (see Table 3 as additional material online).

Preparation of Core Data According to the PICO Model

Table 4 (as additional material online) evaluates the studies with evidence level I according to the PICO model. In detail, the following points are compared: Studie

- Population
- Intervention
- Control group
- Endpoints
- Results Intervention Group
- Results control group

Outcomes

Literature Research

The literature search resulted in 30 articles on the subject, i.e. 15 systematic reviews [1, 5, 7, 9, 17-27] and 15 randomized clinical trials. Two of the RCTs were without results and one was discontinued prematurely. A total of 12 RCTs were finally used for analysis [10-14, 28-31, 33-35]; (see Fig. 1 as additional material online). The total number of randomized study participants was 1015.

Evaluation of RCT in Systematic Reviews

- In systematic reviews, 7 of the selected RCTs have been considered so far [28-31, 33-35].
- 5 RCT [10-14] have not yet been analysed in systematic reviews.
- The most recent study, which was evaluated in a review on the topic, is that by Haas et al. [29] from 2010 (see Table 1 as additional material online).

Physiotherapy Evidence Database Scale

The methodological quality of the researched studies was evaluated using the PEDro scale (see Table 2 as additional material online). Each study is subjected to a questionnaire. If a criterion is fulfilled, 1 point is awarded (possible total score of 10 points). This total score can be used to determine the level of evidence: A high methodical quality of the studies is available at ≥7, a medium quality at 4 to 6 and a weak quality at up to 3 points [32].

With evidence level I 9 studies were evaluated:

- Nilsson et al. 1997 [31]
- Bove & Nilsson 1998 [35]
- Tuchin et al. 2000 [33]
- Jull et al. 2002 [30][5]
- Haas et al. 2004 [28]
- Haas et al. 2010 [29]
- Haas et al. 2010 [13]

5 Maitland study. The Maitland® concept is a manual therapy concept for the assessment and treatment of functional disorders in the joint, muscle and nervous systems. In addition to passive joint mobilisation and manipulation at the extremities and the spine, neurodynamic techniques, muscle stretching, stabilising exercises and individually adapted home programmes are used.

- Espí-López & Cómez - Conesa 2014 [12]
- Vernon et al. 2015 [14]

Three studies were evaluated with evidence level II:

- Castien et al. 2012 [11][6]
- Castien et al. 2009 [10][7]
- Boline et al. 1995 [34]

Core Data of All Randomized Clinical Trials

The following types of headache were investigated in the studies:

- Cervicogenic headache (CH) in 3 studies [14, 30, 31].
- Tension headache (TTH) in 2 studies [14, 34]
- Chronic tension headache (CTTH) in 3 studies [10-12].
- Episodic tension headache (ETTH) in 2 studies [12, 35].
- Chronic cervicogenic headache (CCH) in 3 studies [13, 28, 29].
- Migraine (M) in 3 studies [13, 29, 33]

The order of headache types is shown in Table 3 (Additional material online). The following endpoints were evaluated

- Headache frequency[8],
- Headache intensity[9] and
- Drug intake[10].

In most cases, the number of prematurely eliminated participants was < 15 %. In the studies of Castien et al. [10, 11] and Boline et al. [34] the drop-out rate was higher. Follow-up took place on average after 4 to 26 weeks. In the study by Tuchin et al. [33] this period was 6 months, in the study by Jull et al. [30] 1 year, which is of great importance for the sustainability of the results.

6 McKenzie study.
7 McKenzie study.
8 Values according to patient data and headache diaries.
9 Values according to patient data on the visual analogue scale (VAS) 0–10 or 0–100, 10 points difference in group results are assessed as clinically relevant [15].
10 Values according to patients.

PICO Model

Headache Frequency

Results after evaluation of Table 4 according to the PICO model for endpoint headache frequency.

Vernon et al. [14]

- Group A: 71 % of the participants improved their results by ≥ 40 % with combination therapy of manipulation therapy and massage.
- Group B: 28 % of the participants improved the results by ≥ 40 % with combination therapy of manipulation therapy and self-battery pressure pillow.

Espí-López & Gómez-Conesa [12]

- Group 1: 25 % of participants Improvement through manual therapy
- Group 2: 26 % of participants Improvement through manipulation therapy
- Group 3: 57 % of participants Improvement through combination therapy of manipulation and manual therapy
- Group 4: 39 % of participants Improvement through no treatment

Haas et al. [13]

- Group 1 + 2: 9 days headache reduction through manipulation therapy, 8 and 16 treatments
- Group 3: 6 days headache reduction through 8 massages
- Group 4: 3 days headache reduction through 16 massages

Haas et al. [29]

- Group 1 + 2: 8 headache days, improvement with manipulation therapy, 8 to 16 treatments
- Group 3 + 4: 6 days improvement through massages, 8 to 16 treatments

Jull et al. [30] mean changes in baseline values compared after 7 weeks and after 12 months:

- Group 1: Manipulative treatment and therapeutic exercises (baseline 3.3)
  7 weeks: improved by 2.02
  (61 %) ↓
  12 months: improved by 2.52
  (64 %) ↓

- Group 2: Manipulation treatment
  (underlying 3.6)
  7 weeks: improved by 2.07
  (57.5 %) ↓
  12 weeks: improved by 2.25
  (62.5 %) ↓
- Group 3: Therapeutic exercises[11]
  (Base value 3.7)
  7 weeks: improved by 2.37
  (64 %) ↓
  12 weeks: improved by 2.52
  (68 %) ↓
- Group 4: No physical therapies (baseline 3.5)
  7 weeks: improved by 0.79
  (23 %) ↓
  12 weeks: improved by 0.95
  (27 %) ↓

According to IHS, an improvement in headache frequency of ≥ 50 % is classified as clientially relevant [23]. All results improved again after 12 months.

Tuchin et al. [33]

- Group 1: 3 days (42 %) Reduction of migraine frequency through manipulation therapy
- Group 2: 0.4 days (5 %) Reduction of migraine frequency by sham manipulation

Bove & Nilsson [35] After 7 weeks:

- Group 1: Improvement of 46 % through manipulation therapy
- Group 2: By soft tissue treatment and placebo laser improvement of 44 %.

After another 19 weeks also no significant differences in the comparison of the groups. The values remained unchanged at 25 – 35 %.

11 Therapeutic exercises, physical therapy and physical exercises are referred to as physiotherapy in the respective summary.

Nilsson et al. [31]

- Group 1: 37 % reduction through soft tissue massage and laser therapy
- Group 2: 69 % Reduction of headache hours through manipulation therapy

Summary

Headache frequency as an endpoint was investigated in 8 studies. The greatest improvements were achieved in 2 studies with combination therapy, i.e. chiropractic, once accompanied by massages [14] and once accompanied by manual therapy [12]. One study [30] showed improvements through physiotherapy, 4 studies [13, 29, 31, 33] had success through chiropractic treatment. One study showed no differences between chiropractic and soft tissue treatment with placebo lasers [35].

Headache Intensity

Results after evaluation of Table 4 according to the PICO model for endpoint headache intensity.

Espí-López & Gómez-Conesa [12] After 7 weeks:

- Group 1: 41 % ↓, improved by manual therapy
- Group 2: 36 % ↓, improved by manipulation therapy
- Group 3: 37 % ↓, combination of group 1 + 2
- Group 4: 26 % ↓, no treatment

Haas et al. [13]

- Group 1 + 2: 20.75 points, improved by manipulation therapy
- Group 3: 4.8 points, improved by massages
- Group 4: 1.9 points, improved by massages

Haas et al. [29] The values show a mean difference for pairwise group comparison (see Table 3 of the study).

- Group 1: 5.2 ↓, 8 times manipulation therapy
- Group 2: 14.4 ↓, 16 times manipulation therapy
- Group 3: 4.6 ↑, 8 times massages (4.6 points worsened)
- Group 4: 4.6 ↓, 16 times massages (4.6 points improved)

Haas et al. [28] This study focused exclusively on the effective number of nipulative treatments. It was not included in the overall summary to compare the most successful treatments.

