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## **A bibliometric analysis of the top 100 most-cited case reports and case series in Endodontic journals**

Venkateshbabu Nagendrababu, Jelena Jacimovic, Aleksandar Jakovljevic, Giampiero Rossi-Fedele, Paul M. H. Dummer

### **Introduction**

Presentations of new or unusual diseases, rare clinical conditions, innovative treatment techniques and approaches, as well as rare or unusual complications are most often reported as case reports in scientific journals for the benefit of clinicians, the scientific community and particularly for individuals with an interest in the specialty. Case reports may also drive the testing of new and innovative hypotheses through new research and contribute to best-practice guidelines for clinical practice (Cohen 2006, Danish *et al.* 2017). Case reports can also be used to highlight serious or important adverse events as well as the economics and cost-benefit of treatment approaches (Nayak 2010, Riley *et al.* 2017). However, in the hierarchy of evidence-based decision making, case reports and case series are at the lowest level as they have low specificity even if they have high sensitivity for identifying innovation (Vandenbroucke 2001).

Traditionally, a large number of case reports and case series are submitted for publication in Endodontics (PMH Dummer, unpublished information), however, their quality is variable, often a repeat of a previous topic and commonly sub-optimal. The quality of case reports is important as they form a source of information in the fields of health education, clinical research, patient management guidelines and treatment outcomes (Cohen 2006). Case reports of poor quality that are inconsistent, inaccurate and incomplete have limited usefulness (Riley *et al.* 2017) and can be misleading, and the absence of relevant guidelines and the ambiguity in existing reporting guidelines has led

to confusion in the minds of authors whilst preparing manuscripts. Recently, the Preferred Reporting Items for Case reports in Endodontics (PRICE) 2020 guidelines (Nagendrababu *et al.* 2020a) were developed in an attempt to improve the overall quality of case reports in the field of Endodontics. The PRICE 2020 guidelines consist of a checklist made up of 19 domains and 47 items as well as a flowchart that summarises the sequence of stages involved when drafting case reports (Nagendrababu *et al.* 2020a).

In Endodontology, a substantial number of case reports and case series have been published in a wide array of journals. It is important that those case reports/ case series that are published are analysed periodically so that their impact on research, clinical practice and the development of the specialty of Endodontology can be assessed. One method to evaluate this impact is the application of bibliometric analysis.

Bibliometrics is a systematic, transparent, and reproducible review process based on a statistical approach to provide an overview of the current status of the literature in a particular field through the analysis of the published literature (Aria & Cuccurullo 2017). This approach provides objective and reliable information on the progress and direction of publications through the analysis of authors, institutions and countries involved (Aria & Cuccurullo 2017). The influence of an author and article is most often measured by its citation count. The number of citations an article receives is one of the measures of its scientific merit (Eyre-Walker & Stoletzki 2013). However, the scientific rigor of an article and its impact on clinical practice cannot be gauged solely on the basis of the citations it obtains (Mishra *et al.* 2018, Yilmaz *et al.* 2019).

A publication in a particular field that is most frequently cited recognises the authors and institutions that had the most impact (Baltussen & Kindler 2004, Bornmann 2008, Moed 2009). An article cited more than 400 times is referred to as a “citation classic”, however, this number varies based on the number of authors and the size of the specialty in the particular field of interest.

Bibliometric performance based on citation data has been widely analyzed in various fields of dentistry. Previously published bibliometric studies have described the most cited (also highly or top-cited) articles published in the field of dentistry (Feijoo *et al.* 2014; Yeung & Ho 2019), in specific dental journal/s (Ullah *et al.* 2019; Ahmad *et al.* 2019a, 2019b, 2020a, 2020b) or subareas, such as prosthodontics (Praveen *et al.* 2020), pediatric dentistry (Patil *et al.* 2020), endodontics (Yilmaz *et al.* 2019), dental caries (Arshad *et al.* 2020), orthodontics (Tarazona *et al.* 2018), dental implantology (Fardi *et al.* 2017), periodontology (Faggion *et al.* 2017; Ahmad *et al.* 2020c), oral pathology and medicine (Yang *et al.* 2019), or oral and maxillofacial surgery (Aslam-Pervez *et al.* 2018). In Endodontology, bibliometric studies are of importance because they provide an overview of the publications in a particular field and assess scientific and clinical activity by calculating bibliometric indicators that provide valuable information on the quantity and quality of publications. In Endodontology, bibliometric studies have been published in areas such as regenerative endodontics (Adnan & Ullah 2018), micro-computed tomography (Aksoy *et al.* 2020), and management of fractured instruments (Mishra *et al.* 2018). Ahmad *et al.* (2019c) studied the main characteristics of the top 100 most-cited randomised controlled trials, systematic reviews and meta-analyses published in Endodontic journals. No bibliometric analysis has been conducted exclusively on case report/case series in Endodontic journals. Hence, the current bibliometric analysis aimed

to identify the top most-cited case reports and case series in Endodontic journals and to analyse their bibliometric characteristics.

## **Materials and Methods**

### *Data sources and search strategy*

Identification and retrieval of the top 100 most-cited case reports and case series published in Endodontic journals were performed using several data sources and a two-step approach. The first step focused on the identification of published case reports and case series, while the second step aimed at citation tracking and identifying those most frequently cited.

Three leading bibliographic databases were used as the main source of data, namely Clarivate Analytics' Web of Science (WoS) [1980-present], Elsevier's Scopus [1960-present], and PubMed [1964-present], both to identify case reports and case series and to track citations and identify those most frequently cited. To locate case reports and case series published in the English language within the field of Endodontics, journals containing "endodontology", "endodontics" or "endodontic" in the title were considered, regardless of their inclusion in selected databases. Therefore, the content of the following journals was searched:

1. *Journal of Endodontics*,
2. *International Endodontic Journal* (formerly known as *Journal of the British Endodontic Society* until 1980),
3. *Dental Traumatology* (formerly known as *Endodontics and Dental Traumatology* until 2001),
4. *Australian Endodontic Journal*,
5. *Iranian Endodontic Journal*,

6. *Restorative Dentistry and Endodontics*,
7. *Endo-Endodontic Practice Today*,
8. *Saudi Endodontic Journal*,
9. *European Endodontic Journal*,
10. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology* (formerly known as *Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontology* until 2012 and *Oral Surgery, Oral Medicine, Oral Pathology* until 1995),
11. *Brazilian Endodontic Journal* (published in English from 1996 to 2001),
12. *Endodontology: Journal of Indian Endodontic Society*.

Since case reports and case series do not necessarily contain the word "case" in the title or abstract, preliminary searches were conducted to evaluate various retrieval strategies and to develop the most optimal terms to provide the most comprehensive search. Also, due to disparities in coverage and indexing methods among databases, these trial searches confirmed the need and rationale for using several sources in the process of identification of published case reports. The final search was performed on January 5, 2021, using the expression detailed in Supplementary Table S1. All references that were obtained, including bibliographic and citation data, were automatically exported from databases and imported into a spreadsheet (Excel, Microsoft, Redmond, WA, USA) for duplicate removal and screening. The search strategy resulted in 4889 unique records, listed by descending number of citations retrieved from the source database (WoS or Scopus).

The second step was directed at citation tracking and identifying the most frequently cited case reports and case series based on WoS citation counts, which were

further cross-matched with Scopus and PubMed data, as well as Google Scholar (GS) citations. The total number of WoS citations for articles published in journals not indexed in selected databases (such as *Brazilian Endodontic Journal* or *Endodontology: Journal of Indian Endodontic Society*) was examined through Clarivate Analytics' Cited Reference Search. For all records found in Scopus or PubMed only, citations from WoS were also checked using the Cited Reference Search option. PubMed citations were retrieved using the *iCite* tool from the National Institute of Health (NIH), USA (<https://icite.od.nih.gov>) and public-domain citation data from the NIH Open Citation Collection (NIH-OCC) that comprises citation links between articles published in PubMed [1980- present].

#### *Study selection and data extraction*

Screening of the studies identified, arranged in descending order of WoS citations, was undertaken by two independent investigators (A.J. and J.J.). Clinical trials, retrospective cohort studies, animal studies, laboratory-based studies, and reviews not describing case reports or case series were excluded. Disagreements between the investigators during the selection of studies were resolved by a third investigator (V.N.). Finally, a unanimous decision was made on the list of the top 100 most-cited case reports and case series published in Endodontic journals to be included and then analysed further.

Complete bibliographic records of selected case reports and case series were exported in plain text or BibTeX format from WoS (n=64) and Scopus (n=36), respectively, and imported into the R environment for statistical computing and graphics (R Core Team 2016).

The following information about the 100 selected case reports and case series was extracted automatically and saved in a spreadsheet: names and affiliations of authors, title, abstract, keywords, Keywords Plus (index terms automatically generated by Clarivate Analytics from the titles of cited articles), year of publication, journal of publication, first author (FA), corresponding author (CA), references cited in the report, language, PMID, DOI, the total number of citations (TC), the average number of citations per year (TC<sub>Y</sub>), the average number of citations per case report (TC<sub>A</sub>), local citations (LC) that measure how many times an author or a document included in this set of case reports was cited by other authors in the included reports. Additionally, the Impact factor (IF) of the journal, based on the current release of Journal Citation Reports (JCR® IF2019) and Journal IF 2019 Quartile in the WoS subject category *Dentistry, Oral Surgery & Medicine* (QC), as well as JCR IF in the category *Dentistry, Oral Surgery & Medicine* for the year in which the case report/series is published, were also noted. Each component study was further reviewed to record document type (*case report* presenting one to four cases or *case series* presenting five or more cases), number of cases per document, number of authors per document, whether phrases such as "case report(s)" or "case series" were included in the title, and whether a case report or case series was cited in clinical studies based on iCite data. All case reports were also classified into 21 categories according to the research topic.

#### *Data analysis and visualisation*

The R-package *bibliometrix* version 3.0.4 (Aria & Cuccurullo 2017) was used to perform a descriptive analysis of the bibliographic data and extraction of collaboration networks. To remove transcription or indexing errors and ensure valid output, certain data were manually refined and disambiguated. Due to abbreviations of the names of



authors created in databases, all authors were checked through their institute or e-mail addresses. All institutional affiliations were normalized and included on a macro level, such as universities and research centres, while individual departments or research units were dropped. Publications originating from Northern Ireland and England were considered as being from the United Kingdom, while case reports from Taiwan were counted as China. The titles of the journals, formerly known by another name, were also normalised based on the current title. The literature cited in the selected case reports was examined and all references were normalized to create a uniform presentation. Different keywords with the same meaning were merged into one term (e.g. *mineral trioxide aggregate* and *MTA*).

Citation counts for each evaluated case report/case series were retrieved from the WoS (TC<sub>W</sub>), Scopus (TC<sub>S</sub>), PubMed (TC<sub>PM</sub>) and GS (TC<sub>GS</sub>). Correlation between citation counts of these databases was assessed and represented by a Pearson's correlation coefficient ( $r$ ). To understand the value of the top 100 most-cited case reports and case series in the context of clinical research and their subsequent impact on evidence-based practice, citations in clinical studies were also recorded based on *iCite* data (TC<sub>c</sub>). Further, local citations (LC), expressing the number of citations of a report in a collection of the analysed reports, were noted.

The total number of contributing authors and the frequency of their appearances were recorded, assessing the contribution of each through the full (e.g. two authors each receive one full credit) and fractionalized (e.g. two authors receive half of a credit) counting method (Abramo *et al.* 2013). Further, the contributions of authors were investigated using Dominance Factor (DF) as a ratio indicating the fraction of multi-

authored articles in which an author appears as the first author (Kumar & Kumar 2008). Co-author analysis, based on co-occurrence of authors/institutions/countries in the author/address list of the analysed case reports, was used to identify co-authorships and determine collaboration networks of authors, institutions, or countries (Glänzel & Schubert 2005), laid out using the Kamada-Kawai algorithm (Kamada & Kawai 1989) and the Louvain clustering method for detecting communities in networks (Blondel *et al.* 2008). To identify and describe topics of selected case reports, co-word analysis, based on keywords' co-occurrence in the analysed case reports, was performed. Additionally, the distribution of case reports was analysed based on the clinical topic. Bibliometric networks were graphically presented using R packages *bibliometrix* version 3.0.4 (Aria & Cuccurullo 2017) and *wordcloud2* version 0.2.1. Geomapping of the evaluated papers by country was completed using the R package *rworldmap* version 1.3.6 (South 2011).

