

Tendencias de investigación en terapia manual: una revisión bibliométrica de los últimos 10 años

Research trends in manual therapy: a bibliometric review of the last 10 years

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Abstract. Manual therapy (MT) is a dynamic entity progressing rapidly. The current trend stimulates a direction toward higher specificity in the research. This is the first bibliometric review to identify the trends in MT in the last ten years (till 2023). The Scopus database was selected to retrieve the bibliographic records. Biblioshiny (Bibliometrix), PowerBI, MS Excel, and MS Access were used to visualize and analyze the results. 1208 relevant studies were included in the analysis. Publishing has a rising character. The four-author articles are the most common, while only 68 are single-author studies. In 2021, the highest number of publications (n=178) was published. The Journal of Bodywork and Movement Therapies has published the highest number of publications (75). The USA is the most prolific country in publishing (361 studies) and total citations (4869). Universidad Rey Juan Carlos (Spain) is the most productive and cited institution. Fernández-De-Las-Peñas C. is the most productive, and Mark D. Bishop is the most cited author. The USA, Australia, Canada, and European countries have the most frequent collaborations. MT was the most common research focus from 2017 to 2019. The topics of exercise therapy, musculoskeletal therapy, physical therapy, and physiotherapy have been the focus of research in the context of MT lately. The present study reported the research-related trends in MT applying bibliometric methods and identified the most productive countries, institutions, and researchers over the past decade. These findings are intended to assist the researchers in better orientation in the research field and to specify the trends for future research studies.

Keywords: Manual therapy; physiotherapy; research trends; bibliometrics; thematic evolution; research collaboration

Resumen. La terapia manual (TM) es un campo dinámico que progresa rápidamente. La tendencia actual fomenta un enfoque hacia una mayor especificidad en la investigación. Esta es la primera revisión bibliométrica que identifica las tendencias en TM en los últimos diez años (hasta 2023). Se hizo uso de la base de datos Scopus para obtener los registros bibliográficos. Se utilizaron Biblioshiny (Bibliometrix), PowerBI, MS Excel y MS Access para visualizar y analizar los resultados. Un total de 1208 estudios relevantes fueron incluidos en el análisis. El número de publicaciones tiene un carácter ascendente. Los artículos con cuatro autores son los más comunes, mientras que solo 68 estudios fueron realizados por un único autor. En 2021, se registró el mayor número de publicaciones (n=178). La revista Bodywork and Movement Therapies es la que contiene el mayor número de publicaciones (75). Estados Unidos es el país más prolífico en publicaciones (361 estudios) y citas totales (4869). La Universidad Rey Juan Carlos de España es la institución más productiva y citada. Fernández-De-Las-Peñas C. es el autor más productivo, y Mark D. Bishop es el autor más citado. Estados Unidos, Australia, Canadá y los países europeos tienen las colaboraciones más frecuente. La TM fue el tema enfoque de investigación más común entre 2017 y 2019. Los temas relativos a la terapia con ejercicios, terapia musculoesquelética y fisioterapia han sido el foco de investigación en el contexto de la MT en los últimos años. El presente estudio analizó las tendencias relacionadas con la investigación en TM aplicando métodos bibliométricos e identificó los países, instituciones e investigadores más productivos durante la última década. Estos hallazgos pretenden ayudar a los investigadores a orientarse mejor en el ámbito de la investigación y especificar las tendencias para futuros estudios de investigación.

Palabras clave: Terapia manual; fisioterapia; tendencias en investigación; bibliometría; evolución temática; colaboración en investigación

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Introduction

Manual therapy (MT) or manipulative therapy is a wide-range approach that includes many modalities applied to improve musculoskeletal health (Avandi et al. 2024). It is the use of the therapist's hands, elbows, or other body parts to apply a specific force with healing intention. It involves joint manipulation, mobilization, and treatment of the soft tissues. It is a professional motion applied by clinicians on the passive human body that directly or indirectly aims at a variety of anatomical systems or structures. It applies the movement with the intent to develop beneficial modifications in some aspect of the patient's pain perception (Bishop et al. 2015). MT has been utilized to alleviate pain experience, restore normal range of motion, break fibrous adhe-

