

Research Article

Open Access

Root Canal Treatment: A Bibliometric Analysis

Sara Cakici

Dentist, Brussels, Belgium

ABSTRACT

Introduction: Root canal treatment is a cornerstone in contemporary endodontic therapy. Bibliometric analyses allow comparisons among countries, institutions, or academic schools of thought. Scientific communication can be examined from a broad perspective.

Objective: This comprehensive article aims to elucidate the historical evolution, current concepts, and emerging trends in root canal treatment.

Materials and Methods: The Web of Science database was utilized in our research. The analysis ultimately incorporated 5,018 articles. The Bibliometrix software was employed to analyze the data obtained. Our examination of 5,018 articles was divided into four segments: performance analysis, word analysis, thematic analysis, and collaboration network analysis.

Results: The peak of annual scientific production was reached in 2023 with 547 articles, while the highest annual average citation count was achieved in 2006 with 3.7 citations per article. India, the USA, and China are prominent in single-country publications, while the USA, Brazil, and China stand out in multi-country publications.

Conclusion: Based on the data about the research at hand, the literature surrounding RCT is expansive and continually growing, featuring contributions on an international scale and incorporating a diverse array of document types.

***Corresponding author**

Sara Cakici, Dentist, Brussels, Belgium.

Received: March 01, 2024; **Accepted:** March 11, 2024; **Published:** March 18, 2024

Keywords: Root Canal Treatment, Bibliometric Analysis, Scientific Communication, Web of Science

Introduction

Root canal treatment (RCT) is a cornerstone in contemporary endodontic therapy, offering a fundamental approach to salvage diseased teeth while preserving their functional integrity within the dental arch. Endodontic pathologies, including irreversible pulpitis and apical periodontitis, necessitate the intervention of RCT to alleviate symptoms, eradicate microbial pathogens, and mitigate periapical inflammation [1]. Over the years, RCT has undergone significant advancements, driven by evolving techniques, materials, and technological innovations, enhancing treatment outcomes and patient comfort [2].

The process of extracting information pertinent to academic literature through statistical and mathematical methodologies is termed bibliometrics. This discipline encompasses analyzing scientific research and similar forms of scientific communication. Bibliometrics facilitates the comprehension of trends, interactions, and quantitative and qualitative characteristics within scientific communication [3].

Within this discipline, the characteristics of academic research are analyzed, leading to findings related to scientific communication. It enables the determination of the dimensions of interaction between

the most influential researchers and their studies. Bibliometric analyses allow comparisons among countries, institutions, or academic schools of thought. Scientific communication can be examined from a broad perspective [4].

As the literature in a research field expands over time, mastery becomes increasingly challenging. Bibliometric analysis is one method to overcome this difficulty, offering a microscopic perspective on the literature and projecting insights to the reader. This method can examine the characteristics and developmental processes of scientific outputs in a research field from a broad perspective [5].

This comprehensive article aims to elucidate the historical evolution, current concepts, and emerging trends in root canal treatment, encompassing diagnostic strategies, biomechanical preparation, obturation techniques, and adjunctive therapies. Additionally, this article will explore recent research endeavors and future directions in endodontic therapy, shedding light on novel approaches to optimize root canal treatment's efficacy, predictability, and sustainability in contemporary dental practice.

Material and Methods

The stages of data collection and analysis pertaining to our study are illustrated in Figure 1.

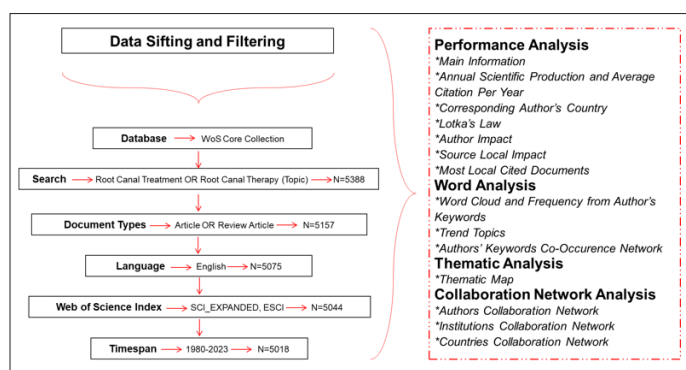


Figure 1: Workflow of Science Mapping

The Web of Science (WoS) database, frequently preferred for bibliometric analyses or literature reviews, was utilized in our research. The data scanning was conducted in the WoS database on February 4, 2024. A total of 5,388 articles concerning “Root Canal Treatment” and “Root Canal Therapy” were identified through the database search. By selecting “Article and Review Article” as the article types, access was obtained to 5,157 articles. When “English” was chosen, the number of articles was reduced to 5,075. We selected “SCI-E and ESCI” as the WoS index and refined the dataset to 5,044 articles. Excluding articles from the year 2024, the analysis ultimately incorporated 5,018 articles. The Bibliometrix software was employed to analyze the data obtained.

Our examination of 5,018 articles was divided into four segments: performance analysis, word analysis, thematic analysis, and collaboration network analysis. No word combination was utilized during the analyses.

Performance Analysis

The period between 1980 and 2023 was scrutinized. Articles and their sources, the annual growth rates of articles, and their average ages were analyzed. Additionally, the average number of citations per article, references, keywords, and the number of authors were examined. International collaborations were also explored. Using Bibliometrics, annual article counts and average annual citation numbers were obtained in descending order of total publications. Metrics such as the Total Number of Publications, Single Country Publications, Multiple Country Publications, and the MCP ratio were calculated, with the MCP ratio indicating the frequency of international collaborations. The articles were analyzed according to Lotka’s Law, which, as proposed by Alfred J. Lotka in 1926, is a bibliometric principle describing the distribution of scientific productivity among researchers. The top 20 most active authors were analyzed based on their h-index values, including assessments of h, g, and m indices, total citations (TC), total

number of publications (NP), and the year of first publication. The Source Local Impact was constructed based on the h-index value, showcasing the top 20 journals. Similarly, h, g, and m indices, TC, NP, TC/NP, and the year of first publication were analyzed.

