Medicine

Bibliometric analysis of research on manual therapy for low back pain from 2013 to 2023

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Abstract

Background: Low back pain (LBP) is one of the most common symptoms prompting patients to seek treatment. Manual therapy is widely used to treat LBP. Nevertheless, there is a scarcity of bibliometric analyses examining the worldwide utilization of manual therapy for the treatment of LBP.

Methods: This research used the Online Bibliometric overview Platform website (https://bibliometric.com), CiteSpace (6.2.R4), and VOSviewer (1.6.19) to provide a comprehensive analysis of the current status and prospective developments in the field. The Web of Science Core Collection (WOSCC) database was searched for publications from August 1, 2013, to August 1, 2023 on manual therapy of low back pain.

Results: Among the identified articles, 488 fit the criteria. The number of papers on manual therapy for LBP has progressively risen over in the past 10 years, whereas the average number of citations of these papers has decreased. The leading countries producing publications on this discipline were the USA, Canada, and China. There were 345 authors of the studies, with Christine M. Goertz having the most publications. The University of Southern Denmark was the institution that contributed the most to the field. The *Journal of Manipulative and Physiological Therapeutics* published many of the research papers in this field. Keyword analysis showed that the relationship between low back pain, spinal manipulation, and management has been present throughout the development of this research area.

Conclusions: Spinal manipulation, management, randomized controlled trials, Physical therapy, care and disability are the current research hotspots in the treatment of LBP with manual therapy. In addition, research on complementary medicine and clinical practice guidelines may become an important trend in the future.

Abbreviations: LBP = low back pain, WOSCC = web of science core collection.

Keywords: bibliometric analysis, CiteSpace, low back pain, manual therapy, VOSviewer

1. Introduction

Low back pain (LBP) is a musculoskeletal condition with negative impacts on society.[1,2] It affected 619 million people worldwide in 2020, and the number of cases is projected to rise to 843 million by 2050, primarily due to population growth and aging.[3] LBP is a prevalent condition that is recognized as the primary cause of disability worldwide.[4] In the United States, 80% of adults will experience severe lower back pain during their lifetime,[5] with middle-aged to elderly women (40–80 years) being the most susceptible.[6,7]Accordingly, the effective treatment of LBP has significant importance for patients, healthcare providers, and policymakers in the healthcare sector.

Manual therapy is the most widely employed form of complementary or alternative medicine, and it is one of the earliest forms of medicine known to humanity.[8] As per the guidelines provided by The Orthopaedic Section of the American Physical Therapy Association,[9] manual therapy is a recommended method used for the management of acute, subacute, and chronic low back pain. Moreover, manual therapy has unique advantages in clinical practice due to its ecological safety, precision therapeutic effect, and high compliance among patients.[10] With the growing body of research on manual therapy, some studies have examined manual therapy for LBP. However, there is a lack of systematic visual analyses of the characteristics, focal points, and cutting-edge aspects of manual therapy.
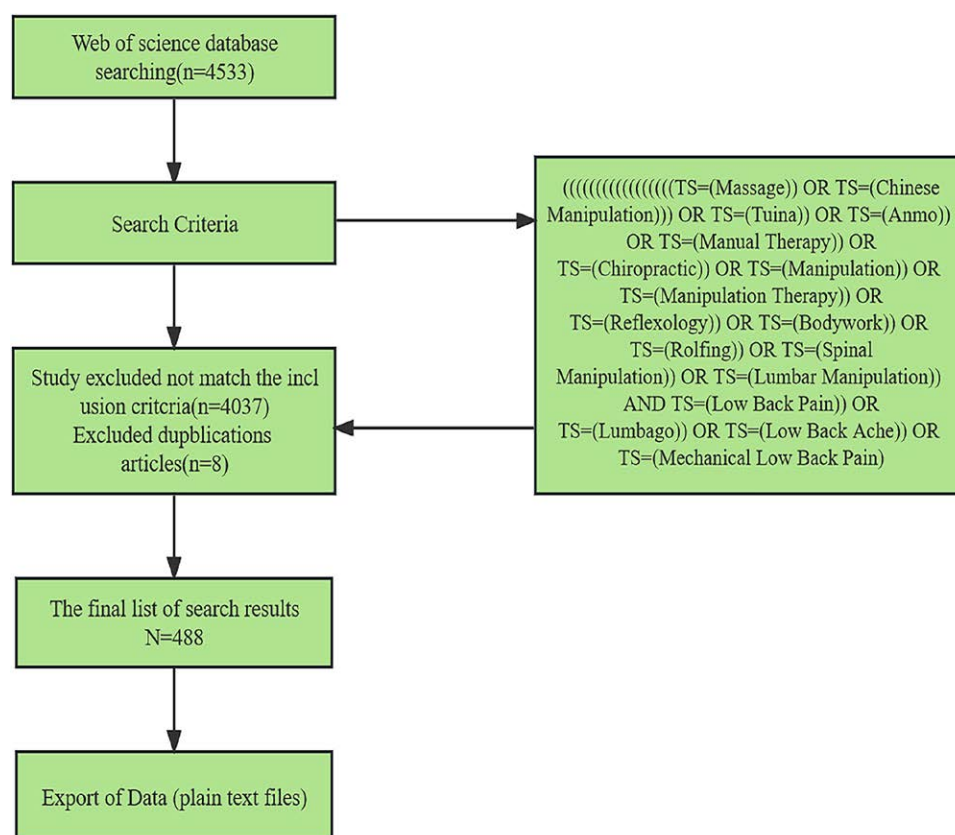
Figure 1. Data processing flow chart.

Bibliometrics is a literature analysis method that analyzes the output and status of publications in a particular research field from a quantitative and qualitative perspective.[11,12] Bibliometric tools, namely, CiteSpace, VOSviewer, R package "bibliometrix," and HistCite, are often used for the purpose of visualizing the published outcomes of research.

CiteSpace software is a Java-based bibliometrics and visualization software developed by Prof Chao-Mei Chen for bibliometrics and visual analysis of published literature in natural and social sciences.[13] This software can show the dynamic evolution of the field during different times and along different dimensions; for example, it can be used to establish cooperation between countries, institutions and authors of a specific field of scientific research and display frequently cited studies and frequently used keywords.[14,15] The resulting data structure is presented in the form of a diversified, multidimensional, visual and graphical map. VOSviewer is open source and free, with a wealth of computational statistics, network analysis, and visualization features.[16] Bibliometrix is an R-based bibliometric software created by Dr Massimo Aria of Italy.[17] This program generates visual histograms, word clouds, coordinate graphs, citation network diagrams, etc., and has been utilized extensively in a variety of research disciplines.

