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Endodontic therapy in primary teeth: a bibliometric analysis of the 100 most-cited papers

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Abstract: The purpose of this review was to identify and analyze the main characteristics of the 100 most-cited papers in the field of endodontic therapy in primary teeth. A search for the most-cited articles was conducted in the Clarivate Analytics Web of Science 'Core-Collection' (WoS-CC) database up to December 2020. Papers were ranked in descending order, by number of citations, and each paper was matched with the citation count on Scopus and Google Scholar. Two independent reviewers selected the most-cited papers and analyzed it according to the number and density of citations, year and journal of publication, authors, countries and contributing institutions, study design, topic of the paper, and keywords. Spearman's correlation and Poisson regression were used to determine associations between the number of citations and study characteristics. The citation count varied from 15 to 135 (WoS-CC), 8 to 141 (Scopus), and 14 to 317 (Google Scholar). Of the 306 contributing authors, most paper contributions were from Sakai VT, Oliveira TM, and Machado MAAM (5 each). Most of the papers originated from the USA (n=21) and Brazil (n=18). Randomized trials were the most common study design (n=32), and "pulpotomy" was the most frequently used keyword (n=35). Poisson regression showed that the number of citations decreased by 1.5% each year, and increased by 9.7% for each unit of impact factor. This bibliometric analysis highlighted papers, authors, and institutions that have contributed to endodontic therapy in primary teeth. Common terms of interest in this research area was also identified, representing the first bibliometric analysis on this subject.

Keywords: Bibliometric; Endodontics; Tooth, Deciduous.

Introduction

The main goal of endodontic therapy in primary teeth is to maintain the integrity of teeth, allowing phonation, masticatory function, aesthetics, and maintenance of the space until the appropriate time for teeth exfoliation.[1,2] This therapy can be accomplished through different types of procedures, which include direct or indirect pulp capping, pulpotomy, and pulpectomy.[3-5] The choice of treatment modality depends on several factors, such as symptoms, extent of damage, presence of contamination, general condition of the pulp, and factors related to the child's behavior.[3,6,7]

In general, indirect pulp capping is indicated for teeth with deep carious lesions that approach but do not reach the pulp, whereas direct pulp capping is indicated in cases of minor pulp exposure during cavity preparation or due to traumatic injury.[3,8] Pulpotomy is generally indicated in cases of major pulp exposures during carious tissue removal.[3,8] In these cases, the coronary pulp tissue is amputated and the root pulp is preserved, while in pulpectomy all pulp tissue is removed and root canals are filled with a filling material.[3,9]

In the field of Endodontics, the body of research on the modalities of pulp therapy in primary teeth is still much smaller than that on pulp therapies in permanent teeth. Therefore, it is important to know which areas of primary pulp therapy in endodontics is most frequently read and cited. Analysis of the citations of a scientific paper allows quantification of the importance of research within an area.[10] The analysis of the most-cited papers is performed to evaluate past and current areas of research and to provide perspectives for the future, as well as to recognize contributing institutions, authors, and journals.[10] Although other reviews have been performed to identify and analyze the most-cited papers in the field of endodontics,[10-12] no bibliometric analysis of papers focusing on endodontic therapy in primary teeth have been performed. Therefore, the aim of this study was to identify and analyze the 100 most-cited papers focused on endodontic therapy in primary teeth, highlight the manuscripts and authors with the greatest impact over time, and evaluate the subjects of greatest interest in this area of endodontics.

Methodology

Search strategy

An electronic literature search was conducted on December 1st, 2020 using the Web of Science (WoS) database. The choice of this database was due to the fact that WoS retrieves publications since 1945 and contains peer-reviewed, high-quality scientific journals published worldwide.[13] In contrast, the Scopus database retrieves only citations made after 1996, which may be a short period of time for evaluating the most-cited papers, and Google Scholar includes books, theses, and dissertations whose scientific value is debatable because they are not peer-reviewed documents.

The following search strategy was created and used to retrieve relevant papers: TS=(pulpectom* OR pulpotom* OR "pulp therap*" OR "pulp treatment" OR "pulp capping" OR "endodontic treatment" OR "endodontic therap*" OR "vital pulp therap*" OR "dentin-pulp complex therap*" OR "root canal treatment" OR "root canal therap*" OR "root treatment" OR "canal treatment") AND TS=("primary dentition" OR "deciduous dentition" OR "primary tooth" OR "primary teeth" OR "deciduous tooth" OR "deciduous teeth" OR "Tooth, Deciduous" OR "Dentition, Mixed" OR "Mixed Dentition"). There was no restriction on the year or language of publication.

According to the WoS "All document types" selection, 617 papers were initially identified. The list of papers was ranked in descending order according to the number of citations in the WoS Core Collection (WoS-CC) database. Screening was performed by two reviewers and disagreements were resolved by consensus. The selection was based on the title and abstract of the papers and ended at the hundredth most-cited paper. Only papers focused on endodontic therapy involving primary teeth were considered. The selected papers were matched with citation data from Google Scholar and Elsevier's Scopus databases.

Bibliometric parameters

The following bibliometric parameters were recorded for the most-cited papers: Title of the paper, WoS-CC/Google Scholar/Scopus citation count, WoS-CC citation density (mean number of citations received per year), year of publication, authorship (name, number), institution and country (based on the corresponding author's affiliation at the time of publication), journal title, study design, and keywords. Two authors collected the data. The accuracy of the data was double-checked, and discrepancies were resolved by consulting the original paper.

In the study design, papers were classified as literature review, laboratory studies (*in vitro*/*in vivo*/*ex vivo*), case report, case series, cross-sectional

study, cohort study, non-randomized clinical trial, randomized clinical trial, systematic review/meta-analysis, and practice guideline based on the Cochrane Collaboration glossary[14].

Maps of collaborative co-authorship and keyword density were created using the VOS viewer (University of Leiden, South Holland, Netherlands) software.[15] This software allows the creation of a bibliometric network from data exported from the WoS-CC database, establishing connections between the items of the papers, such as co-authorship and keywords, based on density or number of citations.

Statistical analysis

Spearman's correlation was applied to determine associations between the number of citations in the WoS-CC with number of citations in the Scopus and Google Scholar databases, and between these databases with publication year and journals' impact factor (non-normal data distribution by Kolmogorov-Smirnov test, $p < 0.05$). Poisson regression analysis was used to determine associations between the total number of WoS-CC citations, study design, year of publication, and journal impact factor. The impact factor was related to the year 2019 according to the InCites Journal Citation Reports. For regression analysis, study design was categorized into revision (literature review and systematic review), laboratory, observational (cohort, cross-sectional), intervention (randomized and non-randomized clinical trials), case series/case report, and practice guideline. These analyses were performed using the statistical software IBM SPSS Statistics for Windows (Chicago, USA). The level of significance was set at 5%.

Results

Analysis of citations

The 100 most-cited papers received a total of 3254 (WoS-CC), 3773 (Scopus), and 8429 (Google Scholar) citations. The range of citations was between 15 and 135 (WOS-CC), 8 and 141 (Scopus), and 14 and 317 (Google Scholar). The overall citation density was 3.24 (WoS-CC), 3.60 (Scopus), and 7.75 (Google Scholar). Self-citations accounted for 1.18% of WoS-CC citations and were included in this study. There were very strong positive correlations between the number of citations in WoS-CC and Scopus ($r = 0.881$, $p < 0.01$) and Google Scholar ($r = 0.762$, $p < 0.01$). That is, the higher the number of citations in WoS-CC, the higher it was in Scopus and Google Scholar. Table 1 gives an overview of the classification of the papers. In case of a tie, the position of a paper in the ranking was based on the highest WoS-CC citation density.