Word Analysis

This analysis yielded the keyword frequency and a word cloud of the study field, providing a graphical representation of concepts within the study area. The size of the keywords in the word cloud corresponds to their frequency of use in the dataset. The popularity of keywords over the years was analyzed, and a Trend Topics graph was created. The first two keywords used at least five times each year were included in the analysis. A co-occurrence network analysis was conducted for the top 30 keywords, forming a co-occurrence network without combining words. The keywords were clustered into four groups, differentiated by color.

Thematic Analysis

A Thematic Map (Strategic Diagram) was created using the top 2000 keywords repeated at least four times. The most frequently repeated keywords were grouped into thematic clusters, each represented by the top three most frequently mentioned keywords within that cluster. Clustering was performed using the Louvain clustering algorithm. The size of the circles in the thematic map correlates with the frequency of use of the represented keywords. The Thematic Map was divided into four quadrants, each representing themes. Each quadrant was interpreted based on two parameters: centrality and density. The more central a theme, the more significant it is; the denser a theme, the more developed it is. The Thematic Map featured four themes: motor themes, niche themes, emerging or declining themes, and basic themes.

Collaboration Network Analysis

The Authors Collaboration Network analysis was based on 28 circles, each representing an author. The thickness of the lines between authors indicates the strength of their connection. The Institutions Collaboration Network analysis considered 29 nodes, utilizing the Louvain Algorithm. Each node represents an institution, with a minimum of five joint relationships considered for each node. The thickness of the lines between institutions indicates the strength of their connection. The font size in the figure is proportional to the level of collaboration. For the Countries Collaboration Network analysis, 30 nodes were considered using the Louvain Algorithm, each circle representing a country.

Results

Performance Analysis

General statistical data related to the analyzed articles are presented in Table 1.

Table 1: Main Information

Description	Results	Description	Results
MAIN INFORMATION ABOUT DATA		AUTHORS COLLABORATION	
Timespan	1980:2023	Single-authored docs	259
Sources (Journals, Books, etc)	641	Co-Authors per Doc	4.6
Documents	5018	International co-authorships %	20.43
Annual Growth Rate %	12.87	DOCUMENT TYPES	
Document Average Age	8.81	article	4245
Average citations per doc	18.4	article; early access	44
References	77986	article; proceedings paper	31
DOCUMENT CONTENTS		article; retracted publication	1
Keywords Plus (ID)	5012	review	678
Author's Keywords (DE)	7228	review; early access	19
AUTHORS			
Authors	14737		
Authors of single-authored docs	207		

The annual number of articles and average annual citation counts between 1980 and 2023, obtained using Bibliometrix, are depicted in Figure 2. The peak of annual scientific production was reached in 2023 with 547 articles, while the highest annual average citation count was achieved in 2006 with 3.7 citations per article.

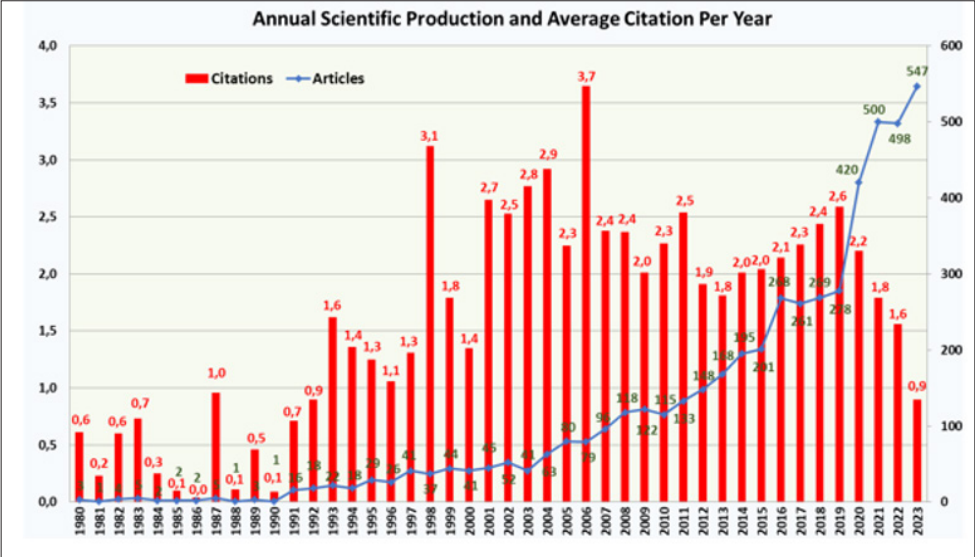


Figure 2: Annual Scientific Production and Average Citation Per Year

The countries of corresponding authors for the articles (top 20 countries) are shown in Figure 3, with the United States having the highest total number of publications, indicating its leading role in this field. The distribution of publications by country for the top 20 countries is detailed in Figure 3, derived from Bibliometrix in descending order of total publications. India, the USA, and China are prominent in single-country publications, while the USA, Brazil, and China stand out in multi-country publications. Malaysia and Switzerland possess high MCP-Ratio values.

