

## Original Article

# Bibliometric and visual analysis of trends in tenosynovitis research from 1999 to 2021

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Received November 19, 2022; Accepted March 24, 2023; Epub April 15, 2023; Published April 30, 2023

**Abstract:** Background: Tenosynovitis is an acute or chronic inflammatory reaction of the tendon/tendon sheath. The purpose of this study is to summarize the current status, hotspots, and development trends in tenosynovitis related research. Methods: Data on tenosynovitis from 1999 to 2021 were identified from the Web of Science core collection (WoSCC) database and analyzed using bibliometric software. CiteSpace was utilized to identify the top 25 references with the strongest citation bursts, the top 25 keywords with the strongest citation bursts, the dual-map overlay of journals, and a timeline of keywords. VOSviewer was utilized to conduct co-citation, academic collaboration, and keyword analysis. Microsoft Excel was used to draw relevant charts. Results: A total of 4,740 publications were collected in this study. The United States ranked first in terms of the H-index, total citations, and total number of publications. The University of California System, University of London, and UDICE-French Research Universities were the major contributing institutions to tenosynovitis research. The Journal of Hand Surgery-American Volume, Skeletal Radiology, and American Journal of Sports Medicine were the main publishing channels for tenosynovitis-related articles. Moreover, Maffulli, N., Van der Helm-van Mil, Annette H.M., Ostergaard, M. were major contributing authors to tenosynovitis research. Finally, research on nonsurgical treatment for tenosynovitis appears to be a future hot spot. Conclusion: Overall, the number of publications on tenosynovitis grew over the 1999-2021 period. Our study summarized the research status and global trends of tenosynovitis from multiple angles (i.e., countries, institutions, authors, publications). These considerations are helpful to better understand the research hotspots and development trends in the field.

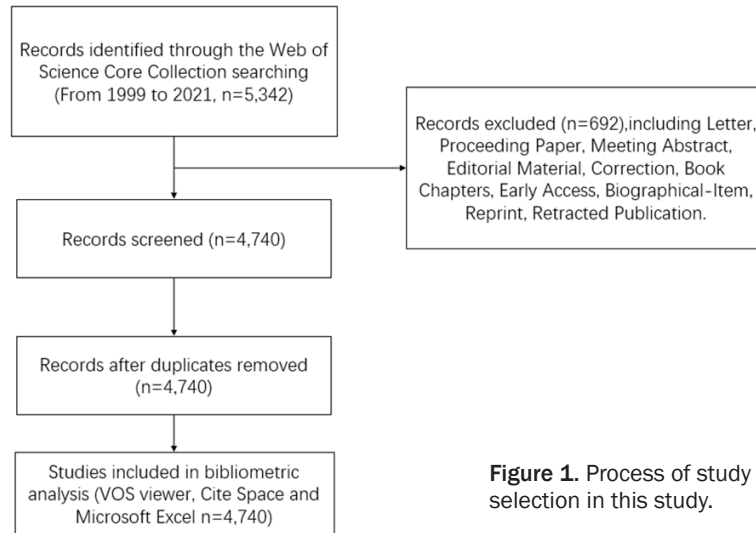
**Keywords:** Tenosynovitis, bibliometrics, research trend, Web of Science, VOSviewer, CiteSpace

## Introduction

The tendon sheath is a closed synovial tube that covers and protects the tendon [1]. The tendon sheath wraps around the tendon in two layers with an empty cavity called the synovial cavity. The cavity contains synovial fluid from the tendon sheath. The inner layer is attached to the tendon, whereas the outer layer is lined in the tendon fiber sheath and joined to the bone surface. The function of the tendon sheath is to fix, lubricate, and protect the tendon from compression or friction. However, long-term excessive friction may lead to tendon sheath inflammation and swelling, a condition called tenosynovitis, and permanent mobility problems may develop if the issue is not treated properly. Although tenosynovitis may occur

in different age groups, middle-aged and older workers, and women are more likely to develop tenosynovitis [2]. The etiology of tenosynovitis includes the following types: 1) Stenosis tenosynovitis develops occurs under chronic strain and mainly occurs in the fingers, wrists, long head tendon of the biceps brachii, ankles and children's congenital flexor pollicis longus tendon; 2) Pyogenic tenosynovitis is mostly caused by infection after stabbing of the tendon sheath; 3) Acute fibrous tenosynovitis is caused by congestion and swelling of connective tissue around the tendon sheath (i.e., the swollen tendon sheath compresses and rubs the tendon, causing inflammation); 4) Rheumatic tenosynovitis is a reaction of acute rheumatic fever; and 5) Tuberculous tenosynovitis [3]. The symptoms of tenosynovitis are local pain, tenderness, and

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**Figure 1.** Process of study selection in this study.

Sources Citations Index (ESCI), is frequently utilized in bibliometric analysis.

## Search strategy

All text files were retrieved from the WoSCC in September, 2022. The search formula was: (TS = tenosynovitis OR peritendinitis OR tendovaginitis OR tendinitis OR thecitis). Articles published in English between January 1999 and December 2021 were included in this study. In the search, only “article” and “review article” were selected in article types.

limited movement of affected joints. The therapy methods include general, drug, local blocking and surgical treatment [4].

Bibliometrics is an interdisciplinary method that combines statistics and bibliography to quantitatively analyze academic publishing through statistical methods to discover research hotspots and development trends [5]. Most clinical research on the diagnosis and treatment of tenosynovitis has been published only in the past few decades [6, 7]. However, very few studies have investigated the hotspots and characteristics of tenosynovitis worldwide. A bibliometric and visual analysis may help understand the development and future trend of research in tenosynovitis. Therefore, our study has explored the progress of research in tenosynovitis from the perspective of bibliometrics to reveal constructive information in the field.

## Methods

### Data sources

The WoSCC database, which includes the Science Citation Index-Expanded (SCI-Expanded), Arts & Humanities Citation Index (AHCI), Social Science Citation Index (SSCI), Conference Proceedings Citation Index Social Science & Humanities (CPCI-SSH), Conference Proceedings Citation Index-Science (CPCI-S), Current Chemical Reactions-Expanded (CCR-Expanded), Index of Copernicus (IC) and Emerging