The most-cited paper[16] was "Long-term evaluation of pulpotomy in primary molars using Mineral Trioxide Aggregate or Formocresol", authored by Holan, Eidelman & Fuks, published in Pediatric Dentistry in 2005, with 135 (WoS-CC), 141 (Scopus), and 317 (Google Scholar) citations, and a citation density of 9.15 (WoS-CC). The second ranked paper[17] "Comparison of Mineral Trioxide Aggregate and Formocresol as pulp-capping agents in pulpotomized primary teeth" was authored by Agamy, Bakry, Mounir & Avery, and published in Pediatric Dentistry in 2004, with 119 (WoS-CC), 131 (Scopus), and 292 (Google Scholar) citations, and a citation density of 7.56 (WoS-CC). The third ranked paper[5] "Current and potential pulp therapies for primary and young permanent teeth" was authored by Ranly & Garcia-Godoy and published in the Journal of Dentistry in 2000, with 92 (WoS-CC), 121 (Scopus), and 268 (Google Scholar) citations, and a citation density of 4.66 (WoS-CC).

Year of publication

The top 100 papers were published between 1964[18] and 2017[1,19,20] (Figure 1). The majority of publications were in 2008, a total of 18. The number of papers published by decade was 1 in the 1960s, 1 in the 1970s, 5 in the 1980s, 9 in the 1990s, 44 in the 2000s, and 40 in the 2010s. There was a weak negative correlation between the year of publication and the number of citations in WoS-CC ($r = -0.274$, $p < 0.01$), while in Scopus ($r = -0.406$, $p < 0.01$) and Google Scholar ($r = -0.524$, $p < 0.01$) the negative correlation was moderate. That is, the older the paper, the higher the number of citations it received. In addition, Poisson regression analysis (Table 2) showed that the number of citations from WoS-CC tended to decrease by 1.5% each year (RR: 0.985, 95% CI 0.975–0.995).

Table 1. List of the 100 most-cited papers about endodontic therapy in primary teeth.

Rank	Title of the paper	N. of citations WOS-CC	N. of citations Scopus	N. of citations Google Scholar	Citation density (WOS)
1	Long-term evaluation of pulpotomy in primary molars using Mineral Trioxide Aggregate or Formocresol	135	141	317	9.15
2	Comparison of Mineral Trioxide Aggregate and Formocresol as pulp-capping agents in pulpotomized primary teeth	119	131	292	7.56
3	Current and potential pulp therapies for primary and young permanent teeth	92	121	268	4.66
4	The effectiveness of Mineral Trioxide Aggregate, Calcium Hydroxide and Formocresol for pulpotomies in primary teeth	81	91	188	6.89
5	A comparison of four pulpotomy techniques in primary molars: A long-term follow-up	78	85	172	6.64
6	Dentin bridge formation after Mineral Trioxide Aggregate (MTA) pulpotomies in primary teeth	77	76	141	5.22
7	Endodontic treatment of primary teeth using a combination of antibacterial drugs	66	89	238	4.19
8	An investigation of the relative efficacy of Buckley's Formocresol and Calcium Hydroxide in primary molar vital pulp therapy	63	65	159	3.19
9	Clinical, radiographic and histological analysis of the effects of Mineral Trioxide Aggregate used in direct pulp capping and pulpotomies of primary teeth	61	66	157	4.44
10	Randomized controlled trial of Mineral Trioxide Aggregate and Formocresol for pulpotomy in primary molar teeth	58	65	154	4.55
11	Pulp therapy with new materials for primary teeth: New directions and treatment perspectives	55	73	18	4.68
12	Vital pulp therapy with new materials for primary teeth: New directions and treatment perspectives	51	51	253	4.34
13	Pulp exposure occurrence and outcomes after 1-or 2-visit indirect pulp therapy vs complete caries removal in primary and permanent molars	50	65	119	5.13
14	Primary molar pulpotomy: A systematic review and network meta-analysis	48	45	80	8.35
15	Evaluation of various root canal filling materials in primary molar pulpectomies: An in vivo study	45	53	115	3.05
16	Success rate of root canal treatment in primary molars	43	56	128	2.92
17	Success of pulpectomy with Zinc Oxide-Eugenol vs Calcium Hydroxide/Iodoform paste in primary molars: A clinical study	41	53	103	3.49
18	A survey of primary tooth pulp therapy as taught in US dental schools and practiced by diplomates of the American Board of Pediatric Dentistry	40	43	85	3.40
19	Evaluation of an Iodoform paste in root-canal therapy for infected primary teeth	40	60	162	1.22
20	Primary tooth vital pulp therapy: A Systematic Review and Meta-analysis	39	37	63	14.18
21	Effects of Nd: YAG laser pulpotomy on human primary molars	39	47	83	2.84
22	Is there life after Buckley's Formocresol? Part I - A narrative review of alternative interventions and materials	39	39	122	2.84
23	Effect of different adhesive protocols vs Calcium Hydroxide on primary tooth pulp with different remaining dentin thicknesses: 24-month results	38	41	54	3.23
24	Clinical evaluation of success of primary teeth pulpotomy using Mineral Trioxide Aggregate (R), Laser and Biodentine (TM)- An in vivo study	37	36	79	7.79
25	Pulp treatment for extensive decay in primary teeth	37	8	144	6.43
26	Long-term outcomes of primary molar Ferric Sulfate pulpotomy and root canal therapy	37	38	94	2.35
27	Treatment outcomes of pulpotomy in primary molars using two endodontic biomaterials. A 2-year randomised clinical trial	36	62	93	4.11
28	Mineral Trioxide Aggregate and Formocresol pulpotomy of primary teeth: A 2-year follow-up	36	44	88	3.69
29	Indirect pulp treatment in primary teeth: 4-year results	36	43	84	3.69