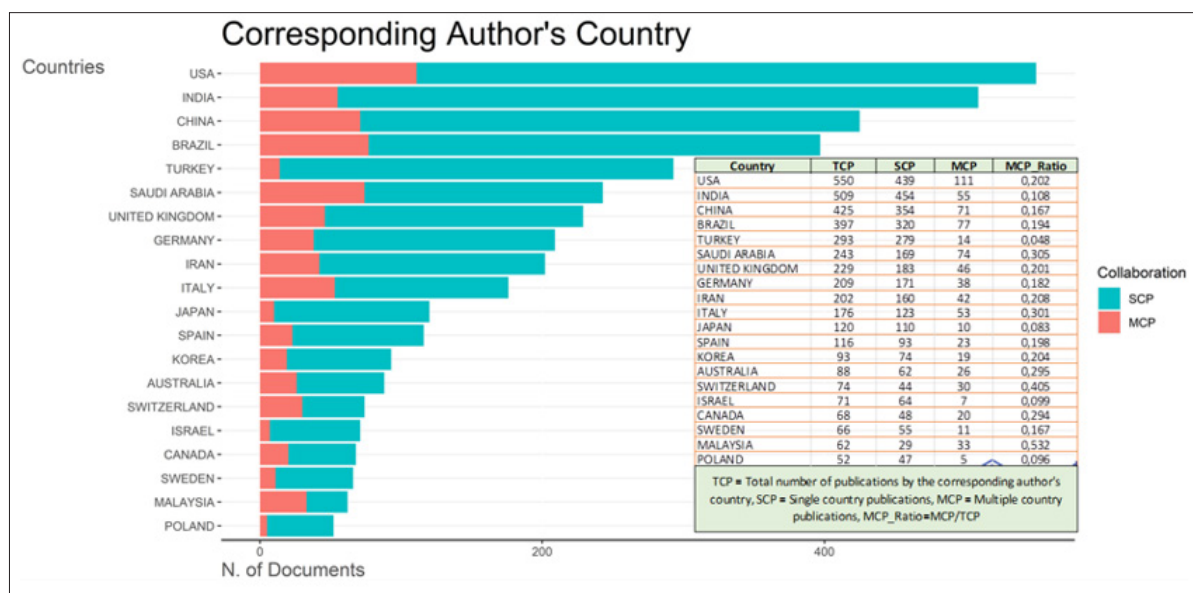


Figure 3: Corresponding Author's Country

According to an analysis under Lotka's Law, the proportion of authors contributing with one article is 77%, with two articles is 12.7%, and with three articles is 4.3%. This distribution of author contributions does not exactly conform to Lotka's Law but is notably close, as illustrated in Figure 4.

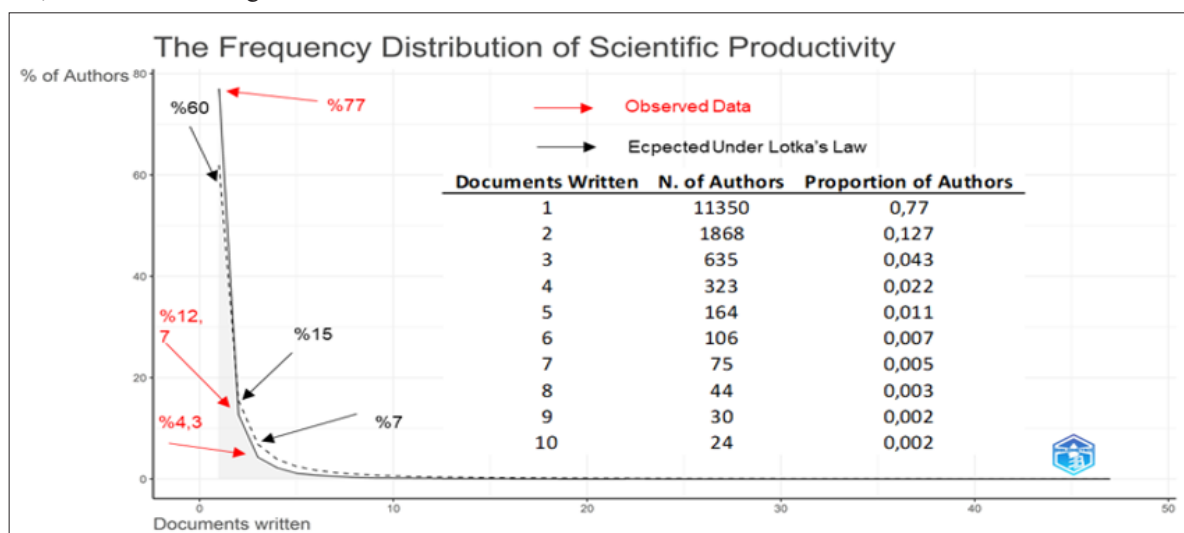


Figure 4: Lotka's Law

Dummer PMH has the highest h-index value among the authors, with significant g-index and m-index values. Gulabivala K boasts a notably high total citation count. Schwendicke F has the highest m-index value and started their publishing career later than other researchers (Table 2).

Table 2: Author Impact

Element	h_index	g_index	m_index	TC	NP	PY_start
DUMMER PMH	26	45	0,765	2031	47	1991
SEGURA-EGEA JJ	20	33	0,87	1154	40	2002
GULABIVALA K	19	28	0,655	2748	28	1996
WEIGER R	18	28	0,6	1259	28	1995
WESSELINK PR	17	20	0,531	1751	20	1993
WU MK	17	18	0,531	1372	18	1993
ABBOTT PV	16	29	0,471	879	32	1991
NG YL	16	23	0,696	2641	23	2002

TORABINEJAD M	16	23	0,381	1186	23	1983
PATEL S	15	22	0,938	818	22	2009
RICUCCI D	15	18	0,536	1386	18	1997
DUNCAN HF	14	28	1	800	34	2011
GOMES BPFA	14	26	0,483	1161	26	1996
KRASTL G	14	29	0,778	855	29	2007
MARTÍN-GONZÁLEZ J	14	23	1,077	626	23	2012
SCHWENDICKE F	14	21	1,273	486	26	2014
SIQUEIRA JF	14	24	0,538	1759	24	1999
TAY FR	14	22	0,7	923	22	2005
AHMED HMA	13	22	1	495	22	2012
FRIEDMAN S	13	14	0,382	715	14	1991

The International Endodontic Journal possesses the highest H and G index values, with a notably high TC/NP value, indicating its seasoned presence in the field since its inception in 1983.

