Publications on basketball sport: A bibliometric analysis

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Abstract: *The goal of the study is to conduct bibliometric analysis on 4496 studies, 14108 authors, and 903 sources (journals, books, etc.) with the word "basketball" in the article title that were published within the SCI-Expanded framework between the years 2000 and 2023 regarding football matches in order to identify current trends.*

In this context, a scanning was made under the title of "basketball" in the Web of Science Core Collection database and bibliometric data were obtained. The studies were examined in terms of the number of publications, publication types, reference analyses, annual total citation per year, most frequent words, most local cited authors, most relevant affiliations, and most relevant sources.

According to the results of the analysis, the journals publishing the highest number of articles regarding "basketball" are respectively Journal of Strength and Conditioning Research, International Journal of Environmental Research and Public Health and Journal of Sports Sciences. The phrases humans, male, basketball, female, and adolescent, in that order, are most often used. In publications, these terms were used respectively 3301, 2275, 2093, 1551, and 1403.

As a result, the rise in bibliometrics research can make a significant contribution by acting as a springboard for research in the subject of sport.

Keywords: Bibliometry, basketball, sport, publish.

I. INTRODUCTION

Basketball is a sport with occasional high intensity [1]. Whatever its classification, it is made up of four components that, like all others, must be considered and should be trainable. Basketball players are being prepared in this situation by honing their physical, technical, tactical, and psychological skills [2].

One of the peculiarities of this sport is that, in many ways, the level of individual training of players and teams is determined by the complexity, content, and circumstances of their actions. Basketball players' movements change and become more complicated throughout the course of the game as a result of the intense amount of work their muscles and musculoskeletal system must put in [3].

Professional basketball players constantly sprint, jump, land, pivot, and slide laterally, which is particularly taxing on their knees. Though several articles have recently been published discussing microfracture in amateur, professional, and certain leisure sports [4, 5], none have specifically addressed chondral injuries in professional basketball players.

Basketball players in their natural surroundings offer a singular opportunity to illustrate reinforcement learning in a repeated-choice context by highly motivated human specialists. Basketball players are frequently forced to make decisions in a challenging setting. The players go through years of intensive training geared at improving their decision-making processes, and they are highly motivated to make the right choices. Field goal attempts (FGAs) are particularly illuminating since a quantitative analysis may be done based on the binary outcome of these choices (made/missed). Moreover, depending on how close to the basket the player is, made FGAs in basketball are worth 2 or 3 points (pts) [6].

Youth can acquire data and conduct analyses that are directly related to their own better on-court performance using sports analytics, which offers a rigorous yet practical application of math and statistics. This makes it possible for students who aren't typically interested in STEM fields to be genuinely motivated to use STEM ideas as a training tool for basketball. [7] (2017) proposed the hypothesis that STEM would become more appealing as a job after it has been demonstrated that it could be applied to enhancing one's personal basketball skills.

The goal of this research is to determine the most common study topics of basketball sport, the most common time periods, and the most important publications of the chosen time period. This study is anticipated to contribute to the literature by throwing light on basketball-related studies.

II.   MATERIAL AND METHOD

To assess the studies taken into consideration for this study, the bibliometric analysis technique was used. The Web of Science core collection database and the publications indexed by the SCI-Expanded, SSCI, AHCI, and ESCI databases provided the study's data sources. Between 2000 and 2023, the term "basketball" was searched for. Only publications that addressed the topic at hand were spoken about in this study. 4496 entries were pulled from the database. For the bibliometric study, the R programming language's Bibliometrix package was utilized [8].

According to [9, 10] Broadus (1987) and Pritchard (1969), bibliometrics is a branch of library and information sciences that uses quantitative methods to analyze bibliographic data. Bibliometrics is frequently used to condense the most pertinent findings of a collection of bibliographic papers. An impartial, rigorous, and repeatable examination of academic outputs was provided by the bibliometric exploration, which utilized quantitative statistical approaches to the procured publications. This strategy included both a content-centric inquiry that clarified prevailing thematic undertones and research foci and a descriptive elucidation focusing on publishing metrics [11]. The complex dynamics, evolutionary trajectories, and emerging research nexuses within the relevant domain were painstakingly identified using the R package "bibliometrics" in conjunction (Chen et al., 2010; Chen, 2017).