Group 1: 1 treatment/week
after 4 weeks: 10.9 (21 %) ↓
after 12 weeks: 2.4 (5 %) ↓

- Group 2: 3 treatments/week
  after 4 weeks: 29.9 (49 %) ↓
  after 12 weeks: 27.0 (44 %) ↓
- Group 3: 4 treatments/week
  after 4 weeks: 26.3 (58 %) ↓
  after 12 weeks: 17.1 (38 %) ↓
- Adjusted medium group effects:
  3 treatments/week after 12 weeks: 19.4 ↓
  4 treatments/week after 4 weeks: 18.7 ↓
  4 treatments/week after 12 weeks: 18.1 ↓

Jull et al. [30] After 12 months:

- Group 1: Combined group manipulation and physical therapy Baseline 5.1 improved by 2.69
  (53 %) ↓
- Group 2: Manipulation therapy
  Base value 4.8 improved by 2.27
  (47 %) ↓
- Group 3: Physical exercises
  Base value 5.4 improved by 2.83
  (52 %) ↓
- Group 4: No physical therapies
  Base value 5.3 improved by 1.32
  (25 %) ↓

Tuchin et al. [33] After 8 weeks:

- Group 1: Manipulative therapy,
  Base value 7.96 improved by 1.06
  (13 %) ↓

- Group 2: Fake tampering,
  Base value 7.89 improved by 1.69
  (21 %) ↓

No significant differences in the group results.

Bove & Nilsson [35]

- Group 1: Manipulation and soft tissue massage (Initial value: 37/100)
  after 7 weeks: 38 (3 %) ↑
  after 19 weeks: 35 (5.4 %) ↓
- Group 2: Soft tissue massage and placebo laser (Initial value: 37/100)
  after 7 weeks: 34 (8 %) ↓
  after 19 weeks: 26 (30 %) ↓

No significant differences in the group results.

Nilsson et al. [31]

- Group 1: Soft tissue massage and laser headache intensity:
  17 % ↓
- Group 2: Manipulation therapy
  Headache intensity: 36 % ↓

Summary

Headache intensity was investigated in 8 studies. The largest improvements were seen in 3 studies [13, 29, 31] with chiropractic treatment. One study [28] investigated only treatment frequency without comparison to control groups and was not included in the overall summary. In one study [12] improvements were achieved by physiotherapy, in another [30] by combination therapy of chiropractic and physiotherapy. In 2 studies [33, 35] no differences were found in the group comparison.

Drug Intake

Results after evaluation of Table 4 after the PICO model for endpoint drug use.

Haas et al. [29]

- Group 1 + 2: Drug reduction by 33 % with manipulation therapy
- Group 3 + 4: Drug reduction by ± 0 % in massages

Jull et al. [30] After 12 months:

- Group 1: 93 % reduction in the combination group Manipulation therapy and therapeutic exercises
- Group 2: 100 % reduction through manipulation therapy
- Group 3: 100 % reduction through physical exercises
- Group 4: 33 % increase in drug intake

Tuchin et al. [33]

- Group 1: 54 % reduction of pain medication through manipulation therapy
- Group 2: 19 % reduction of pain medication through sham manipulation therapy

Bove & Nilsson [35]

- Group 1: 32 % drug reduction through manipulation therapy
- Group 2: 27 % drug reduction through soft tissue treatment with placebo laser

No significant difference in the group results.

Nilsson et al. [31]

- Group 1: ± 0 % Drug use reduced in soft tissue and laser treatment
- Group 2: 36 % drug use reduced by manipulation therapy

Summary

In 5 studies the medication intake was analysed. In 4 studies [29-31, 33] pain-killers were reduced by chiropractic treatments. Physiotherapy had the same success [30]. The Bove & Nilsson study [35] showed hardly any differences between the intervention and control groups.

Overall Summary

For the endpoints, 21 results from 9 studies were analysed: 8 on headache frequency, 7 on headache intensity and 6 on medication. The greatest improvements in the values were 11 times due to chiropractic treatment. One of the studies [28] dealt with optimal treatment frequency without comparison with a control group and improved the endpoint results. In 3 studies success was achieved by physiotherapy: in the study by Jull et al. [30] in all 3 endpoints, 3 times by combination

therapy in the study by Espí-López & Gómez-Conesa [12] and in the study by Vernon et al. [14] in headache frequency, in the study by Jull et al. [30] in headache intensity. Four times there were no differences in the results: in the study by Bove & Nilsson [35] for all 3 endpoints and in the study by Tuchin et al. [33] for analysis of headache intensity. No major side effects were observed in individual studies.

Discussion

About the endpoints headache frequency and intensity as well as medication intake, there were no significant differences in the results in the studies compared to the intervention groups and the control groups. Chiropractic treatments were combined with other types of treatment. In the same way, the pure chiropractic treatment was considered in comparison with chiropractic and physiotherapeutic combination therapy. This distorted the results with regard to primary chiropractic treatment outcomes, so that the conclusion that chiropractic treatments for headaches represent a clinically relevant successful standard therapy based on the studies investigated cannot be confirmed. In order to achieve clearer results, the methodology of the studies would need to be improved. Compared to previous reviews, similar conclusions can be drawn from the studies, such as methodological limitations, low study quality and non-representative results [7, 18, 23]. However, 5 newer, not yet evaluated studies were included in the present contribution [10-14]. The difference to other reviews is that only chiropractic treatments were analysed for intervention groups, but with the above-mentioned deviations. This means that there were no treatment methods such as massage or physiotherapy in the intervention groups as in other studies [1, 5, 9, 17, 19, 24, 27]. The chiropractic treatment of headaches corrects dysfunctions of the spine and thus eliminates functional disorders and pain in the musculoskeletal system. At the same time, blood circulation and metabolic processes are improved after the functional disorders of the musculoskeletal system have been eliminated. The study by Jull et al. [30] is evaluated as a Maitland study and shows very good results in the application of physiotherapy to headaches. Thus, it becomes clear that manual techniques for headaches lead to good results. The study showed the most far-reaching improvements in headache frequency and intensity and reduction in medication intake. The review by Gross et al. [36] from 2015 came to a similar conclusion. Although it did not exclusively evaluate headaches, it showed a certain superiority of manual techniques such as manipulation and

mobilisation over other methods such as massages and self-exercises, despite the moderate quality of the studies evaluated. Methodological weaknesses of the studies exist, for example, in the intervention groups with chiropractic therapy in the blinding of therapists and patients. The number of participants was also very low except for the study by Jull et al. [30] with 200 participants. The follow-up times were low with an average of 12 weeks. The exception with 12 months is the study of Jull et al. [30]. The endpoints reported in the studies (headache frequency, intensity and medication) are surrogate endpoints. In the initial chiropractic examination, there is no research after the cause, e.g. pelvic obliquity, which should be taken into account in the manipulative treatments for the sustainability of the results. As a result, endpoints such as recurrences or remission could be investigated. In most studies, painkillers were administered in the intervention and control groups. This also distorts the results (bias). In order to guarantee the newest scientific conditions, also current studies were considered. Jull et al. [30] methodically pointed out how future studies on this topic could possibly be approached - especially with regard to sample sizes and follow-up times. The methods used in the studies were in line with the research question. Methodologically improved studies could be re-analysed to provide evidence of clinical relevance and thus increased external validity for the headache treatments considered in the studies.

Conclusions

Chiropractic treatments, like others, such as physiotherapy or combinations of chiropractic and massages, showed the greatest improvements. However, some studies showed no differences between chiropractic treatment and other therapies. The differences in outcomes between intervention groups and control groups are small. In fact, there is no evidence of clear superiority of chiropractic therapy in headache. The evidence that chiropractic for headache is a scientifically proven standard treatment cannot be provided based on the studies examined here. In order to analyse this question again, certain methodological prerequisites of the studies are required. Methodologically adapted studies should include harder endpoints (recurrences, remission), more study participants and longer follow-up times. By larger differences in the group comparison, clinical relevance for the respective treatment methods can be proven. The study by Jull et al. [30] can be used as a successful example of methodically good quality.