Continue

Continuation

30	Clinical, radiographic, and histopathologic evaluation of Nd: YAG laser pulpotomy on human primary teeth	36	42	93	2.82
31	Photodynamic therapy in endodontic treatment of deciduous teeth	35	41	72	3.26
32	Considerations for the direct pulp capping procedure in primary teeth – A review of the literature	35	41	84	1.26
33	Short-term treatment outcome of pulpotomies in primary molars using Mineral Trioxide Aggregate and Biodentine: A randomized clinical trial	34	34	61	9.07
34	Electronic determination of root canal length in primary teeth with and without root resorption	34	38	92	1.92
35	A simple, effective, safe technique for the root-canal treatment of abscessed primary teeth	34	54	103	0.86
36	Relationship between Formocresol pulpotomies on primary teeth and enamel defects on their permanent successors	33	35	88	0.77
37	Indirect pulp capping and primary teeth: Is the primary tooth pulpotomy out of date?	32	35	83	2.72
38	Electronic apex locator: A useful tool for root canal treatment in the primary dentition	32	38	106	1.35
39	Anatomical challenges, electronic working length determination and current developments in root canal preparation of primary molar teeth	31	42	84	4.59
40	Clinical evaluation of 3Mix and Vitapex (R) as treatment options for pulpally involved primary molars	31	47	117	3.18
41	Mineral Trioxide Aggregate as pulp capping agent for primary teeth pulpotomy: 2 years follow up study	31	32	67	2.88
42	Accuracy of an electronic apex locator in primary teeth with root resorption	31	34	113	2.88
43	Biofilm on the apical region of roots in primary teeth with vital and necrotic pulps with or without radiographically evident apical pathosis	31	36	73	2.64
44	Clinical and radiographic outcomes of the use of Low-Level Laser Therapy in vital pulp of primary teeth	30	30	37	6.32
45	Calcium Hydroxide pulpotomy for primary teeth – A clinical study	30	35	84	0.84
46	Efficacy of three different pulpotomy agents in primary molars: a randomized control trial	29	25	44	10.55
47	Clinical and radiographic evaluation of indirect pulp treatment in primary molars: 36 months follow-up	29	37	77	2.27
48	Dentin bridge formation after white mineral trioxide aggregate (white MTA) pulpotomies in primary molars	29	29	60	2.11
49	Evaluation of cleaning capacity and instrumentation time of manual, hybrid and rotary instrumentation techniques in primary molars	27	40	70	3.48
50	The influence of smear layer removal on primary tooth pulpectomy outcome: a 24-month, double-blind, randomized, and controlled clinical trial evaluation	26	27	41	3.35
51	Mineral trioxide aggregate in primary teeth pulpotomy. A systematic literature review	26	30	87	2.67
52	Radiographic success of ferric sulfate and formocresol pulpotomies in relation to early exfoliation	26	21	66	1.76
53	Calcium hydroxide pulpotomy with a light-cured cavity-sealing material after two years	26	36	80	1.14
54	Root-canal filling materials for primary teeth – a review of the literature	26	45	94	0.94
55	Accuracy of two different apex locators in primary teeth with and without root resorption	25	26	74	2.13
56	Beta-tricalcium phosphate, white mineral trioxide aggregate, white Portland cement, ferric sulfate, and formocresol used as pulpotomy agents in primary pig teeth	25	26	55	2.13
57	A randomized clinical trial on the use of medical Portland cement, MTA and calcium hydroxide in indirect pulp treatment	24	33	66	4.17
58	Clinical and radiographic outcomes of the use of four dressing materials in pulpotomized primary molars: a randomized clinical trial with 2-year follow-up	24	28	37	3.56
59	Clinical evaluation of root canal obturation methods in primary teeth	24	32	77	1.75
60	Elimination of infection in pulpectomized deciduous teeth – A short term study using Iodoform paste	24	37	107	0.93
61	Clinical and radiographic evaluation of the effectiveness of Formocresol, Mineral Trioxide Aggregate, Portland Cement, and Enamel Matrix Derivative in primary teeth pulpotomies: A two-year follow-up	23	23	44	6.13

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62	Pulpotomy of human primary molars with MTA and Portland cement: a randomized controlled trial	22	27	68	2.05
63	Sodium Hypochlorite pulpotomies in primary teeth: A retrospective assessment	21	24	54	2.40
64	Pulpotomy medicaments for vital primary teeth	21	38	83	0.68
65	In vivo evaluation of the treatment outcome of pulpotomy in primary molars using diode laser, Formocresol, and Ferric Sulphate	20	22	38	3.48
66	Electronic determination of root canal working length in primary molar teeth: an in vivo and ex vivo study	20	29	68	2.29
67	Ex vivo performance of five methods for root canal length determination in primary anterior teeth	20	25	59	2.05
68	In vivo outcomes of indirect pulp treatment using a Self-etching Primer versus Calcium Hydroxide over the demineralized dentin in primary molars	20	26	38	1.70
69	Ex vivo study of manual and rotary instrumentation techniques in human primary teeth	20	31	74	1.70
70	Clinical evaluation of Glutaraldehyde with Calcium Hydroxide and Glutaraldehyde with Zinc Oxide Eugenol in pulpotomy of primary molars	20	16	47	0.96
71	Reviewing pulp treatment for primary teeth	20	27	70	0.70
72	Use of vital pulp therapies in primary teeth with deep caries lesions	19	16	28	6.91
73	Evidence of pulpotomy in primary teeth comparing MTA, Calcium Hydroxide, Ferric Sulphate, and electrosurgery with Formocresol	19	17	34	4.00
74	Development of a core set of outcomes for randomized controlled trials with multiple outcomes - Example of pulp treatments of primary teeth for extensive decay in children	19	25	34	2.81
75	Clinical and radiographic success rates of Mineral Trioxide Aggregate and Ferric Sulphate pulpotomies performed by dental students	19	22	41	2.45
76	Diagnosis dilemmas in vital pulp therapy: Treatment for the toothache is changing, especially in young, immature teeth	19	25	113	1.62
77	A randomized controlled trial of ProRoot MTA, OrthoMTA and RetroMTA for pulpotomy in primary molars	18	15	25	3.79
78	Low-level laser therapy as an alternative for pulpotomy in human primary teeth	18	24	39	3.79
79	MTA and Ferric Sulfate in pulpotomy outcomes of primary molars: A Systematic Review and Meta-Analysis	18	16	36	3.13
80	Laser-assisted pulpotomy in primary teeth: a systematic review	18	21	45	2.67
81	A randomized study of Sodium Hypochlorite versus Formocresol pulpotomy in primary molar teeth	18	21	62	2.67
82	Success rates of a mixture of Ciprofloxacin, Metronidazole, and Minocycline antibiotics used in the non-instrumentation endodontic treatment of mandibular primary molars with carious pulpal involvement	18	26	62	2.32
83	Formocresol versus Calcium Hydroxide direct pulp capping of human primary molars: Two-year follow-up	18	16	16	1.85
84	Contemporary perspectives on vital pulp therapy: Views from the endodontists and pediatric dentists	18	15	60	1.53
85	Accuracy of two electronic apex locators in primary teeth with and without apical resorption: a laboratory study	18	19	64	1.53
86	Comparison of conventional, rotary, and ultrasonic preparation, different final irrigation regimens, and 2 sealers in primary molar root canal therapy	18	23	51	1.31
87	In vitro toxicity of MTA compared with other primary teeth pulpotomy agents	17	13	30	1.58
88	Impact of Er,Cr: YSGG laser therapy on the cleanliness of the root canal walls of primary teeth	17	21	41	1.45
89	Evolving primary pulp therapy technique	17	28	68	0.59
90	Assessment of a 2-percent buffered Glutaraldehyde solution in pulpomotized primary teeth of schoolchildren	17	27	62	0.57
91	Formocresol pulpotomy in deciduous teeth	17	15	47	0.30

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92	Determination of working length for teeth with wide or immature apices: a review	16	18	50	2.37
93	ZOE Paste pulpectomies outcome in primary teeth: A Systematic Review	16	26	61	1.83
94	Pulpotomy of human primary molars with MTA and Portland cement: a randomized controlled trial	16	16	38	1.49
95	Histopathological evaluation of pulpotomy with Er,Cr: YSGG laser vs Formocresol	16	18	47	1.36
96	Comparison of Calcium Hydroxide and Zinc-Oxide and Eugenol pulpectomies in primary teeth of dogs	16	23	54	0.42
97	Evaluation of root canal morphology of human primary molars by using CBCT and comprehensive review of the literature	15	17	34	4.00
98	Clinical and radiographic success of Mineral Trioxide Aggregate compared with Formocresol as a pulpotomy treatment in primary molars: A Systematic Review and Meta-analysis	15	18	43	2.61
99	Clinical and radiological evaluation of Calcium Sulfate as direct pulp capping material in primary teeth	15	16	14	2.61
100	Is there sufficient evidence to support the long-term efficacy of Mineral Trioxide Aggregate (MTA) for endodontic therapy in primary teeth?	15	18	42	2.22

WOS-CC: Web of Science Core Collection.