This study employs the method of visual mapping to present a relatively intuitive overview of the research in the field of manual therapy for LBP from 2013 to 2023, with the purpose of exploring the current state of research and future trends in this field and to provide insights and suggest methods for future research.

2. Materials and methods

2.1. Data acquisition

The Web of Science Core Collection (WOSCC) is the most widely used database in bibliometric analyses, including more than 20,000 publications from high-quality journals.[18] A comprehensive search was conducted in the WOSCC database to identify relevant material published during the time frame of August 1, 2013, to August 1, 2023. The search strategy included the subject terms Tuina manipulation and LBP using the following words: ((((((((((((((((TS = (Manual Therapy)) OR TS = (Chinese Manipulation))) OR TS = (Tuina)) OR TS = (Anmo)) OR TS = (Massage)) OR TS = (Chiropractic)) OR TS = (Manipulation)) OR TS = (Manipulation Therapy)) OR TS = (Reflexology)) OR TS = (Bodywork)) OR TS = (Rolfing)) OR TS = (Spinal Manipulation)) OR TS = (Lumbar Manipulation)) AND TS = (Low Back Pain)) OR TS = (Lumbago)) OR TS = (Low Back Ache)) OR TS = (Mechanical Low Back Pain).[19] Overall, 4533 articles were obtained from the WOSCC; after screening, this search yielded 488 articles of interest (Fig. 1).

2.2. Data analysis

In accordance with the aforementioned search strategies, the WOSCC search results were exported as "plain text - full records with cited references." Subsequently, the WOSCC database, VOSviewer (version 1.6.19), CiteSpace (version 6.2. R4), Online Analytical Platform and R package (version 4.3.1) were used to conduct the bibliometric analysis. The WOSCC database was queried for information. Then, highly influential countries, authors, and institutions were analyzed with VOSviewer. CiteSpace was used to perform keyword cooccurrence, keyword clustering, burst keyword, and coreference analyses. The R package "bibliometrix" was applied to quantify the parameters.[17] This software package generates country and journal collaboration maps that reflect the research trends in a particular region.

Different colors indicate different modules in the visual mapping. The magnitude of the nodes represents the frequency of
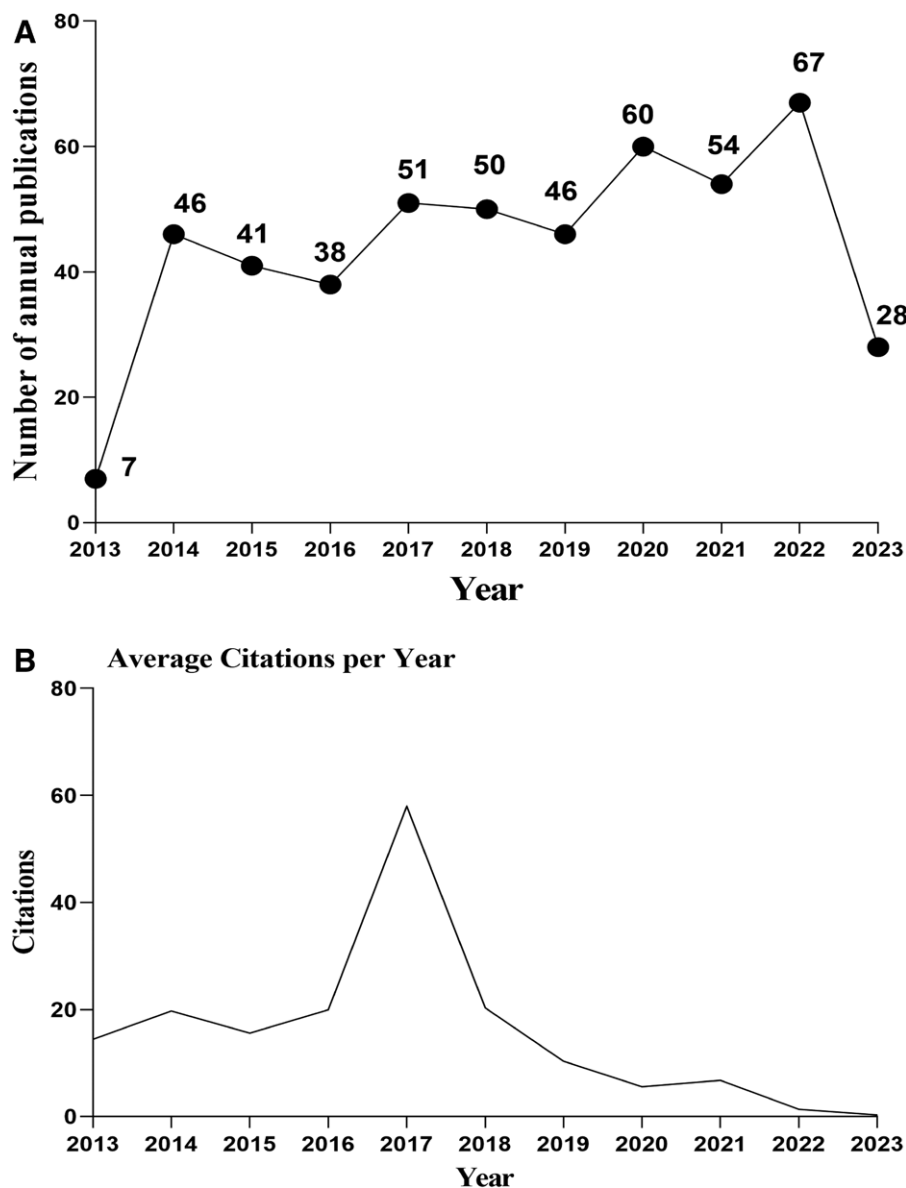
Figure 2. (A) Overall trends over time. (B) Average annual citations.

occurrence of the relevant parameter, whereas the thickness of the connections between the nodes represents the level of cooperation.

The CiteSpace parameters were as follows: time slicing (2013–2023), years per slice (1), term source (default), node type (selection based on needs), selection criteria (k = 25), pruning (pathfinder and pruning sliced networks), and visualization.

The VOSviewer parameters were as follows: the analysis type was set to coauthorship/co-occurrence, the counting method was full counting, the minimum number of occurrences of a keyword was set to 5 according to the research needs, and the visualization was a network or density visualization.

3. Results

3.1. Publication output analysis

The quantity of publications during each period shows the overall trend of the field's research. On the basis of the annual number of publications in the field of manual therapy for LBP (Fig. 2A), it can be seen that the number of publications has

exhibited a fluctuating but increasing trend, indicating that the field is progressively acquiring researchers' attention.