III.   RESULTS

A total of 4496 publications about football were published, 3879 of which were articles, according to statistics from the WOS database. The study was written by 14108 writers (Table 1).

Table 1. Main information about data

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2000:2023
Sources (Journals, Books, etc.)	903
Documents	4496
Annual Growth Rate %	4,95
Document Average Age	7,64
Average citations per doc	0
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	2806
Author's Keywords (DE)	5379
AUTHORS	
Authors	14108
Authors of single-authored docs	185
AUTHORS COLLABORATION	
Single-authored docs	201
Co-Authors per Doc	4,8
International co-authorships %	0
DOCUMENT TYPES	
autobiography	1
biography	3
case reports	207
clinical study	3
clinical trial	68
comment	7

comparative study	259
controlled clinical trial	18
evaluation study	16
historical article	5
introductory journal article	1
journal article	3879
meta-analysis	5
observational study	6
randomized controlled trial	9
review	2
systematic review	7

When the phrase "basketball" is searched on September 8, 2023, 4496 entries are found in the Web of Science database. The years 2000 through 2023 are covered by this dataset (see Table 2 and Figure 1). Over that time, there were fluctuations in the number of publications per year. There were more papers published between 2014 and 2022. 432 investigations were done in 2022, the year with the greatest research.

Table 2. Distribution of publications by years

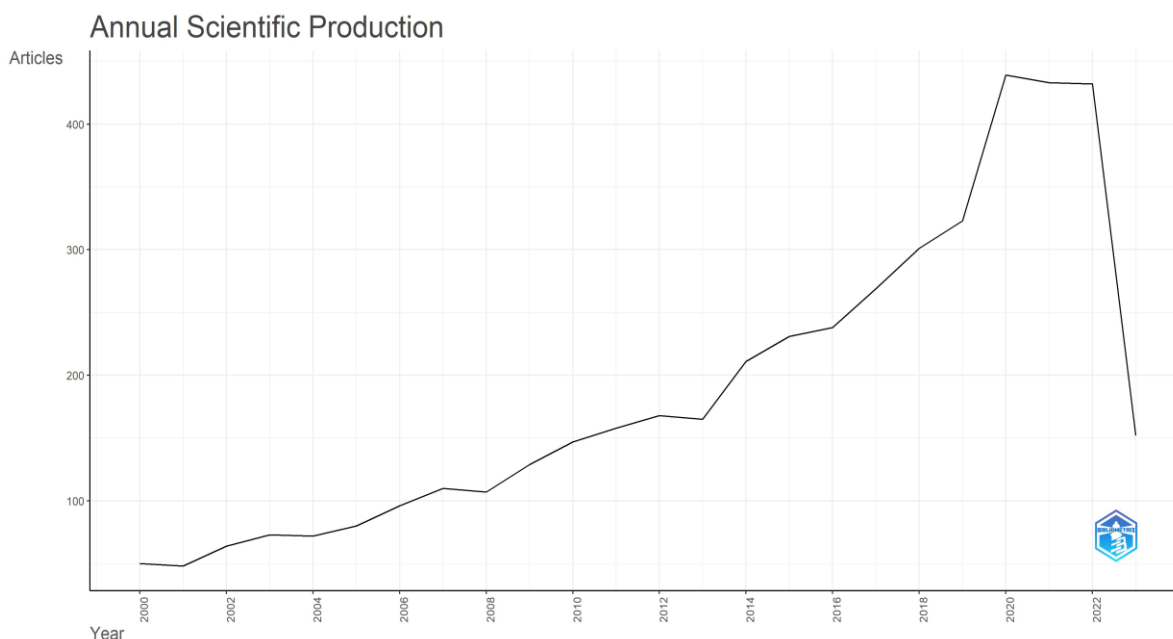| Year	Articles
2000	50
2001	48
2002	64
2003	73
2004	72
2005	80
2006	96
2007	110
2008	107
2009	129
2010	147
2011	158
2012	168
2013	165
2014	211
2015	231
2016	238
2017	269
2018	301
2019	323
2020	439
2021	433
2022	432
2023	152

Figure 1. Annual scientific production

Journal of Sports Sciences, with 275 articles, is the journal with the most publications published in the topic of football. This is followed by Journal of Strength and Conditioning Research which has 241 articles, International Journal of Environmental Research and Public Health, which has 146 articles, and Journal of Sports Sciences, which has 145 articles (Table 3, Figure 2).