Contributing authors

Considering all authors who contributed to the papers either as first author or as co-author, a total of 306 authors were identified. The major contribution as first author was by Fuks AB (n = 3), followed by Ranly DM, Sakai VT, Maroto M, Trairatvorakul C, Coll JA, Smail-Faugeron V, Casagrande L, Odabas ME, Pinheiro SL, and Barcelos R (n = 2). Other first authors (n = 77) contributed with one paper. Considering the total number of top 100 papers, the most contributions came from three authors, namely Sakai VT, Oliveira TM, and Machado MAAM (n = 5). Considering only the contribution of the last author, the most contributions were made by de Araujo FB (n = 3). Of the other authors, three were included in four papers and eight in three papers each (Table 3). Figure 2 shows a density map of co-authorship. Each point has a color indicating the density of the items at that point. The greater the number of items near a point and the greater the weight of adjacent items, the closer the color is to red. In contrast, the smaller the number of items near a point and the lower the weight of the adjacent items, the closer the color of the point is to blue. The larger the font size of the author's name, the greater the number of citations that this author has among the 100 most-cited papers.

Contributing countries and institutions

In total, twenty-four countries contributed to the 100 most-cited papers (Figure 3), based on the institutional address of the corresponding author. The top three countries were the United States with 21 publications and 634 citations, followed by Brazil (18 papers; 483 citations) and Turkey (13 papers; 400 citations). Among the sixty-eight institutions, the University of São Paulo (Brazil) was the largest contributor to the most-cited articles with six publications, followed by Hebrew University (Israel), University of Maryland (USA), and Shahid Beheshti University of Medical Sciences (Iran), with four publications each. Table 4 shows the list of contributing institutions with two or more publications.

Journal of publication

In total, twenty-four journals contributed to the 100 most-cited papers. The top four journals were Pediatric Dentistry Journal (16 papers; 693 citations), International Endodontic Journal (15 papers; 513 citations), Journal of Dentistry for Children (8 papers; 231 citations), and International Journal of Pediatric Dentistry (8 papers; 204 citations). Table 5 shows the full list of contributing journals. Poisson regression analysis (Table 2) showed that for a unit increase in impact factor, the number of WoS-CC citations tended to increase by 9.7% (RR: 1.097, 95% CI 1.025–1.173).

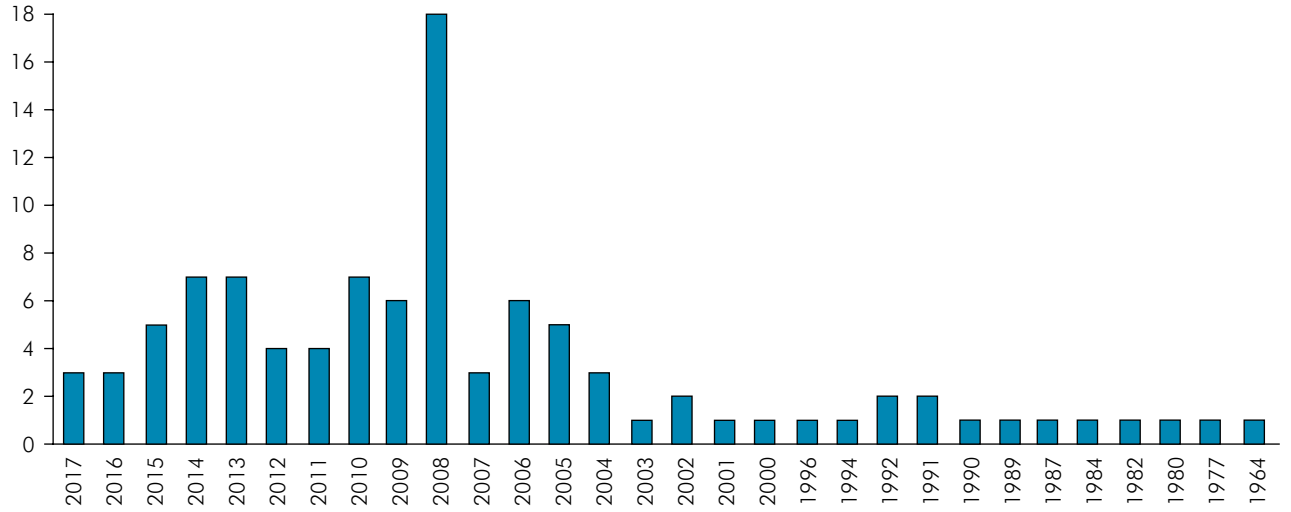

Figure 1. Number of papers by year of the 100 most-cited.

Table 2. Poisson regression between total number of WOS-CC citations and independent variables.

Independent variables	WOS-CC number of citations	
	RR (95% CI)	p-value
Study design		
Interventional	1	
Review	0.818 (0.620 – 1.080)	0.157
Observational	0.742 (0.589 – 0.934)	0.011*
Laboratorial	0.546 (0.434 – 0.687)	< 0.01*
Case series/case report	0.362 (0.244 – 0.537)	< 0.01*
Practice guideline	0.645 (0.514 – 0.808)	< 0.01*
Year of publication	0.985 (0.975 – 0.995)	0.004*
Journals' impact factors	1.097 (1.025 – 1.173)	0.007*

CI: confidence interval; RR: rate ratio; WOS-CC: Web of Science Core Collection .

Study design and topics

Among the 100 most-cited papers, 32 were randomized clinical trials, 15 were literature reviews, 14 were laboratorial studies, 12 were cohort studies, 9 were systematic reviews, 7 were nonrandomized clinical trials, 7 were case series, 2 were cross-sectional studies, 1 was a case report, and 1 was a practice guideline. Poisson regression analysis (Table 2) showed that the interventional and review studies had a high number of WoS-CC citations when compared to observational studies, laboratory studies, case reports/case series, and practice guidelines.

The main topics of interest of the 100 most-cited papers was the evaluation of the effectiveness of different medications for pulpotomy in primary teeth (n = 46). Among pulpotomy materials, Mineral Trioxide Aggregate (MTA) materials (n = 24) were most frequently evaluated, followed by Formocresol (n = 21) and calcium hydroxide (n = 7). Other topics of interest included pulp capping, lasers in endodontic therapy, accuracy of apex locators for determining root canal length, filling materials and techniques, smear layer, canal instrumentation, microbiology, diagnostic methods, and root canal anatomy.

Keywords

A total of 151 keywords were identified in the articles. "Pulpotomy" (n = 35) was mentioned most frequently, followed by "primary teeth" (n = 25), "mineral trioxide aggregate" (n = 18), "formocresol" (n = 16), "primary molar" (n = 13), and "calcium hydroxide" (n = 11). Other keywords were found in less than 7 papers. Figure 4 shows a density map of the keywords. The size of the circle shows the keyword density in the 100 most-cited papers. The most frequent keywords have larger circles and the less frequent ones have smaller circles. The lines between the circles indicate relationships, and thicker lines represent a stronger link between two keywords.

Table 3. Number of papers an author appeared as the first author and as the co-author.

Author	as first author	as co-author (2nd to the penultimate author)	as co-author (last author)	Total	Total of citations WOS-CC
Sakai VT	2	3	0	5	167
Oliveira TM	0	3	2	5	167
Machado MAAM	0	5	0	5	167
Fuks AB	3	1	0	4	253
Garcia-Godoy F	0	3	1	4	186
Casagrande L	2	1	0	3	85
Coll JA	2	1	0	3	111
Odabas ME	2	1	0	3	80
Marghalani AA	1	2	0	3	73
Abdo RCC	0	1	2	3	119
Araujo FB	0	0	3	3	85
Moretti ABS	0	3	0	4	68
Fornetti APC	0	3	0	3	119
Santos CF	0	3	0	3	119

WOS-CC: Web of Science Core Collection.

