



Ankylosing spondylitis rehabilitation publications and the global productivity: a Web of Science-based bibliometric analysis (2000–2019)

Ahmet Akyol¹ · Burhan Fatih Kocyigit²

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Abstract

Rehabilitation programs have an important place in the treatment of ankylosing spondylitis (AS), but there is no comprehensive bibliometric research that assesses publications on AS rehabilitation in a holistic way. The aim of this study was to investigate the quantity and quality of articles related to AS rehabilitation and to reveal the features of global productivity in this topic. This bibliometric study was conducted utilizing the Web of Science (WoS) database with the keywords ‘ankylosing spondylitis rehabilitation’, ‘ankylosing spondylitis exercise’, ‘ankylosing spondylitis physical therapy’ and ‘ankylosing spondylitis physiotherapy’. The number of articles, citations, and main active countries were determined and trend analyses were performed. A total of 792 articles were reviewed. The articles originated from 51 different countries, 22 of which met the main active country criteria. A significant increase trend was detected in the number of articles between 2000 and 2019 ($p < 0.001$). The five most productive countries were Germany ($n = 111$; 14.02%), Turkey ($n = 98$; 12.37%), the United States ($n = 71$; 8.96%), the United Kingdom ($n = 53$; 6.69%) and the Netherlands ($n = 53$; 6.69%). The highest values in number of articles per million population were calculated in Norway, the Netherlands and Austria, respectively. In the analysis according to GDP, Norway, the Netherlands and Turkey were ranked as the first three. The top three countries for the average citation count were France, Netherlands and Germany. This bibliometric study can be considered as an assessment and summary of worldwide scientific production on AS rehabilitation. The data demonstrate an increasing trend in research productivity since 2000. European countries were seen to be at the forefront both quantitatively and qualitatively in this area.

Keywords Ankylosing spondylitis · Rehabilitation · Bibliometric analysis · Articles · Web of Science

Introduction

Ankylosing spondylitis (AS) is a progressive rheumatic disorder with chronic inflammation, predominantly affecting the axial skeleton, with potential involvement of peripheral joints, entheses, and extra-articular regions [1]. AS gradually induces new bone formation, syndesmophytes, and

ankylosis, resulting in structural damage which leads to difficulty in daily living activities and deterioration in quality of life [2, 3]. Non-pharmacological treatment options, especially exercise programs are an integral part of the AS treatment [4].

Bibliometric analysis is a tool that statistically evaluates articles published in a specific subject or field within a certain date range [5]. Nowadays, when the literature is rapidly expanding, bibliometric analysis presents objective and practical data on scientific outcome. It allows the comparison of various scientific data between countries, institutions and researchers, and temporal trend analysis of data can be assessed [6]. Bibliometric analysis presents summarized data in a specific area, and researchers can reveal novel perspectives by evaluating past and current data [7].

Although there have been bibliometric studies on different rheumatic diseases such as AS, Sjögren’s syndrome, psoriatic arthritis and Behçet disease, a comprehensive

✉ Ahmet Akyol
ahmetakyol07@gmail.com

Burhan Fatih Kocyigit
bfk2701@hotmail.com

¹ Physiotherapy and Rehabilitation Application and Research Center, Hasan Kalyoncu University, Gaziantep, Turkey

² Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Kahramanmaraş Sütçü İmam University, Kahramanmaraş, Turkey

bibliometric study summarizing and presenting research on AS rehabilitation has not been carried out as yet [8–11]. Considering the role of rehabilitation and exercise programs in the treatment of AS, this deficiency creates an important gap in the literature. It is substantial to reveal the 20-year course of articles related to AS rehabilitation. Thus, it is ensured that trends in research activities are evaluated over time. Our study allows to assess the worldwide interest in this particular topic. The data may raise awareness in the background countries and present supporting argument for health policies, such as directly increasing resources in the field of AS rehabilitation. Researchers can contact and collaborate with authors or institutions active in AS rehabilitation. Therefore, the aim of this study was to assess scientific articles on AS rehabilitation quantitatively and qualitatively through the Web of Science (WoS) database. It was also aimed to identify the most influential studies by performing bibliometric analysis of scientific articles on AS rehabilitation.