### Data collection

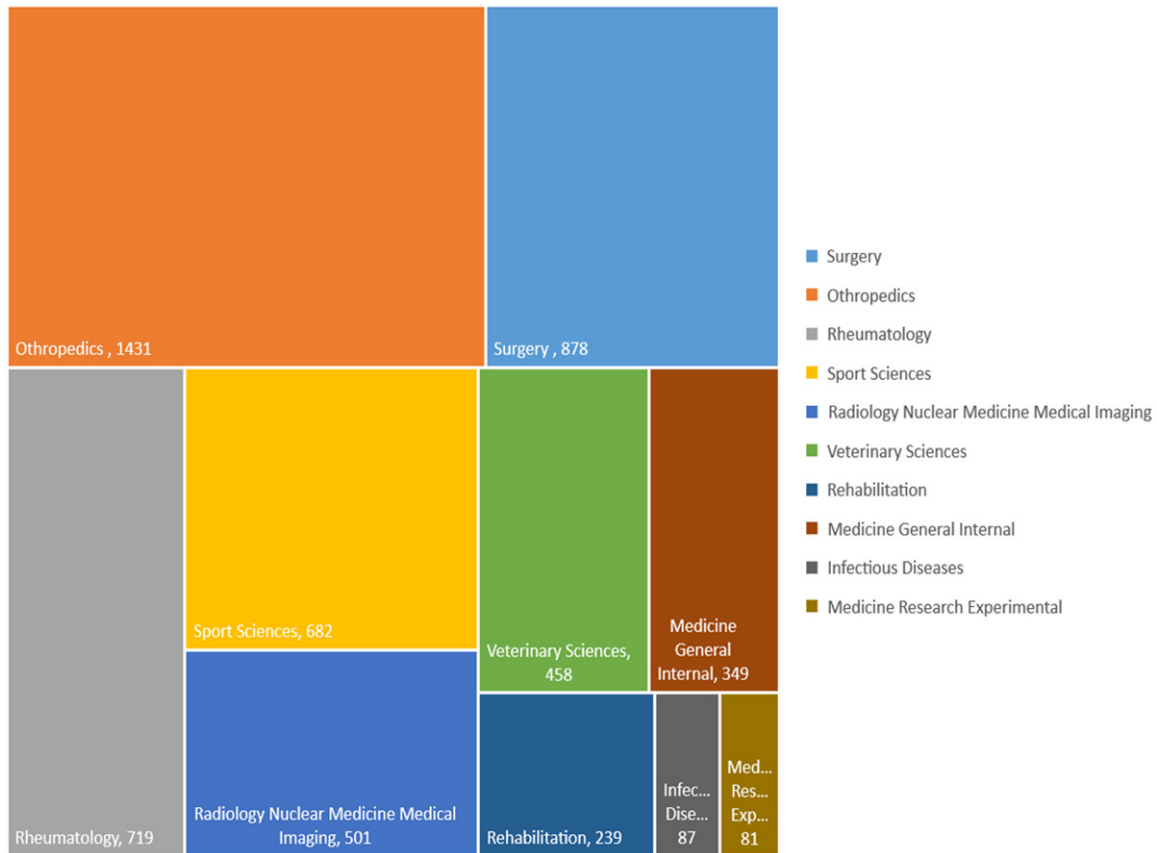
Full records and cited references (e.g., authors, titles, source, years of publications, nationalities, cited references, institutions of authors, abstract, keywords, total citations, etc.) were exported from the WoSCC database for bibliometric and visual analysis. The records were imported into VOSviewer (v.1.6.18), CiteSpace (v.6.1.R2) and Microsoft Excel 2021 for analysis. All the data in the following tables were acquired from the citation report in the WoSCC database.

## Results

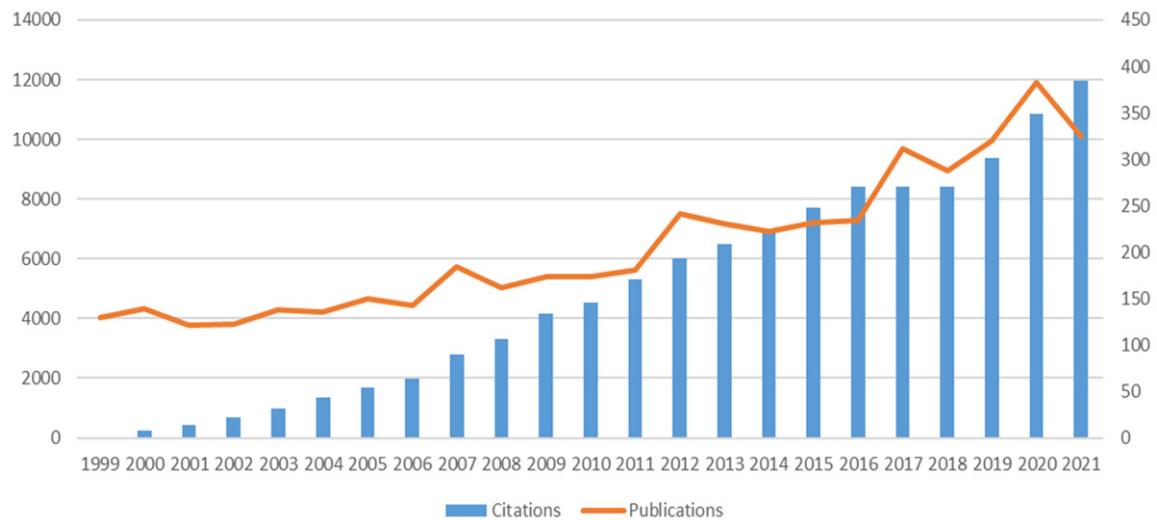
### Trends in publications and citations over time

Through the aforementioned search strategy, a total of 5,342 tenosynovitis-related records were identified in our study. After filtering article types and removing duplicate articles, 4,740 studies remained (Figure 1). The 4,740 publications included in this study came from 18,560 authors and 4,996 institutions in 88 countries and were published in 1,001 journals. These publications cited 76,793 references from 11,788 journals. These articles are mainly distributed in orthopedics, surgery, rheumatology, sports science, and radiology nuclear medical imaging (Figure 2). The number of citations about tenosynovitis grew steadily over the 1999-2021 period, peaking at 325 in 2021 (Figure 3).

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**Figure 2.** Research area analysis of global publications in tenosynovitis from 1999 to 2021.



**Figure 3.** Trends in publications and citations of tenosynovitis research.

### Quality analysis of global publications

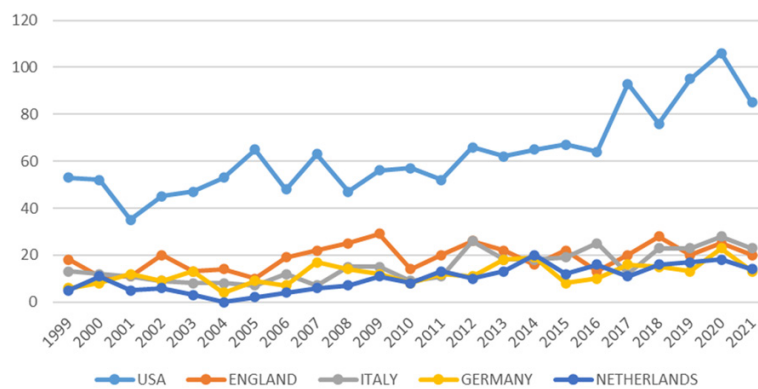
**Country:** According to the amount of literature on tenosynovitis in each country (**Table 1**), the

United States was firmly in first place with 1,452 publications, followed by England (438 articles, 9.24%), Italy (352 articles, 7.43%), Germany (277, 5.84%), and the Netherlands

## Bibliometric and visual analysis of tenosynovitis research

**Table 1.** The top 10 countries by publications

Rank	Country	Publications	% of 4,740	Total citations	Average citations	H-index
1	United States	1,452	30.63	36,950	25.45	87
2	England	438	9.24	18,255	41.68	72
3	Italy	352	7.43	11,067	31.44	52
4	Germany	277	5.84	10,371	37.44	53
5	Netherlands	228	4.81	8,686	38.1	51
6	Japan	226	4.77	2,593	11.47	24
7	France	210	4.43	7,339	34.95	44
8	Turkey	187	3.96	1,924	10.29	22
9	Canada	183	3.86	7,751	42.36	47
10	China	183	3.86	2,643	14.44	27



**Figure 4.** Tenosynovitis-related publications of the top 5 countries over time.

(228, 4.81%). As **Figure 4** shows, in addition to the United States, which has a relatively high growth momentum, the other four countries showed little change between the beginning and the end. In addition, the United States ranked first in terms of publications, total citations, and H-index, whereas Canada, England and the Netherlands are the top three countries in terms of average citations.

**Institution:** Speaking of the top ten research institutions (**Table 2**), the United States has three, England has two, France has two, Switzerland has two, and Denmark has one. The institution with the most publications on tenosynovitis research was the University of California System. However, the University of London had the highest H-index. UDICE-French Research Universities have the highest total citations. However, the institution with the highest average number of citations was the University of Copenhagen.

**Author:** As shown in **Table 3**, among the top ten contributors to tenosynovitis, three are from

England, two are from the Netherlands, two are from Denmark, two are from Italy, and one is from Spain. Maffulli, N had the highest H-index, the most publications, and the highest total citations and average citations.

**Journal:** **Table 4** shows the top ten journals that publish the most literature on tenosynovitis. The impact factor (IF) and journal quartile were excerpted from Journal Citation

Reports 2021. The top three most-published journals were the Journal of Hand Surgery-American Volume, Skeletal Radiology, and American Journal of Sports Medicine. The American Journal of Sports Medicine had the highest total citations and H-index. Annals of the Rheumatic Diseases (IF = 27.973) had the highest average citations. **Figure 5** shows the dual-map overlay of journals on tenosynovitis. The cited journals are on the right, the citing journals are on the left, and the colored path indicates the citation relationship. It can be seen from the figure that there are seven paths between the citing journals and the cited journals.