sions, stimulate proprioception, promote synovial fluid production, and decrease local ischemia (Armijo-Olivo et al. 2016). It is performed by physiotherapists, chiropractors, osteopaths, and other healthcare providers with various skills and specializations. Various academies emphasize diverse objectives of techniques and interventions. Approaches essentially vary according to an affected area's nature, therapeutic plan, and the force parameters involved in the interventions (Smith 2007). MT clinicians may differ in their manual power delivery. It includes performance velocity, contact place, force direction, movement frequency, and duration. Additionally, the force could be generated externally or internally by the MT provider or by the treated client, respectively (Smith 2007). MT has undergone parallel evolution and expansion across the globe dating back to the antique period. The earliest documented reference of MT practice dates back

to Hellenic Greece, 400 BC (Moon, Lee & Bae 2020). It is a dynamic entity progressing rapidly, although it is not affected by innovations significantly since its nature is included in the name - manual, referring to the use of the clinician's hands. By the time, MT has become a strong part of comprehensive treatment and the subject of a large number of research papers. Its effect on the human body is a subject of intensive scientific debate. The current trend in medicine for evidence-based interventions stimulates a direction toward higher specificity in the research. The importance is on MT effectiveness, with emphasis on characteristic symptoms and precise manual procedures that result in sufficient beneficial therapy (Smith 2007). MT's current and future role is a very important research area to explore. We decided to identify the trends in MT research using the bibliometric method of research analysis.

A bibliometric review is a statistical analysis of documented research studies, and it is also a valid instrument and method to assess or summarize research outcomes of a certain specialization (Kazakis 2014). Bibliometric approaches are quantitative by nature but are employed to create pronouncements about qualitative research markers. This is, in fact, the primary objective of all types of bibliometric practices, to transform something intangible (scientific quality) into a manageable entity (Wallin 2005, Simbolon 2024). Bibliometric investigations, including analyses of content (what is published) and citation (who/what is cited and how often), seek to explore peer-reviewed publications and define current research trends both within and among professional fields (Maher et al. 2008). Therefore, the primary objective of this study is to identify research trends in MT during the last ten years with the following objectives:

1. To analyze the growth of publications and citations in the field of MT
2. To explore the authorship pattern of the research produced
3. To identify the highly cited publications in the field
4. To identify the most prolific countries, journals, organizations, and authors
5. To explore the thematic evolution of the keywords used in the MT research
6. To analyze the international collaboration

Materials and Methods

Data Source

Selection of database is a crucial task in bibliometric studies. The Scopus database was selected to retrieve the bibliographic records of research papers published in the field of MT. The database was selected, conceding its wide coverage of published scientific literature. Several other researchers (Al

Ardha et al. 2024, Ejaz et al., 2022; Raza et al. 2021; Tanveer, Haq, & Mahmood, 2022) have selected the Scopus database to conduct their studies.

Method

This study uses the bibliometric method of research evaluation. The method is widely used to evaluate the research performance of institutions (Ahmad et al., 2020; Javed, Ahmad, & Khahro, 2020), countries, and regions (Ahmad, Ur Rehman, & Ashiq, 2021), persons (Qayyum & Naseer, 2013) and fields of knowledge (Ahmed, Ashiq, Ur Rehman, Ahmad, & Rashid, 2021; Khan et al., 2020).

Data Retrieval

A comprehensive search query was designed by a professionally qualified physiotherapist with a clinical and academic background. The query was run in the TITLE-ABS-KEY field of Scopus search. TITLE-ABS-KEY searches records from the fields of title, abstract, and keywords. TITLE-ABS-KEY ("Manual therapy" AND ("Thrust therapy" OR "Manipulation" OR Osteopathy OR "Chiropractic adjustment" OR "High-Velocity Low-Amplitude Manipulation" OR "Manipulative therapy"). A date range filter was applied to retrieve the records of research studies published during the study period 2013-2022. A document-type filter was applied to retrieve the peer-reviewed records only. Non-peer records were not included in the analysis. Retrieved records were manually screened, and titles and abstracts of the papers were read. Irrelevant records were excluded from the analysis.

Software Used

To visualize and analyze the results, Biblioshiny (Bibliometrix), PowerBI, MS Excel, and MS Access were used. Figure 1 describes the detailed process of data extraction and filtration.