Materials and methods

The methodology of this study was planned with reference to similar studies in the literature [8, 12, 13]. Bibliometric data were extracted using the WoS database. The WoS is a reliable database frequently used by researchers to obtain citation data and other academic impact information. In addition, this database was preferred as it has often been used in similar bibliometric studies in the literature [14–16]. A topic search was made with the keywords ‘ankylosing spondylitis rehabilitation’, ‘ankylosing spondylitis exercise’, ‘ankylosing spondylitis physical therapy’ and ‘ankylosing spondylitis physiotherapy’ used for the listing of articles. The date range was January 2000–December 2019.

The articles were recorded by two researchers (AA and BFK) (access date: 29.09.2020), duplicated articles were removed, and a data pool was created. Only original articles and reviews were obtained from the data pool and other types of publications such as case reports, book chapters, meeting abstracts, scientific letters, editorial papers and corrections were not used for the further analyses [17, 18]. The total number of articles, year of article, country where the article was sourced and citation data were noted. Indexing status in Science Citation Index Expanded (SCIE) and Emerging Sources Citation Index (ESCI) was noted for each journal. In addition, SCIE journals were recorded as quarter 1 (Q1), quarter 2 (Q2), quarter 3 (Q3) and quarter 4 (Q4). The total number of articles published each year from 2000 to 2019 was evaluated. The method in similar studies was used to determine the country of studies with authors from different countries and the corresponding author’s country was considered as the country of the article [9]. The

population size and gross domestic product (GDP) data of each country were extracted from ‘<https://www.cia.gov/library/publications/the-world-factbook>’ and the number of articles was evaluated based on these data. The total number of articles and citations of the countries were calculated. The average citation count was obtained by dividing the total number of citations by the total number of articles for each country. The countries were separated into four groups as defined by the World Bank: high-income, upper middle-income, low-middle-income, and low-income.

Countries providing 1% or more of the total number of articles within the specified date range were classified as main active countries [19, 20]. The contribution rate of main active countries was calculated through the formula of ‘number of articles per country/total number of articles’.

The five most productive countries and the top five journals were determined based on the number of articles published. The five most productive countries for each journal in the top five were determined according to the number of articles.

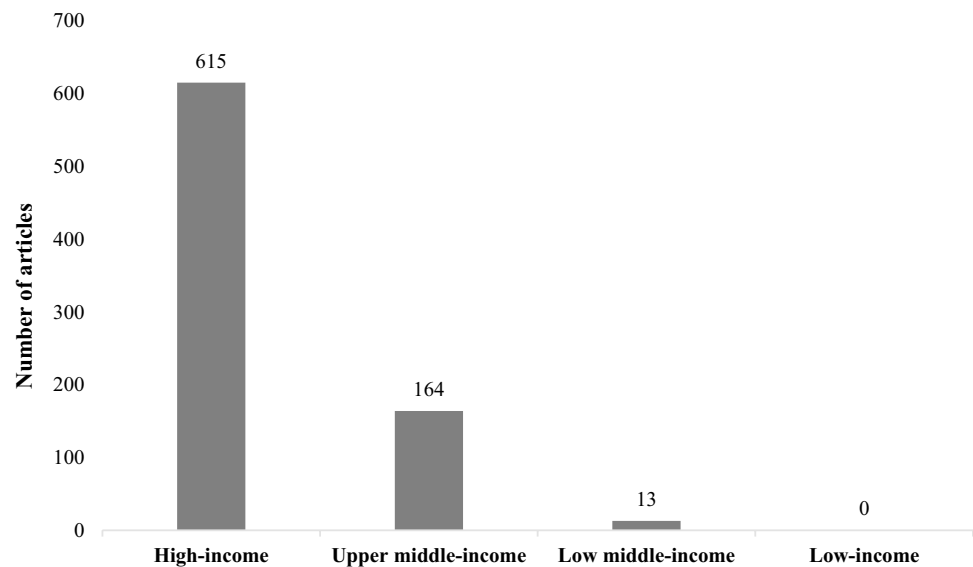
Statistical analysis

The bibliometric analysis was performed using the Statistical Package for the Social Sciences version 20.0 software (SPSS Inc., Chicago, IL, USA). Data were expressed as number (*n*) and percentage (%). Regression analysis was performed to determine the yearly trend of the number of articles between 2000 and 2019. A value of $p < 0.05$ was accepted as statistically significant.