### Academic collaboration

Academic cooperation and exchanges between various countries/regions, institutions and authors are crucial to fostering in-depth academic research. In **Figure 6A**, each node stands for a different country. Node colors represent different clusters (i.e., research topics). The node connection line represents the collabora-



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**Table 2.** Top 10 institutions distributed by publications

Rank	Institution	Publications	Total citations	Average citations	H-index	Original country
1	University of California System	92	2,025	22.01	28	United States
2	University of London	85	3,696	43.48	36	England
3	UDICE-French Research Universities	83	4,307	51.89	32	French
4	University of Copenhagen	73	4,233	57.99	29	Denmark
5	Assistance Publique Hopitaux Paris (APHP)	71	3,477	48.97	32	French
6	Leiden University	69	1,479	21.43	21	Netherlands
7	Harvard University	68	2,073	30.49	25	United States
8	Mayo Clinic	68	1,093	16.07	18	United States
9	Leiden University Medical Center (LUMC)	67	1,437	21.45	21	Netherlands
10	University of Leeds	64	3,119	48.73	28	England

**Table 3.** Top 10 authors distributed by publications

Rank	Author	Publications	Total Citations	Average Citations	Country	Institution	H-index
1	Maffulli, N.	56	5,913	105.59	England	Keele University	40
2	van der Helm-van Mil, Annette H.M.	43	696	16.19	Netherlands	Leiden University	14
3	Ostergaard, M.	37	2,625	70.95	Denmark	University of Copenhagen	22
4	Iagnocco, A.	35	2,264	64.69	Italy	Sapienza University of Rome	22
5	Reijnen, M.	32	713	22.28	Netherlands	Leiden University	15
6	Emery, P.	30	1,876	62.53	England	Leeds General Infirmary	23
7	Naredo, E.	28	1,320	47.14	Spain	Severo Ochoa University Hospital	17
8	Filippucci, E.	26	2,125	81.73	Italy	Marche Polytechnic University	19
9	Conaghan, P.G.	25	2,145	85.8	England	University of Leeds	18
10	Terslev, L.	25	911	36.44	Denmark	University of Copenhagen	12

**Table 4.** Top 10 journals distributed by publications

Rank	Journal	Publications	Total Citation	Average Citations	H-index	Impact factors	JIF quartile
1	Journal of Hand Surgery-American Volume	109	2,267	20.8	27	2.342	Q3
2	Skeletal Radiology	97	1,661	17.12	23	2.128	Q3
3	American Journal of Sports Medicine	92	6,264	68.09	49	7.01	Q1
4	Foot & Ankle International	75	2,330	31.07	28	3.569	Q2
5	Rheumatology	71	2,485	35	28	7.046	Q1
6	Clinical Rheumatology	64	946	14.78	18	3.65	Q3
7	Journal of Rheumatology	64	3,221	50.33	28	5.346	Q2
8	Annals of the Rheumatic Diseases	58	4,320	74.48	39	27.973	Q1
9	Journal of Shoulder and Elbow Surgery	53	2,392	45.13	30	3.507	Q2
10	Equine Veterinary Journal	51	1,695	33.24	23	3.752	Q2

tive relationship. The thicker the connection line, the more closely the two entities cooperate. The size of the nodes represents the number of articles published after their collaboration. This figure displays the cooperation between the 56 most-connected countries. Clearly, the United States, the country with the

most publications, occupies the leading status in the tenosynovitis field. In **Figure 6B**, institutions with a frequency of five or more are selected. The University of Leeds, Leiden University, and Mayo Clinic stand out. Through VOSviewer software, 235 authors whose number of publications is equal to or more than five are includ-

# Bibliometric and visual analysis of tenosynovitis research

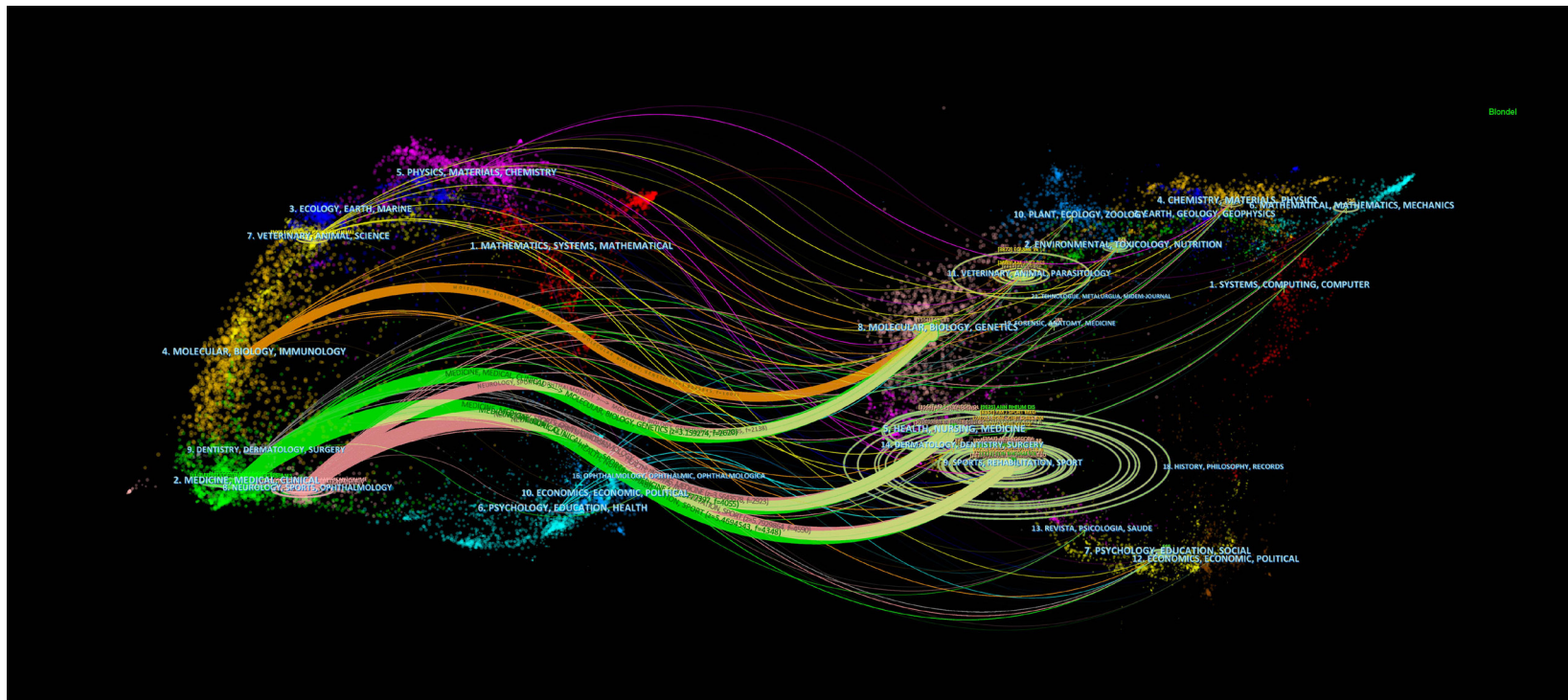


Figure 5. Dual-map overlay of journals on tenosynovitis-related research.