## **Results**

### *Citations*

The study comprises the top 88 most-cited case reports and 12 case series (with five to 19 cases), published since 1977 in endodontic journals in the English language. Of the documents analysed, 8 case reports and one case series (7 cases presented) were published as part of reviews. The median number of cases in case reports was one and for case series 8; in total, the median number of cases was one. A complete record of the top 100 most-cited case reports appears in Table 1, where documents are listed in descending order according to the WoS total citation count ( $TC_W$ ), as on the day of the search. Also, citations from Scopus ( $TC_S$ ), GS ( $TC_{GS}$ ), and PubMed ( $TC_{PM}$ ) are presented, as well as the average number of citations per year based on WoS data ( $mTC_{WY}$ ).

According to all the citation sources considered ( $TC_W=453$ ,  $TC_S=497$ ,  $TC_{GS}=1114$ ,  $TC_{PM}=393$ ), the most-cited case report that introduced a new treatment protocol for revascularisation of immature permanent teeth with apical periodontitis, with the largest average number of citations per year based on WoS data ( $mTC_{WY}=28.31$ ), was published in the *Journal of Endodontics* (Banchs & Trope 2004), which was also the most cited reference ( $LC=21$ ) from the other reports included in this study, that is local citations. The second-ranked paper, based on the total number of citations retrieved from all sources ( $TC_W=330$ ,  $TC_S=370$ ,  $TC_{GS}=797$ ,  $TC_{PM}=281$ ), dealt with the same topic and was published in *Dental Traumatology* (Iwaya *et al.* 2001). The third-ranked paper was a literature review with three cases describing complications during root canal irrigation, which was published in the *International Endodontic Journal* ( $TC_W=208$ ,  $TC_S=239$ ,  $TC_{GS}=672$ ,  $TC_{PM}=186$ ) (Hülsmann & Hahn 2000). This paper was also the case report most frequently cited within clinical studies, based on *iCite* data ( $TC_C=15$ ). The fourth-ranked paper according to WoS data ( $TC_W=191$ ,  $TC_S=200$ ,  $TC_{GS}=425$ ,  $TC_{PM}=166$ ) was published in the *Journal of Endodontics* (Jung *et al.* 2008) and described a series of cases of the treatment of immature permanent teeth with pulpal necrosis ( $n=9$ ).

The case reports and case series received a total of 6626 to 19634 citations, depending on the source ( $TC_W=7997$ ,  $TC_S=8916$ ,  $TC_{GS}=19634$ ,  $TC_{PM}=6626$ ). The total number of citations ranged between 42-453 (WoS), 42-497 (Scopus), 83-1114 (GS), and 16-393 (PubMed) (Figure 1). A perfect positive correlation ( $r=0.99$ ) between citations from WoS, Scopus, and PubMed exists, with a slightly lower Pearson correlation coefficient ( $r_{GS,W}=0.97$ ,  $r_{GS,S}=0.97$  and  $r_{GS,PM}=0.96$ ) also confirmed a strong positive relationship between citations from GS and other databases. Since a significant

correlation was noted between citations obtained from selected sources (Figure 2), only citations from WoS are described further in this study.

The average number of citations per document was 79.97, while the average number of citations per year was 254.38. The average number of citations per year per document was 5.25.

#### *Year of publication*

The distribution of the number of citations received per year for each case report, according to the selected databases, as well as GS, is shown in the first column of Figure 2. The top 100 most-cited case reports were published between 1977 (Hovland & Block 1977) and 2016 (Krastl *et al.* 2016), with an average period of 18.2 years following publication. The largest number of the most-cited case reports and case series per year were published in 2002, 2004, and 2007 (n=7) (Figure 3). Half of the top 100 most-cited case reports and case series were published in the 2000s (n=49), followed by the 2010s (n=26), 1990s and 1980s with 12 and 10 case reports, respectively. Only three of the top 100 most-cited case reports were published in the 1970s (Hovland & Block 1977, Marbach 1978, Harrington & Natkin 1979). The oldest report describing a series of 19 cases of tooth anomalies was published in the *International Endodontic Journal* (Manning 1990), with a total of 65 citations. Case reports and case series published in the 2000s and 2010s received the largest total number of citations (TCW=4208 and TCW=2239, respectively). There was no significant correlation between the age of the paper and the average number of citations per year ( $r=-0.59$ ).

#### *Contributing authors*

Two hundred and sixty authors were involved in the reports (the average number of authors per document was 2.6) with 314 author appearances (co-authorships). The number of authors per included study ranged from 1 to 7, with the average number of co-authors per included study of 3.14. Many case reports/case series (76%) were co-authored by two, three, and four individuals, whereas 14 and 2 case reports had 5 and 6 authors, respectively. Out of the top 100 studies, 7 were single-authored articles and only one was written by 7 authors.

Table 2 lists the authors with the greatest contribution (more than two published most-cited case reports). The author who published the largest number of the most-cited case reports/case series, both in terms of the total number of papers and based on fractionalised frequency, was D Ricucci, Private practice, Cetraro, Italy. This author was also the most frequent corresponding author (CA=6). Based on Dominance Factor, A Nosrat (University of Maryland, USA) was the most prominent, as this author appeared as the first author in all his reports (FA=3). There were other authors whose Dominance Factor was also equal to 1, but they have not been listed as they published only one top-cited case report. Table 3 gives the overview of the 20 most-cited authors, according to the TC<sub>w</sub>. The most cited author, both in terms of the total and local citations (TC<sub>w</sub>=577, LC=27), was M Trope (University of Pennsylvania, USA) for three case reports published in 1997 or afterwards.

The number of reports of the top 20 authors, published in the list over time, as well as their citation counts, are illustrated in Figure 4, where the size of the bubble represents the number of studies published in a certain year and the colour designates the total number of citations per year. M Trope was the author with the largest number of total citations received for a case report published in 2004 (TC=453), and the highest

average number of citations per year of 25.17. However, D Ricucci, whose top-cited studies were published in the period 2008-2014, had the largest number of citations per year for the case report published in 2013 ( $TC_Y=29.78$ ). Ricucci's close collaborators, LM Lin and JL Gibbs from New York University, USA, also received a large number of citations per year ( $TC_Y=24.33$ ). A complete collaboration network of authors contributing to the top 100 most-cited case reports is presented interactively in Figure S1.

### *Contributing countries and institutions*

All contributing institutions ordered according to their total number of citations are shown in Table 4. The most cited were the University of Washington, Temple University, University of North Carolina, New York University from the USA, and Private Practice, Cetraro, Italy, each achieving more than 450 citations. Among 100 identified institutions, the University of Washington and Private Practice, Cetraro, Italy appeared most often ( $TA=6$ ), followed by New York University ( $TA=5$ ) and the University of Maryland, USA, and the University of Melbourne, Australia ( $TA=4$ ). New York University, University of Florence, and Private Practice, Cetraro, Italy were the most frequently mentioned institutions (16, 12, and 11, respectively). Corresponding authors were associated with 63 different institutions. The most frequently stated correspondents were Private Practice, Cetraro, Italy ( $AC=6$ ) and the University of Washington ( $AC=5$ ). Most of the reports were produced by individuals aligned with a single institution, while 38% of the case reports were the result of cooperation between institutions. Private Practice, Cetraro, Italy ( $TA=6$ ) and the University of Washington, USA ( $TA=6$ ) were detected as highly collaborative institutions, with 6 and 5 links, respectively. The entire collaboration network among institutions can be explored through Figure S2.

Authors of the most cited case reports and case series originated from 23 countries, including 10 European, 7 Asian, 4 American, 1 Oceanian and 1 transcontinental country (Turkey). The contribution of each country within the distribution of the top 100 most-cited case reports and case series is shown in Figure 5 (5a - based on the frequency of occurrence of a country, 5b - based on the total number of reports, and 5c - based on a country of the corresponding authors). Table 5 provides an overview of the contributing countries ranked by the total number of most-cited case reports and case series. The most frequently stated were countries from Europe and North America (n=101, respectively), followed by countries from Asia (n=69) and South America (n=29). Based on the total number of top 100 most-cited case reports and case series, half (52%) originated from the USA and Italy. Corresponding authors, affiliated with 20 different countries, in half of the analysed case reports (51%) also came from these two countries. Table 5 presents the number of single (SCP) or multi-country case reports and case series (MCP), indicating the number of case reports in which at least one co-author was from a different country to the corresponding author. The majority of most-cited case reports were single-country documents (80%) originating from 17 countries, while the 20 most-cited case reports were the result of international collaboration, illustrated in Figure 6. The country whose case reports received the largest total number of citations was the USA (TC<sub>w</sub>=3559), while South Korea was the most prominent country in terms of the average number of citations per document (mTC<sub>v</sub>=135.7). The social network presented on a macro-level using the links among countries is given in Figure S3.

### *Journal of publication*

The most influential case reports were published in five journals. More than half (59%) were published in the *Journal of Endodontics*, while 21, 15, 4, and 1 appeared in

the *International Endodontic Journal*, *Dental Traumatology*, *Oral Surgery Oral Medicine Oral Pathology and Oral Radiology*, and the *Australian Endodontic Journal*.

Table 6 describes information on the IF of each journal based on the current release of JCRs (JCR® IF2019), Journal IF 2019 Quartile in WoS subject category *Dentistry, Oral Surgery and Medicine* (QC), the total number of published case reports (TA), the total number of received citations (TC<sub>w</sub>), the average number of citations per article (mTC<sub>A</sub>), publication year start and whether term 'case' was used in the title. All the most-cited case reports were indexed on the JCR and had IFs. Articles published in the *Journal of Endodontics* and the *International Endodontic Journal* were case reports and case series with the highest total number of citations. The highest number of average citations per paper was noted from case reports published in the *Journal of Endodontics* (mTC<sub>A</sub>=83.5) and *Dental Traumatology* (mTC<sub>A</sub>=81.1). All top-cited case reports were published in journals listed in JCR lists, mostly in the first (80%) JIF Quartile in the subject category.

Since the title should contain the term 'case report(s)' so that readers are immediately aware of the nature of the paper, only 52.4% and 50% of the case reports published in the *International Endodontic Journal* and *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology* had this term in the title. The terms 'case report(s)' or 'case series' were not included in the title of 57 articles (41% of case reports and 58% of case series included these terms in the title).

*Research topics*



The majority of the top 100 most-cited case reports and case series dealt with topics related to regeneration (TA=26), tooth anomalies (TA=19), and mineral trioxide aggregate (TA=9), followed by canal irrigation (TA=8) and endodontic microbiology (TA=5). According to the citations received, these research topics also proved to be the most influential (Table 7).

In the most-cited case reports and case series, 31% did not have author keywords. In total, 194 author keywords and 336 Keywords Plus were identified. The most frequently used author keywords were revascularization (n=12), mineral trioxide aggregate (10), open apex (n=9), apical periodontitis (n=8), endodontic treatment (n=6), immature permanent tooth (n=6), regenerative endodontics (n=6), apexification (n=5), and immature teeth (n=5). An overview of the author keywords revealing the research topics of the top 100 most-cited case reports and the frequency of their occurrence is shown in Figure S4. However, after normalization of identified author keywords and usage of Keywords Plus for case reports without author keywords, Figure 7 shows the growing popularity of issues related to regenerative endodontics, apical periodontitis and immature permanent teeth.

### *References*

The top 100 most-cited case reports and case series contained 1835 literature references, published between 1844 and 2016. Figure 8 represents a chronological network map of the most relevant direct citations resulting from the collection of the top 100 most-cited case reports and case series. The largest citation networks were observed in the field of regeneration (red) and mineral trioxide aggregate (blue), followed by tooth

anomalies (purple) and digital imaging (orange), as well as endodontic microbiology (green) and irrigation (pink).

The relationship amongst countries, corresponding authors, journals, and research topics of the 20 most cited case reports and case series are depicted in Figure 9.