Results

From the search using the 4 keywords, a total of 1068 publications were identified. These 4 keywords were selected to cover all publications related to AS rehabilitation. Original articles, and reviews were selected from these articles; duplicated and irrelevant papers were excluded. Finally, a total of 792 articles were acquired for analysis. When the trend analysis of the number of articles over the years was performed, a statistically significant increase was detected ($p < 0.001$) (number of articles in 2000 = 15; number of articles in 2019 = 69; a 4.6-fold increase). The articles originated from 51 different countries, 22 of which met the main active country criteria. High-income countries provided more than three quarters of the articles ($n = 615$; 77.65%), followed by upper middle-income countries ($n = 164$; 20.71%) and lower middle-income countries ($n = 13$; 1.64%). No article on this topic was identified from low-income countries (Fig. 1).

The five most productive countries were listed as follows: Germany ($n = 111$; 14.02%), Turkey ($n = 98$; 12.37%), the

Fig. 1 Number of articles in the country classification groups

United States ($n = 71$; 8.96%), the United Kingdom ($n = 53$; 6.69%) and the Netherlands ($n = 53$; 6.69%) (Fig. 2). An increasing trend in the number of articles was detected in Turkey (number of articles in 2000 = 1; number of articles in 2019 = 8), the United States (number of articles in 2000 = 2; number of articles in 2019 = 8) and the United Kingdom (number of articles in 2000 = 1; number of articles in 2019 = 4) ($p < 0.05$). Germany (number of articles in 2000 = 5; number of articles in 2019 = 7) and the Netherlands (number of articles in 2000 = 0; number of articles in 2019 = 1) were seen to have a stable course over the years in terms of the number of articles ($p > 0.05$).

The contribution rates of the five most productive countries between 2000 and 2019 are shown in Table 1. Germany, which ranked first in total contribution rate, has declined in

the last 2 years, whereas in 2018, the United Kingdom and the United States, and in 2019, Turkey and the United States came to the fore.

A total of 22 countries were found to be in the main active country group in terms of articles related to AS rehabilitation. This country group provided more than four-fifths of the total number of articles ($n = 706$, 89.14%). Of these countries, 19 were in the high-income group, and 3 (Turkey, China and Brazil) were in the upper middle-income group. The number of articles produced by low middle-income and low-income countries did not reach the active country level.

The number of articles were adjusted for per million population and GDP. The highest values per million population were calculated in Norway (6.04), the Netherlands (3.06) and Austria (2.15), respectively. In the analysis according

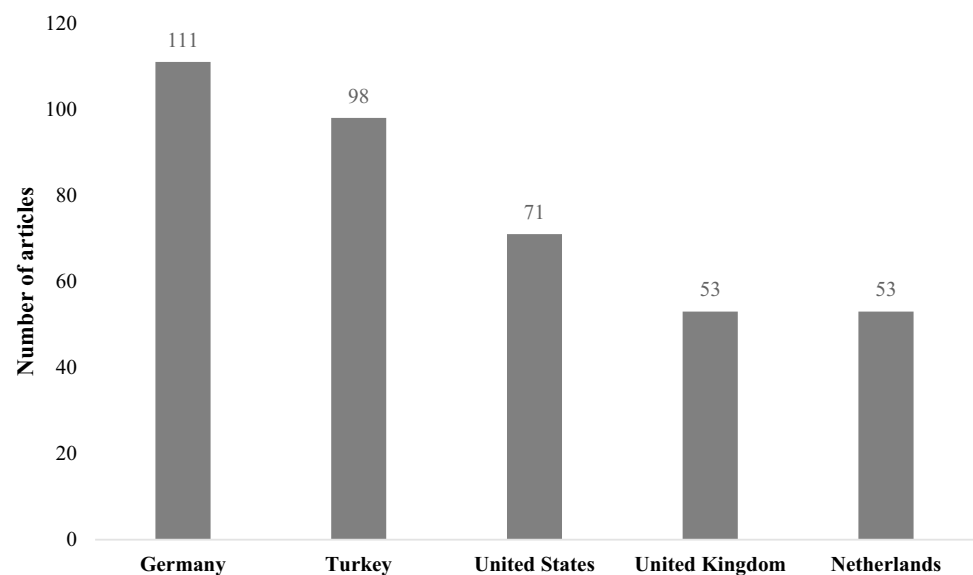
Fig. 2 Number of articles in the five most productive countries

Table 1 Contribution rate of the five most productive countries between 2000 and 2019