# Bibliometric and visual analysis of tenosynovitis research

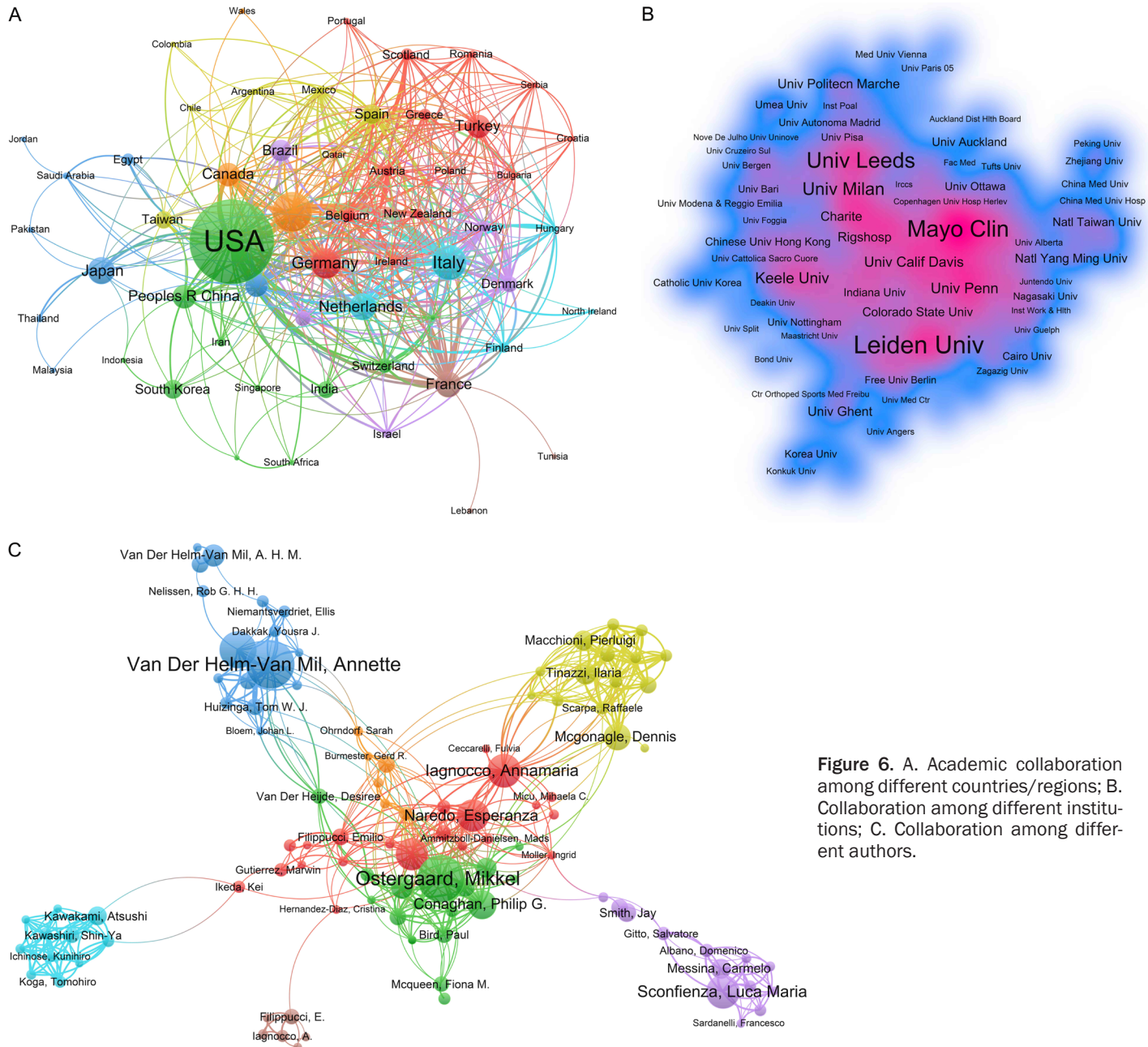


Figure 6. A. Academic collaboration among different countries/regions; B. Collaboration among different institutions; C. Collaboration among different authors.

ed. Some of these authors are not connected with others. The largest set of connected authors consists of 105 items (**Figure 6C**). Authors with more academic collaborations are highly consistent with the results of the top ten authors.

### *Co-citation analysis*

*Co-cited authors:* When two articles from different authors are simultaneously cited by a third author, the authors have co-citation relationship. If they have more co-citations, then this indicates that they are more closely related to each other academically. Co-citation analysis lists a total of 50,093 authors in the tenosynovitis field. Maffulli, N (685 citations) had the most citations, followed by Rompe, JD (678 citations) and Khan, KM (502 citations). Through VOSviewer software, 1,101 authors have at least 20 citations. After clustering these scientists, eight clusters were formed (**Figure 7A**).

*Co-cited journals:* **Figure 7B** shows the relationship among the 814 identified journals (one of which has a minimum number of citations of 20 or more). The top three journals by citations were the Annals of the Rheumatic Diseases (5,056 citations), American Journal of Sports Medicine (4,784 citations), and The Journal of Bone and Joint Surgery-American volume (4,149 citations).

*Co-cited references:* Clustering of cited literature reflects the development trends in the field of the study to a certain extent. A total of 681 references with a minimum number of 20 citations are shown in **Figure 7C**. The top three co-cited references were R.J. Wakefield et al. [8] (155 citations), K.M. Khan et al. [9] (125 citations), and L. Gerdesmeyer et al. [10] (123 citations). These articles focus on the histopathology, detection, and treatment of tendonitis, indicating the centrality of these aspects to tendonitis research. **Figure 8** shows the top 25 references about tenosynovitis with the strongest citation bursts, which means that these articles are frequently cited over a period of time. "Reliability of a consensus-based ultrasound score for tenosynovitis in rheumatoid arthritis" by E. Naredo et al. has the strongest burstiness [11]. In addition to the references, there are still six references in burstiness: 1) "Ultrasound-guided percutaneous irrigation in rotator cuff calcific tendinopathy: What is the

evidence? A systematic review with proposals for future reporting" by E. Lanza et al. [12]; 2) "Magnetic Resonance Imaging-Detected Features of Inflammation and Erosions in Symptom-Free Persons From the General Population" by L. Mangnus et al. [13]; 3) "Scoring ultrasound synovitis in rheumatoid arthritis: a EULAR-OMERACT ultrasound taskforce-Part 1: definition and development of a standardised, consensus-based scoring system" by M.A. D'Agostino et al. [14]; 4) "The 2017 EULAR standardised procedures for ultrasound imaging in rheumatology" by I. Möller et al. [15]; 5) "Scoring ultrasound synovitis in rheumatoid arthritis: a EULAR-OMERACT ultrasound taskforce-Part 2: reliability and application to multiple joints of a standardised consensus-based scoring system" by L. Terslev et al. [16]; and 6) "The OMERACT Rheumatoid Arthritis Magnetic Resonance Imaging (MRI) Scoring System: Updated Recommendations by the OMERACT MRI in Arthritis Working Group" by M. Østergaard et al. [17].

### *Analysis of highly cited articles*

The top ten most-cited articles are shown in **Table 5**. "Musculoskeletal ultrasound including definitions for ultrasonographic pathology" by R.J. Wakefield et al. [8] reports that a group of international ultrasound experts met together to describe standardized scanning methods of ultrasound and standardized definitions of pathology, which spoke of tenosynovitis, either hypoechoic or anechoic thickened tissue with or without fluid in the tendon sheath. "Tendon injury and tendinopathy: healing and repair" by P. Sharma et al. [18] described the structure, function and the pathophysiology of tendons, the various stages of tendon injury and healing, and possible strategies to optimize tendon healing and repair. "Histopathology of common tendinopathies. Update and implications for clinical management" by K.M. Khan et al. [9] concluded that an effective treatment for athletes with tendinopathy must target its non-inflammatory state.