## **Discussion**

The current bibliographic study aimed to identify and analyse the top 100 most-cited case reports and case series in Endodontic journals in an attempt to provide an historical overview of the development of clinical cases over time, define interesting trends and potentially provide hints on how the future of clinical practice in Endodontics will evolve. The sample size of the top 100 most-cited reports, reflects the methodology adopted in previous bibliometric studies in Endodontics (Adnan & Ullah 2018, Ahmad *et al.* 2019c) and various other disciplines within Dentistry (Gondivkar *et al.* 2018, Garcovich *et al.* 2020, Praveen *et al.* 2020). Generally, the sample size in bibliometric studies is determined based on traditional recommendations, without considering a precise scientific or statistical justification (Garcovich *et al.* 2020).

A manuscript receiving more than 400 citations is considered as a “classic”, however, receiving more than 100 citations has also been considered a classic in smaller specialties with limited numbers of authors, academic centres and journals (Brandt *et al.* 2019, Ahmad *et al.* 2019c). A manuscript that becomes a “classic” is an acknowledgement that the clinical and scientific communities have recognised it as having made a substantial contribution to the specialty (Ahmad *et al.* 2019c). In general, the number of citations received by an individual article reflects its impact. However, the number of

citations depends on many factors, which can be classified as "paper-related factors" (including quality of paper; novelty, popularity, and interest of subject; characteristics of fields/subfields of a discipline and study subject/topics; methodology; document type; study design; length of paper; the age of paper; early citation and speed of citation; accessibility and visibility of papers; etc.), "journal-related factors" (such as journal impact factor and prestige; the language of a journal; scope and coverage of journal; and form of publication and presentation), or "author(s) related factors" (number of authors and co-authorship; author's reputation and previous citations; author's academic rank; author's self-citation; international and national collaboration of authors; gender, age and race of authors; author's productivity; etc.) (Tahamtan *et al.* 2016). The most-cited case report in this analysis (Banchs & Trope 2004), described the revascularization of an immature permanent tooth with apical periodontitis. The report was also the most-cited among the top 100-most-cited articles in the field of regenerative endodontics (Adnan & Ullah 2018), however, that study included *in vitro* studies, reviews, case report/case series, animal studies, cohort studies and longitudinal studies.

The citation count depends on many factors besides scientific merit *per se* (Garfield 1955), including the field of research or clinical specialty. The case reports and case series in Endodontics included in this analysis were associated with relatively large numbers of citations when compared to Paediatric Dentistry (Perazzo *et al.* 2019), but lower than Orthodontics (Tarazona *et al.* 2018), Dental Public Health (Mattos *et al.* 2021), and Oral Medicine and Pathology (Martelli *et al.* 2021), though there were several differences in the methodologies between these studies. Variations in citation counts are mostly attributable to the number of researchers and journals publishing articles related to the specific discipline (Tarazona *et al.* 2018, Perazzo *et al.* 2019). Bibliometric studies

within Endodontology assessing specific fields, other study types, or specific decades, have reported comparable counts (Adnan & Ullah 2018, Ahmad *et al.* 2019c, Ordinola-Zapata *et al.* 2020). In general, citations counts reflect the academic and clinical communities have recognised and valued the report and are considered indicative of potential clinical translation of the topic in question (Ahmad *et al.* 2019c, Perazzo *et al.* 2019); they may also reflect areas for future research.

Several case reports and case series evaluated in this study proved to be beneficial to the development of clinical practice and significantly contributed to the translation of scientific knowledge into clinical studies that also has been reported in previous narrative reviews (Diogenes *et al.* 2013, 2014). For example, one of the most-cited case reports (TCW=330) was also one of the most-cited reports in clinical studies (TCC=7), according to iCite data (Iwaya *et al.* 2001). It was the first reported case in the field of regenerative endodontics demonstrating that appreciable root development can be achieved without canal instrumentation and with the use of an antibiotic paste composed of ciprofloxacin and metronidazole, that ultimately resulted in a positive response to pulp testing. The most-cited case report (TCW=453) was another report with great translational potential (TCC=8), also describing continued root development and a positive response to pulp testing, which became widely accepted and the most commonly used regenerative endodontic procedure (Banchs & Trope 2004). Many of the 100 most-cited case reports and case series in the field of regenerative endodontics have been recognized as clinical observations with considerable translational potential (Jung *et al.* 2008, Reynolds *et al.* 2009, Kim *et al.* 2010, Petrino *et al.* 2010, Nosrat *et al.* 2011). Even though most of these cases have their shortcomings, such as lack of the use of a standardized treatment protocol and variations amongst the published cases, they have

addressed a previously unanswered clinical problem, that is the treatment of immature teeth diagnosed with pulpal necrosis and reported clinical outcomes including continued root development, representing a knowledge successfully translated into clinical studies (Diogenes *et al.* 2013).

In the current study, “regeneration” was the most common topic covered in case reports and case series. Regenerative endodontics includes biologically-based procedures, which aim to regenerate the pulp-dentine complex and improve the quality of life of patients (Diogenes *et al.* 2013, Yang *et al.* 2016). Regenerative endodontics is one of the most recent and rapidly growing fields within Endodontology and one not often taught in undergraduate programmes. On average, the annual increase in publications on this topic was around 40% between 2007 and 2017 (Shamszadeh *et al.* 2019). In fact, Yilmaz *et al.* (2019) concluded that “regenerative endodontics” and “endodontic microbiology” were the most common subspecialties among the top 103 most-cited publications in Endodontics. Similarly, Ordinola-Zapata *et al.* (2019) reported that “endodontic regeneration” was the most common term used and cited in journals published in the *International Endodontic Journal* and *Journal of Endodontics* between 2010 and 2019. Interestingly three bibliometric analyses have been conducted on the topic of “endodontic regeneration” (Adnan & Ullah 2018, Shamszadeh *et al.* 2019, Krishnan *et al.* 2020). Adnan & Ullah (2018) reported that the largest number of articles in the top 100 most-cited articles in regenerative endodontics were *in vitro* studies, followed by reviews and case reports, whereas Krishnan *et al.* (2020) reported that Indian authors had published the greatest number of case reports and case series followed by reviews.

The majority of the top 100 most-cited case reports and case series were published in the *International Endodontic Journal* and *Journal of Endodontics*, which aligns with the report of Yilmaz *et al.* (2019) who concluded that the same journals published the majority of the top 103 most-cited articles in the field of Endodontics. Ahmad *et al.* (2019c) also reported that the *International Endodontic Journal* and *Journal of Endodontics* published the majority of the top 100 most-cited randomized controlled trials, systematic reviews and meta-analyses published in Endodontic journals, whilst Adnan & Ullah (2018) reported they had published the majority (73%) of articles among the top-100 most-cited articles in regenerative endodontics. Clearly, the *International Endodontic Journal* and *Journal of Endodontics* are recognised as the most important and influential journals in Endodontology and according to bibliometric law, very productive journals account for a considerable percentage of all articles in a particular specialty (Yilmaz *et al.* 2019) and are then commonly cited by subsequent articles (Brookes 1969). The predominance of core journals in citation analysis has been highlighted in a seminal study (Garfield 1955) and the impact factor of the journal has been widely investigated as a factor affecting the number of citations (Callaham *et al.* 2002; Chung 2007; Hunt *et al.* 2010; Peng & Zhu 2012; Royle *et al.* 2013; Van Der Pol *et al.* 2015; van Leeuwen & Moed 2005; Vanclay 2013; Weale *et al.* 2004; Winker 2011). Although many studies prove a positive correlation between the journal's impact factor and the frequency of citations, there are investigations (Roldan-Valadez & Rios 2015; Willis *et al.* 2011) showing that the impact factor is not a predictor for total cites. Besides, it can be said that topics of more extensive interest may receive more citations, even though they may appear in journals with a lesser impact factor.

The importance and role of the year of publication in bibliometrics needs further understanding. The year of publication of the top 100 most-cited case reports and series in Endodontics ranged from 1977 (Hovland & Block) and 2016 (Krstl *et al.* 2016), with 25 published before the year 2000 and 26 after 2009. A previous comparable analysis which included randomised controlled trials, systematic reviews and meta-analysis in endodontic journals suggested that the year of publication had no obvious impact on citation counts and most of the selected papers were published in the same time frame (Ahmad *et al.* 2019c). The number of citations per article can be influenced by factors such as how long they have been available, which obviously depends on their date of publication (Perazzo *et al.* 2019), however, new research areas have been associated with higher citation counts for more recently-published papers (Mattos *et al.* 2021). One such example in Endodontics is regenerative endodontic, which has seen an exponential growth in the number of publications (Shamszadeh *et al.* 2019), a trend that was confirmed in the present study. Changes in citation patterns are expected over time (Mattos *et al.* 2021). Plausible explanations why an article with an earlier date of publication may receive a low number of citations are that the concepts originally illustrated are considered assumed knowledge, that is, they no longer require further analysis and therefore do not result in additional supporting literature (Garfield 1989), the desire of authors to include more recent material in their papers (Perazzo *et al.* 2019) and, particularly in clinical endodontics, that the historical concepts illustrated may not be considered relevant. At the same time, recently published articles will require time to attract the number of citations to become 'citation classics' (Ahmad *et al.* 2019c).

Contributing authors and institutions of the included reports encompassed various settings and locations. The affiliation of the researcher with the highest number

of articles (n=7) and corresponding author role (n=6), D Ricucci, was Private Practice, Cetraro. Italy. It should be noted that this investigator has a particular set-up allowing access to a histopathology laboratory. Conversely, other high-ranking authors in respect of total number of articles and/or citations, such as LM Lin, JL Gibbs and M Trope listed an academic institution as their affiliation, which were New York University and University of Pennsylvania, respectively. Overall, the University of Washington and Private Practice, Cetraro contributed with the largest number of articles each (n=6).

The number of authors for case reports and case series appears to be lower than that of other types of manuscripts, with the average author per report being 2.6 whereas seven publications had a single author. The total number of authors in the present study (n=260) was less than that of randomised controlled trials, systematic reviews and meta-analyses in Endodontics (n=373) (Ahmad *et al.* 2019c). This can be explained by the subject matter, as case reports and series do not necessarily require a multidisciplinary group, funding, or access to a laboratory, and often encompass “thought provoking unique cases” that can be encountered in the primary care setting (Adhan & Ullah 2018).

Authors from the United States and Italy contributed more than half of the component studies. This is in agreement with a previous bibliometric review which highlighted the United States as the most prolific country when the number of citations and institutions involved in publications in the *International Endodontic Journal* and *Journal of Endodontics* was assessed (Ordinola-Zapata *et al.* 2019). Therefore, the present findings can be explained by the size and numbers of academic and clinical institutions in the United States (Ahmad *et al.* 2019c).



Fifty percent of the reports published in the *International Endodontic Journal* and *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology* used the terms “case report(s) or ‘case series’ in the title. It is recommended that the term “case report” should be mentioned in the title because readers can easily identify the nature of the article and which also allows them being indexed in search databases. In the Medical Subject Headings (MeSH) of the National Library of Medicine (NLM), the word ‘case report’ is included for indexing (Riley *et al.* 2017, Nagendrababu *et al.* 2020b). This is one of the items in both the CARE and PRICE 2020 checklists, which authors should consider while drafting case reports (Riley *et al.* 2017, Nagendrababu *et al.* 2020a).

Analysis of keywords by authors and KeyWords Plus from the top 100 most-cited case reports and series confirms that regeneration was the most common topic, as “regeneration” and “revascularization”, are the most frequently used keywords in regenerative endodontics (Adnan & Ullah 2018) and had an upwards trend in regards to their annual occurrence. Conversely, mineral trioxide aggregate had an obvious downwards trend, probably because the attention has shifted towards novel materials. Again, this in agreement with a previous bibliometric study assessing other types of reports in the two leading endodontic journals (Ordinola-Zapata *et al.* 2019). Keywords facilitate searches of the literature in databases and give visibility to publications and will depend on the type of study in question (Ahmad *et al.* 2019c). KeyWords Plus are generated using an algorithm by Clarivate Analytics based on recurring words or phrases appearing in the titles included in the reference list of the indexed article (Garfield 1990). KeyWords Plus are considered of particular value in the absence of author keywords (Garfield 1990), which occurred with several milestone studies in Endodontology (Ahmad *et al.* 2019c). Furthermore, keywords proposed by the authors, following

guidelines from the journal and subject to peer-review, are often terms found in the title of the article therefore they do not offer further information about the themes discussed within them (Garfield 1990). Further discussion on the role of references is not possible due to the absence of comparable analysis in Endodontology. The use of KeyWords Plus for the analysis of themes lists in bibliometric analyses should be considered in future studies.