Table 3: Source Local Impact

Source	H-Index	G-Index	TC	NP	TC/NP	PY_start
INTERNATIONAL ENDODONTIC JOURNAL	77	130	26384	660	40,0	1983
JOURNAL OF ENDODONTICS	71	114	23764	679	35,0	1983
ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY AND ENDODONTOLOGY	28	41	1946	64	30,4	1980
CLINICAL ORAL INVESTIGATIONS	25	35	1744	114	15,3	2006
JOURNAL OF DENTISTRY	25	41	1750	63	27,8	1998
BRITISH DENTAL JOURNAL	23	39	1795	89	20,2	1982
ENDODONTICS & DENTAL TRAUMATOLOGY	18	34	1270	47	27,0	1990
DENTAL TRAUMATOLOGY	17	39	1598	52	30,7	2001
QUINTESENCE INTERNATIONAL	17	32	1217	72	16,9	1998
AUSTRALIAN ENDODONTIC JOURNAL	16	24	851	100	8,5	2008
BMC ORAL HEALTH	13	18	573	88	6,5	2011
JOURNAL OF THE AMERICAN DENTAL ASSOCIATION	13	23	566	31	18,3	1999
PHOTOMEDICINE AND LASER SURGERY	13	16	330	16	20,6	2004
AUSTRALIAN DENTAL JOURNAL	12	19	386	28	13,8	1998
INTERNATIONAL DENTAL JOURNAL	12	24	629	32	19,7	1999
JOURNAL OF CLINICAL AND DIAGNOSTIC RESEARCH	12	16	427	76	5,6	2011
JOURNAL OF DENTAL RESEARCH	12	19	832	19	43,8	2006
PHOTODIAGNOSIS AND PHOTODYNAMIC THERAPY	12	18	385	38	10,1	2014
ACTA ODONTOLOGICA SCANDINAVICA	11	20	451	34	13,3	2005

NP = Number of publications, TC = Total citations, TC/NP = Citations per paper, PY_start = Publication year starting

The top 20 most cited articles, based on local citation (LC) numbers, are presented in Table 4. The article by Löst C in 2006 stands out with high LC and GC values. The article by Ng YL in 2008 is notable for its LC/YYP ratio of 18.06% and an LC/GC ratio of 61.10%, highlighting its significant impact at a local level.

Table 4: Most Local Cited Documents

Document	YP	LC	LC/YYP	GC	GC/YYP	LC/GC Ratio%
LÖST C, 2006, INT ENDOD J	2006	299	16,611	645	35,833	46,36
NG YL, 2008, INT ENDOD J-a	2008	289	18,063	473	29,563	61,10
NG YL, 2011, INT ENDOD J-a	2011	219	16,846	413	31,769	53,03
NG YL, 2007, INT ENDOD J	2007	204	12,000	308	18,118	66,23
ZEHNDER M, 2006, J ENDODONT	2006	184	10,222	973	54,056	18,91
SUNDQVIST G, 1998, ORAL SURG ORAL MED O	1998	176	6,769	857	32,962	20,54
PAK JG, 2011, J ENDODONT	2011	160	12,308	208	16,000	76,92
NG YL, 2010, INT ENDOD J	2010	157	11,214	231	16,500	67,97
NAIR PNR, 2006, INT ENDOD J	2006	153	8,500	533	29,611	28,71
NG YL, 2011, INT ENDOD J	2011	151	11,615	238	18,308	63,45
SALEHRABI R, 2004, J ENDODONT	2004	150	7,500	283	14,150	53,00
SIQUEIRA JF, 2001, INT ENDOD J	2001	136	5,913	482	20,957	28,22
NG YL, 2008, INT ENDOD J	2008	136	8,500	220	13,750	61,82
SATHORN C, 2008, INT ENDOD J	2008	135	8,438	173	10,813	78,03
MOLANDER A, 1998, INT ENDOD J	1998	119	4,577	581	22,346	20,48
LAZARSKI MP, 2001, J ENDODONT	2001	116	5,043	163	7,087	71,17
DE MOOR RJG, 2000, INT ENDOD J	2000	115	4,792	183	7,625	62,84
NAIR PNR, 2005, ORAL SURG ORAL MED O	2005	110	5,789	500	26,316	22,00
STUART CH, 2006, J ENDODONT	2006	105	5,833	602	33,444	17,44
NG YL, 2004, INT ENDOD J	2004	100	5,000	124	6,200	80,65

Year of Publication (YP), YYP= Year 2024-Year of Publication, Global Citations (GC), Local Citations (LC),

Word Analysis

The first 50 keywords identified by the authors, with the top 15 presented in a word cloud, are shown in Figure 5. “Root Canal Treatment” is the most frequently used keyword in the literature, followed by “Endodontics,” “Root Canal Therapy,” and “Apical Periodontitis.”