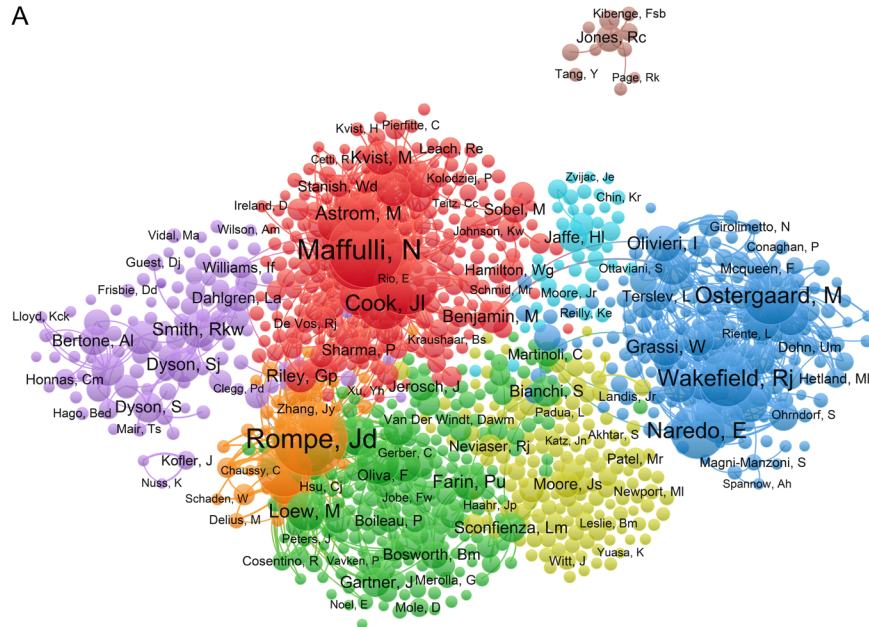
### *Analysis of keywords*

Keywords represent the core concepts of the literature, which reflects the research hotspots in a certain field. The top ten keywords ranked in this study and their frequencies were tendinitis (1,048), tenosynovitis (928), ultrasound

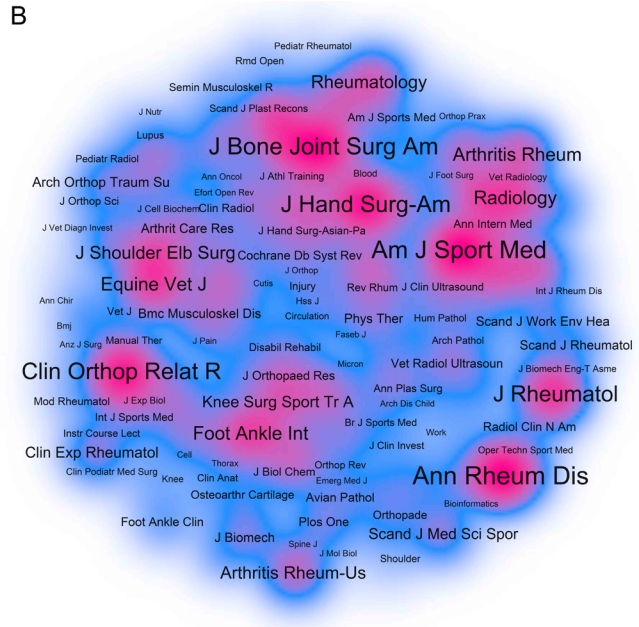


# Bibliometric and visual analysis of tenosynovitis research

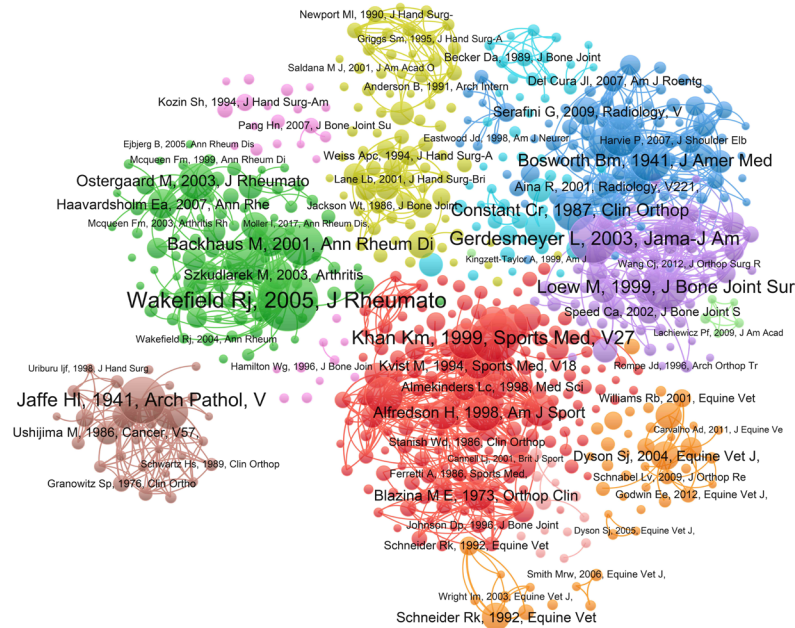
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**Figure 7.** A. VOSviewer visualization map of co-cited authors devoted to tenosynovitis research; B. VOSviewer visualization map of co-cited journals devoted to tenosynovitis research; C. VOSviewer visualization map of co-cited references devoted to tenosynovitis research.

# Bibliometric and visual analysis of tenosynovitis research

## Top 25 References with the Strongest Citation Bursts

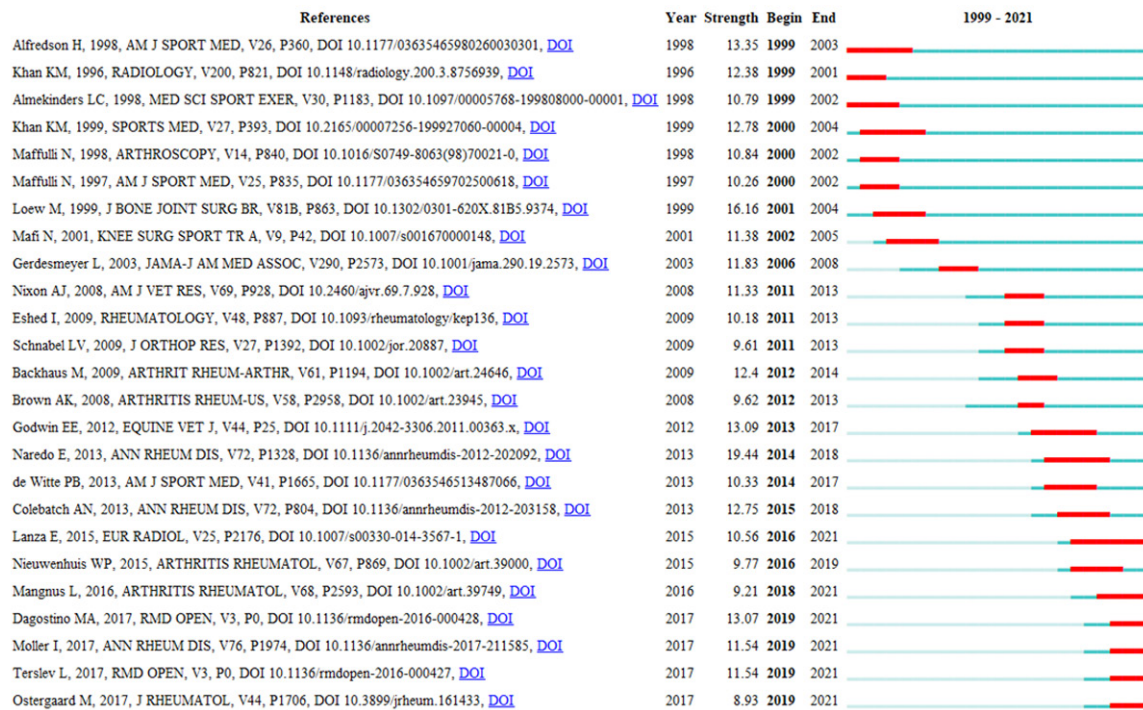


Figure 8. Top 25 references with the strongest citation bursts involved in tenosynovitis.