Table 3. Number of most relevant sources

| Sources	Articles
Journal of Strength and Conditioning Research	241
International Journal of Environmental Research and Public Health	146
Journal of Sports Sciences	145
The American Journal of Sports Medicine	117
The Journal of Sports Medicine and Physical Fitness	105
Frontiers in Psychology	103
Orthopaedic Journal of Sports Medicine	97
Journal of Human Kinetics	95
International Journal of Sports Physiology and Performance	94
Journal of Athletic Training	92
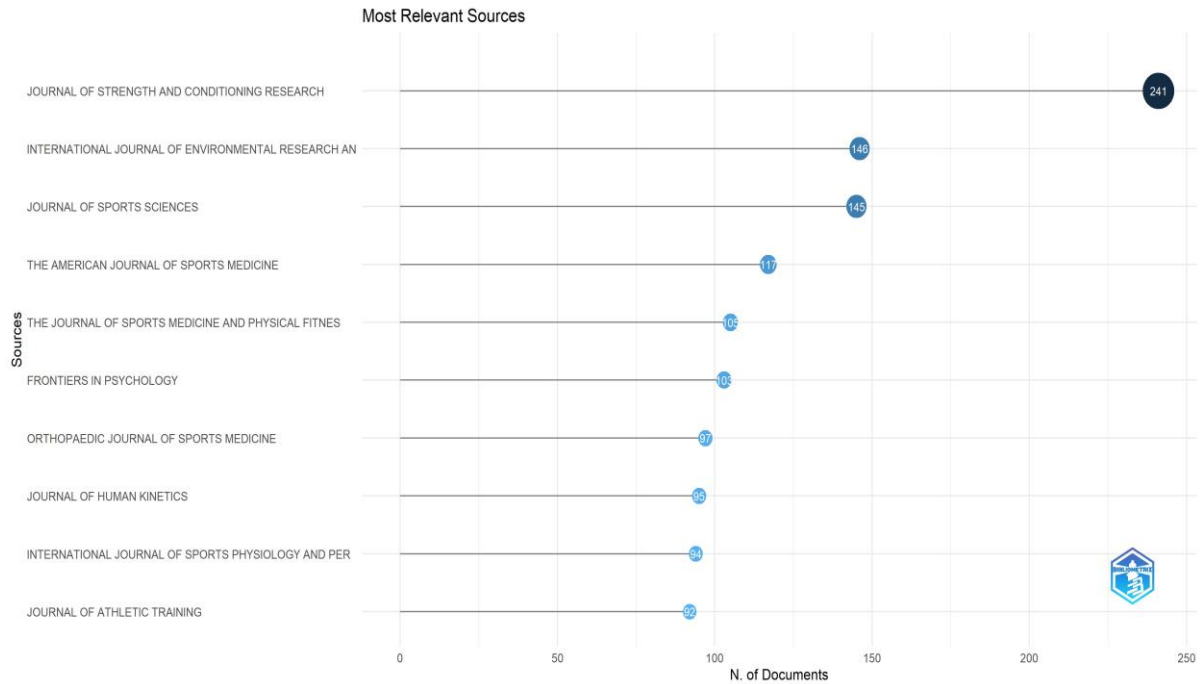
Figure 2. Number of documents most relevant sources

The number of publications made by the authors over time is presented in Table 4. Scallan AT broadcasts the most about football with 76 broadcasts. This was followed by Conte D with 48 studies and Hewett TE with 48 studies. The same information was played in Figure 3. These publications covered the period 2003-2023 (Table 4 and Figure 4).