Year	Germany (%)	Turkey (%)	United States (%)	United Kingdom (%)	Netherlands (%)
2000	33.33	6.66	20	6.66	0
2001	30	0	10	0	10
2002	15.78	0	10.52	10.52	31.57
2003	31.57	5.26	5.26	5.26	5.26
2004	20.83	8.33	8.33	12.50	8.33
2005	15.62	21.87	9.37	3.12	12.50
2006	28.57	10.71	17.85	3.57	10.71
2007	9.37	12.50	9.37	3.12	9.37
2008	23.07	12.82	10.25	5.12	5.12
2009	14.28	16.66	9.52	2.38	16.66
2010	12.50	12.50	3.12	12.50	6.25
2011	13.15	26.31	13.15	0	5.26
2012	10	10	2	6	10
2013	20.83	14.58	6.25	10.41	4.16
2014	13.11	14.75	6.55	6.55	4.91
2015	8	6	6	8	10
2016	5.08	11.86	8.47	1.69	1.69
2017	13.63	13.63	10.60	10.60	3.03
2018	5.08	10.16	11.86	13.55	1.69
2019	10.14	11.59	11.59	5.79	1.44

%Percentage

to GDP, Norway (8.68), the Netherlands (5.76) and Turkey (4.86) took the first three places. The top three countries for the average citation count were France (41.69), the Netherlands (39.90) and Germany (34.87). These data are presented in Table 2.

A total of 610 (77.02%) papers were original articles and 182 (22.98%) were review articles. The average number of citations for both article types was evaluated, and calculated as 20.41 for original articles and 32.91 for review articles.

SCIE journals published the majority of articles ($n=719$; 90.78% for SCIE journals and $n=73$; 9.22% for ESCI journals). The average citation count was 25.20 for articles published in SCIE journals and 4.40 for ESCI journals. In addition, 161 (22.39%) articles were published in Q1 SCIE journals, 208 (28.93%) in Q2 SCIE journals, 184 (25.59%) in Q3 SCIE journals and 166 (23.09%) in Q4 SCIE journals.

The five most active journals in the five most productive countries were identified. The first ranked journals for Germany, Turkey, the United States, the United Kingdom and the Netherlands were determined as *Aktuelle Rheumatologie (Aktuelle Rheumatol)*, *Rheumatology International (Rheumatol Int)*, *Arthritis Care and Research (Arthritis Care Res)*, and *Rheumatology and Arthritis Care Res*, respectively (Table 3).

The five journals which published the highest number of articles on AS rehabilitation were *Journal of Rheumatology (J Rheumatol)* ($n=55$, 6.94%), *Clinical Rheumatology*

(*Clin Rheumatol*) ($n=50$, 6.31%), *Rheumatol Int* ($n=45$, 5.68%), *Arthritis Care Res* ($n=37$, 4.67%), and *Rheumatology* ($n=31$, 3.91%). The five most active countries in these five journals are presented in Table 4. The countries ranked first for each journal are as follows: Canada in *J Rheumatol*, Turkey in *Clin Rheumatol*, Turkey in *Rheumatol Int*, the Netherlands in *Arthritis Care Res* and the United Kingdom in *Rheumatology*. No country was on the list of all five journals. The United States, the United Kingdom and the Netherlands were on the lists of four journals.

Following the exclusion criteria, it was identified that 45 (5.68%) articles were published in *Rheumatol Int*. Total number of citations was 1275 and average number of citations per article was calculated as 28.33. Articles providing from 18 different countries were determined. A total of 24 (53.33%) articles were provided from high-income countries and 21 articles (46.66%) upper middle-income countries. The top five countries in *Rheumatol Int* were Turkey ($n=16$, 35.55%), United Kingdom ($n=3$, 6.66%), Germany ($n=3$, 6.66%), China ($n=3$, 6.66%) and Italy ($n=3$, 6.66%).

Discussion

It is necessary to identify and interpret worldwide research productivity trends in specific areas to assess scientific progress and manage resources in the most appropriate way.