The study interrogated four sources (WoS, Scopus, GS and PubMed) to identify the number of citations received by each report, which is a strength of the review. Searching four sources results in a far more complete picture of the citations received because the number varies from source to source (Bakkalbasi *et al.* 2006). Since there was a significant correlation between the citations from the four sources, the number of citations from WoS was used.

The current study has several limitations: i) only case reports and case series published in English were included, ii) case reports and case series published in non-endodontic journals were excluded, iii) the content and conclusion of the individual case reports and case series have not been discussed as they are beyond the scope of the current study. Future studies could analyse the influence of various forms of self-citation such as direct, co-author, collaborative, and coercive induced. The practice of using inappropriate self-citations might result in highly misleading data and distort the scientific evidence (Ioannidis 2015).

## **Conclusion**

This bibliometric study provides an overview of the progress, trends, and current directions for clinical practice in the field of Endodontics. The top 100 most-cited case reports and case series published in Endodontic journals were associated with relatively large numbers of citations when compared to other fields of dentistry. The most common topic covered in case reports and case series included in this analysis was regenerative endodontics, one of the most recent and rapidly growing fields within Endodontology. The most cited case report described a regenerative endodontic procedure, while many of the 100 most-cited case reports and case series in the field of regenerative endodontics have been recognized as clinical observations with considerable translational potential and proved to be beneficial to the development of clinical practice. The age of publication had no obvious impact on citation counts, while new research areas, such as regenerative endodontics, have been associated with higher citation counts for more recently-published papers.

## **Legends**

## **Figures**

Figure 1. Distribution of citations retrieved from selected sources

Figure 2. The distribution of the number of citations received per year and correlation between citation counts from selected sources

Figure 3. Number of case reports and case series by year of publication

Figure 4. The production and citations over time of the top 20 authors

Figure 5. The contribution of each country within the distribution of top-cited case reports and case series (5a - based on the frequency of occurrence of a country, 5b - based on the total number of reports, and 5c - based on a country of the corresponding authors)

Figure 6. Country collaboration map

Figure 7. Dynamics of authors' keywords and Keywords Plus from the top-cited case reports and case series

Figure 8. Chronological network map of the most relevant direct citations of the top-cited case reports and case series

Figure 9. Sankey plot showing the relationship amongst countries, authors, journals, and research topics of the top 20 most cited case reports and case series

Figure S1. Author's collaboration network

Figure S2. Collaboration network at the institutional level

Figure S3. Complete country collaboration network

Figure S4. The most frequently used keywords by author's

## **Tables**

Table 1. List of the top 100 most-cited case reports and case series

Table 2. The authors with the most contributions in the top 100 most-cited case reports and case series

Table 3. The top 20 most-cited authors

Table 4. Contributing institutions to the top 100 most-cited case reports and case series

Table 5. Contributing countries ranked by the total number of the case reports and case series in the top 100 most-cited

Table 6. Overall characteristics of journals and analysed case reports and case series

Table 7. The research topics in the top 100 most-cited case reports and case series

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Table 1. List of the top 100 most-cited case reports and case series

Rank	Case reports/case series	JCR®				TC <sub>P</sub> <sub>M</sub>	mTC <sub>WY</sub>	TC <sub>C</sub>
		IF	TC <sub>W</sub>	TC <sub>S</sub>	TC <sub>GS</sub>			
1	Banchs F, Trope M (2004) Revascularization of immature permanent teeth with apical periodontitis: New treatment protocol? <i>Journal of Endodontics</i> 30(4), 196-200.	1.323	453	497	1114	393	28.31	8
2	Iwaya S, Ikawa M, Kubota M (2001) Revascularization of an immature permanent tooth with apical periodontitis and sinus tract. <i>Dental Traumatology</i> 17(4), 185-187.	0.000	330	370	797	281	17.37	7
3	Hulsmann M, Hahn W (2000) Complications during root canal irrigation - literature review and case reports. <i>International Endodontic Journal</i> 33(3), 186-193.	0.933	208	239	672	186	10.40	15
4	Jung IY, Lee SJ, Hargreaves KM (2008) Biologically based treatment of immature permanent teeth with pulpal necrosis: A case series. <i>Journal of Endodontics</i> 34(7), 876-887.	2.727	191	200	425	166	15.92	7
5	Petrino JA, Boda KK, Shambarger S, Bowles WR, McClanahan SB (2010) Challenges in Regenerative Endodontics: A Case Series. <i>Journal of Endodontics</i> 36(3), 536-541.	3.291	189	217	424	175	18.90	6
6	Chueh LH, Huang GTJ (2006) Immature teeth with periradicular periodontitis or abscess undergoing apexogenesis: A paradigm shift. <i>Journal of Endodontics</i> 32(12), 1205-1213.	3.077	188	204	424	150	13.43	3
7	Kim JH, Kim Y, Shin SJ, Park JW, Jung IY (2010) Tooth Discoloration of Immature Permanent Incisor Associated with Triple Antibiotic Therapy: A Case Report. <i>Journal of Endodontics</i> 36(6), 1086-1091.	3.291	171	207	454	163	17.10	7

8	Reynolds K, Johnson JD, Cohenca N (2009) Pulp revascularization of necrotic bilateral bicuspid using a modified novel technique to eliminate potential coronal discoloration: a case report. <i>International Endodontic Journal</i> 42(1), 84-92.	2.223	151	175	372	139	13.73	6
9	Torabinejad M, Turman M (2011) Revitalization of Tooth with Necrotic Pulp and Open Apex by Using Platelet-rich Plasma: A Case Report. <i>Journal of Endodontics</i> 37(2), 265-268.	2.880	145	173	349	142	16.11	4
10	Nosrat A, Seifi A, Asgary S (2011) Regenerative Endodontic Treatment (Revascularization) for Necrotic Immature Permanent Molars: A Review and Report of Two Cases with a New Biomaterial. <i>Journal of Endodontics</i> 37(4), 562-567.	2.880	138	170	316	140	15.33	8
11	Bogen G, Kuttler S (2009) Mineral Trioxide Aggregate Obturation: A Review and Case Series. <i>Journal of Endodontics</i> 35(6), 777-790.	2.953	134	145	337	108	12.18	8
12	Harrington GW, Natkin E (1979) External resorption associated with bleaching of pulpless teeth. <i>Journal of Endodontics</i> 5(11), 344-348.	N/A	129	170	336		3.15	N/A
13	Martin G, Ricucci D, Gibbs JL, Lin LM (2013) Histological Findings of Revascularized/Revitalized Immature Permanent Molar with Apical Periodontitis Using Platelet-rich Plasma. <i>Journal of Endodontics</i> 39(1), 138-144.	2.788	129	135	246	111	18.43	2
14	Nair PNR, Sjogren U, Figdor D, Sundqvist G (1999) Persistent periapical radiolucencies of root-filled human teeth, failed endodontic treatments, and periapical scars. <i>Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics</i> 87(5), 617-627.	0.908	119	118	279	103	5.67	2
15	Gernhardt CR, Eppendorf K, Kozlowski A, Brandt M (2004) Toxicity of concentrated sodium hypochlorite used as an endodontic irrigant. <i>International Endodontic Journal</i> 37(4), 272-280.	1.470	115	122	309	97	7.19	7
16	Cehreli ZC, Isbitiren B, Sara S, Erbas G (2011) Regenerative Endodontic Treatment (Revascularization) of Immature Necrotic Molars Medicated with Calcium Hydroxide: A Case Series. <i>Journal of Endodontics</i> 37(9), 1327-1330.	2.880	114	127	249	106	12.67	5
17	Becerra P, Ricucci D, Loghin S, Gibbs JL, Lin LM (2014) Histologic Study of a Human Immature Permanent Premolar with Chronic Apical Abscess after Revascularization/Revitalization. <i>Journal of Endodontics</i> 40(1), 133-139.	3.375	112	114	185	86	18.67	0
18	Cotti E, Mereu M, Lusso D (2008) Regenerative treatment of an immature, traumatized tooth with apical periodontitis: Report of a case. <i>Journal of Endodontics</i> 34(5), 611-616.	2.727	104	113	230	94	8.67	2
19	Belobrov I, Parashos P (2011) Treatment of Tooth Discoloration after the Use of White Mineral Trioxide Aggregate. <i>Journal of Endodontics</i> 37(7), 1017-1020.	2.880	100	118	217	85	11.11	7
20	Giuliani V, Baccetti T, Pace R, Pagavino G (2002) The use of MTA in teeth with necrotic pulps and open apices. <i>Dental Traumatology</i> 18(4), 217-221.	1.064	100	118	281	89	5.56	4



35	Bortoluzzi EA, Araujo GS, Guerreiro Tanomaru JM, Tanomaru-Filho M (2007) Marginal gingiva discoloration by gray MTA: A case report. <i>Journal of Endodontics</i> 33(3), 325-327.	3.369	72	75	170	62	5.54	5
36	Filippi A, Pohl Y, von Arx T (2001) Decoronation of an ankylosed tooth for preservation of alveolar bone prior to implant placement. <i>Dental Traumatology</i> 17(2), 93-95.	0.000	72	72	151	49	2.67	1
37	Nair PNR, Sjogren U, Schumacher E, Sundqvist G (1993) Radicular cyst affecting a root-filled human tooth: a long-term post-treatment follow-up. <i>International Endodontic Journal</i> 26(4), 225-233.	N/A	72	86	174	64	3.79	0
38	Pace R, Giuliani V, Pagavino G (2008) Mineral trioxide aggregate as repair material for furcal perforation: Case series. <i>Journal of Endodontics</i> 34(9), 1130-1133.	2.727	71	77	171	48	5.92	3
39	Gazelius B, Olgart L, Edwall B (1988) Restored vitality in luxated teeth assessed by laser Doppler flowmeter. <i>Dental Traumatology</i> 4(6), 265-268.	N/A	69	83	127	63	6.90	3
40	Karabucak B, Li D, Lim J, Iqbal M (2005) Vital pulp therapy with mineral trioxide aggregate. <i>Dental Traumatology</i> 21(4), 240-243.	0.716	69	79	153	56	2.16	2
41	Kottoor J, Velmurugan N, Sudba R, Hemamalathi S (2010) Maxillary First Molar with Seven Root Canals Diagnosed with Cone-Beam Computed Tomography Scanning: A Case Report. <i>Journal of Endodontics</i> 36(5), 915-921.	3.291	69	73	198	62	4.60	0
42	Hovland EJ, Block RM (1977) Nonrecognition and subsequent endodontic treatment of dens invaginatus. <i>Journal of Endodontics</i> 3(9), 360-362.	N/A	67	87	171		1.56	N/A
43	Nakata K, Naitoh M, Izumi M, Inamoto K, Arijji E, Nakamura H (2006) Effectiveness of dental computed tomography in diagnostic imaging of periradicular lesion of each root of a multirrooted tooth: A case report. <i>Journal of Endodontics</i> 32(6), 583-587.	3.077	67	76	184	57	4.79	2
44	Krastl G, Zehnder MS, Connert T, Weiger R, Kuhl S (2016) Guided Endodontics: a novel treatment approach for teeth with pulp canal calcification and apical pathology. <i>Dental Traumatology</i> 32(3), 240-246.	1.413	66	76	129	40	16.50	1
45	Manning SA (1990) Root canal anatomy of mandibular second molars: Part II C-shaped canals. <i>International Endodontic Journal</i> 23(1), 40-45.	N/A	65	66	234	55	2.17	0
46	Keswani D, Pandey RK (2013) Revascularization of an immature tooth with a necrotic pulp using platelet-rich fibrin: a case report. <i>International Endodontic Journal</i> 46(11), 1096-1104.	2.273	64	68	138	48	8.00	1
47	Lin LM, Shimizu E, Gibbs JL, Loghin S, Ricucci D (2014) Histologic and Histobacteriologic Observations of Failed Revascularization/Revitalization Therapy: A Case Report. <i>Journal of Endodontics</i> 40(2), 291-295.	3.375	64	62	107	47	10.67	2
48	Vieira AR, Siqueira JF, Ricucci D, Lopes WSP (2012) Dentinal Tubule Infection as the Cause of Recurrent Disease and Late Endodontic Treatment Failure: A Case Report. <i>Journal of Endodontics</i> 38(2), 250-254.	2.929	64	66	134	50	9.14	3
49	Patel S, Dawood A (2007) The use of cone beam computed tomography in the management of external	2.150	63	74	182	50	1.97	0