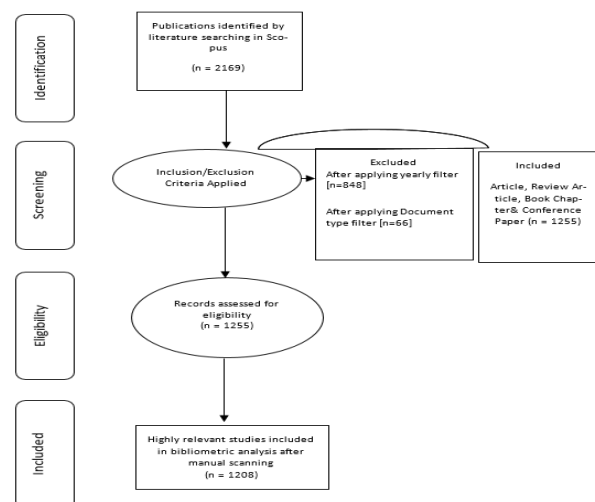


Figure 1. Four-phase flow chart of data extraction and filtration process

Results

Yearly growth of publications and citations

In the year 2021, the highest number of publications ($n=178$) was published, followed by the year 2020 ($n=134$). The highest number of citations was received in the publications of the year 2014. Publications published in 2013 were cited with the best average of 25 citations per publication. Figure 2 presents the yearly output of the research.

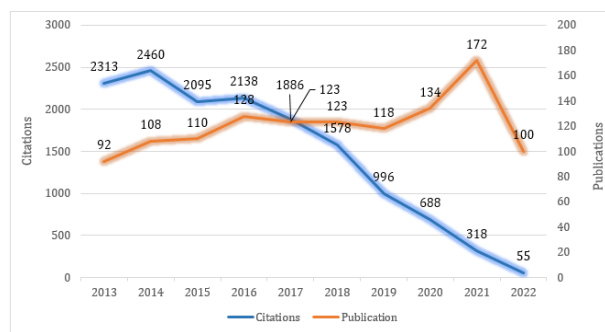


Figure 2. Yearly growth of publications and citations.

Authorship pattern

The authorship pattern indicates that the researchers in the field of MT preferred to publish their research collaboratively, as only 68 are single-author studies. Four-author studies are more common, followed by three and five-author studies. The highest number of citations were received in the publications with six authors. Figure 3 shows the authorship pattern of the research on MT.

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Figure 3. Authorship pattern of MT research

Highly Cited Publications

Vibe Fersum K's publication titled "Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: A randomized controlled trial" received the highest number ($n=286$) of citations, followed by Stochkendahl M.J's "National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy" with 266 citations. "Unraveling the mechanisms of MT: Modeling an approach" by Bialosky J.E is the most cited article, with MT as the main focus ranking it in 5th place. It is worth noting that all the publications listed in Table 1 were cited more than 100 times.

Table 1.

Highly cited publications in the field of MT

Title	First Author	Total Citations	Journal	Year of Publication
Efficacy of classification-based cognitive functional therapy in patients with non-specific chronic low back pain: A randomized controlled trial	Vibe Fersum K.	286	European Journal of Pain (United Kingdom)	2013
National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy	Stochkendahl M.J.	266	European Spine Journal	2018
Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration	Wong J.J.	195	European Journal of Pain (United Kingdom)	2017
Rehabilitation of scapular dyskinesis: From the office worker to the elite overhead athlete	Cools A.M.J.	153	British Journal of Sports Medicine	2014
Unraveling the mechanisms of manual therapy: Modeling an approach	Bialosky J.E.	143	Journal of Orthopaedic and Sports Physical Therapy	2018
2018 Consensus statement on exercise therapy and physical interventions (orthoses, taping and manual therapy) to treat patellofemoral pain: Recommendations from the 5th International Patellofemoral Pain Research Retreat, Gold Coast, Australia, 2017	Collins N.J.	138	British Journal of Sports Medicine	2018
Manual therapy, exercise therapy, or both, in addition to usual care, for osteoarthritis of the hip or knee: A randomized controlled trial. 1: Clinical effectiveness	Abbott J.H.	133	Osteoarthritis and Cartilage	2013
Manipulation and mobilisation for neck pain contrasted against	Gross A.	132	Cochrane Database of Systematic	2015

an inactive control or another active treatment			Reviews	
Effectiveness of manual therapy and therapeutic exercise for temporomandibular disorders: Systematic review and meta-analysis	Armijo-Olivo S.	125	Physical Therapy	2016
Manual therapy and exercise for adhesive capsulitis (frozen shoulder)	Page M.J.	121	Cochrane Database of Systematic Reviews	2014