Table 2 The main active countries between 2000 and 2019

Country	<i>n</i> (%)	<i>n</i> ^a	<i>n</i> ^b	Total citations	Average citations
Germany	111 (14.01)	1.38	2.76	3871	34.87
Turkey	98 (12.37)	1.19	4.86	1723	17.58
United States	71 (8.96)	0.21	0.36	2333	32.85
United Kingdom	53 (6.69)	0.81	1.82	932	17.58
Netherlands	53 (6.69)	3.06	5.76	2115	39.90
China	36 (4.55)	0.03	0.14	224	6.22
Italy	36 (4.55)	0.57	1.55	759	21.08
Canada	34 (4.29)	0.90	1.92	973	28.61
Norway	33 (4.17)	6.04	8.68	1055	31.96
France	26 (3.28)	0.38	0.91	1084	41.69
Spain	24 (3.03)	0.48	1.36	351	14.63
Austria	19 (2.40)	2.15	4.32	216	11.36
Sweden	17 (2.15)	1.67	3.33	250	14.71
Australia	16 (2.02)	0.63	0.06	171	10.68
Brazil	15 (2.20)	0.07	0.46	252	16.80
South Korea	10 (1.26)	0.19	0.49	137	13.70
Switzerland	10 (1.26)	1.19	1.92	266	26.60
Taiwan	10 (1.26)	0.42	0.85	116	11.60
Romania	9 (1.14)	0.42	1.88	92	10.22
Denmark	9 (1.14)	1.54	3.21	86	9.56
Portugal	8 (1.01)	0.78	2.58	49	6.13
Belgium	8 (1.01)	0.68	1.54	67	8.38

n: number of articles, %: percentage,

n^a: number of articles per million population, *n*^b: number of articles per \$ 100 billion gross domestic product

Table 3 The five most active journals in the five most productive countries

Rank	Germany (<i>n</i>)	Turkey (<i>n</i>)	United States (<i>n</i>)	United Kingdom (<i>n</i>)	Netherlands (<i>n</i>)
1	<i>Aktuelle Rheumatol</i> (23)	<i>Rheumatol Int</i> (16)	<i>Arthritis Care Res</i> (7)	<i>Rheumatology</i> (9)	<i>Arthritis Care Res</i> (8)
2	<i>Z Rheumatol</i> (22)	<i>Clin Rheumatol</i> (13)	<i>Curr Opin Rheumatol</i> (6)	<i>J Rheumatol</i> (6)	<i>Ann Rheum Dis</i> (7)
3	<i>Ann Rheum Dis</i> (7)	<i>Arch Rheumatol</i> (11)	<i>J Rheumatol</i> (6)	<i>Musculoskeletal Care</i> (4)	<i>J Rheumatol</i> (6)
4	<i>Phys Medizin Rehabilitationsmedizin Kurortmedizin</i> (6)	<i>J Clin Rheumatol</i> (4)	<i>Ann Rheum Dis</i> (3)	<i>Arthritis Care Res</i> (3)	<i>Rheumatology</i> (5)
5	<i>J Rheumatol</i> (5)	<i>J Back Musculoskelet Rehabil</i> (4)	<i>Clin Exp Rheumatol</i> (3)	<i>BMC Musculoskelet Disord</i> (3)	<i>Arthritis Res Ther</i> (4)

n: number of articles

Aktuelle Rheumatol: Aktuelle Rheumatologie, *Z Rheumatol*: Zeitschrift für Rheumatologie, *Ann Rheum Dis*: Annals of the Rheumatic Diseases, *Phys Medizin Rehabilitationsmedizin Kurortmedizin*: Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, *J Rheumatol*: Journal of Rheumatology, *Rheumatol Int*: Rheumatology International, *Clin Rheumatol*: Clinical Rheumatology, *Arch Rheumatol*: Archives of Rheumatology, *J Clin Rheumatol*: Journal of Clinical Rheumatology, *J Back Musculoskelet Rehabil*: Journal of Back and Musculoskeletal Rehabilitation, *Arthritis Care Res*: Arthritis Care and Research, *Curr Opin Rheumatol*: Current Opinion in Rheumatology, *Clin Exp Rheumatol*: Clinical and Experimental Rheumatology, *BMC Musculoskelet Disord*: BMC Musculoskeletal Disorders, *Arthritis Res Ther*: Arthritis Research and Therapy

The current study is the first to use a bibliometric method to assess the contributions of different locations in the world to research in AS rehabilitation. The number of articles published in the field of AS rehabilitation has increased over the course of 20 years, indicating that researchers and journals have increased interest in AS rehabilitation. High-income

countries were seen to have produced the majority of the articles on this topic, and 19 out of 22 main active countries were in the high-income country category. This is not a surprising result, as the relationship between the economic size of countries and scientific productivity has previously been emphasized in the literature [21].