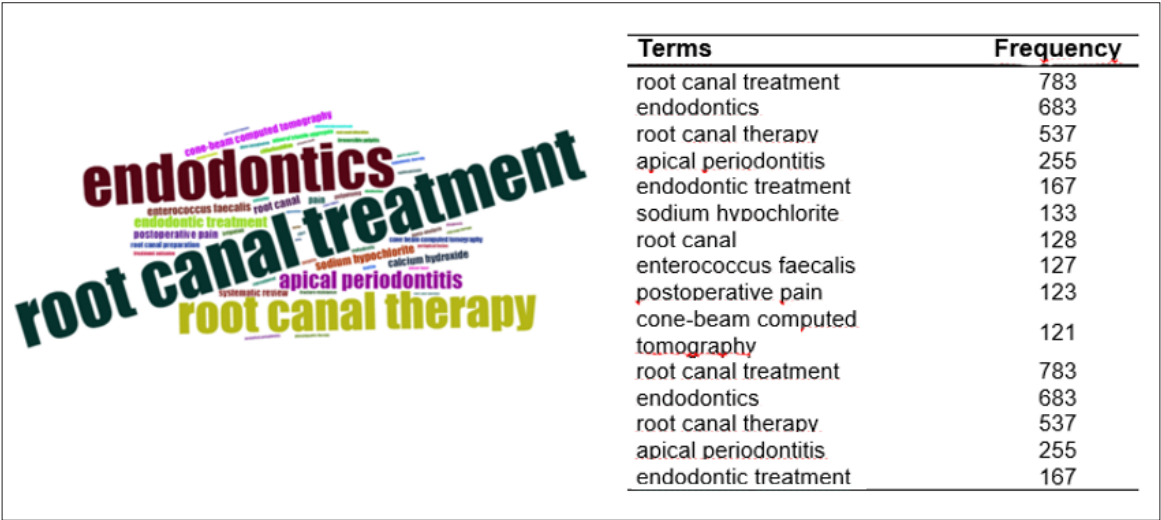


Figure 5: Word Cloud and Frequency from Author’s Keywords

The graph in Figure 6 illustrates the years in which the keywords identified by authors became popular. Between 1999 and 2003, the keywords “Lateral Condensation,” “Amalgam,” and “Apicectomy” were more frequently used, whereas currently, “Odontogenic Sinusitis,” “Bioceramic Sealers,” and “Finite Element Analysis” have become trending topics. The terms “Lateral Condensation,” “Amalgam,” “Apicectomy,” and “Coronal Leakage” represent techniques, materials, and surgical interventions used during root canal treatment.

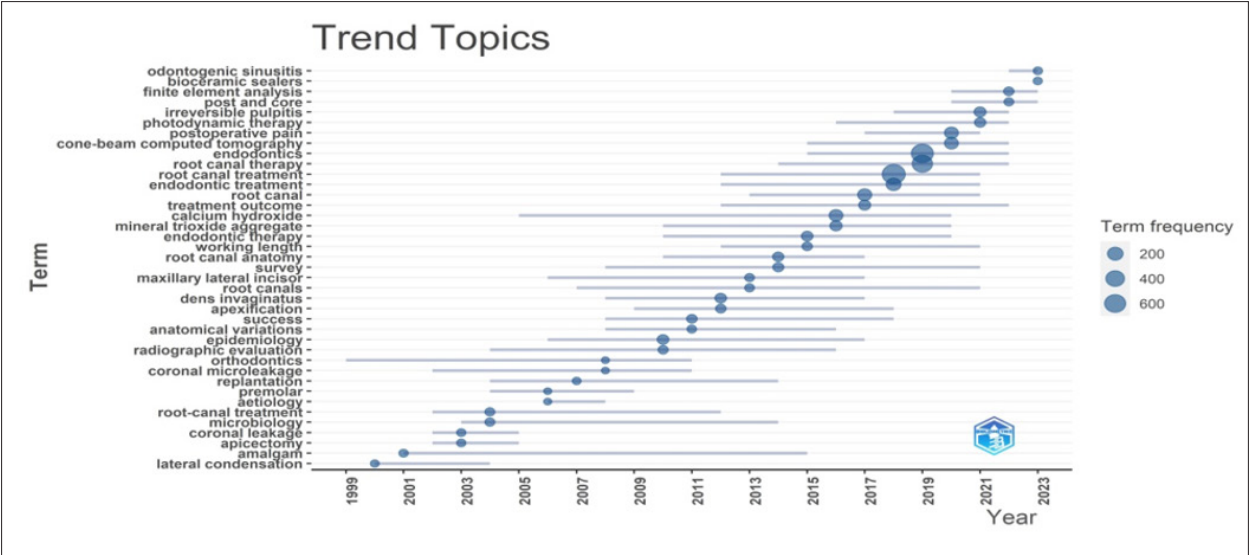


Figure 6: Trend Topics

The co-occurrence network of keywords is displayed in Figure 7. The red cluster highlights “Endodontic Care and Related Terms”, the blue cluster showcases “Endodontic Procedures and Imaging Techniques”, the purple cluster emphasizes “Endodontic Evaluation and Procedure Outcomes”, and the green cluster features “Canal Irrigation and Microbial Control”.

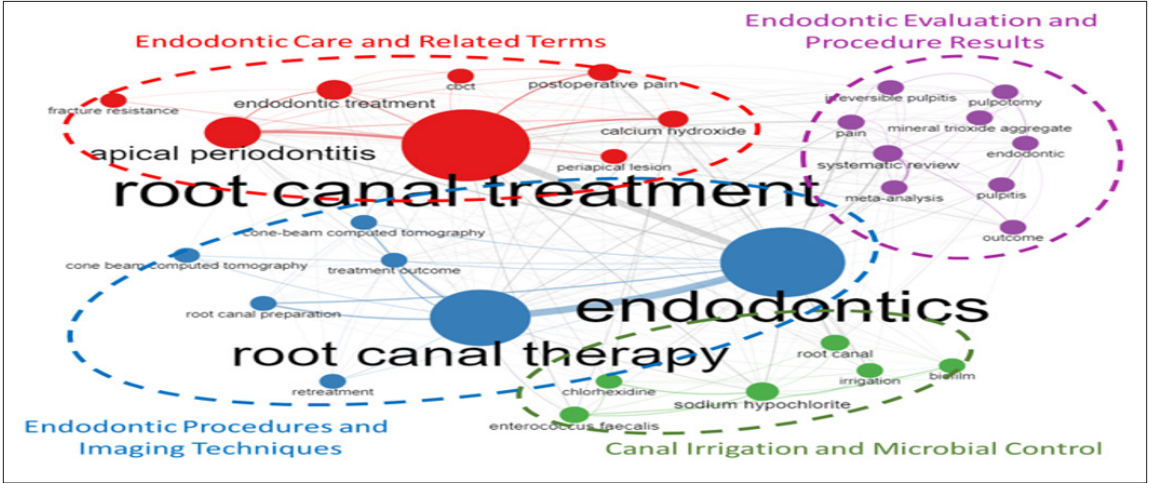


Figure 7: Authors’ Keywords Co-Occurrence Network

Thematic Analysis

A Thematic Map is divided into four quadrants, each representing different themes. Motor themes form a single cluster, represented by keywords such as “Endodontics”, “Endodontic Therapy”, and “Dental Education”. Niche themes are divided into three clusters, emerging or declining themes into two clusters, and basic themes into three clusters, with the respective keywords depicted in Figure 8.