Table 4. Author production over time

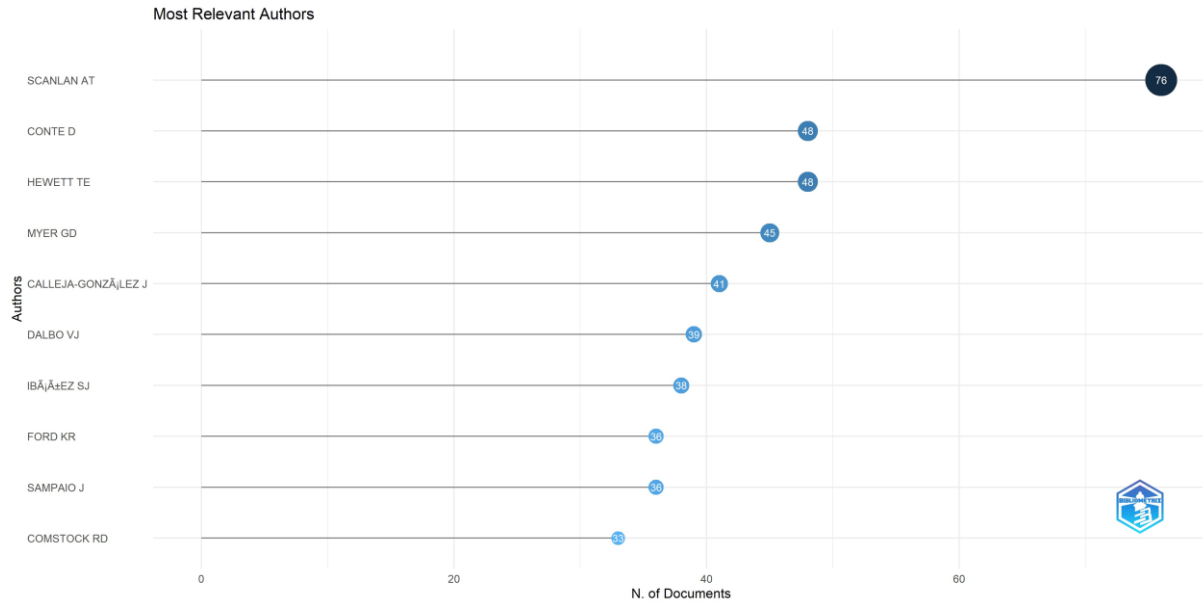| Author	Years	Frequency
CALLEJA-GONZÃ¡LEZ J	2012-2023	41
COMSTOCK RD	2007-2019	33
CONTE D	2014-2023	48
DALBO VJ	2011-2021	39
FORD KR	2003-2022	36
HEWETT TE	2015-2023	48
IBÃ¡ÃEZ SJ	2008-2023	38
MYER GD	2003-2022	45
SAMPAIO J	2005-2021	36
SCANLAN AT	2011-2022	76