Table 4 Top five countries in the five most active journals

Rank	<i>J Rheumatol</i> (n)	<i>Clin Rheumatol</i> (n)	<i>Rheumatol Int</i> (n)	<i>Arthritis Care Res</i> (n)	<i>Rheumatology</i> (n)
1	Canada (14)	Turkey (13)	Turkey (16)	Netherlands (8)	United Kingdom (9)
2	United States (7)	China (7)	United Kingdom (3)	United States (7)	Netherlands (5)
3	United Kingdom (6)	Netherlands (3)	Germany (3)	Canada (6)	Italy (3)
4	Netherlands (6)	United States (3)	Italy (3)	France (3)	United States (2)
5	Germany (5)	Czechia (3)	China (3)	United Kingdom (3)	Germany (2)

n: number of articles

J Rheumatol: Journal of Rheumatology, *Clin Rheumatol*: Clinical Rheumatology, *Rheumatol Int*: Rheumatology International, *Arthritis Care Res*: Arthritis Care and Research

The fact that the five most productive countries in AS rehabilitation were Germany, Turkey, the United States, the United Kingdom and the Netherlands demonstrated that economic and development levels of the countries were effective determinants. Of these countries, only Turkey is not in the high-income group. The interest of physical medicine and rehabilitation specialists in rheumatology may be the reason for the high number of articles provided from Turkey. This result also shows that European countries are at the forefront in the field of AS rehabilitation.

Germany was seen to rank first in terms of the total number of citations. Although this can be explained by the fact that it is the country with the highest total number of articles, the effect of being the third in the number of average citations is also significant. This result reveals that Germany produced a higher number of articles without sacrificing quality.

Although France was 10th in terms of number of articles, it ranked first in the average citation numbers, followed by the Netherlands and Germany. This suggests that European countries are at the forefront not only quantitatively but also qualitatively.

The number of articles produced by high-income and non-high-income countries has been proportioned in similar bibliometric studies, and it has been emphasized that this ratio is 90/10 in favor of high-income countries [22]. Although the current study determined the dominance of high-income countries, it did not reach this ratio, which was due particularly to Turkey which was ranked second in terms of the number of articles, and China and Brazil. The inadequacy of low-middle-income and low-income countries in producing articles can be attributed to policy makers not giving priority to research, limitations in research budgets, and a shortage of researchers.

After the results were adjusted according to population size, Norway, the Netherlands, and Austria were ranked as the top three. In the analyses based on GDP, Norway, the Netherlands and Turkey took the first three places. This suggests that relatively small European countries have superiority in completely utilizing their researchers and

funds, and find the optimum way to use human resources and budgets.

The fact that more than 90% of the articles were published in SCIE journals showed that SCIE journals dominate AS rehabilitation-related research. The articles published in journals indexed in SCIE and ESCI were evaluated in terms of average citation numbers and the results were in favor of articles published in SCIE journals (25.20 vs 4.40). The SCIE journals were not only numerically superior, but there was also a striking difference from ESCI journals in terms of quality. ESCI journal editors should strive to reduce this gap, be more selective, and prioritize quality. Although the number of articles published in Q1, Q2, Q3 and Q4 SCIE journals showed a relatively balanced distribution, the lowest rate was detected in Q1 journals, although the difference was minimal. Researchers interested in AS rehabilitation should plan articles with higher quality and accurate methodology that can be published in Q1 journals.

The five most active journals in the five most productive countries were identified as *Aktuelle Rheumatol* in Germany, *Rheumatol Int* in Turkey, *Arthritis Care Res* in the United States, *Rheumatology* in the United Kingdom and *Arthritis Care Res* in the Netherlands. As in previous studies, these results suggest that journals give priority to articles sourcing from their respective countries [8, 9]. *Aktuelle Rheumatol*—Germany, *Arthritis Care Res*—United States, and *Rheumatology*—UK relationships support this interpretation. In addition, researchers may prefer submitting articles to journals in their region, and past habits may have led to this result.