In terms of the number of citations per year (Fig. 2B), 2013 to 2016 had low citation frequencies, indicating that published studies had not yet received widespread attention. From 2017 to 2023, as the annual publication volume in the field of manual therapy for LBP increased, the total annual number of citations changed, with the highest average number of citations occurring in 2017 (57.98).

3.2. Country analysis

Within the group of the top 10 most productive nations, the United States published the most studies (194), followed by Canada (60), China (47), Australia (43), and Denmark (33). Publications from the United States and Canada accounted for 53.69% of the total number, representing far more publications than any other country (Fig. 3). The United States (41.01%) represented the largest percentage of WOSCC publications. Canada, China and Australia followed with 12.68%, 9.94%, and 9.09%, respectively. According to Table 1, the United States is still the most cited country.

Figure 3. Global distribution of manual therapy for low back pain.

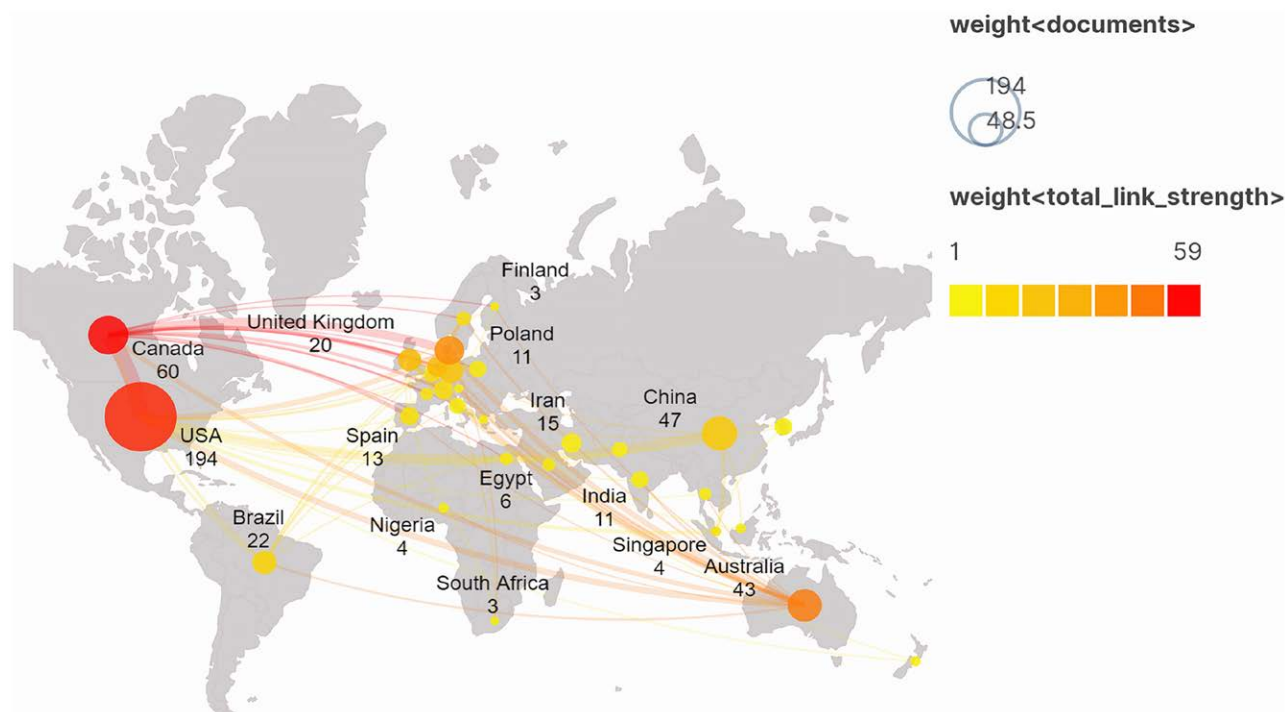| Ranking	Country	Publications	Percentage (%)	Citations	Total link strength
1	USA	194	41.01	4014	663
2	Canada	60	12.68	578	385
3	China	47	9.94	191	233
4	Australia	43	9.09	1607	233
5	Denmark	33	6.98	669	149
6	Germany	23	4.86	290	147
7	Brazil	22	4.65	307	128
8	United Kingdom	20	4.23	1210	116
9	Netherlands	16	3.38	452	108
10	Iran	15	3.17	96	100

3.3. Author analysis

The analysis was conducted using VOSviewer 1.6.18 software; on the generated visualization, the size of the circle represents the number of published papers and the thickness of the connecting line represents the collaboration's efficacy (Fig. 4). A total of 345 authors were included, and the results showed that the author with the most publications was Goertz, Christine M, with a total of 19 articles, followed by Long, Cynthia R, with 17 articles, and the top ten authors each had more than 8 publications (Table 2).

3.4. Institution analysis

The main research institutions contributing to the field of manual therapy for LBP were analyzed and visualized using VOSviewer. As seen from the institutional collaboration network diagram (Fig. 5), a total of 266 institutions were identified, and the institution with the most publications was Univ Southern Denmark, followed by Palmer Coll Chiropract, Canadian Mem Chiropract Coll and Rand Corp. According to Table 3, the Univ Southern Denmark was the most productive

institution (25 papers) with the most citations (487), followed by Palmer Coll Chiropract (23 papers, 188 citations), Canadian Mem Chiropract Coll University (16 papers, 230 citations), and Rand Corp (16 papers, 328 citations).

3.5. Relevant journal and highly influential publication analyses

A total of 167 different journals are indexed in the WOSCC database. The journals with the highest relevance were *Journal of Manipulative and Physiological Therapeutics*, *Chiropractic & Manual Therapies* and *Journal of Chiropractic Medicine*, with 54, 40, and 20 papers, respectively (Table 4). The top 5 journals published a total of 141 papers. According to the data presented in Table 5, *Annals of Internal Medicine* is the journal with the highest impact factor, 39.2, among the cited journals, followed by *Pain* (7.4), the *Journal of Orthopaedic & Sports Physical Therapy* (6.1), and *The Spine Journal* (4.5).

Figure 6A depicts the most influential recently published journals and the number of journals linked to research in the field of manual therapy for LBP. Figure 6B indicates the distribution of the 7 main journals in which relevant literature has been published. It is evident that the number of remaining journals exhibits little fluctuation, suggesting a substantial decentralization of research within this domain. Figure 6C shows the trend of the number of articles published by the top 6 leading journals in research areas related to the field of manual therapy for LBP over time. The *Journal of Manipulative and Physiological Therapeutics* has far more articles than the other journals.