Compliance with Ethical Guidelines

Conflict of interest. R. Thiele, C.H. Saely and P. Ackermann state that there is no conflict of interest. This article does not include any studies on humans or animals carried out by the authors. The ethical guidelines stated therein apply to the studies listed.

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Supplementary Material

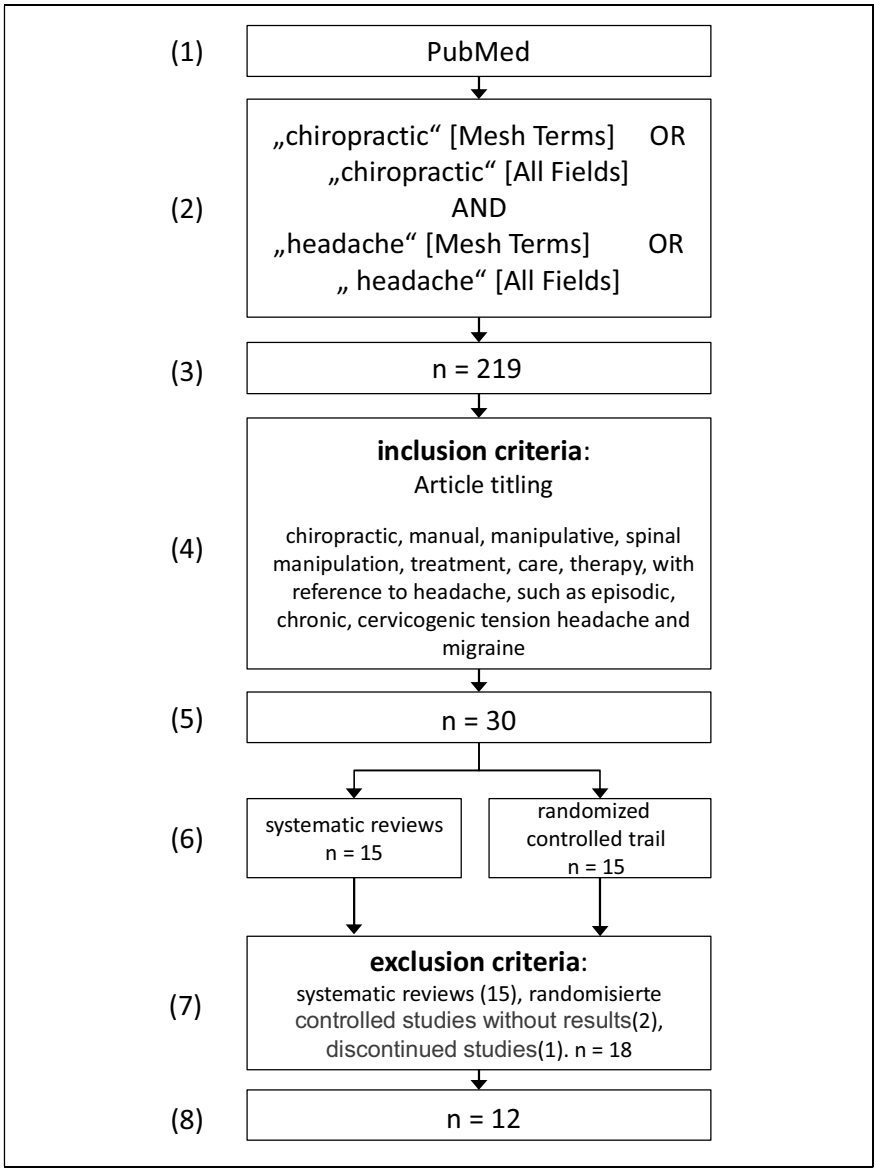

Figure 1: Flow chart for literature research

Explanation of the Flow Chart

(1) Database for literature search of RCTs updated until 21.08.2016

(2) Search criteria

(3) Total hits

(4) Selection criteria

(5) Relevant literature n = 30 articles on the subject

(6) Subdivision after study design

(7) Exclusion criteria: n = 15 SR & n = 3 RCT, total n = 18

(8) usable RCTs on the subject n = 12 RCTs

SR systematic reviews

RCT randomized controlled trials

Table 1: Overview of studies on previous evaluations in reviews

systematic reviews→ / studies ↓	Chaibi u. Russell 2014 Norway [21]	Chaibi u. Russell 2012 Norway [20]	Brayans et al. 2011 Canada [618]	Chaibi et al. 2011 Norway [19]	Posadzki 2011, England [26]	Posadzki u. Ernst 2011, England [25]	Vernon et al. 2011 Canada [27]	Fernandez- de- las Penas et al. 2006 Spain [5]	Fernandez- de- las Penas et al. 2006 Spain [23]	Biondi 2005, America [17]	Fernandez- de- las Penas et al. 2005 Spain [22]	Lenssinck et al. 2004 Netherlands [24]	Astin u. Ernst 2002 America [7]	Bronfort et al. 2001 America [1]	Vernon et al. 1999 Canada [9]	how often have these studies been included in other reviews?
Vernon et al. 2015 Canada [14]																
Espi-Lopez u. Gomez-Conesa 2014 Spain [12]																
Castien et al. 2012 Netherlands [11]																
Haas et al. 2010 America [13]																
Haas et al. 2010 America [29]		■			■		■									3
Castien et al. 2009 Netherlands [10]																
Haas et al. 2004 America [28]		■			■											2
Jull et al. 2002 Australian [30]		■	■		■				■		■					5
Tuchin et al. 2000 Australian [33]			■	■		■	■		■				■			6
Bove u. Nilsson 1998 Denmark [35]			■				■	■	■			■	■	■	■	8
Nilsson et al. 1997 Denmark [31]		■	■				■		■		■		■	■	■	8
Boline et al. 1995 America [34]			■					■	■			■	■	■	■	7
Number of studies/work evaluated	6	7	16	6	9	3	21	6	8	13	2	12	8	9	6	
Number of studies evaluated again in this paper		4	5	1	3	1	4	2	5		2	2	4	3	3	

Number of studies evaluated per paper: Studies that were evaluated overall in the review paper.

Number of studies that are again considered in this paper: Studies that were evaluated in this review but were also evaluated in the listed reviews. Example: Chaibi & Russel 2012 [10] evaluated 7 studies, 4 of which are also evaluated in this paper.

Table 2: Evaluation of methodological quality using the PEDro scale

Study → / PEDro criteria ↓		Jull et al. 2002 Australian [30]	Tuchin et al. 2000 Australian [33]	Bove u. Nilsson 1998 Denmark [35]	Espi-Lopez u. Gomez-Conesa 2014 Spain [12]	Nilsson et al. 1997 Denmark [31]	Vernon et al. 2015 Canada [14]	Haas et al. 2010 America [13]	Haas et al. 2010 America [29]	Haas et al. 2004 America [28]	Boline et al. 1995 America [34]	Castien et al. 2012 Netherlands [11]	Castien et al. 2009 Netherlands [10]
Inclusion and exclusion criteria were specified	■	■	■	■	■	■	■	■	■	■	■	■	
Randomization of the subjects		■	■	■	■	■	■	■	■	■	■	■	
Assignment to the groups was hidden		■	■	■	■	■	■	■	■	■	■		■
Key prognostic indicators in the groups were similar		■	■	■	■	■	■	■	■	■	■	■	■
Subjects were blinded			■		■	■							
Therapists were blinded					■								
Investigators were blinded		■	■	■		■	■						■
more than 85% of subjects assigned to the groups completed the study		■	■	■	■	■	■	■	■	■			
"Intention to treat" method complied		■		■			■	■	■	■			■
Group comparison of at least one central outcome		■	■	■	■	■	■	■	■	■	■	■	
Report on point, as well as dispersion of at least one central outcome		■	■	■	■	■		■	■	■	■	■	
total score		8/10	8/10	8/10	8/10	8/10	7/10	7/10	7/10	7/10	5/10	4/10	4/10
level of evidence		I	I	I	I	I	I	I	I	I	II	II	II