Table 5. Top 10 most-cited articles

Rank	Author	Title	Total citations	Journal
1	Wakefield, RJ	Musculoskeletal ultrasound including definitions for ultrasonographic pathology	1,017	Journal of Rheumatology
2	Sharma, P	Current concepts review tendon injury and tendinopathy: Healing and repair	751	Journal of Bone and Joint Surgery-American Volume
3	Khan, KM	Histopathology of common tendinopathies - update and implications for clinical management	612	Sports Medicine
4	Coleman, BD	Studies of surgical outcome after patellar tendinopathy: clinical significance of methodological deficiencies and guidelines for future studies	572	Scandinavian Journal of Medicine & Science in Sport
5	Robinson, JM	The VISA-A questionnaire: a valid and reliable index of the clinical severity of Achilles tendinopathy	453	British Journal of Sports Medicine
6	Wang, CJ	Shock wave therapy induces neovascularization at the tendon-bone junction - a study in rabbits	429	Journal of Orthopaedic Research
7	Arora, Rohit	Complications following internal fixation of unstable distal radius fracture with a palmar locking-plate	404	Journal of Orthopaedic Trauma
8	Balint, PV	Ultrasonography of enthesal insertions in the lower limb in spondyloarthropathy	389	Annals of the Rheumatic Diseases
9	Shiri, R	Prevalence and determinants of lateral and medial epicondylitis: A population study	369	American Journal of Epidemiology
10	Gerr, F	A prospective study of computer users: I. Study design and incidence of musculoskeletal symptoms and disorders	366	American Journal of Industrial Medicine

(485), tendon (466), tendinopathy (433), shoulder (400), ultrasonography (355), management (355), diagnosis (337), and hand (302). By clustering these keywords with frequencies greater

than or equal to five, a total of 1,420 identified keywords were included. Figure 9 shows the overlay visualization of co-occurring keywords. In this figure, bone marrow edema, reliability,





### Top 25 Keywords with the Strongest Citation Bursts

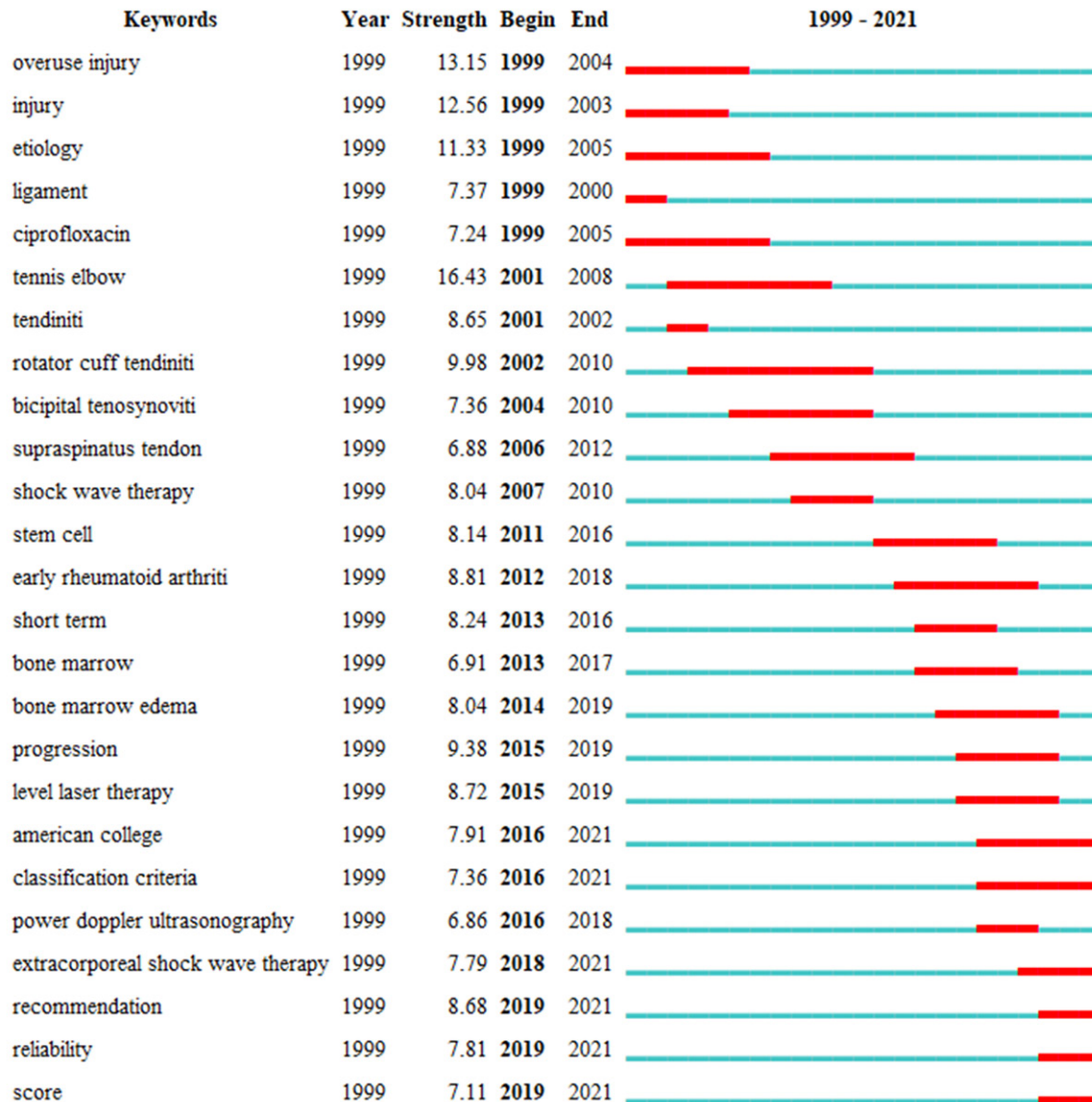


Figure 10. Top 25 keywords with the strongest citation bursts of tenosynovitis articles from 1999 to 2021.

vitis in developing countries lags behind that in developed countries by a wide margin. Among the top ten journals, the Journal of Hand Surgery-American Volume, Skeletal Radiology, and American Journal of Sports Medicine ranked as the top three. These journals are mainly related to sports, surgery, medical, and other fields, which is also shown in the dual-map overlay of journals on tenosynovitis. The American Journal of Sports Medicine (IF = 7.01), the authoritative journal in orthopedics, had the highest average citations and H-index.

Academic cooperation, which is mutually beneficial for all parties, is widespread among different countries, institutions, and outstanding authors. The countries, institutions and authors that collaborate more have a higher publication output and rank. This proves that cooperation is an effective way to promote the development of tenosynovitis academic research. According to an analysis of the highly cited literature, studies on tenosynovitis are mainly distributed in incidence and treatment [22, 23]. The yearly distribution of keywords and burst keywords