3.6. Keyword co-occurrence analysis

Keyword co-occurrence analysis is a commonly used analysis method in bibliometrics that can reflect research themes and hotspots.[20] Figure 7 depicts a map of the common keywords, with larger font sizes indicating a higher frequency of occurrence. The keywords "low back pain," "spinal manipulation," "manual therapy," "management," "therapy," "physical
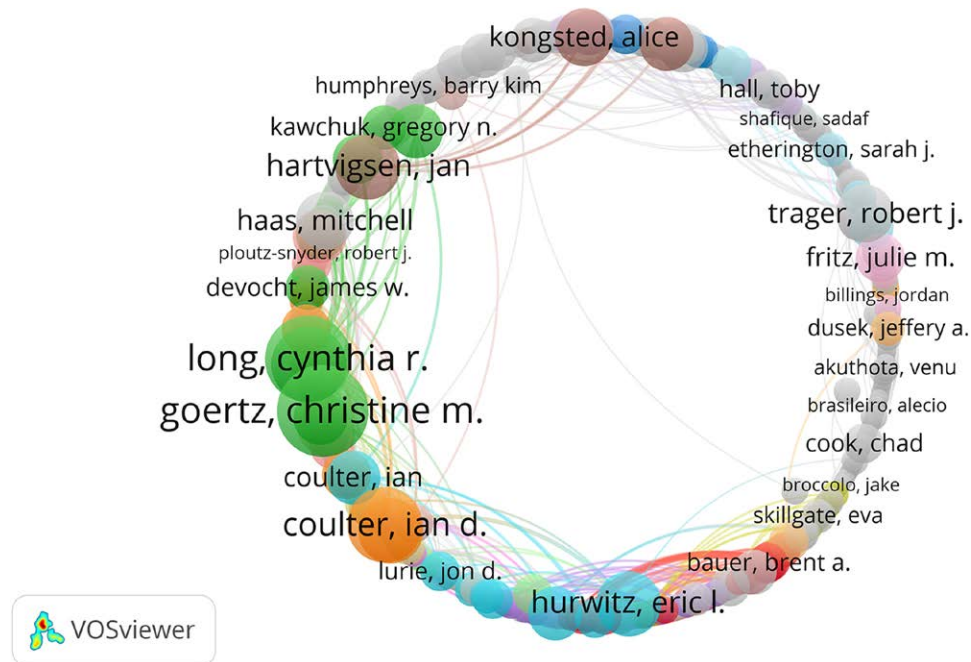
Figure 4. Network map showing author cooperation in the study of manual therapy for low back pain.

Table 2

Top 10 authors researching manual therapy for low back pian

Ranking	Authors	Publications	Percentage (%)	Citations	Total link strength
1	Goertz, Christine M	19	16.38	215	220
2	Long, Cynthia R	17	14.66	211	204
3	Coulter, Ian D	13	11.21	160	145
4	Vining, Robert D	13	11.21	157	185
5	Hartvigsen, Jan	10	8.62	313	38
6	Herman, Patricia M	10	8.62	139	116
7	Hurwitz, Eric L	10	8.62	112	94
8	Haas, Mitchell	8	6.90	167	51
9	Kongsted, Alice	8	6.90	381	26
10	Trager, Robert J	8	6.90	20	29

therapy," "care," and "disability" occurred more than 50 times each.

To present the important keyword data more clearly, the top 10 CiteSpace keywords and center words were plotted (Table 6). According to the frequency of keywords, spinal manipulation and physical therapy were the main interventions chosen for the study. The centrality of "randomized controlled trial" was the highest at 0.1, indicating that it was the most closely associated with each keyword, suggesting that randomized controlled trials were the mainstay of clinical research worldwide.

3.7. Keyword clustering analysis

To improve the accuracy of the results of the analysis of research areas, the keyword clustering function of CiteSpace was used to summarize and cluster the keywords for analysis; the first 10 keywords were intercepted for clustering to obtain the keyword clustering mapping. A value of Q > 0.3 indicates that the clustering structure is significant, and the closer the average profile value is to 1, the higher the homogeneity. According to the Figure 8, the trustworthiness of the clustering generated by the current study is high. In addition, the first 3 keywords of the focus of this clustering were intercepted and analyzed, which

helped to identify the research areas of the core research circle on manual therapy for LBP. According to Table 7, the results can be categorized into 5 parts: disease staging, treatment methods, research Methods, and type of literature.

(i) Disease staging: In the staging of LBP, the main types of low back pain treated with manual therapy are chronic low back pain[21] and nonspecific low back pain (#0, #1, #6).[22,23]

(ii) Therapeutic methods: Therapeutic techniques are mainly based on spinal manipulation and manual therapy (#3, #4, #5, #7).

(iii) Literature type: In addition to the original articles, article types were mainly systematic reviews and clinical practice guidelines (#8, #9).

(iv) Research Methods: In the cluster 2, the secondary data analysis[24] is researchers use data collected by other researchers to solve different problems; kinesio tape is an elastic therapeutic tape used to treat diverse musculoskeletal conditions.[25]