■ This information is not included in the points score

Table 3: Core content of the studies

study year, design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n= patients	number of treatments	endpoints	TN excreted	follow-up	results
Vernon et al. 2015 RCT Canada [14]	**CH** TTH	7/10	I	**39** TN	group A: **n = 17** CHIRO + PHYSIO group B: **n = 22** CHIRO + SAP (ab 2. Wo.) Self-acupressure pillow (SAP)	group A: 5Wo. CHIRO group B: 6 x CHIRO	KF ↓ 4 Wo. Participation entitles to analysis	5 TN 12,8 %	Wo. 4 oder Wo. 5 der BH	group A: **n= 15** KF 71 % of the TN > 40 % ↓ group B: **n= 19** KF 28 % of the TN 40 % ↓

study year design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow up	results
Jull et al. 2002 RCT Austra-lian [30]	**CH**	8/10	I	200 TN	group 1: **n = 49** 21 m / 28 w CHIRO + PHYSIO group 2: **n = 51** 19 m / 32 w CHIRO group 3: **n = 52** 9 m / 43 w PHYSIO group 4: **n = 48** 11 m /37 w keine BH MN in all 4 groups	group 1–3: 6 Wo. 8–12 BH u.MN	primary: KF ↓ d / Wo. secondary: KI ↓ MN ↓	7 TN 3,5 %	7 Wo. 3, 6 und 12 Mo. to BH	**KF** to 7 Wo. and 12 Mo. m. Ä. group 1: n = 48 BW 3,3 7 Wo.: 2,02 61 % ↓ 12 Mo.: 2,12 64 % ↓ group 2: n = 48 BW: 3,6 7 Wochen: 2,07 57,5 % ↓ 12 Monate: 2,2 62,5 % ↓ group 3: n = 51 BW: 3,7 7 Wo.: 2,37 64 % ↓ 12 Mo.: 2,52 68 % ↓ group 4: n = 46 BW: 3,5 7 Wo.: 0,79 23 % ↓ 12 Mo.: 0,95 27 % ↓ **KI**: nach 12 Mo. group 1: BW: 5,1 2,69 53 % ↓ group 2: BW 4,8 2,27 47 % ↓ group 3: BW: 5,4 2,83 52 % ↓ group 4: BW 5,3 1,32 25 % ↓ **MN:** group 1: 93 % ↓ group 2: 100 % ↓ group 3: 100 % ↓ group 4: 33 % ↑

study year design, country	diag-nosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow-up	results
Nilsson et al. 1997 RCT Den-mark [31]	**CH**	8/10	I	53 TN	group1: **n = 25** (10 m / 15 w) PHYSIO and lasers group 2: **n = 28** (13 m 15 w) CHIRO	group 1 and 2: 3 Wo. 2 x Wo. = 6 BH	primary KF / Tag ↓ KI ↓ MN ↓	1 TN 1,8 %	5 Wo.	group 1: group 2: n = 24 n = 28 MN **0 %** **36 %** ↓ KF/day **37 %** ↓ **69 %** ↓ KI 17 % ↓ 36 % ↓
Boline et al. 1995 RCT America [34]	**TTH**	5/10	II	150 TN	group 1: **n = 75** **CHIRO** group 2: **n = 75** MN (Amitriptylin)	group1: 6 Wo. 2 x per Wo. = 12 BH CHIRO group 2: MN Wo.1 = 10 mg/d Wo.2 = 20 mg/d after that 30 mg/d	primary KI ↓ KF ↓ MN ↓	24 TN 16 % group 1: n=70 32 m / 38 w group 2: n= 56 17 m / 39 w	4 Wo.to BH	6 Wo. to BH none substantial improvement in both groups 4 Wo. to BH group 1: n = 70 KI: 32 % ↓ KF: 42 % ↓ MN 30 % ↓ group 2: n = 56 MN no improvement, easy side effects

study year design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow-up	results
Castien et al. 2009 RCT Nether-lands [10]	**CTTH**	4/10	II	84 TN 20 TN ran. in group 1 u.2 31 TN in n. ran. KST CHIRO +PHYSIO	group 1: **n = 42** GP mit MN group 2: **n = 42** CHIRO + PHYSIO MN in both groups	group 1: GP MN = NSAID group 2: 8 Wo. 9 BH / 30 min	primary KF ↓ MN ↓ secondary: KI ↓	**14 TN** 16,6 %	8. und 26. Wo.	nach 8 Wo. group1: n = 35 7 KT ↓ group 2: n = 35 3 KT ↓ MN 25 % ↓ per 2 Wo.
Castien et al. 2012 RCT Nether-lands [11]	**CTTH**	4/10	II	186 TN 82 TN ran. 104 TN KST	group 1: **n = 104** CHIRO + Physio (KST) 21 m / 83 w group 2: **n = 41** CHIRO + Physio ran. 11 m / 30 w group 3:**n = 41** GP ran.	group 1: max. 9 BH à 30 min group 2: max. 9 BH à 30 min	primary KF ↓	group 1 und 2 to 26.Wo. 52 TN 35,9 %	ab 8 und 26 Wo. nach BH group 1 u. 2	to 8 Wo. group 1 u. 2: n = 142 8,1 KT ↓ group 1 und 2: 78% of the participants report a 50% improvement in the KT to 26 Wo. n = 128 8,4 headacheday ↓ 73% of the participants report a 50% improvement in the KT

study year design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow-up	results
Espí-López und Gómez-Conesa 2014 RCT Spain [12]	**CTTH** **ETTH**	8/10	I	**84** TN 16 m (19 %) 68 w (81 %)	group1: **n = 20** PHYSIO group 2: **n = 22** CHIRO group 3: **n = 20** CHIRO + PHYSIO group4: **n = 22** none BH	group1–3: 4 Wo./4 BH 1 BH / Wo. 7-days-interval	primary: KF ↓ KI ↓	3 TN 3,57 %	4. und 8. Wo.	group 2: **KF**: Wo.1 2,9 Wo.4 1,7 Wo.7 2,15 26 % ↓ **KI**: Wo.1 5,12 Wo.4 3,03 Wo.7 3,28 36 % ↓ group 3: **KF**: Wo.1 3,8 Wo.4 1,55 Wo. 7 1,65 57 % ↓ **KI**: Wo. 1 4,8 Wo. 4 3,24 Wo. 7 3,02 37 % ↓ group 1: **KF** Wo. 1 3,25 Wo. 4 2,6 Wo.7 2,45 25 % ↓ **KI**: Wo.1 4,79 Wo.4 3,77 Wo.7 2,82 41 % ↓ group 4: **KF**: Wo.1 3,24 Wo.4 2,45 Wo.7 2,85 39 % ↓ **KI**: Wo.1 5,24 Wo.4 3,95 Wo.7 3,86 26 % ↓

study year design country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number to treatments	endpoints	TN excreted	follow-up	results
Bove und Nilsson 1998 RCT Den-mark [35]	**ETTH**	8/10	I	75 TN	group 1: n = 38 15 m / 23 w CHIRO + PHYSIO group 2: n = 37 11 m / 16 w PHYSIO + Placebo-lasers	4 Wo. 2 x per Wo. 8 BH	primary: KF/d ↓ KI ↓ MN ↓	5 TN 9,3 %	7, 11, 15 u. 19 Wo. to BH	group1: n = 36 **m. Ä** **KF**: BW 2,8 7 Wo. 1,5 19 Wo. 2,1 = 25 % ↓ **KI**: BW 37 nach 7 Wo. 38 nach 19 Wo. 35 5,4 % ↓ **MN**: BW 0,66 7 Wo. 0,38 19 Wo. 0,48 27 % ↓ group 2: n = 34 **m. Ä.** **KF**: BW:3,4 7 Wo.: 1,9 19 Wo.: 2,2 35 % ↓ **KI**: BW: 37 7 Wo. 34 19 Wo. 26 30 % ↓ **MN**: BW: 0,82 7 Wo. 0,59 19 Wo. 0,56 = 32 % ↓