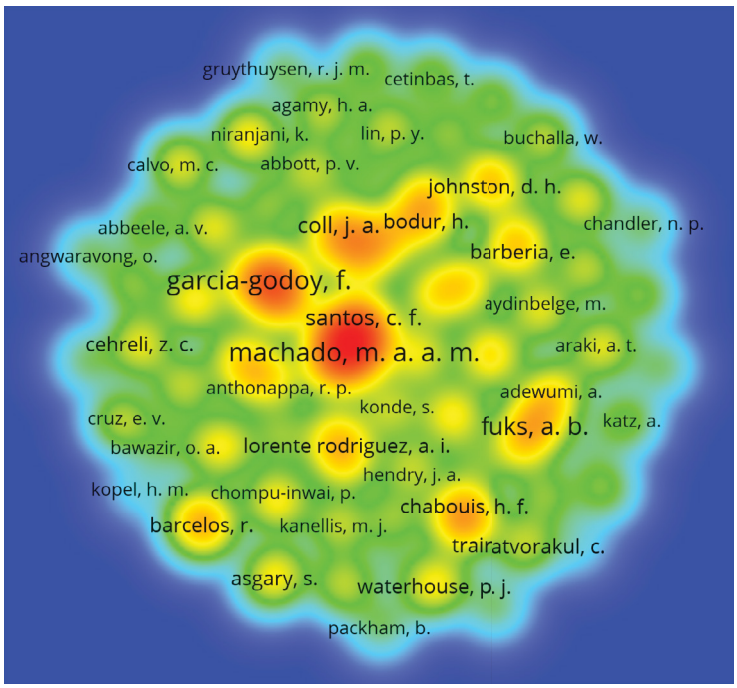

Figure 2. Map of co-authorship and clusters among authors: the colors represent the author density. The greater the number of items near a point and the greater the weight of neighboring items, the closer the color is to red. The smaller the number of items near a point and the smaller the weight of neighboring items, the closer the color is to blue.

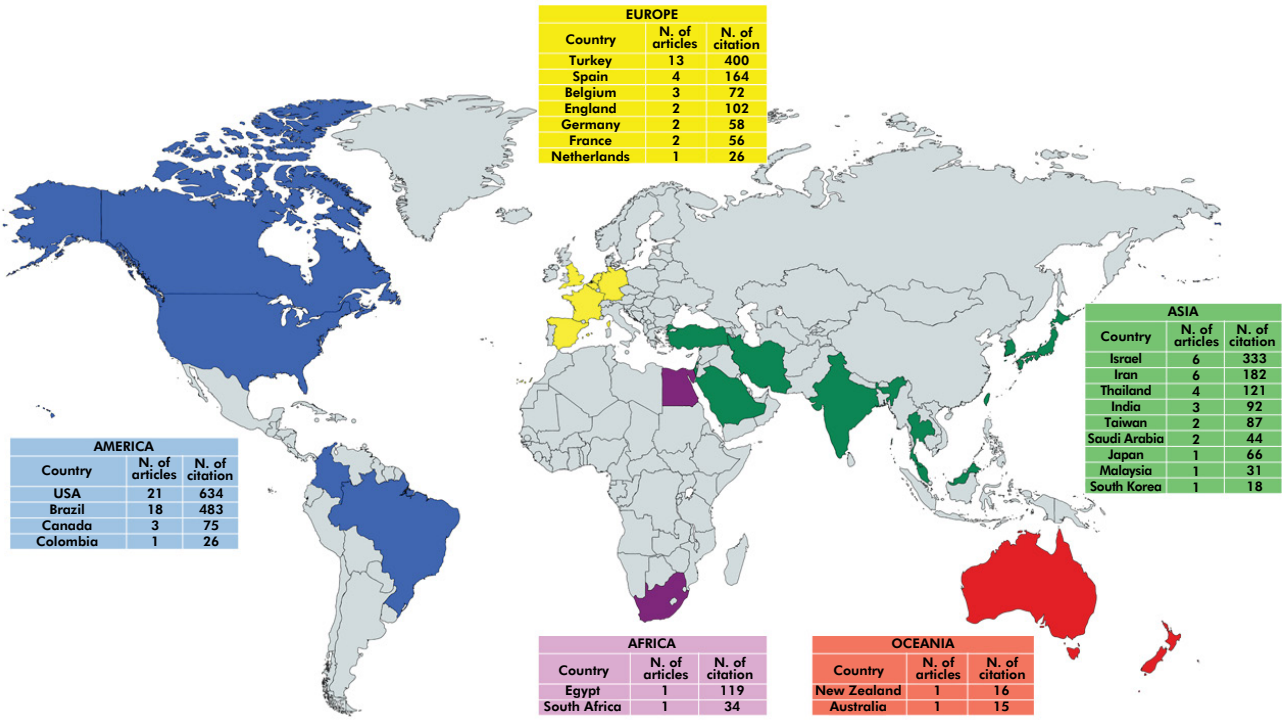

Figure 3. Worldwide distributions of the 100 most-cited papers.

Discussion

Endodontic therapy in primary teeth is a promising area of study within Endodontics, and therefore, knowing which are the most-cited and recognized papers in this field facilitates discussions, helps identify gaps, and serves as a basis for the development of new research directions.[21,22] In this sense, the present bibliometric study aimed to identify and analyze the 100 most-cited papers on endodontic therapy in primary teeth. The most-cited papers in this study were each cited between 15 and 135 times (mean of 32.54 citations). According to Andersen et al.,[21] a paper must have at least 100 citations to be considered classic in a research area. In this study, only two papers were cited more than 100 times and can be considered "classic" papers.

Other reviews in endodontics indicated that of the 100 most-cited papers, 39 to 100 had more than 50 citations, with a mean range of 52.21 to 169.93 citations.[10-12,23] However, these reviews considered broader areas within endodontics and included the study of permanent teeth, therefore, a greater number of citations would be expected for these papers. In other areas of dentistry, the number of citations was even higher, such as in orthodontics, ranging between 115 to 848 citations;[24] in periodontics, 286 to 2,307 citations;[25] in implant dentistry, 262 to 1,693 citations;[26] in Implant Dentistry, Periodontics, and Oral Surgery, 815 to 3,932 citations.[27] However, these studies looked at the number of citations in broader areas of dentistry, rather than a specific area - such as endodontic therapy in primary teeth. Therefore, the lowest number of citations in the present study was not a surprise.

When analyzing the most-cited papers, it is important to consider the citation density in addition to the absolute number of citations, as papers that have been published for a longer period of time tend to receive more citations simply because they have been available for a longer time.[22] When the papers were ranked in descending order of citation density, the paper "Primary tooth vital pulp therapy: A Systematic Review and Meta-analysis" was ranked first.[1] Although a high number of citations is important from a scientific point of view and reflects the influence of

Table 4. List of institutions with two papers or more that contributed to the 100 most-cited papers about endodontic therapy in primary teeth.

Institution (country)	N. of papers	N. of citations WOS-CC
University of São Paulo (Brazil)	6	187
Hebrew University (Israel)	4	284
University of Maryland (USA)	4	130
Shahid Beheshti University of Medical Sciences (Iran)	4	106
Ankara University (Turkey)	3	173
University of Texas Health Science Center (USA)	3	130
University of Gazi (Turkey)	3	80
Complutense University of Madrid (Spain)	2	106
Newcastle upon Tyne (UK)	2	102
Catholic Pontifical University of Campinas (Brazil)	2	62
Chulalongkorn University (Thailand)	2	59
International University of Catalunya (Spain)	2	58
Franciscan University Center (Brazil)	2	56
Hacettepe University (Turkey)	2	56
Hospital for Sick Children (Canada)	2	54
Ghent University (Belgium)	2	47
University of Iowa (USA)	2	47
Federal Fluminense University (Brazil)	2	42
Federal University of Santa Catarina (Brazil)	2	40

WOS-CC: Web of Science Core Collection.