The five journals which published highest number of articles on AS rehabilitation were *J Rheumatol*, *Clin Rheumatol*, *Rheumatol Int*, *Arthritis Care Res*, and *Rheumatology*. The interesting point is that a rehabilitation journal did not publish articles at the level to be included in this list. This may be due to the fact that rehabilitation journals do not prioritize rheumatological rehabilitation, and researchers may have preferred rheumatology journals in this field. The countries ranked first for each journal were Canada in *J Rheumatol*, Turkey in *Clin Rheumatol*, Turkey in *Rheumatol*

Int, the Netherlands in *Arthritis Care Res* and the United Kingdom in *Rheumatology*. The United States, the United Kingdom and the Netherlands were on the lists of four journals. These results showed the impact of these countries on academic productivity related to AS rehabilitation. The reason why Germany, which ranked first in the number of articles, was not in the first place of any of the five journals, is that the authors preferred Germany-based journals such as *Aktuelle Rheumatol* and *Zeitschrift für Rheumatologie (Z Rheumatol)*.

This study had some limitations. The literature review was performed using the WoS database and no other database was used. If a different database, such as Google Scholar or Scopus had been integrated into the study, the results may have been different. WOS was preferred because it is the most reliable database for citations and has been frequently utilized in similar bibliometric analysis. Only articles in English were reviewed. Although articles published before 1990 were not evaluated, an analysis of 20 years was considered sufficient. The self-citations could not be removed from the citation data pool, and there was no evaluation of authors and institutions as the data were large and complex. Despite all these limitations, given the comprehensive, scientific and objective methodology performed, the data of this study can be considered to provide an accurate perspective on worldwide research productivity in the field of AS rehabilitation.

Conclusion

Between 2000 and 2019, the number of AS rehabilitation articles showed a significant increasing trend from year to year. Nearly all of the articles were provided by high-income and upper middle-income countries. European countries are at the forefront both quantitatively and qualitatively in the field of AS rehabilitation, and this field is dominated by rheumatology journals rather than rehabilitation journals. With these results, countries that provide fewer articles in the field of AS rehabilitation have emerged. Health management authorities in these countries can increase funding and support on AS rehabilitation researches. To overcome this deficiency, researchers can contact leading institutions and authors on AS rehabilitation and plan collaborations. Thus, it may be possible to share experiences. The results can raise awareness in journal editors. Editors may give priority to articles related to AS rehabilitation, particularly in journals with low number of articles in this field.

Author contributions BFK designed the study. AA and BFK reviewed the articles and provided the data. BFK analyzed the data. AA contributed the analysis tools. AA and BFK authored and reviewed drafts of

the paper. BFK prepared the tables. AA and BFK approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Compliance with ethical standards

Conflict of interest The authors declare no conflicts of interest.

Ethical approval No human participants/animals were evaluated. These data are public. Therefore, there was no requirement for ethics committee approval.

References

1. Bilgin E, Bilgin E, Özdemir O, Kalyoncu U (2020) Temporomandibular disorders in ankylosing spondylitis: a cross-sectional, monocentric study. *Rheumatol Int* 40:933–940. <https://doi.org/10.1007/s00296-020-04563-y>
2. Hwang MC, Lee MJ, Gensler LS, Ward MM, Brown MA, Eisen S, Learch TJ, Tahanan A, Rahbar MH, Ishimori ML, Weisman MH, Reveille JD (2020) Longitudinal associations between depressive symptoms and clinical factors in ankylosing spondylitis patients: analysis from an observational cohort. *Rheumatol Int* 40:1053–1061. <https://doi.org/10.1007/s00296-020-04544-1>
3. Acar Y, İlçin N, Gürpınar B, Can G (2019) Core stability and balance in patients with ankylosing spondylitis. *Rheumatol Int* 39:1389–1396. <https://doi.org/10.1007/s00296-019-04341-5>
4. Coşkun Benlidayı İ (2020) What are the potential benefits and harms of exercise programs for patients with ankylosing spondylitis? A Cochrane review summary with commentary. *Turk J Phys Med Rehabil* 66:84–87. <https://doi.org/10.5606/tftrd.2020.6041>
5. Kiraz M, Demir E (2020) A bibliometric analysis of publications on spinal cord injury during 1980–2018. *World Neurosurg* 136:e504–e513. <https://doi.org/10.1016/j.wneu.2020.01.064>
6. Kutluk MG, Danis A (2021) Bibliometric analysis of publications on pediatric epilepsy between 1980 and 2018. *Childs Nerv Syst* 37:617–626. <https://doi.org/10.1007/s00381-020-04897-9>
7. Danis A, Kutluk MG (2020) The evolution of cerebral palsy publications and global productivity: a bibliometric analysis between 1980 and 2019. *Acta Neurol Belg*. <https://doi.org/10.1007/s13760-020-01549-2>
8. Zhao X, Chen J, Pan Y, Feng H, Meng B, Meng Y (2019) A bibliometric analysis of the global research in ankylosing spondyloarthritis (2008–2017). *Rheumatol Int* 39:1091–1097. <https://doi.org/10.1007/s00296-019-04308-6>
9. Akyol A, Kocyigit BF (2020) Publication activity in the field of Sjögren's syndrome: a ten-year Web of Science based analysis. *Rheumatol Int*. <https://doi.org/10.1007/s00296-020-04714-1>
10. Berlinberg A, Bilal J, Riaz IB, Kurtzman DJB (2019) The 100 top-cited publications in psoriatic arthritis: a bibliometric analysis. *Int J Dermatol* 58:1023–1034. <https://doi.org/10.1111/ijd.14261>
11. Şenel E, Demir E, Alkan RM (2017) Bibliometric analysis on global Behçet disease publications during 1980–2014: is there a Silk Road in the literature? *J Eur Acad Dermatol Venereol* 31:518–522. <https://doi.org/10.1111/jdv.13897>
12. Lei J, Zhao X, Xu B, Duan Z, Shen Z, Yang H, Jiao G, Ouyang Q TJ (2018) Global scientific productivity in the field of PET: a 10-year survey of research activities. *Nucl Med Commun* 39:277–282. <https://doi.org/10.1097/MNM.0000000000000805>
13. Lee IS, Lee H, Chen YH, Chae Y (2020) Bibliometric analysis of research assessing the use of acupuncture for pain treatment over