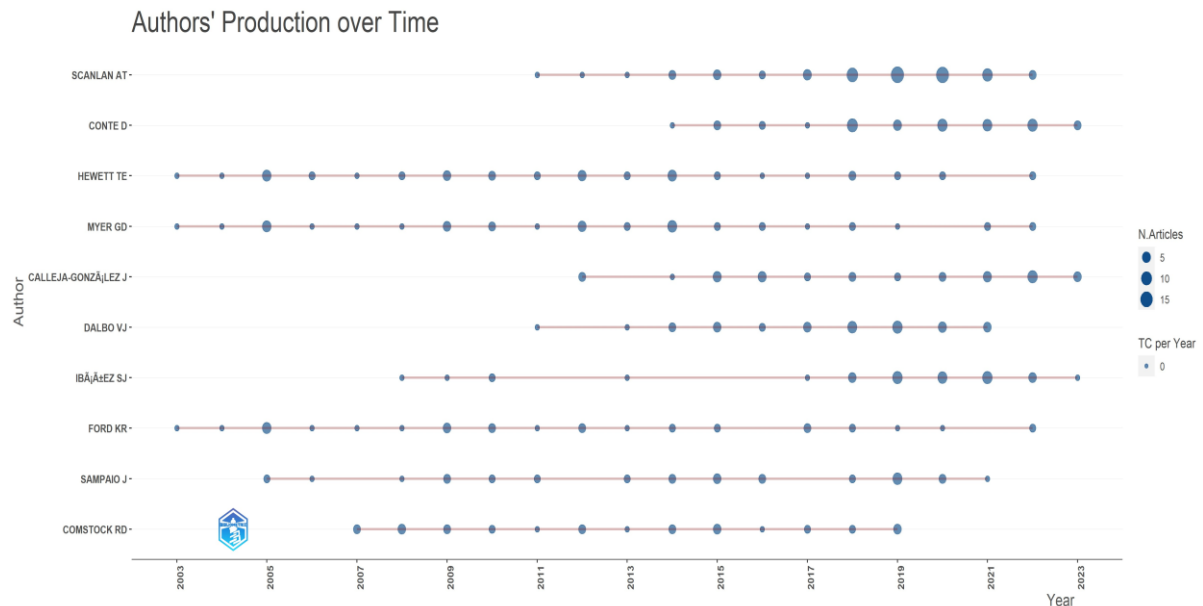Figure 3. Most relevant authors

Figure 4. Authors' production over time

The collaboration map between the words used in published studies is presented in Figure 5. Collaboration networks present the common relationships between keywords through a social network. When collaboration networks are examined according to keywords, the word x word adjacency matrix is used in the collaboration network, which is basically determined according to the frequency of words used together. When the network structure was examined, three different clusters were formed. While words represented nodes in clusters, the thickness of the ties between words represented the frequency of collaboration. The growth of nodes revealed the effect of words on the network. When the clusters in the illustration are analyzed, the blue cluster, which includes people, stands out. The terms male, basketball, adolescent, adult, and female work well with the word human. The term "soccer" is grouped in green with words like prospective studies, incidence, sex factors, movement, knee injuries, physical education and training, and physical fitness. In the red cluster, the word heart rate is associated with the words wheelchairs, athletic performance, psychomotor performance, exercise test, motor skills, and physical education and training.
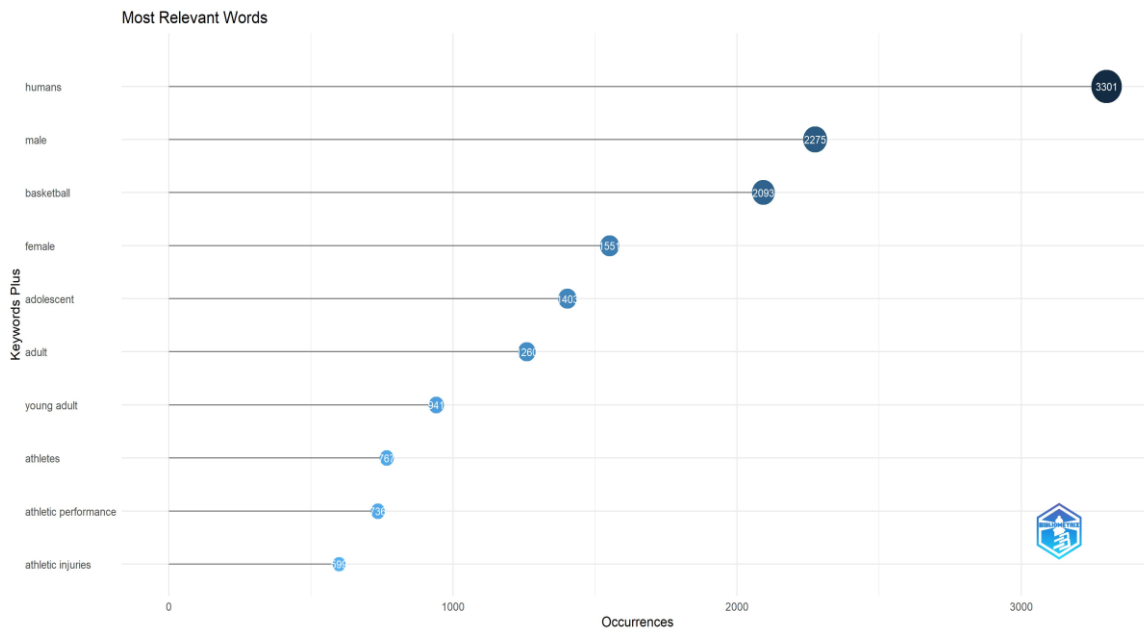
Figure 5. Collaboration occurrence network (keywords)

The most popular terms in the journals listed in the SCI-Exp. index as determined by Web of Science-based scanning are shown in Table 5 and Figure 6.