study ,year design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow-up	results
Haas et al. 2010 RCT America [13]	**CCH M**	7/10	I	80 TN	group 1: **n = 20** 4 m/16 w 8 x CHIRO group2: **n = 20** 4 m/16 w 16 x CHIRO group 3: **n = 20** 5 m/15 w 8 x PHYSIO group 4: **n = 20** 3 m/17 w 16 x PHYSIO	group 1 and group 3: 1 x Wo. BH group 2 and group 4: 2 x pro Wo.BH group 1 - 4: 8 Wo. BH	primary: KI ↓ secondary: KT ↓	7 TN 8,75 %	2, 4, 8 and 12 Wo.	to 12 Wo. group 1: n = 19 group 2 : n = 17 KI: 20,75 ↓ **KT**: 9 ↓ **KI**: group 3: n = 18 4,8 ↓ group 4: n = 19 1,9 ↓ **KT**: group 3: 6 ↓ group 4: 3 ↓
Haas et al. 2004 RCT America [28]	**CCH**	7/10	I	24 TN	group 1: **n = 8** 3 x CHIRO group 2: **n = 8** 2 m / 6 w 9 x CHIRO group 3: **n = 8** 8 w 12 x CHIRO	3 Wochen group1: 3 x BH 1 / Wo. group 2: 9 x BH 3 / Wo. group 3: 12 x BH 4 / Wo.	primary: KI ↓	1 TN 4,16 %	4. u. 12. Wo.	middle BW group 1: 51,4 group 2: 61,2 Gruppe 3: 45,0 group 1: n = 7 4 Wo. 10,9 = 21 % ↓ 12 Wo. 2,4 = 5 % ↓ group 2: n = 8 4 Wo. 29,9 = 49 % ↓ 12 Wo. 27,0 = 44 % ↓ group 3: n = 8 4 Wo. 26,3 = 58 % ↓ 12 Wo. 17,1 = 38 % ↓
Haas et al. 2010 RCT America [29]	CCH M	7/10	I	80 TN	group 1: **n = 20** 4 m/16 w 8 x CHIRO group 2: **n = 20** 4 m/16 w 16 x CHIRO group 3: **n = 20** 5 m/15 w 8 x PHYSIO group 4: **n = 20** 3 m/17 w 16 x PHYSIO	8 Wo. treatment group1 / group 3: 1 x Wo. BH group 2 / group 4: 2 x Wo. BH	primary KI ↓ to reduce secondary: KF ↓ MN ↓	7 TN 8,75 %	2, 4, 8, 12, 16, 20 and 24 Wo.	to 24 Wo. group 1 and 2: KF: 8 days ↓ MN: 33 % ↓ group 3 and 4: KF: 6 Tage ↓ MN: ±0 KI group 1: n = 19 5,2 ↓ group 2: n = 17 14,4 ↓ group 3: n = 18 4,6 ↑ group 4: n = 1 9 4,6 ↓

study, year, design, country	diagnosis	PEDro-Score	Evi-dence	study population	treatment n = patients	number of treatments	endpoints	TN excreted	follow-up	resultse
Tuchin et al. 2000 RCT Austra-lian [33]	M	8/10	I	127 TN	group 1: **n = 83** 25 m / 59 w = 84 ` CHIRO  group 2: **n = 40** 14 m / 27 w = 41 ` SCH CHIRO m / w-division 1 TN more in both groups compared to the number of units ?? (see Tab.1)	group 1 / group 2: 2 Mo. max. 16 BH	~~primary~~ MF (d/Mo.)↓ SI ↓ MN ↓	4 TN 3,1 %	6 Mo. nach BH	group 1: n = 83 DW MT /Mo. 3 days ↓ = 42 % ↓ SI 1,06 ↓ = 13 % ↓ MN 11,5 ↓ = 54 % ↓ group 2: n = 40 DW MT / Mo. 0,4 days ↓ = 5 % ↓ SI 1,7 ↓ = 21 % ↓ MN 3,9 ↓ = 19 % ↓ KI: BW: 37 7 Wo. 34 19 Wo. 26 = 30 %↓ MN: BW: 0,82 7 Wo. 0,59 19 Wo. 0,56 = 32 %↓

Explanation of abbreviations to Table 3

↑	increased
↓	reduced
BH	Treatment
BW	Base value
CCH	Chronic Cervicogenic Headache
CH	Cervicogenic Headache
CHIRO	Chiropractic treatment, manipulative treatment, manipulative treatment, manipulative treatment, manipulative therapy, spinal manipulation
CTTH	Chronic Tension Typ Headache
d	Day
DW	Average value
ETTH	Episodic Tension Typ Headache
GP	General practitioner
h/d	Hour/day
KF	Headache frequency
Kh	Hours of headache
KI	Headache intensity
KST	Cohort Study
KT	Headache Days
M	Migraine
m	Men
m. Ä.	Mean change
max.	Maximal
MF	Migraine frequency
mg	Milligram
min.	Minutes
MN	Drug intake
Mo.	Month
MT	Migraine days
n. ran.	Not randomized
NASID	Non-steroidal anti-inflammatory drugs
PHYSIO	Therapeutic exercises, physical exercises, massages, soft tissue therapy
ran.	Randomized
SAP	Self Acupressure Cushion
SCH CHIRO	Sham manipulation
SI	Pain intensity
TN	Participants

TTH	Tension Type of Headache
w	Womans
Wo.	Weeks

Explanation of the applied therapeutic measures

Boline et al. [34]	MN = Amitriptylin	CHIRO = Spinal manipulation
Bove & Nilsson [35]	PHYSIO = Soft tissue therapy	CHIRO = Spinal manipulation
Castien et al. [11]	GP = General physician	CHIRO = Manipulative treatment
Castien et al. [10]	GP with analgesics treatment	CHIRO = Manipulative treatment + PHYSIO
Espí-López & Cómez-Conesa [14]	PHYSIO = manual treatment	CHIRO = Manipulative treatment
Haas et al. [13]	PHYSIO = light massage	CHIRO = Manipulative therapy
Haas et al. [28]	No control group	CHIRO = Manipulative therapy
Haas et al.[29]	PHYSIO = light massage	CHIRO = Manipulative therapy
Jull et al. [30]	PHYSIO = therapeutic exercises	CHIRO = Manipulative therapy
Nilsson et al. [31]	PHYSIO = Soft tissue therapy	CHIRO = Spinal manipulation
Tuchin et al. [33]	SCH CHIRO = Sham chiropractic	CHIRO = chiropractic, Spinal manipulation
Vernon et al. [14]	PHYSIO = Massage	CHIRO = Manipulative treatment

Table 4: Core statements of the studies with evidence level I after the PICO model

study	population	intervention group	control group	endpoints	result intervention group	results control group
Vernon et al. 2015 Canada [14]	39	group A: CHIRO + PHYSIO	group B: CHIRO+ SAP	KF ↓	group A: KF 71 % of theTN: > 40 %	group B: KF: 28 % der TN 40 % ↓
Juli et al. 2002 Australian [30]	200	group 1: CHIRO + PHYSIO group 2: CHIRO MN in all groups!	group 3: PHYSIO Gruppe 4 none BH MN in the groups!	primary KF ↓ secondary: MN ↓ KI ↓	**KF:** to 7 Wo. and 12 Mo. m. Ä. group 1: BW 3,3 7 Wo. improve 2,02 12 Mo. improve 2,12 61 % ↓ group 2: BW 3,6 7 Wo. improve 2,07 12 Mo. improve 2,25 64 % ↓ Gruppe 57,5 % ↓ 62,5 % ↓ **MN:** group 1: 93 % ↓ group 2: 100 % ↓ **KI:** to 12 Mo. group 1: BW 5,1 on 2,69 53 % ↓ group 2: BW 4,8 2,27 47 % ↓	**KF:** to 7 Wo. u. 12 Mo. m. Ä. group 3: BW: 3,7 7 Wo.: 2,37 = 64 % ↓ 12 Mo.: 2,52 = 68 % ↓ group 4: BW 3,5 7 Wo.: 0,79 23 % ↓ 12 Mo.: 0,95 27 % ↓ **MN:** group 3: 100 % ↓ group 4: 33 % ↑ **KI:** to 12 Mo. group 3: B 5,4 2,83 52 % ↓ group 4: BW 5,3 1,32 25 % ↓
Nilsson et al. 1997 Denmark [31]	53	group 2: CHIRO	group 1: PHYSIO + Laser	KF ↓ KI ↓ MN ↓	KF: 69 % ↓ KI: 36 % ↓ MN: 36 % ↓	KF: 37 % KI: 17 % MN: 0 %