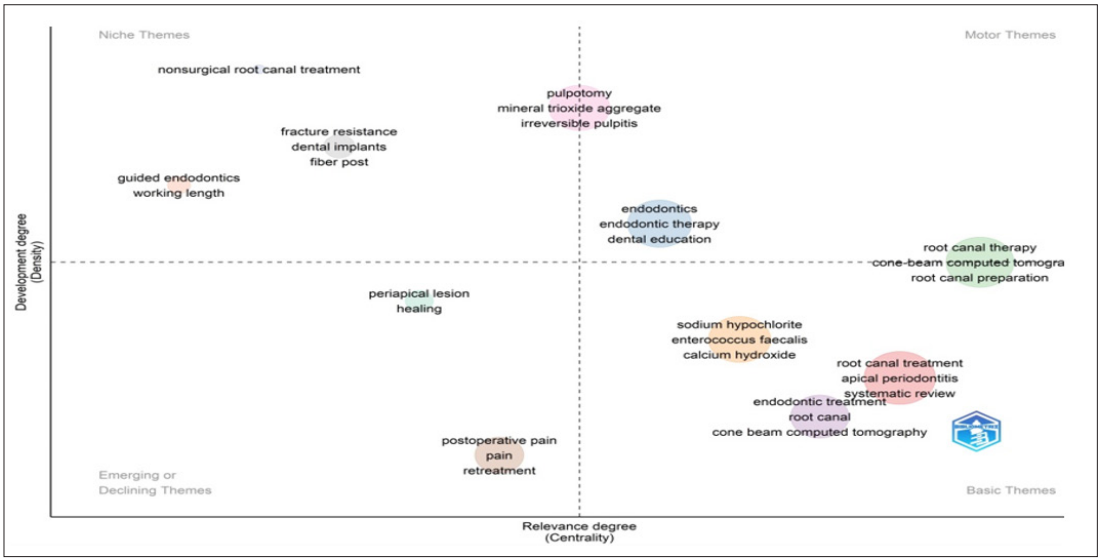


Figure 8: Thematic Map

Collaboration Network Analysis

The Authors Collaboration Network analysis results are shown in Figure 9, with the top 28 authors distributed across eight clusters. Dumper PMH and Nagendrababu V in the red cluster and Segura-Egea JJ in the blue cluster have the highest number of publications within the collaboration network. The most robust connections are between Segura Egea JJ - Martin Gonzales J and Gulabivala K - Ng YL.

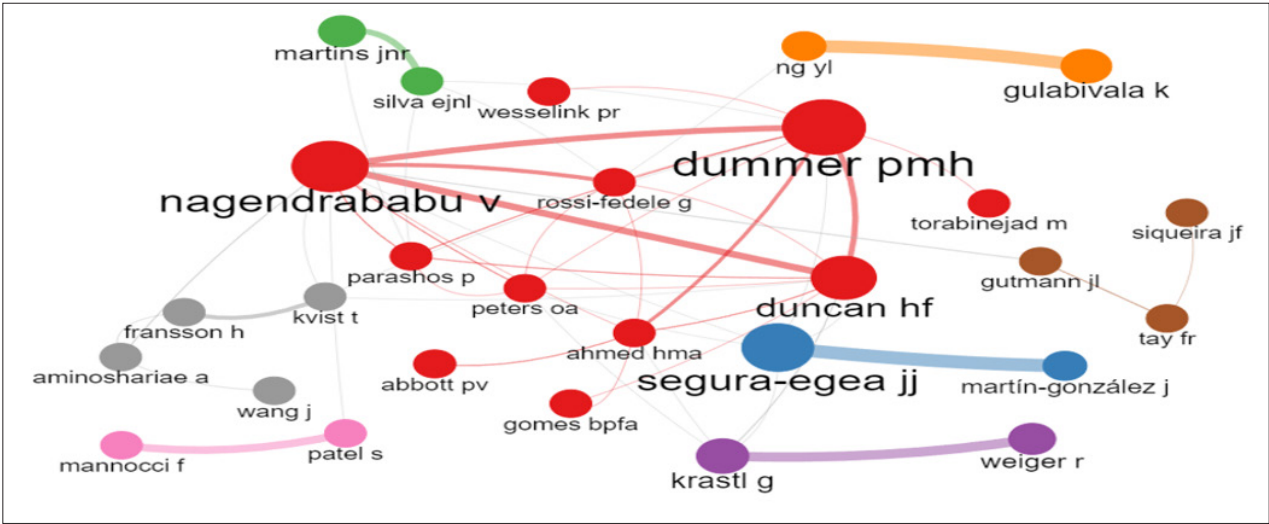


Figure 9: Authors Collaboration Network

The Institutions Collaboration Network is presented in Figure 10, where institutions are grouped into six clusters. Prominent institutions in the collaboration network include the University of Sao Paulo, Saveetha Univ, and King Saud Univ. The most robust network connections are between Cardiff Univ - Univ Tehran Med Sci and Univ N Carolina - Univ Iowa.