Most Preferred Journals

Table 2 lists the journals that the researchers in the field have preferred the most. The list indicates that the “Journal of Bodywork and Movement Therapies” has published the highest number of publications. “Journal of Manual and Manipulative Therapy,” “Journal of Orthopaedic and Sports Physical Therapy,” and “Manual Therapy” (currently “Musculoskeletal Science & Practice”) are the other prominent journals in the list.

Table 2.

Most preferred journals

Sr	Journal	TP	TC	CI
1	Journal of Bodywork and Movement Therapies	75	479	6.39
2	Journal of Manual and Manipulative Therapy	59	385	6.53
3	Journal of Orthopaedic and Sports Physical Therapy	56	1506	26.89
4	Manual Therapy	55	1171	21.29
5	Journal of Manipulative and Physiological Therapeutics	52	934	17.96
6	Chiropractic and Manual Therapies	51	396	7.76
7	Musculoskeletal Science and Practice	32	268	8.38
8	Manuelle Medizin	31	28	0.90
9	Physiotherapy Theory and Practice	31	241	7.77
10	International Journal of Osteopathic Medicine	27	196	7.26

Prolific Countries

The USA, Australia, Spain, and the United Kingdom are the most prolific countries with 361, 150, 145, 102 publications, respectively. The USA, Australia, Canada, and Spain are the countries with the highest number of citations (4869, 2800, 2051, 2048, respectively). Figure 4 provides the list of the top ten prolific countries with the reported total numbers of publications (TP) and citations (TC).

Most Active Organizations

Universidad Rey Juan Carlos was the most active organization, followed by Canadian Memorial Chiropractic College, with 39 and 33 publications and 825 and 785 citations, respectively. Macquarie University, Universidad de Zaragoza, and Karolinska Institutet are the other prominent organizations in the list that contributed to the research on MT. Table 3 reports the list of the most active organizations producing research on MT.

Table 3.

Most active institutions producing research on MT

Rank	Affiliation	TP	TC	CI
1	Universidad Rey Juan Carlos (ESP)	39	825	21.15
2	Canadian Memorial Chiropractic College (CAN)	33	785	23.79
3	Macquarie University (AUS)	25	274	10.96
4	Universidad de Zaragoza (ESP)	22	152	6.91
5	Karolinska Institutet (SWE)	21	215	10.24
6	University of Southern Denmark (DEN)	21	478	22.76
7	Franklin Pierce College (USA)	20	497	24.85
8	Universitat de València (ESP)	21	274	13.05
9	The University of Sydney (AUS)	19	213	11.21
10	University of Alberta (CAN)	19	667	35.11

Most Prolific Authors

Fernández-De-Las-Peñas C. from Universidad Rey Juan Carlos, Alcorcón, Spain was the most prolific author with 24 publications, and Mark D. Bishop is the most cited with 491 citations. Cleland J.A. from Tufts University School of Medicine, Boston, MA, United States, was the other author contributing with more than 20 publications and 350 citations, as reported in Table 4.

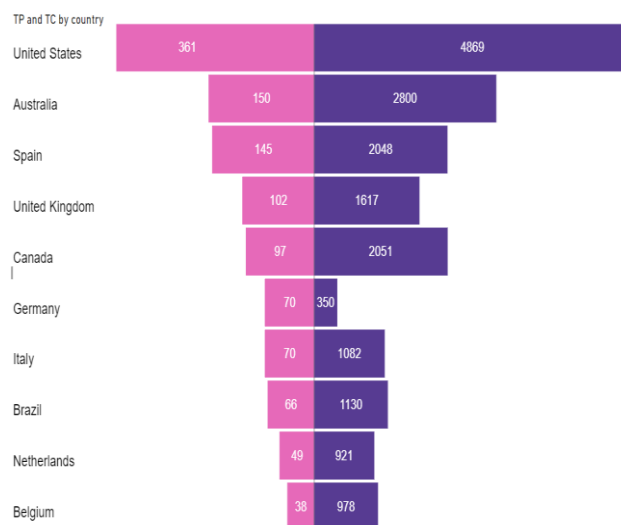


Figure 4. Most prolific countries

Table 4.