study	Population	intervention group	control group	endpoints	results intervention groups	results control group
Espí-López und Gómez-Conesa 2014 Spain [12]	84	group 2: CHIRO group 3: CHIRO + PHYSIO	group 1: PHYSIO group 4: keine BH	KF ↓ d/Wo. KI ↓	group 2: **KF**: Wo. 1 2,9 Wo. 4 1,7 41 % ↓ Wo. 7 2,15 26% ↓ **KI:** Wo. 1 5,12 Wo. 4 3,03 41 % ↓ Wo. 7 3,28 36 % ↓ group 3: **KF:** Wo. 1 3,8 Wo. 4 1,55 59 % ↓ Wo. 7 1,65 57 % ↓ **KI:** Wo. 1 4,8 Wo. 4 3,24 32,5 % ↓ Wo.7 3,02 37 % ↓	group 1 **KF**: Wo. 1 3,25 Wo. 4 2,6 = 20 % ↓ Wo. 7 2,45 = 25 % ↓ **KI**: Wo. 1 4,79 Wo. 4 3,77 = 21 % ↓ Wo. 7 2,82 = 41 % ↓ group 4: **KF**: Wo.1 3,24 Wo.4 2,45 = 24 % ↓ Wo. 7 2,85 = 12 % ↓ **KI:** Wo. 1 5,24 Wo. 4 3,95 = 25 % ↓ Wo. 7 3,86 = 26 % ↓
Bove und Nilsson 1998 Denmark [35]	75	group 1: CHIRO+ PHYSIO	group 2: PHYSIO+ Placebo-lasers	KF / d ↓ KI ↓ MN ↓	group 1: DW **KF:** BW 2,8 h/d to 7 Wo. 1,5 = 46 % ↓ to 19 Wo. 2,1 = 25 % ↓ **KI:** BW 37 to 7 Wo. 38 = 3 % ↑ to 19 Wo. 35 = 5,4 % ↓ **MN:** BW 0,66 7 Wo. 0,38 = 42 % ↓ 19 Wo. 0,48 = 27 % ↓	group 2: DW **KF**: BWt: 3,4 h/d to 7 Wo. 1,9 = 44 % ↓ to 19 . Wo. 2,2 = 35 % ↓ **KI:** BW: 37 to 7 Wo. 34 = 8 % ↓ to 19 Wo. 26 = 30 % ↓ **MN**: BW: 0,82 7 Wo. 0,59 = 28 % ↓ 19 Wo. 0,56 = 32 % ↓
Haas et al. 2010 America [13]	80	group 1: 8 x CHIRO group 2: 16 x CHIRO	group 3: 8 x PHYSIO group 4: 16 x PHYSIO	primary: KI ↓ secondary KF ↓	to 12 Wo. KI: group 1 and 2: 20,75 ↓ **KF**: 9 d ↓	to 12 Wo. KI: group 3: 4,8 ↓ group 4: 1,9 ↓ **KF:** group 3: 6 d ↓ group 4: 3 d ↓

study	Population	intervention group	control group	endpoins	result intervention group	result **control group**
Haas et al. 2004 America [28]	24	group 1: 3 x CHIRO 1 x Wo. group 2: 9 x CHIRO 3 x Wo. group 3: 12 x CHIRO 4 x Wo.	none	KI ↓	average BW group 1:51,4 group 2:61,2 group 3:45 group 1: nach 4 Wo.: 10,9 = 21 % ↓ nach 12 Wo.: 2,4 = 5 % ↓ group 2: nach 4 Wo.: **29,9 = 49 %** ↓ nach 12 Wo.: **27,0 = 44 %** ↓ group 3: nach 4 Wo.: 26,3 = 58 % ↓ nach 12 Wo.: 17,1 = 38 % ↓	none control group
Haas et al. 2010 America [29]	80	group 1: 8 x CHIRO group 2: 16 x CHIRO	group 3: 8 x PHYSIO Gruppe 4: 16 x PHYSIO	KI ↓ KF ↓ MN ↓	to 24 Wo. **KI:** group 1: 5,2 Punkte ↓ group 2: 14,4 Punkte ↓ **KF**: group 1 and 2: 8 Tage ↓ **MN:** 33 % ↓	to 24 Wo. **KI** group 3: 4,6 points ↑ group 4: 4,6 points ↓ **KF**: group 3 and 4: 6 days ↓ **MN** : ±0
Tuchin et al. 2000 Australian [33]	127	group 1: CHIRO	group 2: SCH CHIRO	MF = MT / Mo. ↓ SI ↓ MN ↓	averagevalues group 1: **MF**: 3 days ↓ 42 % ↓ **SI**: 1,06 ↓ 13 % ↓ **MN**: 11,5 ↓ 54 % ↓ migraine ↓ bei 18 TN (22 %) 90 % ↓ bei 41 TN (49 %)	average values group 2: **MF:** 0,4 day 5 % ↓ **SI**: 1,7 21 % ↓ **MN**: 3,9 19 % ↓

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↓	reduced
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CTTH	Chronic Tension Typ Headache
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ETTH	Episodic Tension Typ Headache
GP	General practitioner
h/d	Hour/day
KF	Headache frequency
Kh	Hours of headache
KI	Headache intensity
KST	Cohort Study
KT	Headache Days
M	Migraine
m	Men
m. Ä.	mean change
max.	Maximal
MF	Migraine frequency
mg	Milligram
min.	Minutes
MN	Drug intake
Mo.	Months
MT	Migraine days
n. ran.	ran. not randomized
NASID	Non-steroidal anti-inflammatory drugs
PHYSIO	Therapeutic exercises, physical exercises, massages, soft tissue therapy
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Explanation of the applied therapeutic measures

Bove & Nilsson [35]	PHYSIO = Soft tissue therapy	CHIRO = Spinal manipulation
Espí-López & Cómez-Conesa [14]	PHYSIO = manual treatment	CHIRO = manipulative treatment
Haas et al. [13]	PHYSIO = Light massage	CHIRO = manipulation therapy
Haas et al. [28]	no control group	CHIRO = manipulation therapy
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Nilsson et al. [31]	PHYSIO = Soft tissue therapy	CHIRO = Spinal manipulation
Tuchin et al. [33]	SCH CHIRO = Sham chiropractic	CHIRO = Chiropractic, spinal manipulation
Vernon et al. [14]	PHYSIO = Massage	CHIRO = Manipulative treatment

2.2 Congress Abstract / Congress Poster “Chiropractic Treatment of Lower Back Pain” (German)

Published on the portal German Medical Science (GMS)

The portal German Medical Science (GMS) is the interdisciplinary portal of the Association of Scientific Medical Societies (AWMF). Created in cooperation with the German Institute for Medical Documentation and Information (DIMDI) and ZB MED - Informationszen-trum Lebenswissenschaften, it offers free access to high-ranking and quality-checked medical articles. The portal GMS offers to all scientists from the medical range the possibility of publishing their research results on-line. The project is funded by the German Research Foundation (DFG). The largest portion takes the technical periodicals: GMS German Medical Science - an interdisciplinary journal as electronic journal of the Arbeitsgemeinschaft der Wissenschaftlichen Medi-zinischen Fachgesellschaften (AWMF). It publishes high-ranking original and review papers with peer review from the entire spectrum of medicine, subject-specific, electronic journals of individual specialist societies [55].

Background

A major cost factor in healthcare is lower back pain: through prevalence, the cost of production downtime and treatment. There are various treatment methods that rarely lead to the desired success. Systematic studies from randomized controlled trials in the USA have shown that chiropractic treatment is an effective therapy. There is currently no therapeutic method that meets the gold standard. However, chiropractic therapy shows clearly positive results in terms of pain relief and functional improvement in lower back pain.