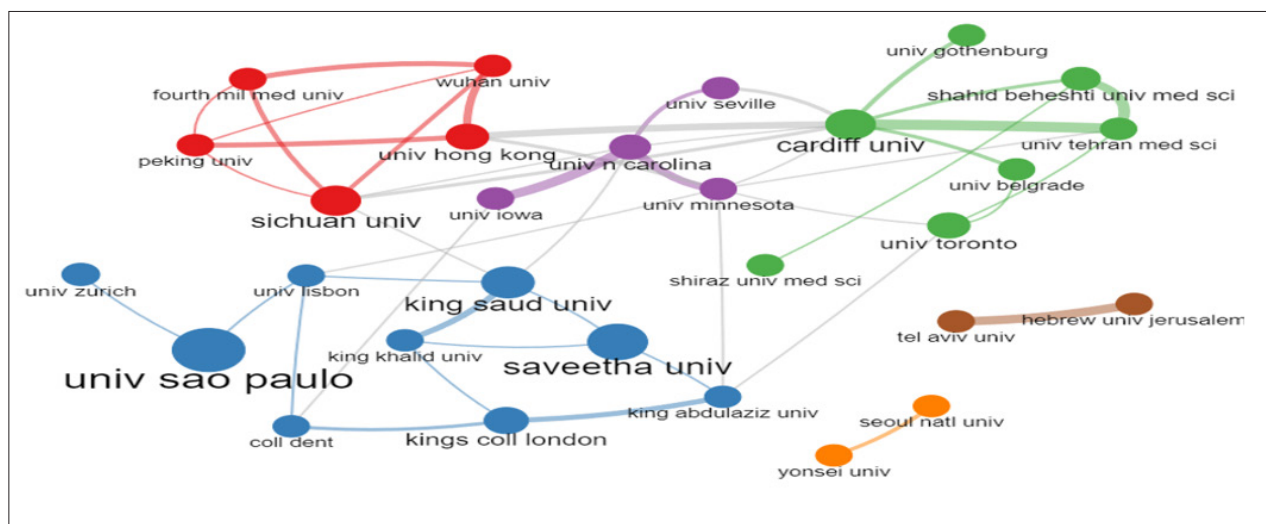


Figure 10: Institutions Collaboration Network

The Countries Collaboration Network analysis results are shown in Figure 11, with four clusters identified. The red cluster is centrally within the network, with the USA central to international collaboration. India holds a significant position in the international collaboration network within the blue cluster. The most robust collaborations are between the USA - China and the USA - Brazil (Figure 11).

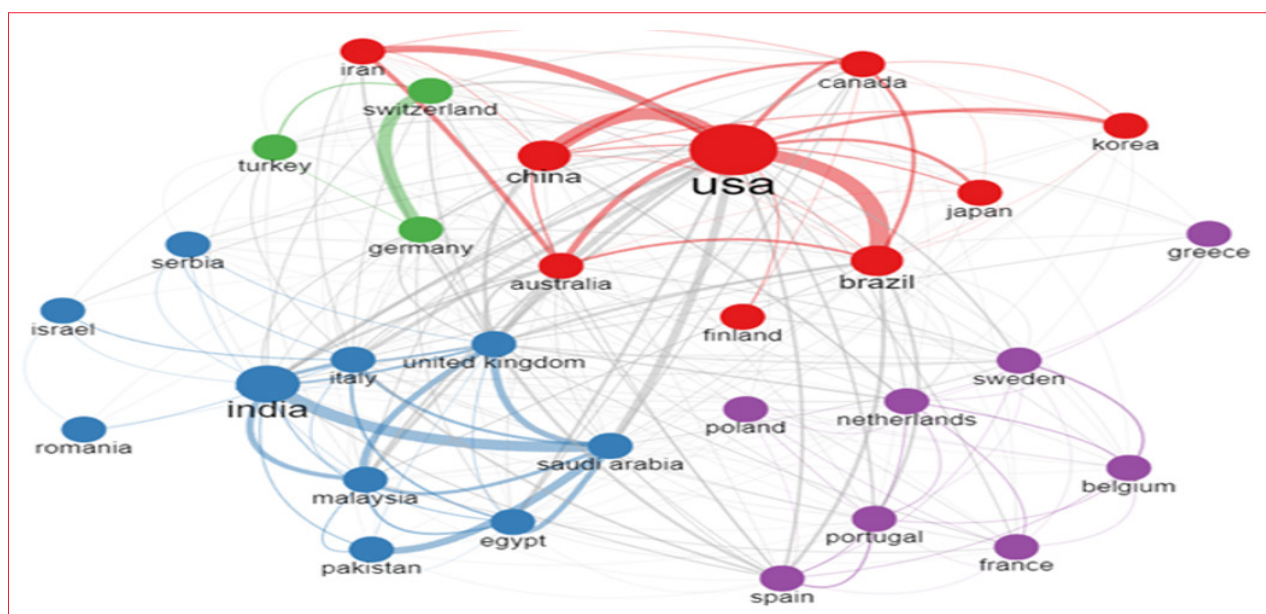


Figure 11: Countries Collaboration Network

Argument

The Web of Science (WoS) Core Collection database constitutes a selective citation index of scientific literature, encompassing journals, conference proceedings, books, and data compilations [6]. The Bibliometrix software, crafted atop the R programming foundation, represents a recent addition to the open-source tools available for science mapping [7].

Based on the data about the research at hand, the literature surrounding RCT is expansive and continually growing, featuring contributions on an international scale and incorporating a diverse array of document types. It is observed that citation numbers are substantial, with documents predominantly concentrated in the genres of articles and reviews. Since the 1980s, there has been a steady increase in the number of scientific publications on RCT, with a more marked rise evident from the mid-2000s onwards. Parallel to the increase in particle counts, citation numbers have ascended. However, a notable decline in citation numbers is observed for articles published post-2020, with the peak citation period being in the latter half of the 2000s, particularly between 2006-2008. Articles published after 2020 face challenges in garnering citations due to temporal disadvantages. This citation-receiving disadvantage implies that newer publications garner fewer citations than their predecessors, reflecting the challenges of engaging with the literature and the high level of competition. Recent publications need more time to accumulate citations.

Single Country Publications refer exclusively to the contributions from one country, with India, the USA, and China being significant contributors in this domain. Multiple Country Publications denote contributions from more than one country, showcasing a robust international collaboration network. The frequency of collaborations notably highlights the USA, Brazil, and China. The MCP Ratio quantifies the frequency of international collaborations, with Malaysia, Switzerland, and Saudi Arabia exhibiting high ratios, indicating their extensive international collaborations compared to other nations.

Lotka's Law suggests that a minor fraction of researchers contribute the majority of scientific publications in a given field, whereas the majority contribute minimally or not. This Law, often expressed through a power-law distribution, underscores a pattern wherein a small subset of prolific authors significantly impacts the scientific literature body, while the majority have limited contributions. This principle is pivotal for understanding scientific collaboration dynamics, productivity incentives, and intellectual output concentration within academic realms. Additionally, it is a cornerstone in bibliometric and scientometric research for quantitatively assessing scientific productivity and collaboration patterns [8].