3.8. Burst keyword analysis

The burst keywords are the words that appear very frequently during a certain period, usually at the turning point or bursting point of the development of the discipline; burst keyword analysis helps to discover the research hotspots at different stages and understand the trend of the development of the discipline. CiteSpace software was used, and the top 25 keywords were analyzed according to their emergence intensity (Fig. 9). Among them, "movement" was the keyword with the highest emergence intensity of 4.27, showing a considerable increase in usage in 2015 to 2016. The findings of a comprehensive meta-analysis indicate a correlation between decreased spinal range of motion and heightened degrees of disability and pain severity among those with LBP. Furthermore, the correlation between the healing of LBP and a decrease in protective motor behavior was emphasized by this analysis. This finding provides support for the incorporation of spinal movement in the comprehensive biopsychosocial approach to comprehending and treating LBP.[26]
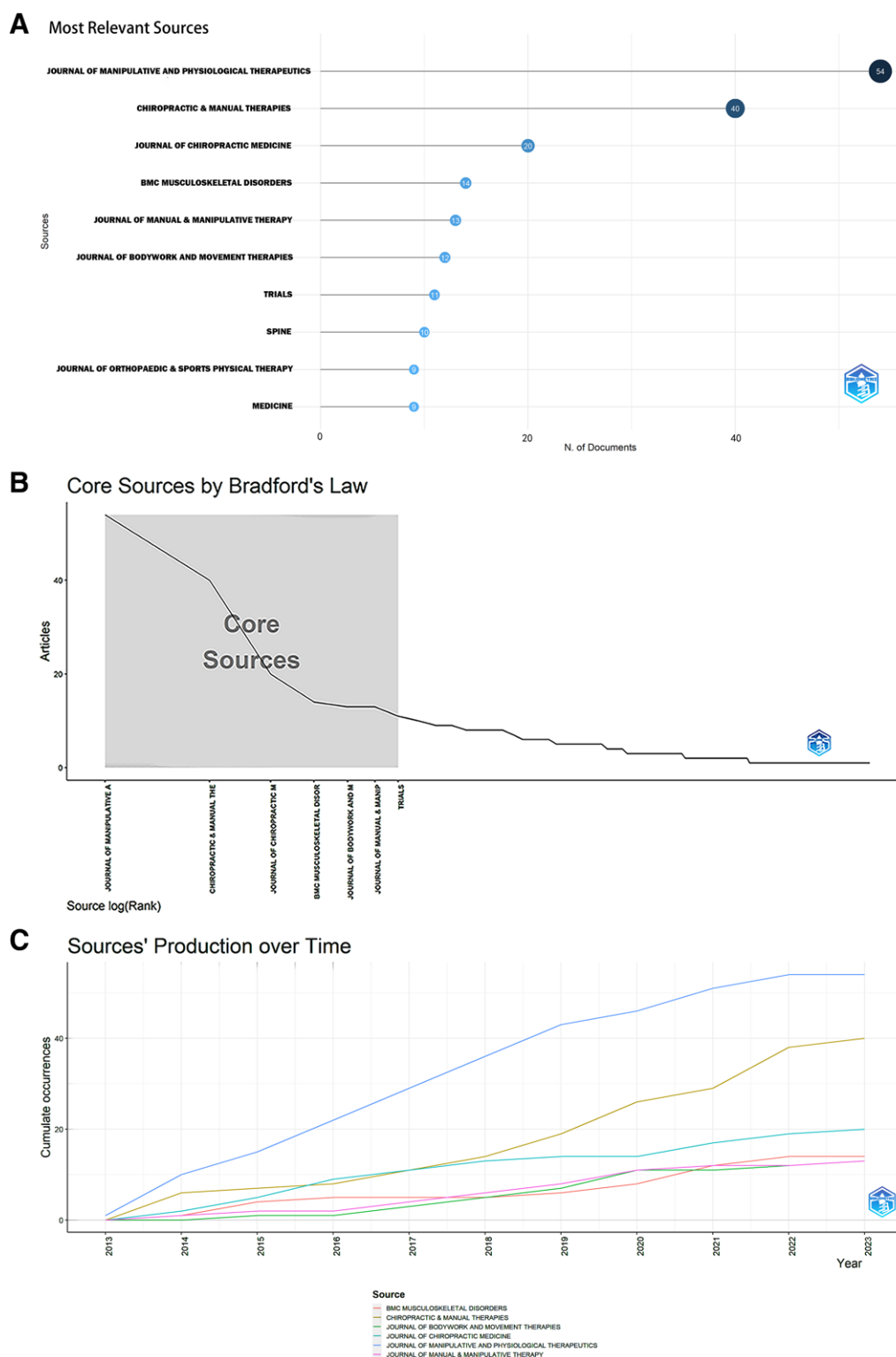
Figure 5. Network map showing institution cooperation in the study of manual therapy for low back pain.

Table 3

Top 10 institutions researching manual therapy for low back pain

Ranking	Institutions	Publications	Percentage (%)	Citations	Total link strength
1	Univ Southern Denmark	25	21.01	487	112
2	Palmer Coll Chiropract	23	12.61	188	120
3	Canadian Mem Chiropract Coll	16	10.92	230	116
4	Rand Corp	16	9.24	328	143
5	Duke Univ	13	9.24	99	57
6	Logan Univ	13	7.56	122	47
7	Univ Alberta	11	7.56	80	64
8	Univ Quebec Trois Rivieres	11	7.56	117	110
9	Univ Iowa	10	7.56	85	75
10	Macquarie Univ	9	6.72	47	32

Table 4

Top 10 journals researching manual therapy for low back pain

Ranking	Journal	Publications	Impact factor	Quartile
1	J MANIP PHYSIOL THER	54	1.3	Q3
2	CHIROPR MAN THER	40	1.9	Q3
3	J CHIROPR MED	20	0.9	Q4
4	BMC MUSCULOSKEL DIS	14	2.3	Q2
5	MANUAL THER	13	2.6	Q1
6	J BODYW MOV THER	12	1.4	Q3
7	TRIALS	11	2.5	Q3
8	SPINE	10	3.0	Q2
9	J ORTHOP SPORT PHYS	9	6.1	Q1
10	MEDICINE	9	1.6	Q3

Impact factor and quartile according to Journal Citation Reports (2022).

Table 5

Top 10 co-cited journals researching manual therapy for low back pain

Ranking	Journal	Publications	Impact factor (JCR2022)	Quartile
1	SPINE	2168	3.0	Q2
2	J MANIP PHYSIOL THER	1351	1.3	Q4
3	PAIN	575	7.4	Q1
4	EUR SPINE J	572	2.8	Q2
5	MANUAL THER	567	2.6	Q2
6	SPINE J	567	4.5	Q1
7	ANN INTERN MED	434	39.2	Q1
8	BMC MUSCULOSKEL DIS	420	2.3	Q2
9	PHYS THER	416	3.2	Q1
10	J ORTHOP SPORT PHYS	398	6.1	Q1

Impact factor and quartile according to Journal Citation Reports (2022).

In 2022 to 2023, the research content mainly focuses on the following:

(i) Guidelines: In recent decades, guidelines have shifted toward improved patient education and the development of a coherent conceptual management framework that includes accurate triage.[27]

(ii) Complementary medicine: Complementary or alternative medicine encompasses therapeutic approaches that emphasize the interplay between the body and mind. These approaches include self-help groups, stress management techniques, meditation, and yoga, as well as specialized fields such as chiropractic, homeopathy, acupuncture, biofeedback, herbal treatment, and massage therapy.[21]

(iii) Clinical practice guidelines: Clinical practice guidelines are a valuable resource that offers evidence-based advice to aid in the process of making informed decisions on health treatments.[28] It is evident that authoritative guides with high credibility are gradually becoming an active areas of concern.

3.9. Co-cited reference analysis

Table 8 displays the details of the 10 most-cited studies in the WOSCC database. Dose–response and Efficacy of

Figure 6. (A) Most relevant sources. (B) Core sources by Bradford's Law. (C) Production of each source over time.

Spinal Manipulation for Care of Chronic Low Back Pain: A Randomized Controlled Trial is the most frequently cited of the top 10 co-citations, having been cited 57 times.