# Bibliometric and visual analysis of tenosynovitis research

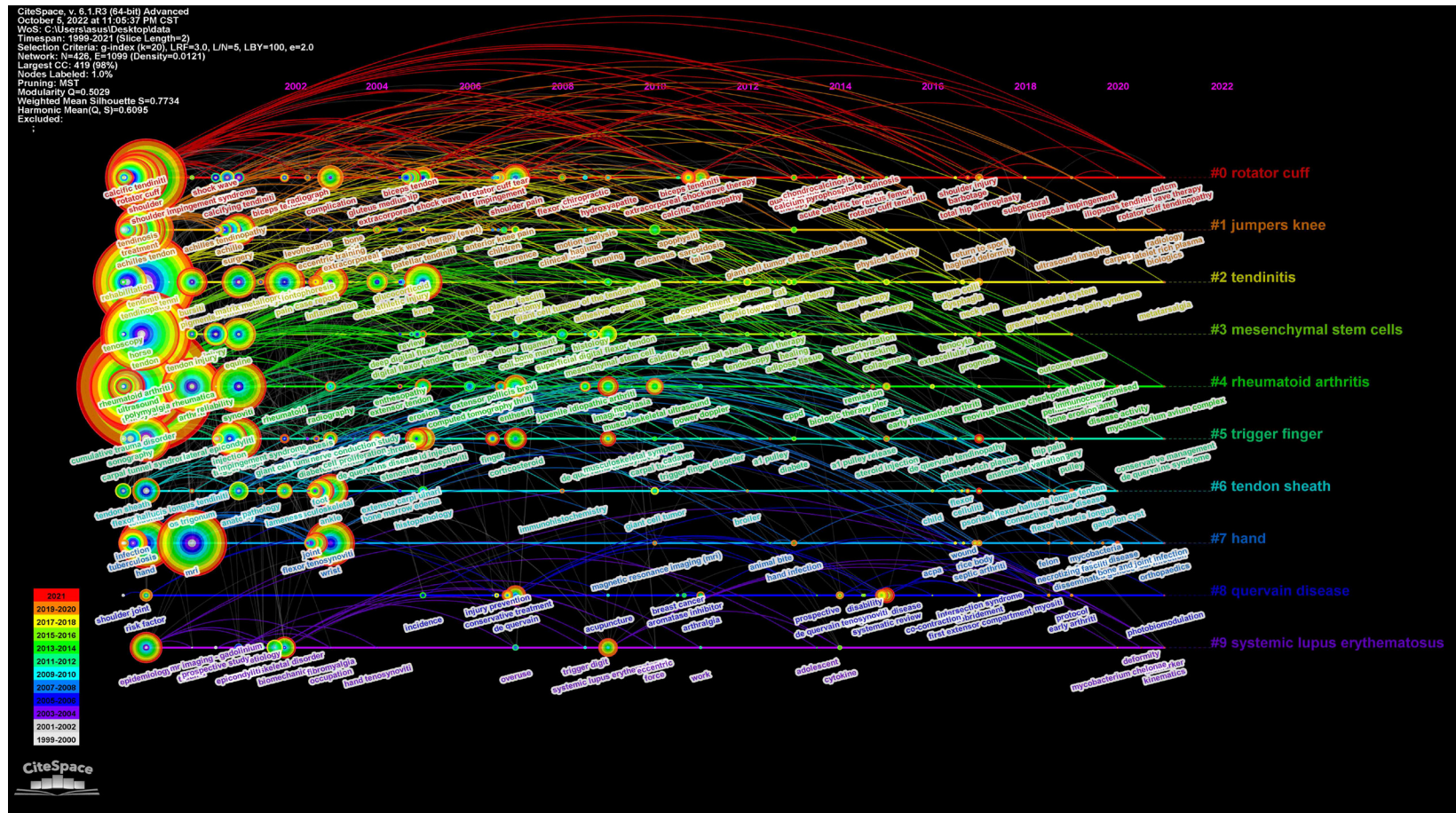


Figure 11. Timeline of keywords on tenosynovitis from 1999 to 2021.

clearly reveals the progress of research in tenosynovitis. The keyword with the longest outbreak duration was rotator cuff tendinitis (2002-2010) (**Figure 10**). Rotator cuff tendinitis is a common cause of shoulder pain. Calcified shoulder tendinitis can progress to rotator cuff tears and shoulder osteoarthritis [24]. Extracorporeal shock wave therapy (ESWT) and ultrasound-guided acupuncture are thought to be beneficial for rotator cuff tendinitis [25]. The timeline of keywords on tenosynovitis shows that the eight clusters, except for mesenchymal stem cells and tendon sheath, all lasted from 1999 to 2021. Ultrasound-guided intralesional injection of mesenchymal stem cells is considered as the benchmark for cell delivery in tendinitis. However, the safety and reliability still need to be verified in vivo [26]. Immune diseases, such as systemic lupus, may develop into bacterial infections due to immunosuppressive therapy, leading to tenosynovitis [27]. Moreover, De Quervain tenosynovitis is a relatively common wrist disease with a reported prevalence of 0.5% in male and 1.3% in female patients [28]. The treatments for De Quervain tenosynovitis include surgical interventions, as well as conservative nonsurgical approaches (eg, physical therapy, corticosteroid injections, and oral nonsteroidal anti-inflammatory drugs). Among these, surgical treatment seems to be the most effective method with a reported cure rate of 91% [29].

Although the etiology, diagnosis, and treatment of tenosynovitis are relatively mature, nonsurgical treatment with great efficacy is a future hot spot. In addition, the incidence of tenosynovitis is increasing every year. Interestingly, some novel forms of tenosynovitis have been clarified recently, such as: sclerosing tenosynovitis in a patient with pan-sclerotic morphea and rice bodies in tenosynovitis due to psoriatic arthritis [30, 31]. These novel forms of tenosynovitis may receive more attention in the future.

### Strengths and limitations

To the best of our knowledge, few studies have extensively investigated the current situation and trends of research in tenosynovitis. Therefore, software such as VOSviewer and CiteSpace were used to visualize the information about countries, institutions, authors, and journals in the field. Our study provides useful information for scientists to better understand the development of tenosynovitis research.

Moreover, we also provide potential new research ideas and perspectives for frontier exploration.

However, the limitations of this study should also be acknowledged. We restricted our search to articles published in the English language, which may affect our results. Nevertheless, English articles in WoSCC are the most commonly used data source in bibliometrics analysis. Only articles from 1999 to 2021 were included in this study due to the limitations of the database. In addition, only articles from the WoSCC database were considered in this study due to the limited capabilities of the analysis software.

### Conclusion

This study identifies tenosynovitis-related publications from 1999 to 2021, and comprehensively presents their global status and trends. Overall, publications about tenosynovitis have generally increased over the past 22 years. The United States ranks first in terms of the H-index, total citations, and total number of publications. The University of California System, University of London, and UDICE-French Research Universities were the major contributing institutions to tenosynovitis research. The Journal of Hand Surgery-American Volume, Skeletal Radiology, and American Journal of Sports Medicine were the main publishing channels for tenosynovitis-related articles. Moreover, Maffulli, N., van der Helm-van Mil, Annette H.M., Ostergaard, M. were the major contributing authors to tenosynovitis. Finally, research on nonsurgical treatment for tenosynovitis seems to be a hot spot in the future.

### Acknowledgements

This study was supported by National Natural Science Foundation of China (82102581, 82270930), National Postdoctoral Science Foundation of China (2021M693562), Provincial Natural Science Foundation of Hunan (2019JJ40517, 2022JJ40843), Provincial Outstanding Postdoctoral Innovative Talents Program of Hunan (2021RC2020), Young Investigator Grant of Xiangya Hospital, Central South University (2020Q14), Fuqing Postdoc Program of Xiangya Hospital, Central South University (176) and Fund of Reform and Practice of Ideological and Political in Xiangya Hospital, Central South University (36, 40).

## Disclosure of conflict of interest

None.