Most prolific authors with their affiliated institutes

Rank	Author	Affiliation	TP	TC	CI
1	Fernández-De-Las-Peñas C.	Universidad Rey Juan Carlos, Alcorcón, Spain	24	477	19.88
2	Cleland J.A.	Tufts University School of Medicine, Boston, MA, United States	20	350	17.50
3	Hall T.	Curtin University, Perth, WA, Australia	13	268	20.62
4	Hidalgo-García C.	Universidad de Zaragoza, Domingo Miral, Spain	12	71	5.92
5	Falla D.	University of Birmingham, Birmingham, United Kingdom	11	115	10.45
6	López-De-Celis C.	Universitat Internacional de Catalunya, Barcelona, Spain	11	43	3.91

7	Rivett D.A.	The University of Newcastle, Callaghan, NSW, Australia	11	228	20.73
8	Rodríguez-Sanz J.	Universitat Internacional de Catalunya, Barcelona, Spain	11	42	3.82
9	Bishop M.D.	University of Florida, Gainesville, FL, United States	10	491	49.10
10	Dommerholt J.	Bethesda Physiocare, Bethesda, MD, United States, Myopain Seminars, Bethesda, MD, United States	10	36	3.60

Thematic Evolution

A thematic evolution was presented by dividing the study period into three different time slices. The first slice covers the period from 2013 to 2015, the second period is from 2016 to 2019, and the last span is from 2020 to 2022. Figure 5 reveals how the research focus changes during different periods. The focus on the theme of MT remained the same throughout the study period. The research on the theme of musculoskeletal manipulations was prevalent from 2013 to 2015 and from 2020 to 2022 and was out of focus from 2016 to 2019

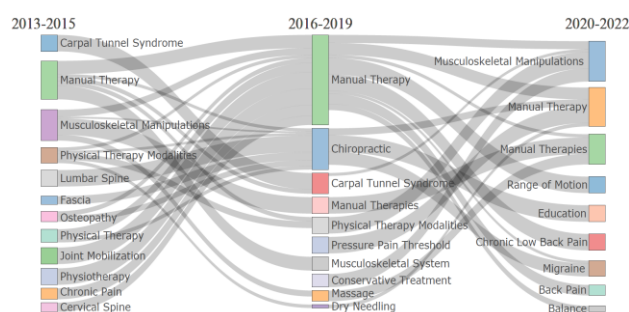


Figure 5. Thematic evolution of MT research

Topical trends

Figure 6 reveals the topical trends during the study period. Manual therapy was the most repeated topic of research from 2017 to 2019. The topics of exercise therapy, musculoskeletal therapy, physical therapy, and physiotherapy have been the focus of research lately.

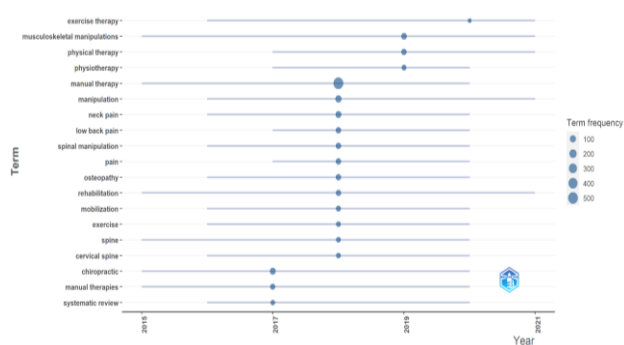


Figure 6. Topics trends during the study period

Countries Collaboration

Figure 7 shows the collaboration between the countries. The United States, Australia, and Canada have the highest share of collaboration with European countries.