These 10 studies consist of 5 articles and 5 reviews. Three studies explored the impact of spinal manipulation on LBP.[29–31] One publication was a clinical practice guideline on the management of acute and chronic low back pain (LBP) in adults.[32] Two other publications were reviews of LBP.[33,34] Three publications

were reviews of spinal manipulative therapy for the treatment of low back pain.[4,35,36]

4. Discussion

4.1. Research status of manual therapy for LBP

This bibliometric analysis of publications on manual therapy for low back pain during the last decade showed that
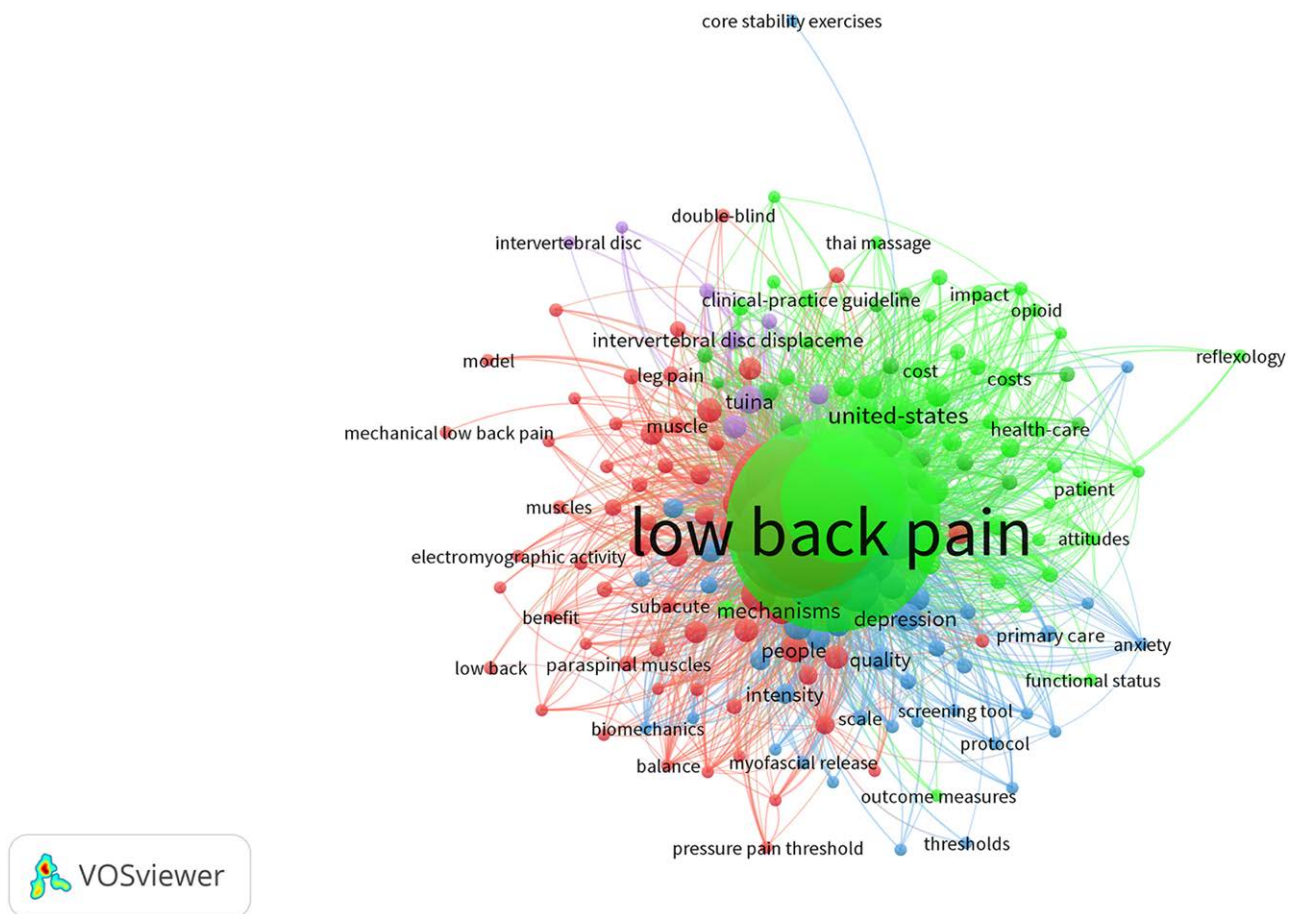
Figure 7. Network map of keyword co-occurrence in the study of manual therapy for low back pain.

Table 6

Top 20 keywords researching manual therapy for low back pain

Ranking	Keyword	Frequency	Keyword	Centrality
1	low back pain	275	randomized controlled trial	0.1
2	spinal manipulation	109	care	0.09
3	manual therapy	99	chronic low back pain	0.09
4	management	94	spinal manipulative therapy	0.09
5	therapy	67	neck pain	0.09
6	physical therapy	56	low back pain	0.08
7	care	52	spinal manipulation	0.07
8	disability	52	therapy	0.07
9	reliability	48	outcome	0.07
10	prevalence	46	lumbar spine	0.07
11	randomized controlled trial	44	united states	0.07
12	chronic low back pain	44	manual therapy	0.06
13	Spinal manipulative therapy	37	physical therapy	0.06
14	neck pain	36	prevalence	0.06
15	exercise	34	exercise	0.06
16	primary care	33	association	0.06
17	outcome	33	validation	0.06
18	validity	30	reliability	0.05
19	back pain	29	guidelines	0.05
20	lumbar spine	25	high velocity	0.05