Table 5. Most Frequent Words

Words	Occurrences
Humans	3301
Male	2275
Basketball	2093
Female	1551
Adolescent	1403
Adult	1260
Young adult	941
Athletes	767
Athletic performance	736
Athletic injuries	599

Figure 6. Most relevant words

The terms people, male, and basketball are used the most frequently in articles on the topic, as can be shown in Table 5 and Figure 6. In the research, these phrases were used 3301, 2275, and 2093 times, respectively. The most popular terms were subjected to word cloud analysis, and the results are displayed in Figure 7.

Figure 7. Word Cloud

When Figure 7 was examined, it was seen that most of the words were domain specific. The most used keyword was "humans (%15)". "Male (%10)" was the second most used keyword. These words were followed by the words "basketball (%9)", "female (%7)" and "adolescent (%6)".

The representation of topic densities is presented in Figure 8. The most intensively studied topics are listed as humans, male, basketball, athletic injures, United States and risk factors. Information about the relevant thematic map clusters is given in Table 6.
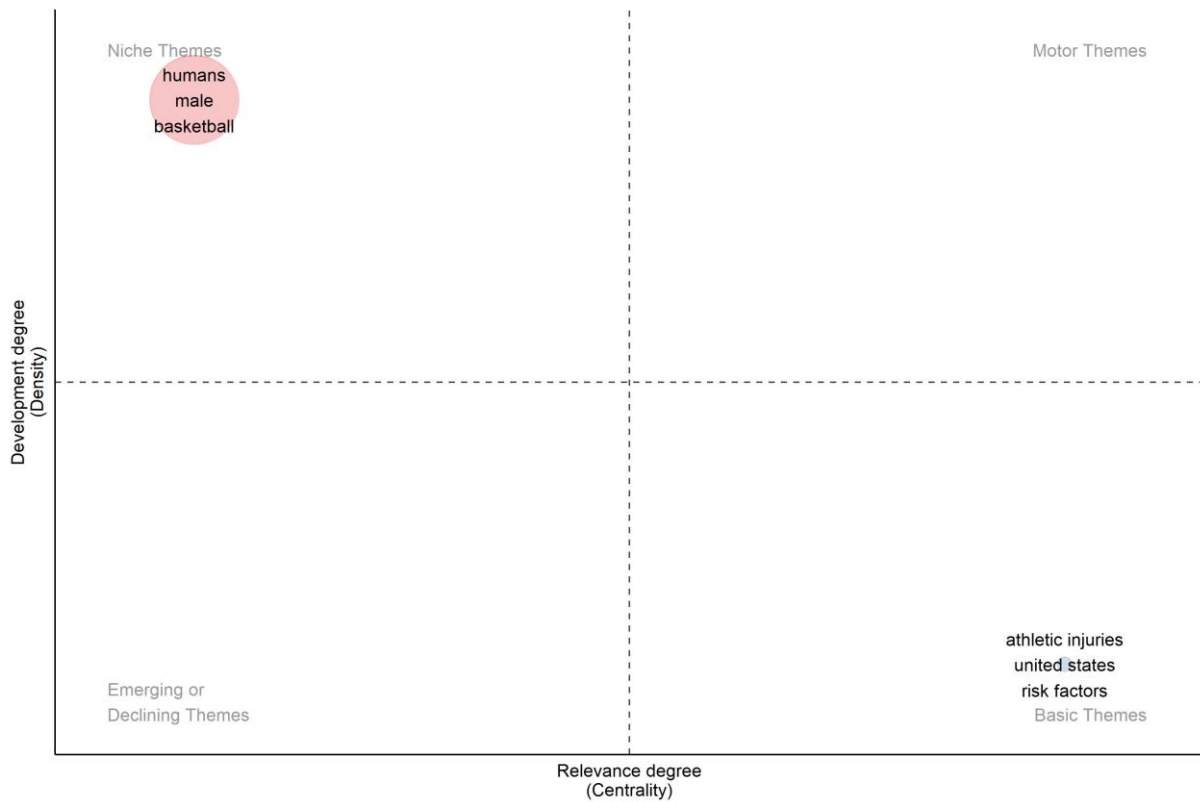
Figure 8. Thematic Map