Table 5. Journal of publication of the 100 most-cited papers about pulp therapy in primary teeth.

Journal (Impact factor)	N. of papers	N. of citations WOS-CC
Pediatric Dentistry (1.594)	16	693
International Endodontic Journal (3.801)	15	513
Journal of Dentistry for Children (0.16)	8	231
International Journal of Pediatric Dentistry (1.993)	8	204
Journal of Clinical Pediatric Dentistry (0.798)	7	143
Journal of Endodontics (3.118)	6	245
Journal of the American Dental Association (2.803)	6	132
American Journal of Dentistry (0.957)	5	216
Clinical Oral Investigations (2.812)	4	121
European Archives of Pediatric Dentistry (0.55)	4	89
Journal of Dentistry (3.242)	3	183
British Dental Journal (1.306)	3	101
Lasers in Medical Science (2.342)	3	69
Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics (1.221)	3	61
Australian Dental Journal (1.401)	1	61
Cochrane Database of Systematic Reviews (1.230)	1	37
Journal of Clinical and Diagnostic Research (0.190)	1	37
Medicina Oral, Patologia Oral y Cirugia Bucal (1.596)	1	26
Endodontics & Dental Traumatology (1.306)	1	20
Photomedicine and Laser Surgery (1.918)	1	20
PloS One (2.740)	1	19
Oral Diseases (2.613)	1	18
Acta Odontologica Scandinavica (1.573)	1	15

WOS-CC: Web of Science Core Collection.

a particular paper in a research field, this parameter alone is not sufficient to assess the scientific value of a paper, as other factors such as study design and methodological quality are also crucial.[10,28] The most-cited paper[16] in absolute numbers received fewer citations per year since its publication in 2005, while the paper published in 2017[1] received more citations per year, but appears only in 20th place. The higher citation density of this paper could be related to its topic and study design (meta-analysis).

The journals in which the most-cited papers were published are not exclusively endodontics or pediatric journals, but the top six journals with the highest number of papers are from these areas. The fact that other journals specialize in other dentistry areas, such as radiology, surgery, and pathology, may reflect the multidisciplinary nature of treatments in pediatric endodontics.

Among the authors who contributed to the most-cited articles, 83.7% contributed to one paper, 11.8% to two papers, 2.6% to three papers, and 0.98% to four papers. Among the authors with the most contributions, the top three (Sakai VT, Oliveira TM, and Machado MAAM) are not those with the highest

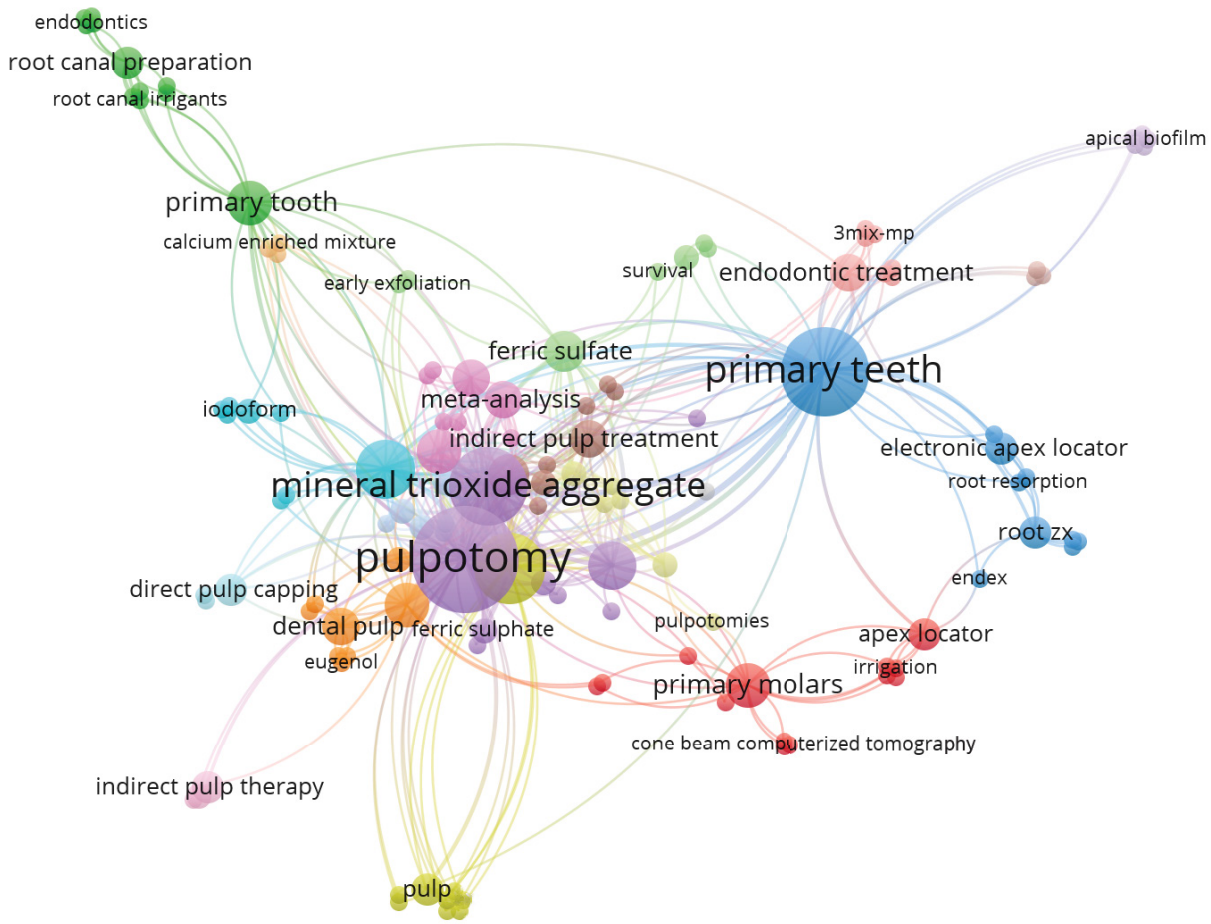

Figure 4. Main keywords and clusters among the 100 most-cited papers. The size of the circle represents keyword density: the most frequent keywords have larger circles and the less frequent ones have smaller circles. The lines between the circles indicate relationships, and thicker lines represent a stronger link between two keywords.

number of papers as first author, but the author Fuks AB, which has three papers as first author and one as co-author. Interestingly, 25% of the papers were authored by a single or two authors, which is different from previous bibliometric reviews where most papers were authored by more than 3 authors.[10-12,25]

As in recent reviews,[10,11,23,29] most papers were published by authors from the USA, followed by Brazil and Turkey. The fact that the USA has the largest number of papers in recent reviews might be related to the greater availability of resources for research investment, being the country with the most important research centers in the world.[30] Although most of the papers are from the USA, the institution with the highest number of papers is from Brazil, the University of São Paulo, and the institution with the highest number of citations is from Israel, the Hebrew University. These universities were identified as the best in their countries and continents, due, among other factors, to their good infrastructure and the ability of their researchers to raise funds to develop quality research. Brazil and Turkey, despite language barriers, gaps in the professional networks, and limited access to information, are still among the most-cited countries, as in other reviews.[11,16,29,30] These countries together account for 31% of the most-cited papers in this study, reflecting the importance of these countries in the field of Pediatric Dentistry research. The distribution of publications by continent is quite

heterogeneous, 43% of the most-cited papers are from the Americas, while 27% are from Europe, 26% from Asia, and only 2% from Africa and 2% from Oceania. It is interesting to note that although 2% seems little for a continent, other reviews of most-cited papers do not include papers from the African continent.[11,23,27]