	cervical resorption lesions. <i>International Endodontic Journal</i> 40(9), 730-737.							
50	Sjogren U, Happonen RP, Kahnberg KE, Sundqvist G (1988) Survival of <i>Arachnia propionica</i> in periapical tissue. <i>International Endodontic Journal</i> 21(4), 277-282.	0.329	63	74	158	57	4.85	0
51	Paryani K, Kim SG (2013) Regenerative Endodontic Treatment of Permanent Teeth after Completion of Root Development: A Report of 2 Cases. <i>Journal of Endodontics</i> 39(7), 929-934.	2.788	60	64	113	50	8.57	0
52	Ricucci D, Siqueira JF (2008) Apical actinomycosis as a continuum of intraradicular and extraradicular infection: Case report and critical review on its involvement with treatment failure. <i>Journal of Endodontics</i> 34(9), 1124-1129.	2.727	59	60	122	42	4.92	0
53	Hayashi M, Shimizu A, Ebisu S (2004) MTA for obturation of mandibular central incisors with open apices: Case report. <i>Journal of Endodontics</i> 30(2), 120-122.	1.323	58	63	139	52	3.63	4
54	Andreasen JO, Munksgaard EC, Fredebo L, Rud J (1993) Periodontal tissue regeneration including cementogenesis adjacent to dentin-bonded retrograde composite fillings in humans. <i>Journal of Endodontics</i> 19(3), 151-153.	N/A	57	48	118	45	1.84	2
55	Kaufman AY, Keila S (1989) Hypersensitivity to sodium hypochlorite. <i>Journal of Endodontics</i> 15(5), 224-226.	N/A	57	65	164	49	2.28	4
56	Yang SF, Rivera EM, Walton RE (1995) Vertical root fracture in nonendodontically treated teeth. <i>Journal of Endodontics</i> 21(6), 337-339.	N/A	57	63	116	47	2.11	0
57	Ehrich DG, Brian JD, Walker WA (1993) Sodium hypochlorite accident: Inadvertent injection into the maxillary sinus. <i>Journal of Endodontics</i> 19(4), 180-182.	N/A	56	67	153	51	2.07	3
58	Hulsmann M, Bahr R, Grohmann U (1997) Hemisection and vital treatment of a fused tooth - literature review and case report. <i>Dental Traumatology</i> 13(6), 253-258.	0.789	56	57	131	40	4.31	0
59	Pace R, Giuliani V, Prato LP, Baccetti T, Pagavino G (2007) Apical plug technique using mineral trioxide aggregate: results from a case series. <i>International Endodontic Journal</i> 40(6), 478-484.	2.150	56	61	153	44	2.43	2
60	Murayama T, Iwatsubo R, Akiyama S, Amano A, Morisaki I (2000) Familial hypophosphatemic vitamin D-resistant rickets: Dental findings and histologic study of teeth. <i>Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics</i> 90(3), 310-316.	0.865	54	52	87	45	2.70	0
61	Carr GB, Schwartz RS, Schaudinn C, Gorur A, Costerton JW (2009) Ultrastructural Examination of Failed Molar Retreatment with Secondary Apical Periodontitis: An Examination of Endodontic Biofilms in an Endodontic Retreatment Failure. <i>Journal of Endodontics</i> 35(9), 1303-1309.	2.953	53	55	121	49	4.82	3
62	Gopikrishna V, Bhargavi N, Kandaswamy D (2006) Endodontic management of a maxillary first molar with a single root and a single canal diagnosed with the aid of spiral CT: A case report. <i>Journal of Endodontics</i> 32(7), 687-691.	3.077	53	75	169	64	3.79	0

63	Fabra-Campos H (1985) Unusual root anatomy of mandibular first molars. <i>Journal of Endodontics</i> 11(12), 568-572.	0.245	52	52	188	38	1.49	1
64	Rappelli G, Massaccesi C, Putignano A (2002) Clinical procedures for the immediate reattachment of a tooth fragment. <i>Dental Traumatology</i> 18(5), 281-284.	1.064	52	52	131	39	2.89	0
65	Ferrari M, Mannocci F (2000) A 'one-bottle' adhesive system for bonding a fibre post into a root canal: an SEM evaluation of the post-resin interface. <i>International Endodontic Journal</i> 33(4), 397-400.	0.933	51	58	120	32	10.20	3
66	Lei LS, Chen YM, Zhou RH, Huang XJ, Cai ZY (2015) Histologic and Immunohistochemical Findings of a Human Immature Permanent Tooth with Apical Periodontitis after Regenerative Endodontic Treatment. <i>Journal of Endodontics</i> 41(7), 1172-1179.	2.904	51	50	84	36	2.55	0
67	Rankow HJ, Krasner PR (1996) Endodontic applications of guided tissue regeneration in endodontic surgery. <i>Journal of Endodontics</i> 22(1), 34-43.	N/A	50	58	126	39	2.08	8
68	Barbizam JVB, Ribeiro RG, Tanomaru-Filho M (2004) Unusual anatomy of permanent maxillary molars. <i>Journal of Endodontics</i> 30(9), 668-671.	1.323	49	69	173	55	1.44	0
69	Latcham NL (1986) Postbleaching cervical resorption. <i>Journal of Endodontics</i> 12(6), 262-264.	0.224	49	69	101	49	3.06	6
70	Ricucci D, Loghin S, Siqueira JF (2013) Exuberant Biofilm Infection in a Lateral Canal as the Cause of Short-term Endodontic Treatment Failure: Report of a Case. <i>Journal of Endodontics</i> 39(5), 712-718.	2.788	49	50	93	40	2.88	1
71	Ward JR, Parashos P, Messer HH (2003) Evaluation of an ultrasonic technique to remove fractured rotary nickel-titanium endodontic instruments from root canals: Clinical cases. <i>Journal of Endodontics</i> 29(11), 764-767.	1.056	49	56	143	45	7.00	5
72	Cohenca N, Stabholz A (2007) Decoronation - a conservative method to treat ankylosed teeth for preservation of alveolar ridge prior to permanent prosthetic reconstruction: literature review and case presentation. <i>Dental Traumatology</i> 23(2), 87-94.	1.093	48	56	102	32	1.55	2
73	Mesaros SV, Trope M (1997) Revascularization of traumatized teeth assessed by laser Doppler flowmetry: Case report. <i>Dental Traumatology</i> 13(1), 24-30.	0.789	48	50	92	39	3.69	1
74	Sabala CL, Powell SE (1989) Sodium hypochlorite injection into periapical tissues. <i>Journal of Endodontics</i> 15(10), 490-492.	N/A	48	49	132	37	2.09	1
75	Finucane D, Kinirons MJ (2003) External inflammatory and replacement resorption of luxated, and avulsed replanted permanent incisors: a review and case presentation. <i>Dental Traumatology</i> 19(3), 170-174.	0.918	47	59	150	41	3.13	0
76	Hannig C, Dullin C, Hulsmann M, Heidrich G (2005) Three-dimensional, non-destructive visualization of vertical root fractures using flat panel volume detector computer tomography: an ex vivo in vitro case report. <i>International Endodontic Journal</i> 38(12), 904-913.	1.606	47	50	114	40	2.94	2
77	Sarathy AP, Bourgeois SL, Goodell GG (2005) Bisphosphonate-associated osteonecrosis of the jaws	1.933	47	54	118	37	3.13	0

	and endodontic treatment: Two case reports. <i>Journal of Endodontics</i> 31(10), 759-763.							
78	Scolozzi P, Lombardi T, Jaques B (2004) Successful inferior alveolar nerve decompression for dysesthesia following endodontic treatment: Report of 4 cases treated by mandibular sagittal osteotomy. <i>Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics</i> 97(5), 625-631.	0.973	47	60	113	35	3.13	1
79	Witton R, Henthorn K, Ethunandan M, Harmer S, Brennan PA (2005) Neurological complications following extrusion of sodium hypochlorite solution during root canal treatment. <i>International Endodontic Journal</i> 38(11), 843-848.	1.606	47	42	118	41	2.76	0
80	Bender IB (2000) Reversible and irreversible painful pulpitis: Diagnosis and treatment. <i>Australian Endodontic Journal</i> 26(1), 10-14.	N/A	46	44	94	31	3.29	8
81	Goncalves A, Goncalves M, Oliveira DP, Goncalves N (2002) Dens invaginatus type III: report of a case and 10-year radiographic follow-up. <i>International Endodontic Journal</i> 35(10), 873-879.	0.974	46	57	93	49	2.56	0
82	Leviton ME, Himel VT (2006) Dens evaginatus: Literature review, pathophysiology, and comprehensive treatment regimen. <i>Journal of Endodontics</i> 32(1), 1-9.	3.077	46	58	130	35	2.30	0
83	Girsch WJ, McClammy TV (2002) Microscopic removal of dens invaginatus. <i>Journal of Endodontics</i> 28(4), 336-339.	0.748	45	58	104	45	2.50	0
84	Goon WWY, Cohen S, Borer RF (1986) External cervical root resorption following bleaching. <i>Journal of Endodontics</i> 12(9), 414-418.	0.224	45	71	117	53	2.81	2
85	Hsien HC, Cheng YA, Lee YL, Lan WH, Lin CP (2003) Repair of perforating internal resorption with mineral trioxide aggregate: A case report. <i>Journal of Endodontics</i> 29(8), 538-539.	1.056	45	52	135	37	1.32	1
86	Kawai K, Masaka N (2002) Vertical root fracture treated by bonding fragments and rotational replantation. <i>Dental Traumatology</i> 18(1), 42-45.	1.064	45	46	116	29	4.50	2
87	La SH, Jung DH, Kim EC, Min KS (2010) Identification of Independent Middle Mesial Canal in Mandibular First Molar Using Cone-Beam Computed Tomography Imaging. <i>Journal of Endodontics</i> 36(3), 542-545.	3.291	45	43	124	38	2.65	0
88	Patel S (2010) The use of cone beam computed tomography in the conservative management of dens invaginatus: a case report. <i>International Endodontic Journal</i> 43(8), 707-713.	2.383	45	45	100	30	4.50	0
89	Serper A, Ozbek M, Calt S (2004) Accidental sodium hypochlorite-induced skin injury during endodontic treatment. <i>Journal of Endodontics</i> 30(3), 180-181.	1.323	45	47	132	41	2.50	3
90	Baratto F, Fariniuk LF, Ferreira EL, Pecora JD, Cruz-Filho AM, Sousa-Neto MD (2002) Clinical and macroscopic study of maxillary molars with two palatal roots. <i>International Endodontic Journal</i> 35(9), 796-801.	0.974	44	57	179	48	6.29	0
91	Bezgin T, Yilmaz AD, Celik BN, Sonmez H (2014) Concentrated platelet-rich plasma used in root canal revascularization: 2 case reports. <i>International Endodontic Journal</i> 47(1), 41-49.	2.971	44	47	83	42	2.44	0