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## References

- [1] Tenosynovitis. *JAMA* 1973; 224 Suppl: 750.
- [2] Maffulli N, Wong J and Almekinders LC. Types and epidemiology of tendinopathy. *Clin Sports Med* 2003; 22: 675-692.
- [3] Almekinders LC and Temple JD. Etiology, diagnosis, and treatment of tendonitis: an analysis of the literature. *Med Sci Sports Exerc* 1998; 30: 1183-1190.
- [4] Ferrara PE, Codazza S, Cerulli S, Maccauro G, Ferriero G and Ronconi G. Physical modalities for the conservative treatment of wrist and hand's tenosynovitis: a systematic review. *Semin Arthritis Rheum* 2020; 50: 1280-1290.
- [5] Ninkov A, Frank JR and Maggio LA. Bibliometrics: methods for studying academic publishing. *Perspect Med Educ* 2022; 11: 173-176.
- [6] Ammitzbøll-Danielsen M, Østergaard M, Naredo E, Iagnocco A, Möller I, D'Agostino MA, Gandjbakhch F and Terslev L. The use of the OMERACT ultrasound tenosynovitis scoring system in multicenter clinical trials. *J Rheumatol* 2018; 45: 165-169.
- [7] Karlibel I A, Aksoy MK and Alkan A. Paraffin bath therapy in De Quervain's tenosynovitis: a single-blind randomized controlled trial. *Int J Biometeorol* 2021; 65: 1391-1398.
- [8] Wakefield RJ, Balint PV, Szkudlarek M, Filippucci E, Backhaus M, D'Agostino MA, Sanchez EN, Iagnocco A, Schmidt WA, Bruyn GA, Kane D, O'Connor PJ, Manger B, Joshua F, Koski J, Grassi W, Lassere MN, Swen N, Kainberger F, Klauser A, Ostergaard M, Brown AK, Machold KP and Conaghan PG; OMERACT 7 Special Interest Group. Musculoskeletal ultrasound including definitions for ultrasonographic pathology. *J Rheumatol* 2005; 32: 2485-2487.
- [9] Khan KM, Cook JL, Bonar F, Harcourt P and Astrom M. Histopathology of common tendinopathies. Update and implications for clinical management. *Sports Med* 1999; 27: 393-408.
- [10] Gerdesmeyer L, Wagenpfeil S, Haake M, Maier M, Loew M, Wörtler K, Lampe R, Seil R, Handle G, Gassel S and Rompe JD. Extracorporeal shock wave therapy for the treatment of chronic calcifying tendonitis of the rotator cuff: a randomized controlled trial. *JAMA* 2003; 290: 2573-2580.
- [11] Naredo E, D'Agostino MA, Wakefield RJ, Möller I, Balint PV, Filippucci E, Iagnocco A, Karim Z, Terslev L, Bong DA, Garrido J, Martínez-Hernández D and Bruyn GA; OMERACT Ultrasound Task Force\*. Reliability of a consensus-based ultrasound score for tenosynovitis in rheumatoid arthritis. *Ann Rheum Dis* 2013; 72: 1328-1334.
- [12] Lanza E, Banfi G, Serafini G, Lacelli F, Orlandi D, Bandirali M, Sardanelli F and Sconfienza LM. Ultrasound-guided percutaneous irrigation in rotator cuff calcific tendinopathy: what is the evidence? A systematic review with proposals for future reporting. *Eur Radiol* 2015; 25: 2176-2183.
- [13] Mangnus L, van Steenberg HW, Reijnierse M and van der Helm-van Mil AH. Magnetic resonance imaging-detected features of inflammation and erosions in symptom-free persons from the general population. *Arthritis Rheumatol* 2016; 68: 2593-2602.
- [14] D'Agostino MA, Terslev L, Aegerter P, Backhaus M, Balint P, Bruyn GA, Filippucci E, Grassi W, Iagnocco A, Jousse-Joulin S, Kane D, Naredo E, Schmidt W, Szkudlarek M, Conaghan PG and Wakefield RJ. Scoring ultrasound synovitis in rheumatoid arthritis: a EULAR-OMERACT ultrasound taskforce-part 1: definition and development of a standardised, consensus-based scoring system. *RMD Open* 2017; 3: e000428.
- [15] Möller I, Janta I, Backhaus M, Ohrndorf S, Bong DA, Martinoli C, Filippucci E, Sconfienza LM, Terslev L, Damjanov N, Hammer HB, Sudol-Szopinska I, Grassi W, Balint P, Bruyn GAW, D'Agostino MA, Hollander D, Siddle HJ, Supp G, Schmidt WA, Iagnocco A, Koski J, Kane D, Fodor D, Bruns A, Mandl P, Kaeley GS, Micu M, Ho C, Vlad V, Chávez-López M, Filippou G, Cerón CE, Nestorova R, Quintero M, Wakefield R, Carmona L and Naredo E. The 2017 EULAR standardised procedures for ultrasound imaging in rheumatology. *Ann Rheum Dis* 2017; 76: 1974-1979.
- [16] Terslev L, Naredo E, Aegerter P, Wakefield RJ, Backhaus M, Balint P, Bruyn GAW, Iagnocco A, Jousse-Joulin S, Schmidt WA, Szkudlarek M, Conaghan PG, Filippucci E and D'Agostino MA. Scoring ultrasound synovitis in rheumatoid arthritis: a EULAR-OMERACT ultrasound taskforce-part 2: reliability and application to multiple joints of a standardised consensus-based scoring system. *RMD Open* 2017; 3: e000427.
- [17] Østergaard M, Peterfy CG, Bird P, Gandjbakhch F, Glinatsi D, Eshed I, Haavardsholm EA, Lillegraven S, Bøyesen P, Ejbjerg B, Foltz V, Emery P, Genant HK and Conaghan PG. The OMERACT rheumatoid arthritis magnetic resonance imaging (MRI) scoring system: updated recommendations by the OMERACT MRI in arthritis



## Bibliometric and visual analysis of tenosynovitis research

- working group. *J Rheumatol* 2017; 44: 1706-1712.
- [18] Sharma P and Maffulli N. Tendon injury and tendinopathy: healing and repair. *J Bone Joint Surg Am* 2005; 87: 187-202.
- [19] Sequeira JH. Tertiary syphilis (gummatous Tenosynovitis). *Proc R Soc Med* 1910; 3: 20-21.
- [20] Rowbotham EL, Freeston JE, Emery P and Grainger AJ. The prevalence of tenosynovitis of the interosseous tendons of the hand in patients with rheumatoid arthritis. *Eur Radiol* 2016; 26: 444-450.
- [21] Bertoli-Barsotti L and Lando T. The h-index as an almost-exact function of some basic statistics. *Scientometrics* 2017; 113: 1209-1228.
- [22] Gerr F, Marcus M, Ensor C, Kleinbaum D, Cohen S, Edwards A, Gentry E, Ortiz DJ and Monteilh C. A prospective study of computer users: I. Study design and incidence of musculoskeletal symptoms and disorders. *Am J Ind Med* 2002; 41: 221-235.
- [23] Wang CJ, Wang FS, Yang KD, Weng LH, Hsu CC, Huang CS and Yang LC. Shock wave therapy induces neovascularization at the tendon-bone junction. A study in rabbits. *J Orthop Res* 2003; 21: 984-989.
- [24] Compagnoni R, Menon A, Radaelli S, Lanzani F, Gallazzi MB, Tassi A and Randelli PS. Long-term evolution of calcific tendinitis of the rotator cuff: clinical and radiological evaluation 10 years after diagnosis. *J Orthop Traumatol* 2021; 22: 42.
- [25] Chen K, Yin S, Wang X, Lin Q, Duan H, Zhang Z, Chang Y, Gu Y, Wu M, Wu N and Liu C. Effect of extracorporeal shock wave therapy for rotator cuff tendonitis: a protocol for systematic review and meta-analysis. *Medicine (Baltimore)* 2020; 99: e22661.
- [26] Scharf A, Holmes SP, Thoresen M, Mumaw J, Stumpf A and Peroni J. MRI-based assessment of intralesional delivery of bone marrow-derived mesenchymal stem cells in a model of equine tendonitis. *Stem Cells Int* 2016; 2016: 8610964.
- [27] Fujieda Y, Ninagawa K, Matsui Y, Kono M, Kamishima T, Iwasaki N and Atsumi T. Non-tuberculosis mycobacterium tenosynovitis with rice bodies in a patient with systemic lupus erythematosus. *Intern Med* 2020; 59: 2317-2320.
- [28] Walker-Bone K, Palmer KT, Reading I, Coggon D and Cooper C. Prevalence and impact of musculoskeletal disorders of the upper limb in the general population. *Arthritis Rheum* 2004; 51: 642-651.
- [29] Ta KT, Eidelman D and Thomson JG. Patient satisfaction and outcomes of surgery for de Quervain's tenosynovitis. *J Hand Surg Am* 1999; 24: 1071-1077.
- [30] Caillault L, Coiffier G, Robin F, Droitcourt C and Lescoat A. Sclerosing tenosynovitis in a patient with pan-sclerotic morphea. *Joint Bone Spine* 2022; 89: 105421.
- [31] Kahn M and Fleece M. Rice bodies in tenosynovitis due to psoriatic arthritis. *N Engl J Med* 2022; 387: e14.