Question

Chiropraktic – an effective therapy for lower back pain?

Method

For the systematic review, one of the authors conducted a targeted literature search in PubMed in February 2017. The search was limited to English-language literature and randomised clinical trials. The search parameters were “Chiropractic and lowback pain” [All Fields includes MeSH]. Randomized clinical trials

and systematic reviews were selected with keywords such as chiropractic, spinal manipulation and adjustment in combination with lower back pain in the title.

Outcomes

131 articles were found matching tag. 24 articles were selected. Of these, 14 randomized clinical trials compared directly with other therapy methods provided results. Two recent systematic reviews were selected for comparison. 4,578 individuals participated in the randomized clinical trials. The endpoints to be evaluated were pain, functional limitations, but also patient satisfaction and cost-effectiveness. In eight studies it was proven that chiropractic achieves the better therapeutic results. In three studies no differences between chiropractic and physiotherapy could be found in a therapy comparison, although the endpoints improved significantly. In only one study did physiotherapy achieve better results. The studies by Haas et al. and Hurwitz et al., in which chiropractic was compared with chiropractic plus physical mo-dalities, do not show any differences in therapy. However, the endpoints to be considered were also improved here.

Discussion

The study shows significant improvements in the application of chiropractic therapy to lower back pain. Three studies show their results to be clinically relevant and statistically significant. An earlier systematic review, however, concluded that chiropractic treatment was not more effective than other therapies for lower back pain. In a second review, the same authors, Rubinsteinet et al., reported a statistically significant but not clinically relevant positive effect on pain relief and functional status of spinal manipulation compared to other interventions. The results are of high quality. The applied methods correspond to the research question. The number of study participants results in a high power as well as a representative cross-section for the determined results. The topicality of the work was guaranteed by incorporating the latest study results. However, the results are subject to a slight distortion, since the study analyses did not always examine the direct comparison of different therapies. Without combination forms of the therapies the results would be still clearer.

Practical Implication

Chiropractic shows in most of the studies positive results of both improvements of the endpoints. Chiropractic is therefore an effective treatment for lower back pain. The pain is usually caused by osseous malpositions and associated muscle pain. These can be alleviated very quickly by professional, targeted adjustments. For future studies, endpoints such as remission or rezi-dive should be investigated.

Chiropraktische Behandlung bei unteren Rückenschmerzen

THIELE AMERIKANISCHE CHIROPRAKTIK
... improve your life

UFL Private Universität im Fürstentum Liechtenstein

Rainer Thiele[1], Christoph H. Saely[1], Paul Ackermann[3]

[1]Gemeinschaftspraxis für amerik. Chiropraktik/Osteopathie u. Sportheilkunde, München
[2]Private Universität Fürstentum Liechtenstein
[3]Ackermann Institut Schweden

Hintergrund

Ein wesentlicher Kostenfaktor im Gesundheitswesen ist der untere Rückenschmerz: durch Prävalenz, die Kosten für Produktionsausfall und Behandlung. Es gibt verschiedene Behandlungsmethoden, welche nur selten zum gewünschten Erfolg führen. Systematische Untersuchungen aus randomisierten kontrollierten Studien in den USA haben gezeigt, dass die chiropraktische Behandlung eine wirksame Therapie ist. Es gibt momentan keine therapeutische Methode, die den Goldstandard erfüllt. Allerdings zeigen sich bei der chiropraktischen Therapie, bezogen auf Schmerzlinderung und Funktionsverbesserung bei unteren Rückenschmerzen, deutlich positive Ergebnisse. **Fragestellung: Chiropraktik – eine wirksame Therapieform bei unteren Rückenschmerzen?**

Methode

Für die systematische Übersichtsarbeit führte einer der Autoren im Februar 2017 eine gezielte Literaturrecherche in PubMed durch. Die Suche war auf englischsprachige Literatur sowie randomisierte klinische Studien begrenzt. Suchparameter waren „Chiropractic and low back pain"[All Fields inkludiert MeSH]. Es wurden randomisierte klinische Studien und systematische Übersichtsarbeiten ausgewählt, bei denen im Titel Schlagworte wie Chiropraktik, Spina Manipulation und Adjustment in Kombination mit unteren Rückenschmerzen vorkamen.

Ergebnisse

131 Artikel zum Thema recherchiert, 24 Artikel ausgewählt,

14 Studien wiesen verwertbare Ergebnisse aus,

2 aktuelle systematische Übersichtsarbeiten wurden zum Vergleich als Referenz ausgewählt.

4.578 Personen nahmen an den randomisierten klinischen Studien teil.

Endpunkte: Schmerz, funktionelle Einschränkungen, Patientenzufriedenheit und Kosteneffektivität.

eine Studie hatte bessere Ergebnisse durch Physiotherapie

drei Studien wiesen keine Unterschiede zwischen Chiropraktik und Physiotherapie aus

zwei Studien verglichen Chiropraktik vs. Chiropraktik + physikalische die Ergebnisse waren gleich

acht Studien zeigten, bessere Therapieerfolge durch Chiropraktik

Therapiearten mit besten Ergebnissen aus den 14 Studien

Studie	Population	Intervention Kontrollgruppe	Endpunkte
Hurwitz et al.[11]	681	Chiropraktik vs. medizinische Behandlung Chiropraktik + physik. Therapien vs. medizinische Behandlung + physik. Therapie	Schmerz + funktionelle Einschränkung +
Hurwitz et al.[7]	681	Chiropraktik vs. medizinische Versorgung Chiropraktik vs. medizinische Versorgung+Physiotherapie	Schmerz + funktionelle Einschränkung +
Cherkin et al.[15]	321	Chiropraktik vs. Physiotherapie (Mc Kenzie Methode)	Schmerz + funktionelle Einschränkung +
Skargren et al.[14]	323	Chiropraktik vs. Physiotherapie	Gesundheit, Kosten
Haas et al. [8]	72	Chiropraktik vs. Chiropraktik + physik. Modalitäten	Schmerz + funktionelle Einschränkung +
Hurwitz et al.[12]	341	Chiropraktik vs. Chiropraktik + physik. Modalitäten	Schmerz + funktionelle Einschränkung +
Goertzt et al.[1]	91	Chiropraktik + Med. Behandlung vs. Med. Behandlung	Schmerz + funktionelle Einschränkung +
Bishop et al.[4]	29	Chiropraktik + ElcoPQ vs. Behandlung beim Familienarzt	Schmerz + funktionelle Einschränkung +
Hondras et al.[5]	240	Chiropraktik vs. minimale conservative medical care	funktioneller Funktionsstatus +
Wilkey et al.[6]	20	Chiropraktik vs. Schmerzklinik Management	Schmerz + funktionelle Einschränkung +
Hlonis et al.[9]	192	Chiropraktik + Placebo vs. Schein Manipulation + Muskelrelaxans Schein Manipulation + Placebo	Schmerz + funktionelle Einschränkung +
Hetzmann-Miller et al.[10]	672	Chiropraktik vs. medizinische Versorgung	Zufriedenheit +
Bronfort et al.[13]	174	Chiropraktik vs. Physiotherapie Chiropraktik + Rückenübungen vs. Medikamente	funktionelle Einschränkung +
Meade et al.[16]	741	Chiropraktik vs. Krankenhaus Management	Schmerz + Patientenzufriedenheit +

Praktische Implikation

Chiropraktik zeigt in der Mehrzahl der Studien positive Ergebnisse bei der Verbesserung der Endpunkte. Damit ist Chiropraktik eine wirksame Therapieform, um untere Rückenschmerzen zu behandeln. Meist werden die Schmerzen durch ossäre Fehlstellungen und damit verbundenen Muskelschmerzen ausgelöst. Durch fachgerechte, zielgerichtete Justierungen lassen sich diese sehr schnell lindern. Durch methodische Verbesserungen der Studien können primäre Endpunkte wie Remission oder Rezidive untersucht werden, somit kann die klinische Relevanz besser eingeschätzt werden.