Table 6. Thematic map clusters

Cluster	Callon Centrality	Callon Density	Rank Centrality	Rank Density	Cluster Frequency
Humans	0.857822511	5.032465215	1	2	23647
Athletic injures	1.030803399	4.303462534	2	1	5413

Trend themes analysis allows us to see how keywords, titles, and abstracts have changed over time, which has become a driving element in the expansion of research in any sector (Figure 9). Trend topics analysis provide terms on a coordinate plane logarithmic frequency values to track changes.
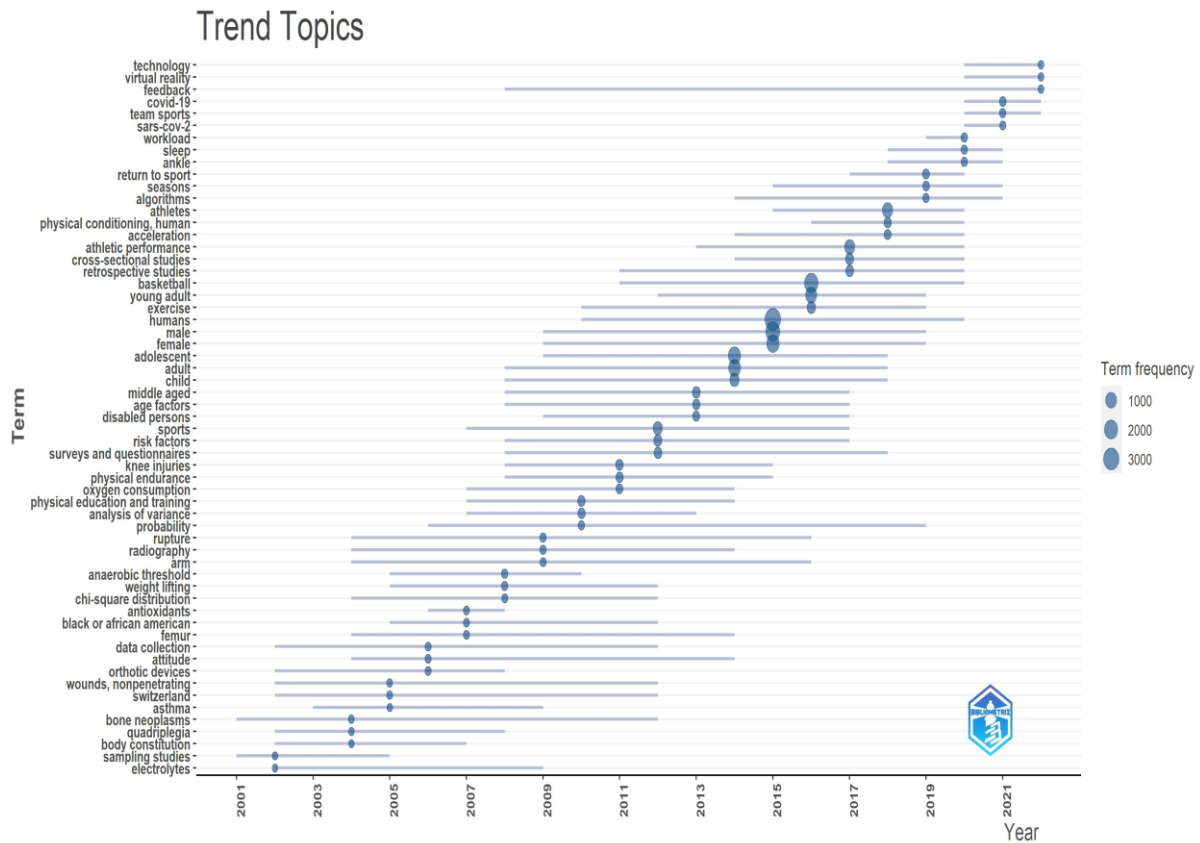
Figure 9. Trend topics of the field

The trends of basketball topic studies were explored using Figure 9, which was constructed to demonstrate the such as abstract, keyword, and title of three keywords cited at least three times each year between 2001 and 2022.