- the past 20 years. *J Pain Res* 13:367–376. <https://doi.org/10.2147/JPR.S235047>
14. Zhang H, Fan Y, Wang R, Feng W, Chen J, Deng P, Qi X, Ye P, Li Y, Li J, Zeng J, Zeng Y (2020) Research trends and hotspots of high tibial osteotomy in two decades (from 2001 to 2020): a bibliometric analysis. *J Orthop Surg Res* 15:512. <https://doi.org/10.1186/s13018-020-01991-1>
 15. Paolino L, Pravettoni R, Epaud S, Ortala M, Lazzati A (2020) Comparison of surgical activity and scientific publications in bariatric surgery: an epidemiological and bibliometric analysis. *Obes Surg* 30:3822–3830. <https://doi.org/10.1007/s11695-020-04703-0>
 16. Chen T, Zhu J, Zhao Y, Li H, Li P, Fan J, Wei X (2021) The global state of research in pain management of osteoarthritis (2000–2019): a 20-year visualized analysis. *Medicine (Baltimore)* 100:e23944. <https://doi.org/10.1097/MD.00000000000023944>
 17. Zhang J, Chen X, Gao X, Yang H, Zhen Z, Li Q, Lin Y, Zhao X (2017) Worldwide research productivity in the field of psychiatry. *Int J Ment Health Syst* 11:20. <https://doi.org/10.1186/s13033-017-0127-5>
 18. O'Neill CJ, Cassar-Gheiti AJ, Harty JA (2019) Arthroplasty and global research output: a bibliometric analysis. *J Orthop* 17:187–192. <https://doi.org/10.1016/j.jor.2019.06.017>
 19. Zhao X, Ye R, Zhao L, Lin Y, Huang W, He X, Lian F, Tong X (2015) Worldwide research productivity in the field of endocrinology and metabolism—a bibliometric analysis. *Endokrynol Pol* 66:434–442. <https://doi.org/10.5603/EP.2015.0054>
 20. Wang B, Zhao P (2018) Worldwide research productivity in the field of back pain: a bibliometric analysis. *Medicine (Baltimore)* 97:e11566. <https://doi.org/10.1097/MD.00000000000011566>
 21. Demir E, Comba A (2020) The evolution of celiac disease publications: a holistic approach with bibliometric analysis. *Iran J Med Sci* 189:267–276. <https://doi.org/10.1007/s11845-019-02080-x>
 22. Saxena S, Paraje G, Sharan P, Karam G, Sadana R (2006) The 10/90 divide in mental health research: trends over a 10-year period. *Br J Psychiatry* 188:81–82. <https://doi.org/10.1192/bjp.bp.105.011221>

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