92	De Moor RJG (2002) C-shaped root canal configuration in maxillary first molars. <i>International Endodontic Journal</i> 35(2), 200-208.	0.974	44	48	123	46	2.44	0
93	Nosrat A, Li KL, Vir K, Hicks ML, Fouad AE (2013) Is Pulp Regeneration Necessary for Root Maturation? <i>Journal of Endodontics</i> 39(10), 1291-1295.	2.788	44	50	100	43	7.33	1
94	Er K, Kustarci A, Ozan U, Tasdemir T (2007) Nonsurgical endodontic treatment of dens invaginatus in a mandibular premolar with large periradicular lesion: A case report. <i>Journal of Endodontics</i> 33(3), 322-324.	3.369	43	48	109	44	3.31	1
95	Khongkhunthian P, Reichart PA (2001) Aspergillosis of the maxillary sinus as a complication of overfilling root canal material into the sinus: Report of two cases. <i>Journal of Endodontics</i> 27(7), 476-478.	0.668	42	49	115	28	1.20	0
96	Kottoor J, Velmurugan N, Surendran S (2011) Endodontic management of a maxillary first molar with eight root canal systems evaluated using cone-beam computed tomography scanning: a case report. <i>Journal of Endodontics</i> 37(5), 715-719.	2.880	42	53	136	46	4.67	0
97	Martinez-Berna A, Badanelli P (1985) Mandibular first molars with six root canals. <i>Journal of Endodontics</i> 11(8), 348-352.	0.245	42	53	117	42	1.14	0
98	Martinez-Berna A, Ruiz-Badanelli P (1983) Maxillary first molars with six canals. <i>Journal of Endodontics</i> 9(9), 375-381.	N/A	42	50	130	46	2.21	0
99	Reeh ES, Messer HH (1989) Long-term paresthesia following inadvertent forcing of sodium hypochlorite through perforation in maxillary incisor. <i>Dental Traumatology</i> 5(4), 200-203.	N/A	42	44	105	38	1.83	1
100	Tidwell E, Jenkins JD, Ellis CD, Hutson B, Cederberg RA (1997) Cutaneous odontogenic sinus tract to the chin: a case report. <i>International Endodontic Journal</i> 30(5), 352-355.	0.716	42	48	115	16	1.35	0

JCR® IF - Journal Citation Reports Impact Factor in the category *Dentistry, Oral Surgery & Medicine* for the year in which the case report/series is published; TC<sub>w</sub> - the total number of WoS citations; TC<sub>s</sub> - the total number of Scopus citations; TC<sub>GS</sub> - the total number of GS citations; TC<sub>PM</sub> - the total number of PubMed citations; mTC<sub>wy</sub> - the average number of citations per year based on WoS data; N/A - Since *iCite* has data for articles from 1980 to the present, three case reports published during the 1970s are missing PubMed citation counts; not available

Table 2. The authors with the most contributions in the top 100 most-cited case reports and case series

<b>Authors</b>	<b>TA</b>	<b>AF</b>	<b>DF</b>	<b>SA</b>	<b>MA</b>	<b>FA</b>	<b>CA</b>
RICUCCI D	7	<b>1.88</b>	0.29	0	7	2	<b>6</b>
LIN LM	5	0.99	0.2	0	5	1	2
GIBBS JL	4	0.79	0	0	4	0	0
TORABINEJAD M	3	1.5	0.67	0	3	2	3
COHENCA N	3	1.08	0.67	0	3	2	3
DE MOOR RJG	3	1.67	0.5	1	2	1	3
HULSMANN M	3	1.08	0.67	0	3	2	2
GIULIANI V	3	0.78	0.33	0	3	1	2
TROPE M	3	1.5	0	0	3	0	2
NOSRAT A	3	0.87	<b>1</b>	0	3	<b>3</b>	1
PACE R	3	0.78	0.67	0	3	2	1
SJOGREN U	3	0.75	0.33	0	3	1	1
SHIMIZU E	3	0.54	0.67	0	3	2	0
SIQUEIRA JF	3	1.08	0	0	3	0	0
PAGAVINO G	3	0.78	0	0	3	0	0
SUNDQVIST G	3	0.75	0	0	3	0	0
LOGHIN S	3	0.73	0	0	3	0	0
MARTINEZ-BERNA A	2	1	<b>1</b>	0	2	2	2
NAIR PNR	2	0.5	<b>1</b>	0	2	2	2
KOTTOOR J	2	0.58	<b>1</b>	0	2	2	2
PATEL S	2	1.5	<b>1</b>	1	1	1	2
TANOMARU-FILHO M	2	0.58	0	0	2	0	2
MESSER HH	2	0.83	0	0	2	0	1
PARASHOS P	2	0.83	0	0	2	0	1
CALBERSON FL	2	0.67	0.5	0	2	1	0
JUNG IY	2	0.53	0.5	0	2	1	0
DEROOSE CAJG	2	0.67	0	0	2	0	0
HUANG GTJ	2	0.64	0	0	2	0	0

BACCETTI T	2	0.45	0	0	2	0	0
VELMURUGAN N	2	0.58	0	0	2	0	0

TA - the total number of articles; AF - adjusted frequency that reflects multiple-authored articles; DF - Dominance Factor; SA - the total number of single-authored articles; MA - the total number of multi-authored articles of an author; FA - the number of multi-authored publications of an author as the first author; CA - the total number of articles of an author as the corresponding author

Table 3. The top 20 most-cited authors

<b>Author</b>	<b>TC<sub>w</sub></b>	<b>TA</b>	<b>PY_start</b>	<b>LC</b>
TROPE M	<b>577</b>	3	1997	<b>27</b>
RICUCCI D	567	7	2008	10
LIN LM	478	5	2012	9
BANCHS F	453	1	2004	22
GIBBS JL	395	4	2013	6
JUNG IY	362	2	2008	20
IKAWA M	330	1	2001	18
IWAYA S	330	1	2001	18
KUBOTA M	330	1	2001	18
HULSMANN M	311	3	1997	2
TORABINEJAD M	309	3	1996	15
COHENCA N	292	3	2007	9
HUANG GTJ	278	2	2006	14
NOSRAT A	277	3	2011	8
SJOGREN U	254	3	1988	4
SUNDQVIST G	254	3	1988	4
SHIMIZU E	237	3	2012	5
GIULIANI V	227	3	2002	5
PACE R	227	3	2002	5
PAGAVINO G	227	3	2002	5

TC<sub>w</sub> - the total number of WoS citations; TA - the total number of articles; LC - the total number of local citations

Table 4. Contributing institutions to the top 100 most-cited case reports and case series

Institution	Country	TA	TC <sub>w</sub>	Freq	CA
NY Univ	USA	5	478	<b>16</b>	2
Univ Florence	Italy	3	227	12	3
Private Practice Cetraro	Italy	<b>6</b>	477	11	<b>6</b>
Meenakshi Ammal Dent Coll	India	3	164	10	3
Univ Washington	USA	<b>6</b>	<b>654</b>	9	5
Univ Gottingen	Germany	3	311	9	3
Univ Maryland	USA	4	394	8	3
Univ Complutense Madrid	Spain	3	164	8	3
Yonsei Univ	South Korea	2	362	7	2
Univ Melbourne	Australia	4	333	7	3
Univ Umea	Sweden	3	254	7	1
Univ Minnesota	USA	2	231	7	2
Univ Ghent	Belgium	3	224	7	3
Hacettepe Univ	Turkey	2	159	7	2
Osaka Univ	Japan	3	157	7	3
Univ Penn	USA	3	191	6	2
Aichi Gakuin Univ	Japan	1	67	6	1
Loma Linda Univ	USA	3	309	5	3
Univ São Paulo	Brazil	3	139	5	2
Fujian Med Univ	China	1	51	5	1
Queen Alexandra Hosp	UK	1	47	5	1
Baylor Coll Dent	USA	1	42	5	1
Univ Estacio Sa	Brazil	3	172	4	0
Univ Halle Wittenberg	Germany	1	115	4	1
Ben-Gurion Univ Negev	Israel	1	74	4	1
Sao Paulo State Univ	Brazil	1	72	4	1

Univ Basel	Switzerland	1	66	4	0
Wonkwang Univ	South Korea	1	45	4	1
Natl Taiwan Univ	China	1	45	4	1
Univ Ribeirão Preto	Brazil	1	44	4	1
Ankara Univ	Turkey	1	44	4	1
Temple Univ	USA	2	503	3	1
Univ N Carolina	USA	2	501	3	2
Univ Zurich	Switzerland	2	191	3	2
Univ Tennessee	USA	2	136	3	1
Columbia Univ	USA	2	135	3	2
Univ London Kings Coll	UK	2	108	3	2
Univ Cagliari	Italy	1	104	3	1
Western Parana State Univ	Brazil	2	95	3	0
Univ So Calif	USA	1	93	3	0
Atlantic Coast Dent Res Clin	USA	1	85	3	1
Karolinska Institute	Sweden	1	69	3	1
Brazilian Assoc Dent	Brazil	1	64	3	0
Naval Dental Center	USA	1	56	3	1
Univ Ancona	Italy	1	52	3	1
National Naval Medical Center	USA	1	47	3	1
Univ Pacific	USA	1	45	3	1
Shahid Beheshti Univ Med Sci	Iran	2	233	2	0
Nova SE Univ	USA	1	134	2	1
Paulista Assoc Dent Surg	Brazil	1	74	2	1
Univ Bern	Switzerland	1	72	2	1
King Georges Med Univ	India	1	64	2	1
Univ Iowa	USA	1	57	2	1
Tel Aviv Univ	Israel	1	57	2	1
Royal Dental College Copenhagen	Denmark	1	57	2	0
Yermiyahu Univ Clinic	Israel	1	57	2	0
Kyoto First Red Cross Hosp	Japan	1	54	2	0
Univ Siena	Italy	1	51	2	1
Univ Oklahoma	USA	1	48	2	1
Hebrew Univ	Israel	1	48	2	0
Centre Hospitalier Universitaire Vaudois Lausanne	Switzerland	1	47	2	1

Oregon Hlth Sci Univ	USA	1	45	2	1
Karadeniz Tech Univ	Turkey	1	43	2	1
Cumhuriyet Univ	Turkey	1	43	2	0
Tohoku Welf Pens Hosp	Japan	1	330	1	1
Tohoku Univ	Japan	1	330	1	0
Iwate Med Univ	Japan	1	330	1	0
Univ Texas Hlth Sci Ctr San Antonio	USA	1	191	1	0
Elite Dent Clin Taipei	China	1	188	1	0
Rafsanjan Univ Med Sci	Iran	1	138	1	1
Natl Univ Cordoba	Argentina	1	129	1	0
Univ Santo Tomas	Colombia	1	112	1	0
Univ Tehran Med Sci	Iran	1	95	1	0
Private practice Rome	Italy	1	90	1	0
Private Practice Rio de Janeiro	Brazil	1	76	1	0
Indiana Univ	USA	1	74	1	0
Univ Giessen	Germany	1	72	1	0
Private practice Richmond	USA	1	67	1	0
Univ Wurzburg	Germany	1	66	1	1
Univ Turku	Finland	1	63	1	0
Univ Hospital Copenhagen	Denmark	1	57	1	1
Private clinic Copenhagen	Denmark	1	57	1	0
Veterans General Hospital-Taipei	China	1	57	1	0
Pacific Endodont Res Fdn	USA	1	53	1	1
Lawrence Berkeley Natl Lab	USA	1	53	1	0
USC Sch Dent	USA	1	53	1	0
Private practice San Antonio	USA	1	53	1	0
Allegheny Singer Res Inst	USA	1	53	1	0
Allegheny Gen Hosp	USA	1	53	1	0
Universidad De Valencia	Spain	1	52	1	1
Univ Queensland	Australia	1	49	1	1
Dublin Dent Hosp	Ireland	1	47	1	1
Sch Dent Belfast	UK	1	47	1	0
Fac Medicine Geneve	Switzerland	1	47	1	0
Albert Einstein Medical Center	USA	1	46	1	1
Masake Dent Clin	Japan	1	45	1	0

Lin Kou Chang Gung Mem Hosp	China	1	45	1	0
Pontificia Univ Catolica Parana	Brazil	1	44	1	0
Chiang Mai Univ	Thailand	1	42	1	1
Humboldt Univ	Germany	1	42	1	0

TA - the total number of articles; TC<sub>w</sub> - the total number of WoS citations; CA - the total number of articles of an institution as the corresponding institution

Table 5. Contributing countries ranked by the total number of the case reports and case series in the top 100 most-cited