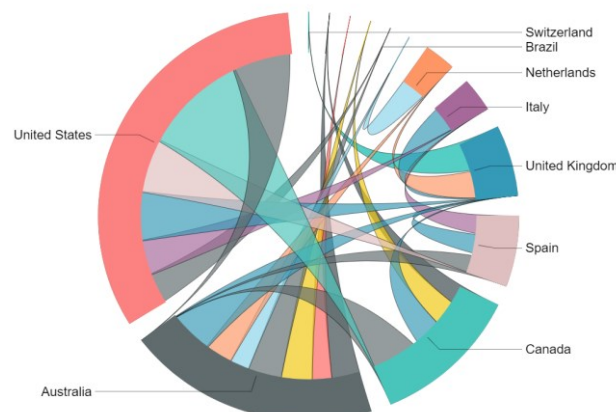


Figure 7. Countries collaboration

Research focus with institutions, and sources of publications

Figure 8 reveals the focus of research in different institutions and journals. Manual therapy was the most focused theme of research in Universidad Rey Juan Carlos, mostly published in two journals; Journal of Orthopaedic & Sports Physical Therapy and Journal of Manipulative & Physiological Therapeutics. The research on the chiropractic theme was conducted mostly by Akershus University Hospital and Macquarie University, predominantly published in Musculoskeletal Science & Practice and Chiropractic & Manual Therapies. Spinal manipulation was the other area of research and focus.

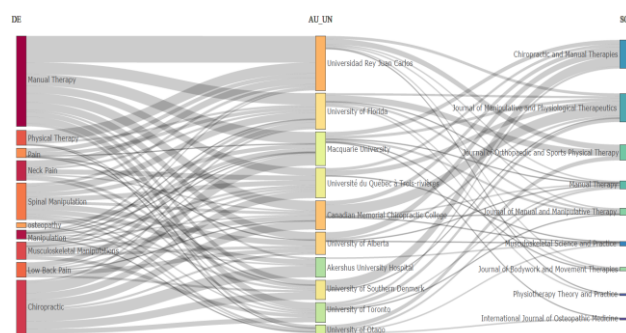


Figure 8. Research focus with institutions, and sources of publications

Discussion

This is the first bibliometric review study to report the trends in MT in the last 10 years. Our study identified 1208 relevant topical articles for the bibliometric review. The targeted publication date was between 2013 and 2022. The following indicators were investigated in the present study:

yearly growth of publications and citations, authorship pattern, highly cited publications, the most preferred journals, the most prolific countries, the most active organizations, the most prolific authors, thematic evolution, topics trends during the specific study period, countries collaborations, and research focus with institutions and sources of publications.

The rising character of publications correlates with the findings of Simon et al. (2014), which mapped the studies published in 1994-2014 in the Journal of Manual & Manipulative Therapy. We can consider the present study as a follow-up review to the above-mentioned article, taking into account the chronology, although the main theme does not fully correspond. The increasing number of research studies could be explained by the higher demand for evidence-based medicine. The yearly growth of publications has a moderately rising trend that appears more significant from 2019, while the highest number of citations is reported in the year 2014. Trager & Dusek (2021) reported the highest citation rate since 2015 in their bibliometric review of chiropractic case reports. The highest number of citations was reported in the publications, with six authors in our study. It can be noticed that the top cited studies were the assessments with MT included in the experimental trials that compared the various therapies effects. Or, it was part of the wider context devoted to the clinical guideline of nonsurgical treatment. MT was highly associated with the treatment of low back pain. The other highly cited papers with the MT topic were studies focusing on the treatment of common musculoskeletal disorders, particularly scapular dyskinesis, patellofemoral pain, osteoarthritis of the hip or knee, neck pain, temporomandibular disorders, and adhesive capsulitis. Contrary to this, Morin & Gaboury (2021) study focused on osteopathic bibliometric review reported the most often-cited scientific publications to address the effects of manual treatment on low back pain along with cervical pain. Similarly, to our study, the musculoskeletal techniques most frequently reported in the scientific literature are aligned with the guidelines for techniques in practice. The highest cited article focusing only on the MT approach was the study of Bialosky J.E. (2018) - "Unraveling the mechanisms of manual therapy: Modeling an approach" with 143 citations and the rank 5 in the highly cited publications ranking with the MT topic. The authorship pattern indicates that the researchers in the field of MT preferred to publish their research collaboratively, as only 68 are single-author studies. Fu et al. (2011) reported that internationally collaborated complementary and alternative medicine research publications generate a higher citation impact than publications of single authors within one country only. The four-author studies are more common in the present study, followed by three-author and five-author studies. The most preferred periodical was the Journal of Bodywork and Movement Therapies, with 75 published articles in the last ten years (Table 3). It's a paradox because the prestigious Journal of Manual and Manipulative

Therapy was only the second, despite its title better describes MT's nature. However, the number of total publications does not correlate with the number of citations. The Journal of Orthopaedic and Sports Physical Therapy published only 56 research studies with the MT focus but reported a 3 times higher citation amount than the most productive journal. The second in total citation ranking was the journal Manual Therapy (current name - Musculoskeletal Science & Practice), with 55 publications in the field.