The country/region networks show the relationships between countries/regions as well as the concentration of paper production. The country/region-based networks in the field of research on horticulture crops secondary metabolism are shown in Figure 10 using the Bibliometrix software (version 4.0.1). On the country map, the amount of publication activity is indicated by the intensity of the blue color, with darker blue denoting a higher number of publications. The red connecting lines on the map represent international collaboration, with stronger lines denoting more frequent interactions. Table 7 lists the country/region partnerships in descending order of frequency of collaboration using the Bibliometrix program (version 4.0.1). With 35 collaborations, Spain and the Australia and Spain and Portugal had the largest level of collaboration, followed by United States and Canada with 30 partnerships.
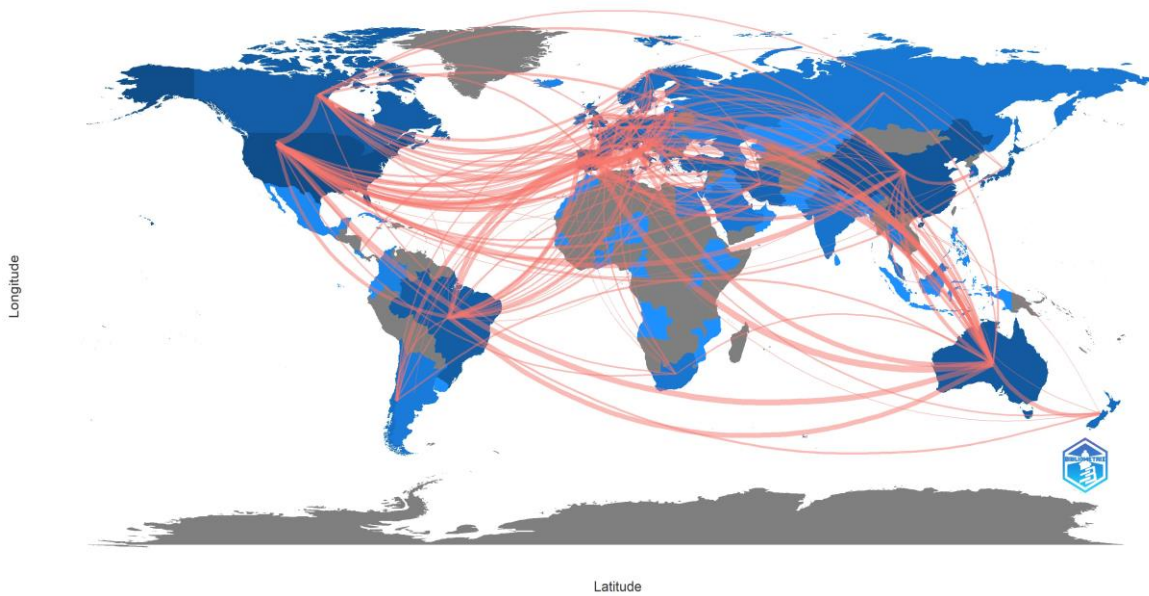
Country Collaboration Map

Figure 10. Collaboration World Map

Table 7. The cooperation among countries.

From	To	Frequency
SPAIN	AUSTRALIA	35
SPAIN	PORTUGAL	35
USA	CANADA	30
USA	AUSTRALIA	27
USA	CHINA	23
USA	SPAIN	22
BRAZIL	PORTUGAL	21
SPAIN	ITALY	21
SPAIN	BRAZIL	19
BRAZIL	AUSTRALIA	18

IV.   CONCLUSION

In this study, a bibliometric analysis has been carried out to offer a broad spectrum of research on basketball sport the past and current trends of research. The thematic trend and potential areas of interest have been obtained by reviewing 4496 papers taken from the scientific database Web of Science and analyzing the most influential authors, countries, and research topics. The results revealed increasing attention in this research field (overall in the last 10 years). Spain, Australia, Portugal, the United States, and Canada are the most influential countries, whereas, among the authors, Scallan AT, Hewett TE, and Conte D are the most productive authors in the field. The most influential journals, are Journal of Strength and Conditioning Research, International Journal of Environmental Research and Public Health and Journal of Sports Sciences.

The findings from several analyses descriptive and performance, bibliometric, and content have identified the three main research streams in the field of basketball sport and the most pertinent themes within them.

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