Country	Freq	TA	CA	SCP	MCP	TC <sub>w</sub>	mTC <sub>A</sub>
USA	<b>101</b>	<b>39</b>	<b>34</b>	<b>28</b>	6	<b>3559</b>	93.7
ITALY	32	13	12	6	<b>7</b>	1001	77
BRAZIL	27	9	5	5	4	533	59.2
GERMANY	16	7	5	4	3	606	86.6
JAPAN	19	5	5	5	0	554	110.8
AUSTRALIA	8	5	4	4	1	382	76.4
SWITZERLAND	12	5	4	1	4	376	75.2
CHINA	12	4	3	3	2	386	96.5
TURKEY	15	4	4	4	0	246	61.5
SPAIN	9	4	4	4	0	216	54
UK	9	4	3	3	1	202	50.5
SWEDEN	10	4	2	1	3	323	80.75
INDIA	12	4	4	4	0	228	57
SOUTH KOREA	11	3	3	2	1	407	<b>135.7</b>
BELGIUM	7	3	3	3	0	224	74.7
ISRAEL	10	3	2	2	1	179	59.7
IRAN	4	2	1	0	2	233	116.5
DENMARK	4	1	1	1	0	57	57
IRELAND	1	1	1	0	1	47	47
THAILAND	1	1	1	0	1	42	42
ARGENTINA	1	1	0	0	1	129	129
COLOMBIA	1	1	0	0	1	112	112
FINLAND	1	1	0	0	1	63	63

TA - the total number of articles; CA - the total number of articles of a country as the corresponding; SCP - the total number of single-country articles; MCP - the total number of

multi-country articles; TC<sub>w</sub> - the total number of WoS citations; mTC<sub>A</sub> - the average number of citations per article

Table 6. Overall characteristics of journals and analysed case reports and case series

Source	JCR® IF2019	QC	TA	TC <sub>w</sub>	mTC <sub>A</sub>	PY_start	Case in Title (%)
<i>Journal of Endodontics</i>	3.118	Q1	59	4926	83.5	1977	26 (44.1)
<i>International Endodontic Journal</i>	3.801	Q1	21	1514	72.1	1988	11 (52.4)
<i>Dental Traumatology</i>	1.53	Q3	15	1217	81.1	1988	4 (26.7)
<i>Oral Surgery Oral Medicine Oral Pathology Oral Radiology</i>	1.601	Q3	4	294	73.5	1996	2 (50)
<i>Australian Endodontic Journal</i>	1.12	Q4	1	46	46	2000	0 (0)

QC - Journal Impact Factor Quartile in *Dentistry, Oral Surgery and Medicine* Category; TA - the total number of articles; TC<sub>w</sub> - the total number of WoS citations; mTC<sub>A</sub> - the average number of citations per article; PY\_start - year when the first case report was published in a journal

Table 7. The research topics in the top 100 most-cited case reports and case series

Topic	Source Title											
	J Endod		Int Endod J		Dent Traumatol		OOOO		Australian Endod J		Total	
	TC <sub>w</sub>	TA	TC <sub>w</sub>	TA	TC <sub>w</sub>	TA	TC <sub>w</sub>	TA	TC <sub>w</sub>	TA	TC <sub>w</sub>	TA
Regeneration	2523	21	308	4	330	1					3161	26
Tooth anomalies	634	12	287	5	56	1	54	1			1031	19
Mineral trioxide aggregate (MTA)	480	6	130	2	249	3	74	1			933	12
Irrigation	280	5	255	2	42	1					577	8
Digital imaging	120	2	155	3	93	1					368	6



Tooth discoloration	171	1	151	1						322	2	
Tooth resorption	223	3			47	1				270	4	
Endodontic microbiology	203	4	63	1						266	5	
Persistent periapical radiolucent lesion	64	1	72	1			119	1		255	3	
Decoronation					120	2				120	2	
Lasers in endodontic therapy					117	2				117	2	
Root fracture	57	1			45	1				102	2	
Phantom tooth pain (PTP)	75	1								75	1	
Guided endodontology					66	1				66	1	
immediate fragment reattachment					52	1				52	1	
Adhesive system			51	1						51	1	
Removal of endodontic instruments	49	1								49	1	
Nerve decompression							47	1		47	1	
Bisphosphonate-associated osteonecrosis of the jaws	47	1								47	1	
Pulpitis									46	1	46	1
Sinus tract			42	1						42	1	
<b>Total</b>	<b>4926</b>	<b>59</b>	<b>1514</b>	<b>21</b>	<b>1217</b>	<b>15</b>	<b>294</b>	<b>4</b>	<b>46</b>	<b>1</b>	<b>7997</b>	<b>100</b>

TC<sub>w</sub> - the total number of WoS citations; TA - the total number of articles

Figure 1. Distribution of citations retrieved from selected sources

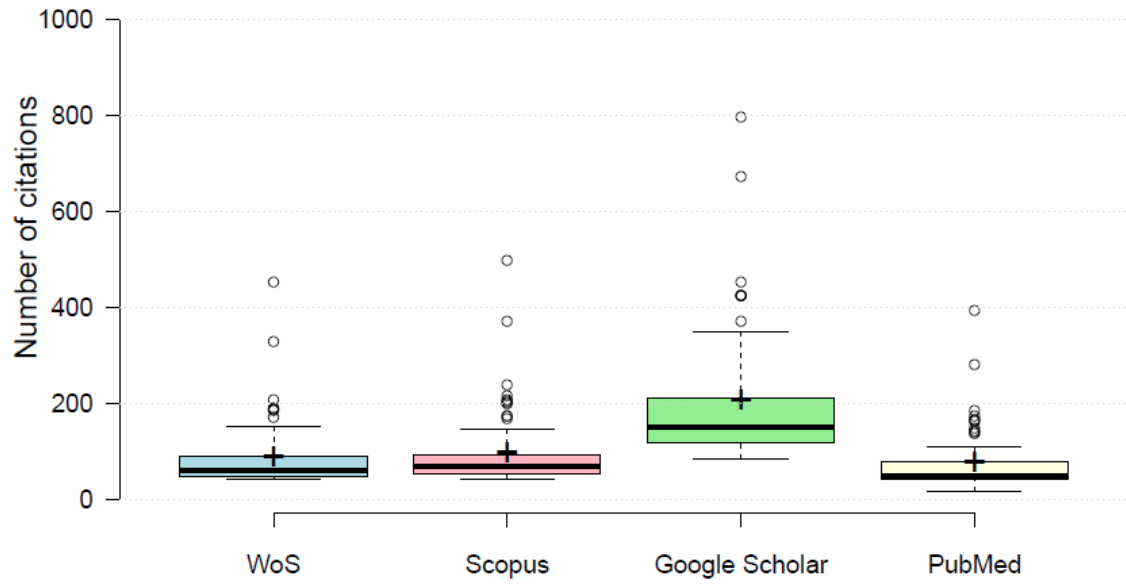


Figure 2. The distribution of the number of citations received per year and correlation between citation counts from selected sources