The USA, Australia, Spain, and the United Kingdom were the most productive countries, with 361, 150, 145, and 102 publications, respectively. The USA, Australia, Canada, and Spain are the countries with the highest number of citations (4869, 2800, 2051, and 2048 respectively) (Figure 3). It is interesting that we do not report any Asian country on the list, considering MT as the main topic. For example, China is the most prolific country in acupuncture therapy (Jiang et al. 2021), complementary and alternative medicine for Long COVID (Kim et al. 2022), or for treatment of facial nerve palsy (Goo et al. 2021). The United States, Australia, and Canada have the highest share of collaboration with European countries (Figure 6). In the list of the ten most prolific authors (Table 5), we reported that the highest number is from Spain (4), followed by the USA (3), Australia (2), and the UK (1). For comparison, in the chiropractic case reports bibliometric review, the most prolific authors were affiliated with chiropractic schools in the USA, Canada, and Australia (Trager and Dusek, 2021). The most active institutions producing research on MT were from Spain (3), Australia (2), Canada (2), the USA, Sweden, and Denmark (Table 4).

MT was the most repeated topic of research from 2017 to 2019. The topics of exercise therapy, musculoskeletal therapy, physical therapy, and physiotherapy have been the focus of research lately (Figure 5). In the thematic evolution of MT research (Figure 4), we reported that musculoskeletal manipulation was prevalent from 2013 to 2015 and from 2020 to 2022 and with a lower focus from 2016 to 2019. Carpal tunnel syndrome was a significant theme from 2013 to 2019, with a reduced focus in recent years. Massage and dry needling in the context of MT appeared only from 2016 to 2019 as a significant topic. Interestingly, since 2020 there has been a higher priority on MT education in research publications.

This study has its limitations as well. The methodology of the MT studies identification relies on the Scopus database. Many studies relevant to the topic are not included in the Scopus database. However, this does not mean they are less important for the body of knowledge and have a lower impact in the MT field. In the present study, we reported the rising trend of publishing in terms of quantity, but we cannot state that the quality of the articles has improved as well. The proportions of particular research study types in the review are not identified. Therefore, there is no information on the number of case re-

ports, research reports, books, conference papers, topical reviews, or meta-analyses included. This study is a heterogeneous effort, considering the inclusion of a wide range of articles with MT as a main scope. This means that the outcome is limited to a general view over the trends in MT. Considering the number of articles on this topic, it will be suitable to specify the subcategories of MT for future bibliometric review studies and identify the trends with higher precision, e.g. cervical spine MT, MT in seniors, or visceral MT.

MT is a vital component of musculoskeletal healthcare. Its practical application extends beyond pain relief to include functional improvement and enhanced quality of life. The growing body of literature highlights its efficacy and underscores the importance of integrating manual therapy into multidisciplinary treatment approaches.

Conclusions

1208 relevant studies were included in the analysis. Publishing has a rising character. The four-author studies are the most common, while only 68 are single-author studies. In 2021, the highest number of publications (n=178) was published. The Journal of Bodywork and Movement Therapies has published the highest number of publications (75). The USA is the most prolific country in publishing (361 studies) and total citations (4869). Universidad Rey Juan Carlos (Spain) is the most productive and cited institution. Fernández-De-Las-Peñas C. is the most productive, and Mark D. Bishop is the most cited author. The USA, Australia, Canada, and European countries have the highest share of collaboration. MT was the most repeated topic of research from 2017 to 2019. The topics of exercise therapy, musculoskeletal therapy, physical therapy, and physiotherapy have been the focus of research in the context of MT lately.

The present study reported the research-related trends in MT applying bibliometric methods and identified the most productive countries, institutions, and researchers over the past decade. These findings are intended to assist the researchers in better orientation in the field and to specify the trends for future research studies in MT.

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