Among the most-cited papers, 32% were randomized clinical trials, possibly reflecting a trend of citations for studies with a higher level of scientific evidence in this area. In evidence-based dentistry, randomized clinical trials are considered the gold standard for clinical decision-making and have the highest level of scientific evidence.[31-33] In other reviews, cross-sectional studies were among the most-cited papers, with few laboratory studies.[11,23,25,29] Controversially, in the present study, 14 papers were laboratory studies and only 2 were cross-sectional studies, which can be explained by the specificity of this area of study, as some lines of research, such as evaluating of the accuracy of electronic apical locators, studying instrumentation techniques, or determining the length of the root canal, were evaluated *in vitro*.[34-37]

Keywords act as 'codes' and are important components of a bibliographic search as they allow more relevant results to be retrieved than the use of sentences or phrases.[10,38] Most keywords were used in a single paper (66.9%), indicating a lack of standardization in the use of these terms. The topic "pulpotomy" was studied in 46 papers, but the keyword "pulpotomy" appeared in 35 papers. In addition, the keyword 'primary teeth' was used in only 25 papers, although it was addressed in all papers. Unfortunately, as in other studies,[10,29] several papers in this review did not include keywords. Considering that keywords are a search strategy to find papers and that these papers were among the most-cited even without keywords, it is interesting to note that other parts of the studies need to be well elaborated, such as an informative title. This shows that the quality of the title of a paper is strongly related to the number of citations.[39]

The main topics of interest among the most-cited papers were primarily concerned with evaluating the efficacy of different medications for pulpotomy in primary teeth. The two oldest papers date from the 1960s and 1970s and evaluated the efficacy of formocresol as a pulpotomy medication.[16,40] In the 1980s and 1990s, studies evaluated other medications for pulpotomy (*i.e.*, MTA, iodoform paste, and calcium hydroxide). The use of electronic apical locators as an aid to endodontic treatment in primary dentition[35] and the first literature review[41] most-cited are from the 1980s and 1990s. In the 2000s, the first randomized clinical trial[42] and in the 2010s, the first systematic literature review[43] were among the most-cited papers. In the 2010s, studies evaluating different methods for determining the working length of the root canal, the results of endodontic procedures, and the use of laser therapy for pulp therapy in primary teeth were among the most-cited, representing a scientific evolution and technological development in this area.

WoS-CC was used to find and select the 100 most-cited papers for the present study. Although other databases - such as MEDLINE/PubMed platform - are more commonly used to search for articles, they do not provide information on the number of citations, therefore, the 100 most-cited papers cannot be identified. Of the other platforms that provide the number of citations, the Scopus database retrieves only citations made after 1996, which may affect the number of citations of more classic papers.[20,44] Google Scholar also retrieves the number of citations, but the inclusion of books, theses, and dissertations - studies without peer-review – may affect the selection of the most-cited papers.[20,44]

There are some limitations present in this review that need to be considered. There is a possibility that papers with no keywords or an informative title that correspond to the current search strategy were excluded from the search. This fact highlights the need for standardization in the use of keywords by authors, as well as the elaboration of a title that is concise and informative enough to be found in a search strategy for a specific area.

Conclusion

This bibliometric analysis provides useful information on the progress of studies evaluating endodontic therapy in primary teeth and acknowledges the institutions and authors that have contributed to

this area of research. This analysis also identifies common terms of interest in this area of research and is the first bibliometric study to identify the most-cited papers on endodontic therapy in primary teeth. This information can be used by clinicians to select the appropriate scientific evidence for their decision-making processes and by researchers to identify research trends and gaps and to see how the most-cited papers have influenced the scientific and clinical communities. It enables editors to better understand the relevance of the most-cited papers in the international scientific scenario.

References

1. Coll JA, Seale NS, Vargas K, Marghalani AA, Al Shamali S, Graham L. Primary tooth vital pulp therapy: A systematic review and meta-analysis. Pediatr Dent. 2017 Jan;39(1):16-123.
2. Stringhini Junior E, Santos MG, Oliveira LB, Mercadé M. MTA and biodentine for primary teeth pulpotomy: a systematic review and meta-analysis of clinical trials. Clin Oral Investig. 2019 Apr;23(4):1967-76. https://doi.org/10.1007/s00784-018-2616-6
3. American Academy of Pediatric Dentistry. Pulp therapy for primary and immature permanent teeth. Pediatr Dent. 2017 Sep;39(6):325-33.
4. Kratunova E, Silva D. Pulp therapy for primary and immature permanent teeth: an overview. Gen Dent. 2018 Nov-Dec;66(6):30-8.
5. Ranly DM, Garcia-Godoy F. Current and potential pulp therapies for primary and young permanent teeth. J Dent. 2000 Mar;28(3):153-61. https://doi.org/10.1016/S0300-5712(99)00065-2
6. Fuks AB. Vital pulp therapy with new materials for primary teeth: new directions and Treatment perspectives. Pediatr Dent. 2008 May-Jun;30(3):211-9. https://doi.org/10.1016/j.joen.2008.02.031
7. Witherspoon DE. Vital pulp therapy with new materials: new directions and treatment perspectives: permanent teeth. J Endod. 2008 Jul;34(7 Suppl):S25-8. https://doi.org/10.1016/j.joen.2008.02.030
8. Boutsiouki C, Frankenberger R, Krämer N. Relative effectiveness of direct and indirect pulp capping in the primary dentition. Eur Arch Paediatr Dent. 2018 Oct;19(5):297-309. https://doi.org/10.1007/s40368-018-0360-x
9. Stringhini Junior E, Vitcel ME, Oliveira LB. Evidence of pulpotomy in primary teeth comparing MTA, calcium hydroxide, ferric sulphate, and electrosurgery with formocresol. Eur Arch Paediatr Dent. 2015 Aug;16(4):303-12. https://doi.org/10.1007/s40368-015-0174-z
10. Ahmad P, Dummer PM, Chaudhry A, Rashid U, Saif S, Asif JA. A bibliometric study of the top 100 most-cited randomized controlled trials, systematic reviews and meta-analyses published in endodontic journals. Int Endod J. 2019 Sep;52(9):1297-316. https://doi.org/10.1111/iej.13131
11. Adnan S, Ullah R. Top-cited articles in regenerative endodontics: A bibliometric analysis. J Endod. 2018 Nov;44(11):1650-64. https://doi.org/10.1016/j.joen.2018.07.015
12. Shamszadeh S, Asgary S, Nosrat A. Regenerative endodontics: a scientometric and bibliometric analysis. J Endod. 2019 Mar;45(3):272-80. https://doi.org/10.1016/j.joen.2018.11.010
13. Mattos FF, Perazzo MF, Vargas-Ferreira F, Martins-Júnior PA, Paiva SM. Top 100 most-cited papers in core dental public health journals: bibliometric analysis. Community Dent Oral Epidemiol. 2021 Feb;49(1):40-6. https://doi.org/10.1111/cdoe.12572
14. Cochrane. Glossary 2019 [cited 202 Nov 29]. Available from: https://community.cochrane.org/glossary
15. Eck NJ, Waltman L. VOSviewer manual. Leiden, 2020 [cited 2020 Dec 30]. Available from: https://www.vosviewer.com
16. Holan G, Eidelman E, Fuks AB. Long-term evaluation of pulpotomy in primary molars using mineral trioxide aggregate or formocresol. Pediatr Dent. 2005 Mar-Apr;27(2):129-36.
17. Agamy HA, Bakry NS, Mounir MM, Avery DR. Comparison of mineral trioxide aggregate and formocresol as pulp-capping agents in pulpotomized primary teeth. Pediatr Dent. 2004 Jul-Aug;26(4):302-9.
18. Law DB, Lewis TM. Formocresol pulpotomy in deciduous teeth. J Am Dent Assoc. 1964 Nov;69(5):601-7. https://doi.org/10.14219/jada.archive.1964.0353
19. Dhar V, Marghalani AA, Crystal YO, Kumar A, Ritwik P, Tulunoglu O, et al. Use of vital pulp therapies in primary teeth with deep caries lesions. Pediatr Dent. 2017 Sep;39(5):146-59.
20. Rajasekharan S, Martens LC, Vandenbulcke J, Jacquet W, Bottenberg P, Cauwels RG. Efficacy of three different pulpotomy agents in primary molars: a randomized control trial. Int Endod J. 2017 Mar;50(3):215-28. https://doi.org/10.1111/iej.12619
21. Andersen J, Belmont J, Cho CT. Journal impact factor in the era of expanding literature. J Microbiol Immunol Infect. 2006 Dec;39(6):436-43.
22. Luo F, Sun A, Erdt M, Sesagiri Raamkumar A, Theng YL. Exploring prestigious citations sourced from top universities in bibliometrics and altmetrics: a case study in the computer science discipline. Scientometrics. 2018;114(1):1-17. https://doi.org/10.1007/s11192-017-2571-z