the number of articles in this research field has been increasing in waves and has maintained at least a certain amount for a long time. In 2017, the American Physical Therapists Association issued guidelines,[21] which resulted in a substantial increase in citations, attracting an increasing number of scholars to the field of LBP. From 2013 to 2023, although the paper publication volume showed an increasing trend, the average number of citations to papers showed a decreasing trend. This suggests that despite the various research orientations in the field of massage manipulation for LBP, the area has not yet developed a central influence and solid cohesion.
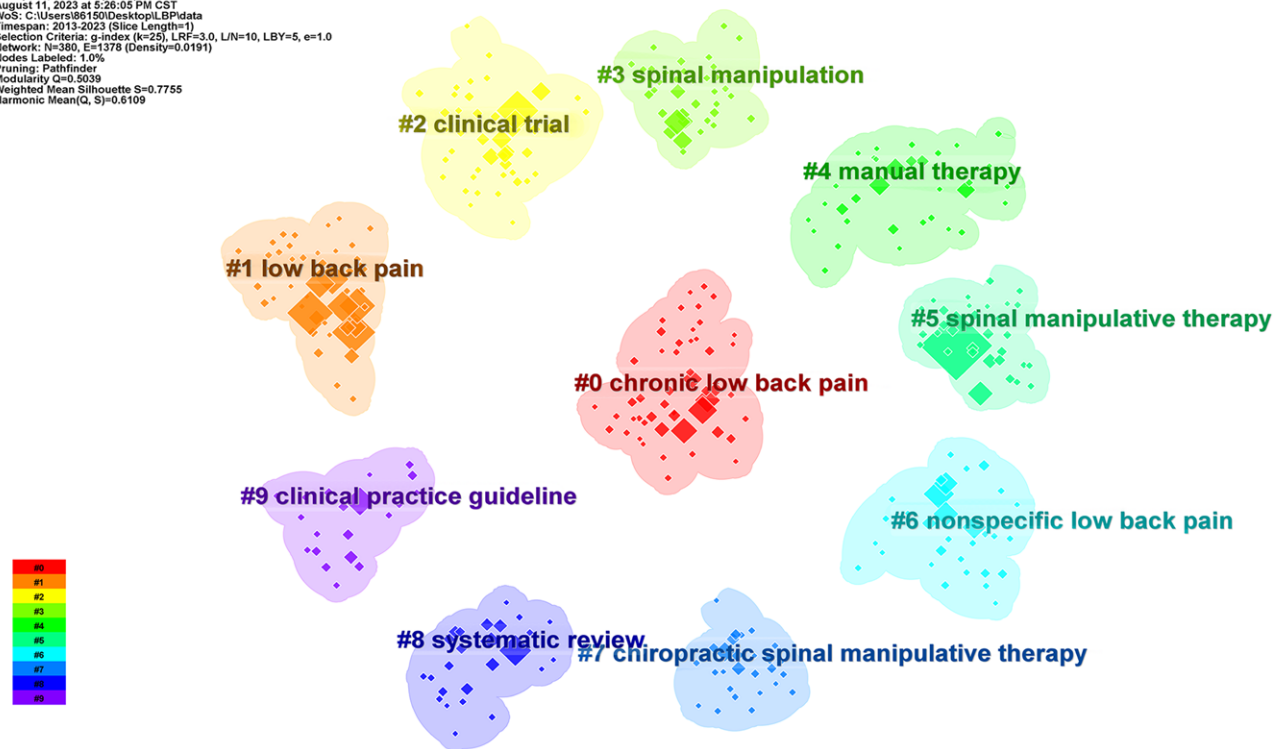
Figure 8. Keyword clustering mapping of manual therapy for low back pain.

Table 7

Top 10 keyword clustering research of manual therapy for low back pain

Number	Nodes	Profile value	Time	Cluster labels (LSI)
#0	51	0.723	2017	Chronic low back pain; controlled trial; study protocol
#1	47	0.825	2018	Low back pain; spinal manipulation; manual therapy
#2	45	0.747	2018	clinical trial; secondary analysis; Kinesio taping
#3	37	0.776	2018	Spinal manipulation; chronic low back pain; controlled trial
#4	35	0.753	2017	Manual therapy; mechanical low back pain; randomized clinical trial
#5	32	0.836	2015	Spinal manipulation therapy; controlled trial; manual therapy
#6	31	0.824	2016	Nonspecific low back pain; laser therapy; clinical trial
#7	27	0.794	2017	Chiropractic spinal manipulation therapy; low back pain; pain sensitivity
#8	26	0.758	2016	Systematic review; manual therapy; chiropractic care
#9	20	0.808	2016	Clinical practice guideline; American college; spinal manipulation

The United States and Canada dominate the main research forces, contributing 53.69% of the published research articles; these countries also demonstrate the highest degree of collaboration and centrality with other nations. China, Australia, Denmark and Germany have partnerships with the United States, but their cooperation with one another is limited and marginal. These countries should bolster international cooperation, particularly with countries that are leaders in manual therapy of LBP research.

Goertz, Christine M, is the author with the most publications and has been cited a total of 215 times. She conducted a randomized controlled study[37] to examine the effectiveness of chiropractic therapy in combination with regular medical care compared to standard medical care alone. The study showed that the group receiving chiropractic therapy saw greater improvements in their pain and level of impairment. Although there are numerous authors conducting research in the field, they lack connections with other researchers and stable research teams, suggesting that cooperation between authors should be strengthened to broaden research ideas.

The University of Southern Denmark has the most publications, mainly due to the strong support of the Danish government in this field. In 2012, the allocation of a significant amount of funds toward clinical guidelines was stipulated in the Danish Finance Act. The Danish Health Authority (DHA) was subsequently tasked with developing 47 national clinical guidelines.[38] Two of these guidelines were focused low back pain and lumbar radiculopathy. However, the analysis of institutional networks shows that the current global research teams are relatively independent and lack domestic and international cooperative relationships. Therefore, different countries and institutions should strengthen their cooperation to promote the development of disciplines.

The *Journal of Manipulative and Physiological Therapeutics* has been identified as the primary source for papers pertaining to manual therapy for the treatment of LBP. The mean impact factor of the majority of academic journals is less than 3, indicating that it might be challenging to publish relevant papers on this topic in journals with high impact factors. However, such publications continue to receive a substantial

Top 25 Keywords with the Strongest Citation Bursts

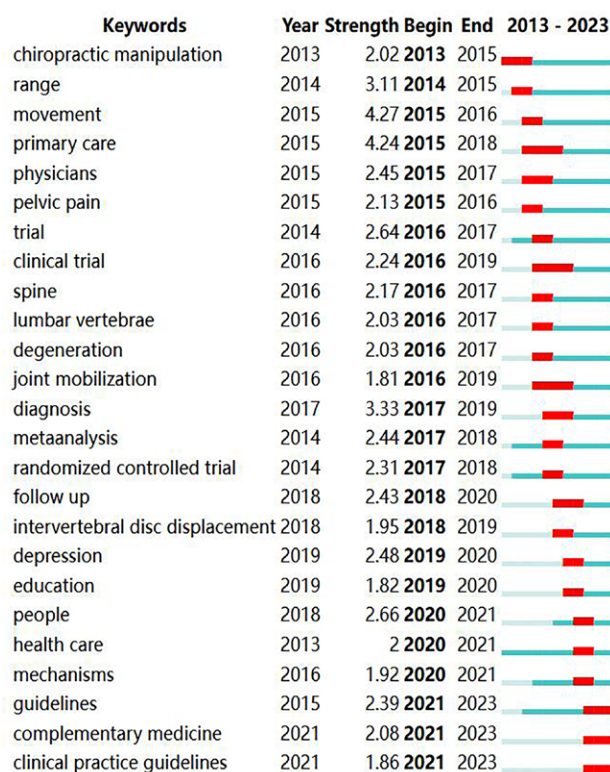| Keywords	Year	Strength	Begin	End	2013 - 2023
chiropractic manipulation	2013	2.02	**2013**	2015	
range	2014	3.11	**2014**	2015	
movement	2015	4.27	**2015**	2016	
primary care	2015	4.24	**2015**	2018	
physicians	2015	2.45	**2015**	2017	
pelvic pain	2015	2.13	**2015**	2016	
trial	2014	2.64	**2016**	2017	
clinical trial	2016	2.24	**2016**	2019	
spine	2016	2.17	**2016**	2017	
lumbar vertebrae	2016	2.03	**2016**	2017	
degeneration	2016	2.03	**2016**	2017	
joint mobilization	2016	1.81	**2016**	2019	
diagnosis	2017	3.33	**2017**	2019	
metaanalysis	2014	2.44	**2017**	2018	
randomized controlled trial	2014	2.31	**2017**	2018	
follow up	2018	2.43	**2018**	2020	
intervertebral disc displacement	2018	1.95	**2018**	2019	
depression	2019	2.48	**2019**	2020	
education	2019	1.82	**2019**	2020	
people	2018	2.66	**2020**	2021	
health care	2013	2	**2020**	2021	
mechanisms	2016	1.92	**2020**	2021	
guidelines	2015	2.39	**2021**	2023	
complementary medicine	2021	2.08	**2021**	2023	
clinical practice guidelines	2021	1.86	**2021**	2023	