Introduced by Jorge E. Hirsch, the h-index measures a researcher's productivity and impact [9,10]. The g-index, introduced by Leo Egghe in 2006, assigns greater weight to highly cited articles [11]. The m-index facilitates comparisons among researchers with varying academic tenures by dividing the h-index by the number of active academic years [12].

Dummer PMH has high h, g, and m index values, indicating significant interaction and impact in the literature. In contrast, Segura-Egea JJ has lower index values than Dummer PMH but still presents considerable total citation and publication numbers. Schwendicke F holds the highest m-index value, having started publishing later than other researchers.

The International Endodontic Journal, established in 1983, is an experienced journal with high h and g index values and a notable TC/NP ratio. The Journal of Endodontics and Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology, both starting in 1983 and 1980, respectively, are among the most venerable in the field, distinguished by their high index values and citation metrics. Photodiagnosis and Photodynamic Therapy, though a later entrant, has quickly become one of the most influential journals in the field.

Keywords defined by authors serve to delineate articles, reflecting current topics and themes within the research domain [13]. Word clouds graphically represent the newest concepts within the RCT examination area, facilitating the analysis of intertwined fields and their prevalent keywords [14].

Recent popular keywords include Bioceramic Sealers, signifying biocompatible ceramic materials that enhance treatment success through sealing and tissue compatibility [15]. Finite Element Analysis aims for more predictable outcomes by examining the mechanical properties of teeth and surrounding tissues during root canal treatment [16]. Post and Core refers to a procedure for strengthening weakened teeth [17]. Irreversible Pulpitis represents untreatable pulp inflammation [18]. These keywords are critical in understanding the challenges, treatments, and successful outcomes within the RCT process.

Thematic analysis constitutes a research methodology that scrutinizes a text, document, or dataset around specific themes, topics, or motivational elements. This form of analysis aims to uncover patterns and meanings within texts, typically under the umbrella of qualitative research methods. It facilitates a profound comprehension of specific subjects for researchers through thematic mapping, wherein research themes are visualized via networks unraveling over time, elucidating their dynamics [19].

The strategic diagram serves as a tool reflecting the interaction of factors within a specific study topic over time. This diagram provides a static depiction of the network structure of the study area [20]. The theme represented by "Root Canal Treatment" encompasses the effects of apical periodontitis, endodontic practices, and treatment outcomes. The theme signified by "Sodium Hypochlorite" concentrates on various antimicrobial agents. The theme denoted by "Endodontic Treatment" focuses on the anatomy and morphology of the root canal.

Authorship Contribution

Sara Cakici reviewed the results and approved the final version of the manuscript.

Data Availability

All data has been obtained from the internet environment and is open to public access. Data can be provided upon request from the author.

Conflict of Interest

None.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

References

1. Iandolo A (2023) Modern Therapeutic Strategies in Endodontics and Restorative Dentistry. *Medicina* 59: 333.
2. Schäfer E (2023) Endodontic Advances and Evidence-based Clinical Guidelines. *European Endodontic Journal*. Turkey 8: 237-238.
3. Chen C (2017) Science Mapping: A Systematic Review of the Literature. *J Data Inf Sci* 2: 1-40.
4. Lafia S, Kuhn W, Caylor K, Hemphill L (2021) Mapping research topics at multiple levels of detail. *Patterns (New York, NY)* 2: 100210.
5. Skov F (2021) Science maps for exploration, navigation, and reflection-A graphic approach to strategic thinking. *PLoS One* 16: e0262081.
6. Li K, Rollins J, Yan E (2018) Web of Science use in published research and review papers 1997-2017: a selective, dynamic, cross-domain, content-based analysis. *Scientometrics* 115: 1-20.
7. Aria M, Cuccurullo C (2017) bibliometrix: An R-tool for comprehensive science mapping analysis. *J Informetr* 11: 959-975.
8. Kawamura M, Thomas CD, Kawaguchi Y, Sasahara H (1999) Lotka's law and the pattern of scientific productivity in the dental science literature. *Med Inform Internet Med* 24: 309-315.
9. Hirsch JE (2005) An index to quantify an individual's scientific research output. *Proc Natl Acad Sci U S A* 102: 16569-16572.
10. Kamdem JP, Duarte AE, Lima KRR, Rocha JBT, Hassan W, et

- al. (2019) Research trends in food chemistry: A bibliometric review of its 40 years anniversary (1976-2016). Food Chem 294: 448-457.
11. Egghe L (2006) Theory and practise of the g-index. Scientometrics Internet 69: 131-152.
12. Harzing A (2012) Reflections On The H-Index. Bus Leadersh 1: 101-106.
13. Zheng X, Le Y, Chan APC, Hu Y, Li Y (2016) Review of the application of social network analysis (SNA) in construction project management research. Int J Proj Manag 34: 1214-1225.
14. Orimoloye IR, Ololade OO (2020) Potential implications of gold-mining activities on some environmental components: a global assessment (1990 to 2018). J King Saud Univ 32: 2432-2438.
15. Estivalet MS, De Araújo LP, Immich F, Da Silva AF, Ferreira N de S, et al. (2022) Bioactivity Potential of Bioceramic-Based Root Canal Sealers: A Scoping Review. Life Basel, Switzerland 12: 1853.
16. Welch Phillips A, Gibbons D, Ahern DP, Butler JS (2020) What Is Finite Element Analysis? Clin spine Surg 33: 323-324.
17. Baik KM (2023) Quality of post and core placement by final year undergraduate dental students. PLoS One 18: e0294073.
18. Dabuleanu M (2013) Pulpitis (reversible/irreversible). J Can Dent Assoc 79: d90.
19. Schögl J P, Stumpf L, Baumgartner RJ (2020) The narrative of sustainability and circular economy-A longitudinal review of two decades of research. Resour Conserv Recycl 163: 105073.
20. Fan J, Xu X, Zhao L (2023) A bibliometric analysis of the theme trends and knowledge structures of pulmonary embolism from 2017 to 2021. Front Med 10: 1052928.

Copyright: ©2024 Sara Cakici. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.