23. Yılmaz B, Dinçol ME, Yalçın TY. A bibliometric analysis of the 103 top-cited articles in endodontics. Acta Odontol Scand. 2019 Nov;77(8):574-83. https://doi.org/10.1080/00016357.2019.1621378
24. Tarazona B, Lucas-Dominguez R, Paredes-Gallardo V, Alonso-Arroyo A, Vidal-Infer A. The 100 most-cited articles in orthodontics: A bibliometric study. Angle Orthod. 2018 Nov;88(6):785-96. https://doi.org/10.2319/012418-65.1
25. Corbella S, Francetti L, Taschieri S, Weinstein R, Del Fabbro M. Analysis of the 100 most-cited articles in periodontology. J Investig Clin Dent. 2017 Aug;8(3):e12222. https://doi.org/10.1111/jicd.12222
26. Chiang HS, Huang RY, Weng PW, Mau LP, Su CC, Tsai YC, et al. Increasing prominence of implantology research: a chronological trend analysis of 100 top-cited articles in periodontal journals. Eur J Oral Implantology. 2018;11(1):97-110.
27. De la Flor-Martínez M, Galindo-Moreno P, Sánchez-Fernández E, Piattelli A, Cobo MJ, Herrera-Viedma E. H-classic: a new method to identify classic articles in Implant Dentistry, Periodontics, and Oral Surgery. Clin Oral Implants Res. 2016 Oct;27(10):1317-30. https://doi.org/10.1111/clr.12749
28. Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, et al.; PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan;350 jan02 1:g7647. https://doi.org/10.1136/bmj.g7647
29. Ordinola-Zapata R, Peters OA, Nagendrababu V, Azevedo B, Dummer PM, Neelakantan P. What is of interest in Endodontology? A bibliometric review of research published in the International Endodontic Journal and the Journal of Endodontics from 1980 to 2019. Int Endod J. 2020 Jan;53(1):36-52. https://doi.org/10.1111/iej.13210
30. Shadgan B, Roig M, Hajghanbari B, Reid WD. Top-cited articles in rehabilitation. Arch Phys Med Rehabil. 2010 May;91(5):806-15. https://doi.org/10.1016/j.apmr.2010.01.011
31. Pandis N. The evidence pyramid and introduction to randomized controlled trials. Am J Orthod Dentofacial Orthop. 2011 Sep;140(3):446-7. https://doi.org/10.1016/j.ajodo.2011.04.016
32. Schulz KF, Altman DG, Moher D; CONSORT Group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. BMJ. 2010 Mar;340 mar23 1:c332. https://doi.org/10.1136/bmj.c332
33. Swingler GH, Volmink J, Ioannidis JP. Number of published systematic reviews and global burden of disease: database analysis. BMJ. 2003 Nov;327(7423):1083-4. https://doi.org/10.1136/bmj.327.7423.1083
34. Bodur H, Odabaş M, Tulunoğlu O, Tinaz AC. Accuracy of two different apex locators in primary teeth with and without root resorption. Clin Oral Investig. 2008 Jun;12(2):137-41. https://doi.org/10.1007/s00784-007-0157-5
35. Katz A, Mass E, Kaufman AY. Electronic apex locator: a useful tool for root canal treatment in the primary dentition. ASDC J Dent Child. 1996 Nov-Dec;63(6):414-7.
36. Kummer TR, Calvo MC, Cordeiro MM, Vieira RS, Rocha MJC. Ex vivo study of manual and rotary instrumentation techniques in human primary teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008 Apr;105(4):e84-92. https://doi.org/10.1016/j.tripleo.2007.12.008
37. Mello-Moura AC, Moura-Netto C, Araki AT, Guedes-Pinto AC, Mendes FM. Ex vivo performance of five methods for root canal length determination in primary anterior teeth. Int Endod J. 2010 Feb;43(2):142-7. https://doi.org/10.1111/j.1365-2591.2009.01667.x
38. Natarajan K, Stein D, Jain S, Elhadad N. An analysis of clinical queries in an electronic health record search utility. Int J Med Inform. 2010 Jul;79(7):515-22. https://doi.org/10.1016/j.ijmedinf.2010.03.004
39. Gjersvik P, Gulbrandsen P, Aasheim ET, Nylenna M. Poor title: poor manuscript? Tidsskr Nor Laegeforen. 2013 Dec;133(23-24):2475-7. https://doi.org/10.4045/tidsskr.13.1077
40. Pruhs RJ, Olen GA, Sharma PS. Relationship between formocresol pulpotomies on primary teeth and enamel defects on their permanent successors. J Am Dent Assoc. 1977 Apr;94(4):698-700. https://doi.org/10.14219/jada.archive.1977.0353
41. Avram DC, Pulver F. Pulpotomy medicaments for vital primary teeth. Surveys to determine use and attitudes in pediatric dental practice and in dental schools throughout the world. ASDC J Dent Child. 1989 Nov-Dec;56(6):426-34.
42. Casas MJ, Kenny DJ, Johnston DH, Judd PL. Long-term outcomes of primary molar ferric sulfate pulpotomy and root canal therapy. Pediatr Dent. 2004 Jan-Feb;26(1):44-8.
43. Barcelos R, Santos MP, Primo LG, Luiz RR, Maia LC. ZOE paste pulpectomies outcome in primary teeth: a systematic review. J Clin Pediatr Dent. 2011;35(3):241-8. https://doi.org/10.17796/jcpd.35.3.y777187463255n34
44. Jafarzadeh H, Sarraf Shirazi A, Andersson L. The most-cited articles in dental, oral, and maxillofacial traumatology during 64 years. Dent Traumatol. 2015 Oct;31(5):350-60. https://doi.org/10.1111/edt.12195