Figure 9. Top 25 keywords with the strongest citation bursts of publications on manual therapy for low back pain research.

number of citations. Annals of Internal Medicine was the journal with the highest impact factor, 39.2 in 2022. Prof Roger published a review, "Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline,"[39] which was cited 434 times. Although this review only recommends manual therapy for chronic low back pain (the strength of evidence was low to moderate), it implies that manipulative therapies are more advantageous in the long run and may be greatly boosted when combined with other treatments.

The most cited research is Dr Mitchell's "Dose–response and Efficacy of Spinal Manipulation for Care of Chronic Low Back Pain: A Randomized Controlled Trial," which was cited 57 times. This study examines the dose–response relationship between visits to a chiropractor for spinal manipulation and outcomes of patients with chronic low back pain; it also compares the efficacy of manipulation to a light massage control to determine the effectiveness of manipulation.[31] One of the most cited clinical practice guidelines was Spinal Manipulative Therapy and Other Conservative Treatments for Low Back Pain: A Guideline from the Canadian Chiropractic Guideline Initiative. The aim of this publication was to provide best practice recommendations for the initial assessment and monitoring of people with low back pain. Ultimately, this guideline suggests that spinal manipulation therapy is an effective treatment strategy for acute and chronic back pain.[32]

4.2. Research hotspots and trends on manual therapy for LBP

We used CiteSpace's keyword co-occurrence analysis to understand the research hotspots and sort out the research focus in the field of manual therapy of LBP. According to Table 6 and Figure 7, "spinal manipulation," "randomized controlled trials," "management," "physical therapy," "care," and "disability" seem to be the hot research topics. For "spinal manipulation" and "physical therapy," they are the most popular and most commonly discussed methods of manual therapy. According to The Orthopaedic Section of the American Physical Therapy Association,[9] the majority of studies have primarily evaluated the effectiveness of manipulation as a standalone intervention. In recent times, spinal manipulation has been shown to be a more cost-effective option than physical therapy for managing acute low back pain in the short term.[40]

For "randomized controlled trials," a cursory examination of the Central Register of Controlled studies indicates that the quantity of randomized controlled studies pertaining to LBP has seen an approximate 2-fold increase since 2010.[28] Some clinical practice guideline recommendations for the treatment of LBP may have undergone modifications over the past few years. For "management," according to a report published by the World Health Organization on the management of low back pain on June 19, 2023, nonpharmacological interventions have a high priority in the majority of cases. To promote health, manipulation therapy seeks to attain and maintain patients' independence in daily living and participation in meaningful activities, such as work and community involvement. For "care," self-care is an important part of managing LBP and returning to meaningful daily activities. Maintaining a healthy lifestyle and receiving psychological and social support can alleviate symptoms and prevent recurrences of nonspecific low back pain.

According to burst keyword, complementary medicine and clinical practice guideline analysis is likely be at the forefront of research, signaling new trends and future directions.

Table 8

Total frequency of citations for manual therapy for low back pain. (Top 10)

Ranking	Title	Author	Co-citation counts	Publication year
1	Dose–response and efficacy of spinal manipulation for care of chronic low back pain: a randomized controlled trial	Haas M	57	2014
2	Spinal manipulative therapy for acute low-back pain (Review)	Rubinstein SM	39	2012
3	Spinal Manipulative Therapy and Other Conservative Treatments for Low Back Pain: A Guideline from the Canadian Chiropractic Guideline Initiative	Bussieres AE	34	2018
4	What low back pain is and why we need to pay attention	Hartvigsen J	32	2018
5	Patient-centered outcomes of high-velocity, low-amplitude spinal manipulation for low back pain: A systematic review	Goertz CM	30	2012
6	Spinal manipulation compared with back school and with individually delivered physiotherapy for the treatment of chronic low back pain: a randomized trial with one-year follow-up	Cecchi F	29	2010
7	Low back pain	Vlaeyen JWS	27	2018
8	Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomized controlled trials	Rubinstein SM	27	2019
9	A path analysis of the effects of the doctor–patient encounter and expectancy in an open-label randomized trial of spinal manipulation for the care of low back pain	Haas M	27	2014
10	Cost-effectiveness of early interventions for nonspecific low back pain: a randomized controlled study investigating medical yoga, exercise therapy and self-care advice	Aboagye E	26	2015

In summary, the research hotspots of manual therapy for LBP have changed rapidly in recent years, and the overall research direction is synchronized with the development of clinical medicine.

4.3. Limitations

This study has some limitations. Although we used sufficient bibliometric network analysis and visualization, the search was primarily performed in the WOS database. If data from other sources, such as PubMed, Embase, and Scopus, were added to the results, the data would be improved. Furthermore, including datasets from different languages, in our future analysis would improve the quality of our findings.

5. Conclusion

In this study, bibliometric analysis of the research literature related to manual therapy of LBP in the WOSCC database from August 1, 2013, to August 1, 2023 was conducted by utilizing CiteSpace, VOSviewer, and bibliometrix software and presented in the form of visual maps to illustrate the overall status of the research on manual therapy of LBP in the past 10 years. The study considers the annual publication volume, country, author, research institution, journal, keyword co-occurrence, keyword clustering, keyword bursts, and cocitation of the literature related to manual therapy of LBP. At present, the research hotspots of manual therapy of LBP mainly focus on the aspects of "Spinal manipulation," "management," "randomized controlled trials," "Physical therapy," "care," and "disability." The aim is to furnish researchers in this domain with important insights and to highlight possible areas of focus and emerging research trends. Additionally, this study serves as a valuable resource for clinical research.

Author contributions

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