Referenzen

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DKVF 2017, Berlin Kontakt: rainer.thiele@gmx.com

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3 Overall Discussion

The results of the study clearly showed majority improvements through chiropractic treatments. Combination therapies such as chiropractic in combination with massages and chiropractic and physiotherapy as well as all other applications of physiotherapy also delivered very good results. Finally, out of 35 of the evaluated results, 19 showed best results in therapy comparison and endpoint improvement through chiropractic treatments. Nine times the results showed no differences between the intervention group and the control group. At 26%, this corresponds to almost one third. Four best results were achieved by physiotherapy and three by combination therapy with chiropractic and physiotherapy. Resulta¬te between the groups showed mostly only small differences (see Figure 4).

Previous reviews [28, 37, 51-53] came to similar results. Also, methodological weaknesses of the studies, as in this paper, were lacking. It is interesting to note that five newer studies were considered without earlier evaluation. Furthermore, the focus of the intervention groups was exclusively on chiropractic treatments. This work thus conveys the latest scientific findings.

The clinical implication is that with chiropractic treatments, osseous malpositions and associated muscle pain are very quickly alleviated by professional, targeted adjustments.

For future research, methodological weaknesses of the studies should be improved. The number of participants should be increased in order to increase the significance of the studies. Initial examinations with causative chiropractic diagnostics, such as pelvic obliquity, must be considered in order to achieve sustainable results in treatment. As a result, private endpoints such as remission or recurrence can be used as endpoints and clinical relevance can be more clearly demonstrated. Intervention groups should perform pure chiropractic treatments - without combination therapies and painkillers - to avoid performance bias. Furthermore, follow-up times are too short with an average of twelve weeks. Periods of up to one year can be considered here in order to better assess the sustainability of the therapy.

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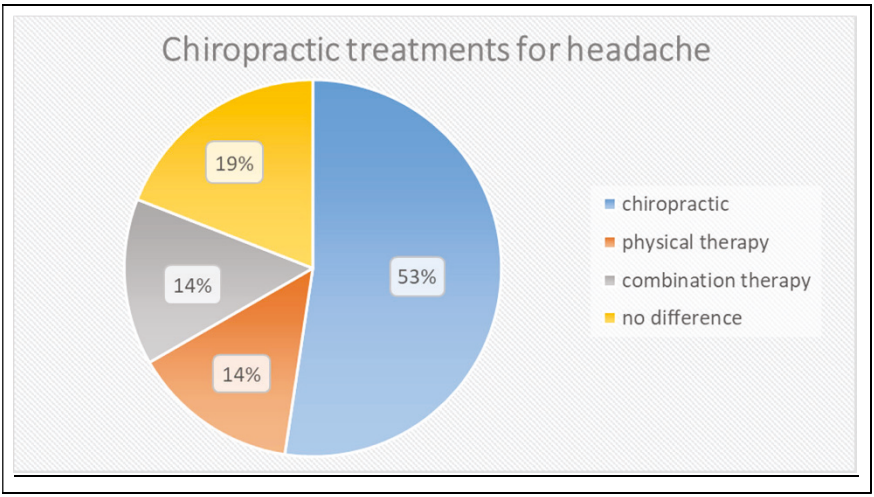

Figure 2: In 21 outcomes, the most successful forms of chiropractic treatment for headache are

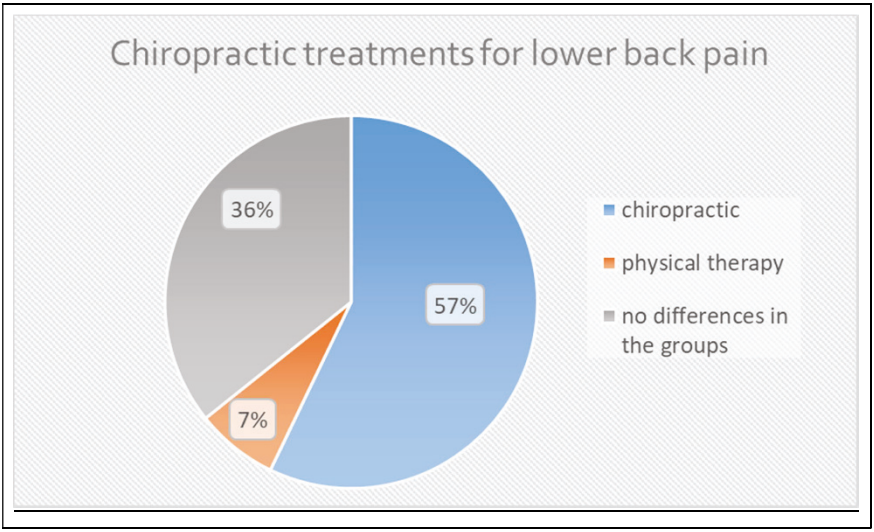

Figure 3: In 14 outcomes, the most successful forms of chiropractic treatment for lower back pain were

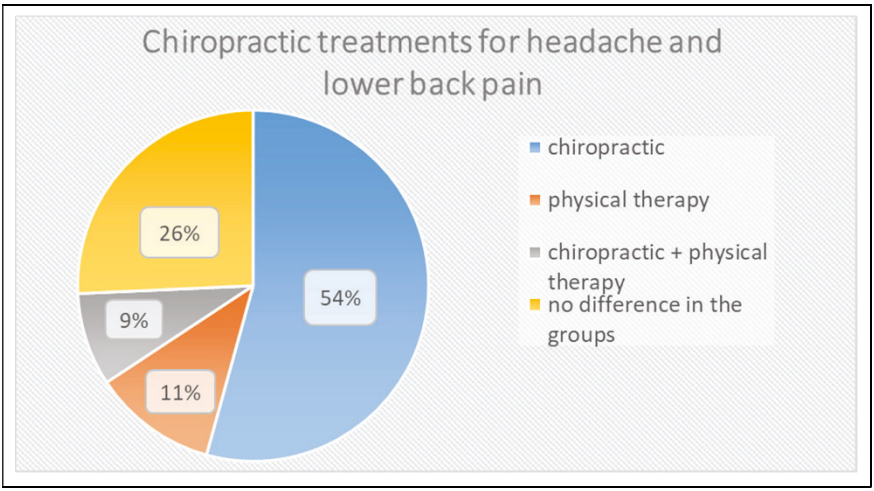

Figure 4: In 35 results on both symptoms, the most successful forms of therapy.

Based on the results of the review, the research question must be answered as follows: Chiropractic treatment of headache and lower back pain is not a clinically relevant, sustainable treatment and therefore not a standard therapy.

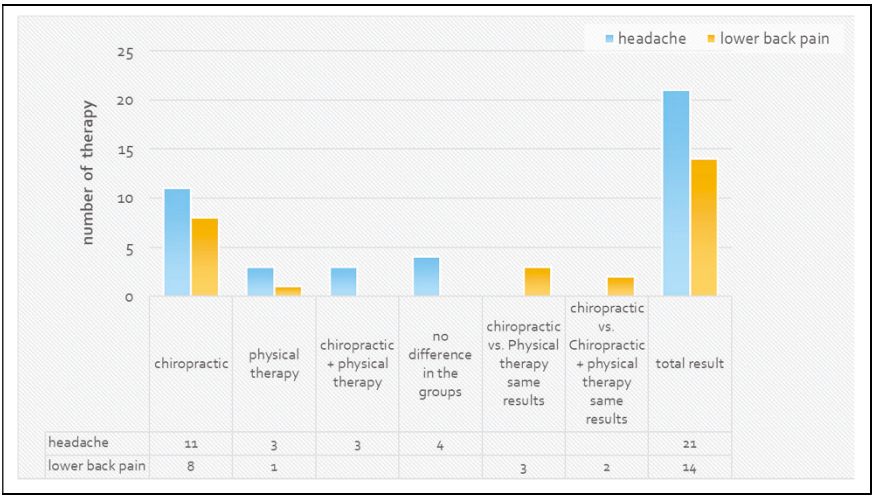

Figure 5: Therapies that achieved optimal improvements in the respective symptoms.

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