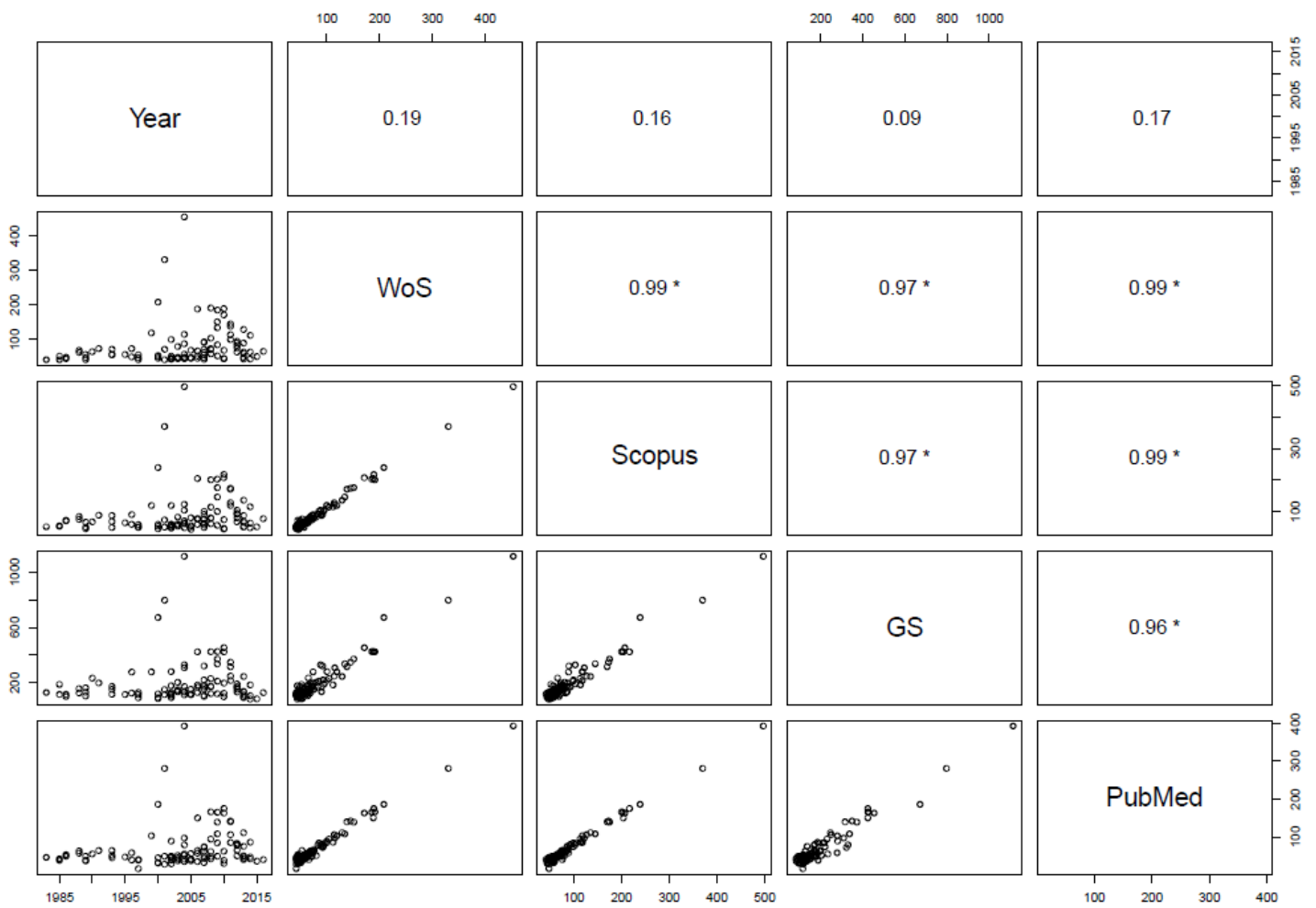


Figure 3. Number of case reports and case series by year of publication

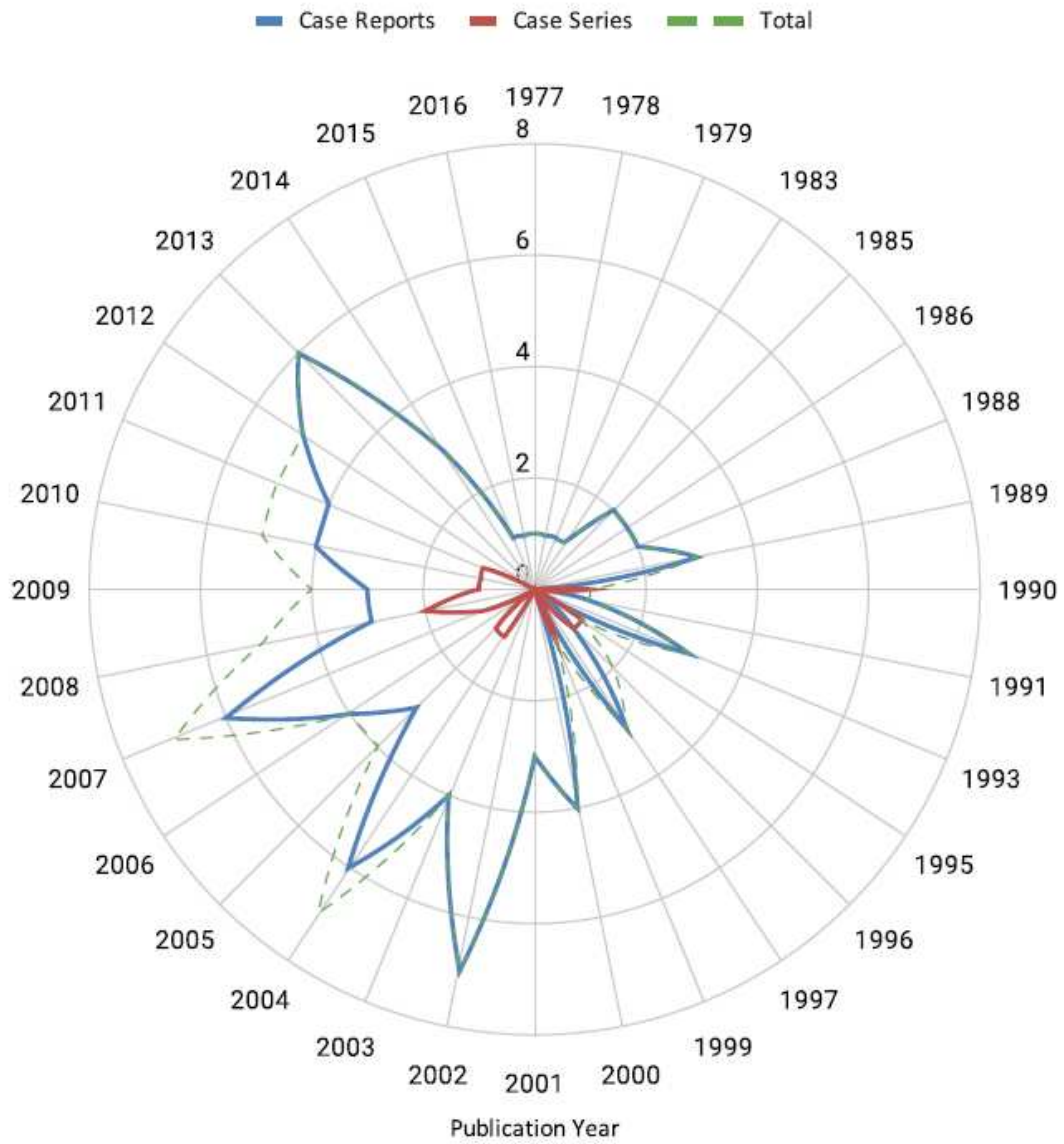


Figure 4. The production and citations over time of the top 20 authors

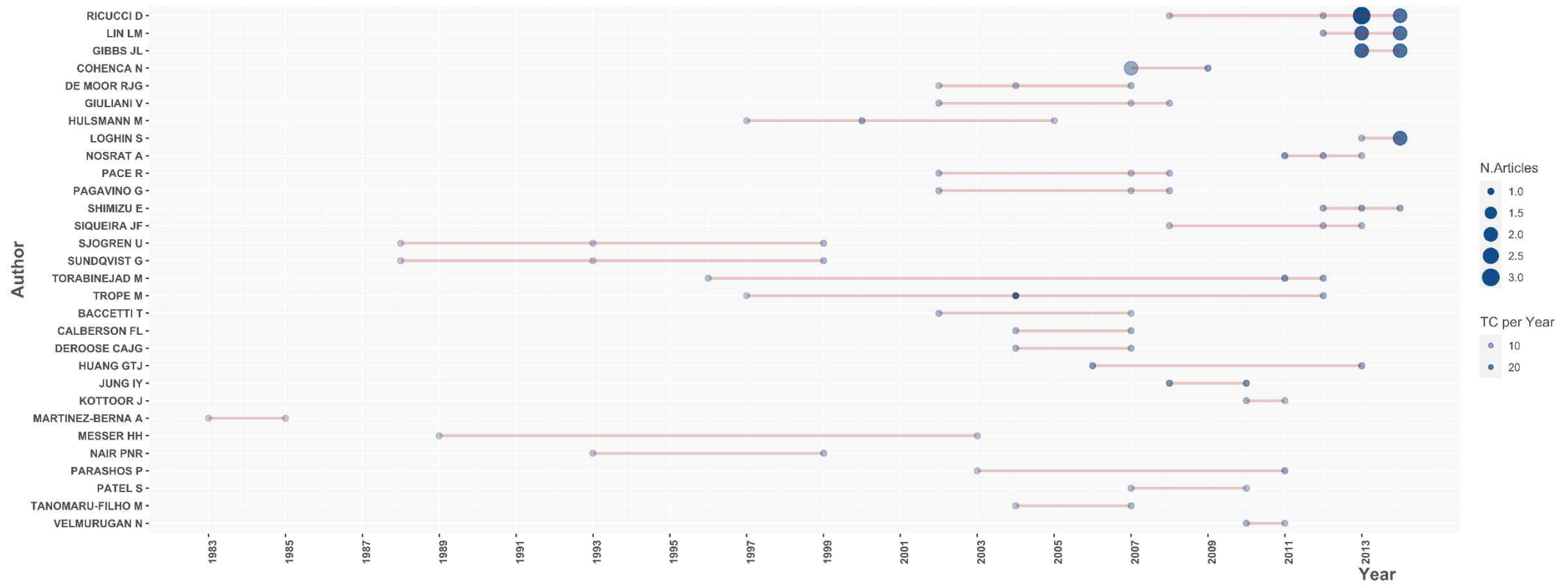
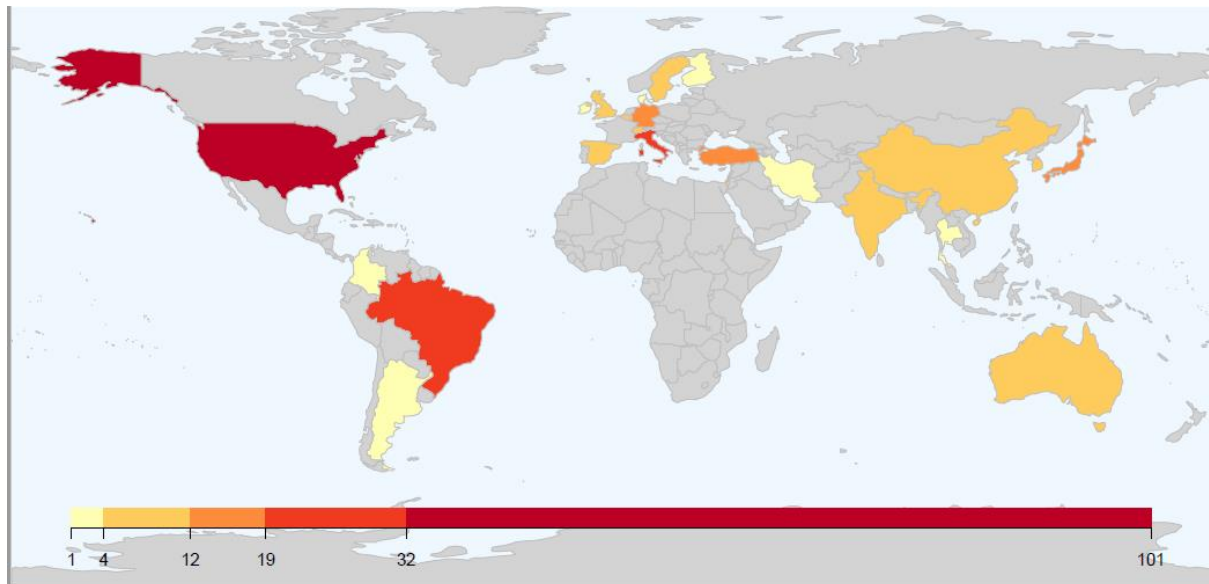
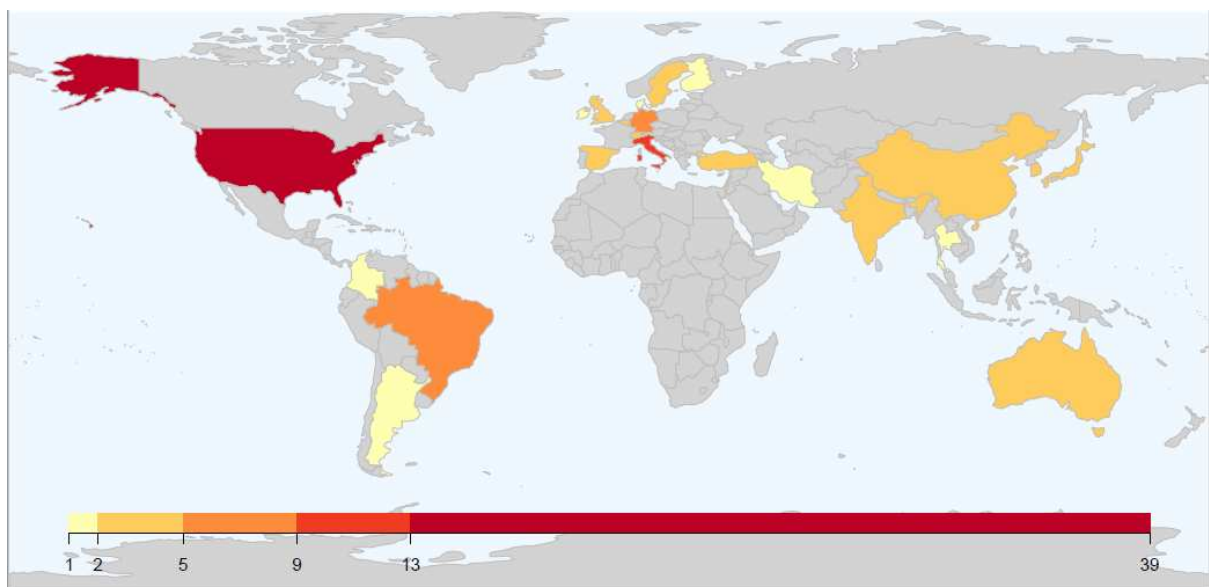


Figure 5. The contribution of each country within the distribution of top-cited case reports and case series (5a - based on the frequency of occurrence of a country, 5b - based on the total number of reports, and 5c - based on a country of the corresponding authors)

5A



5B



5C

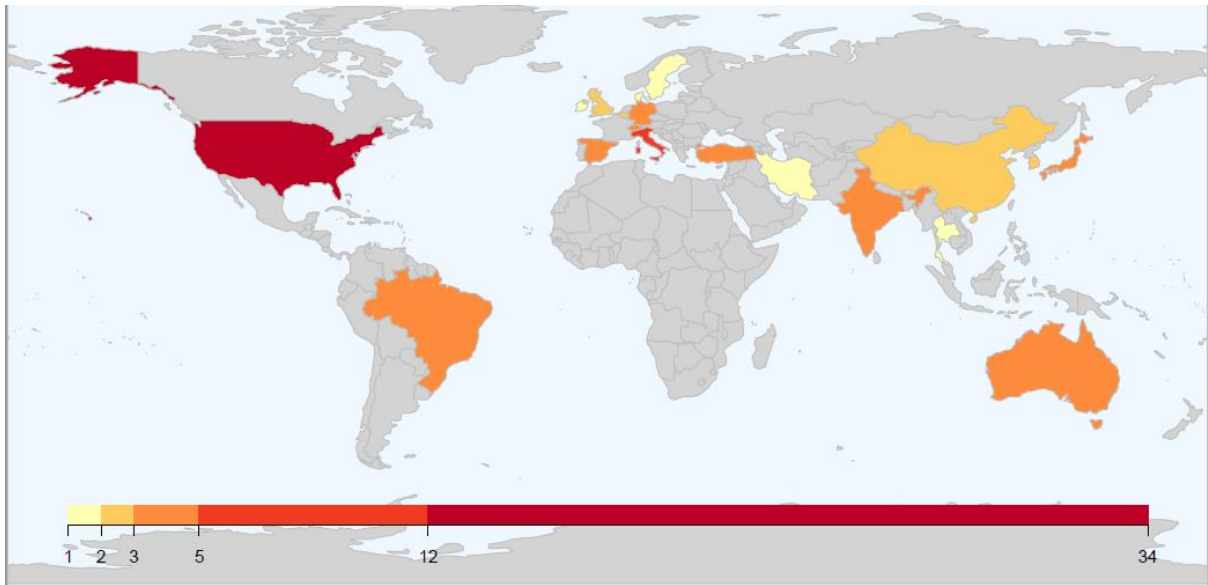


Figure 6. Country collaboration map

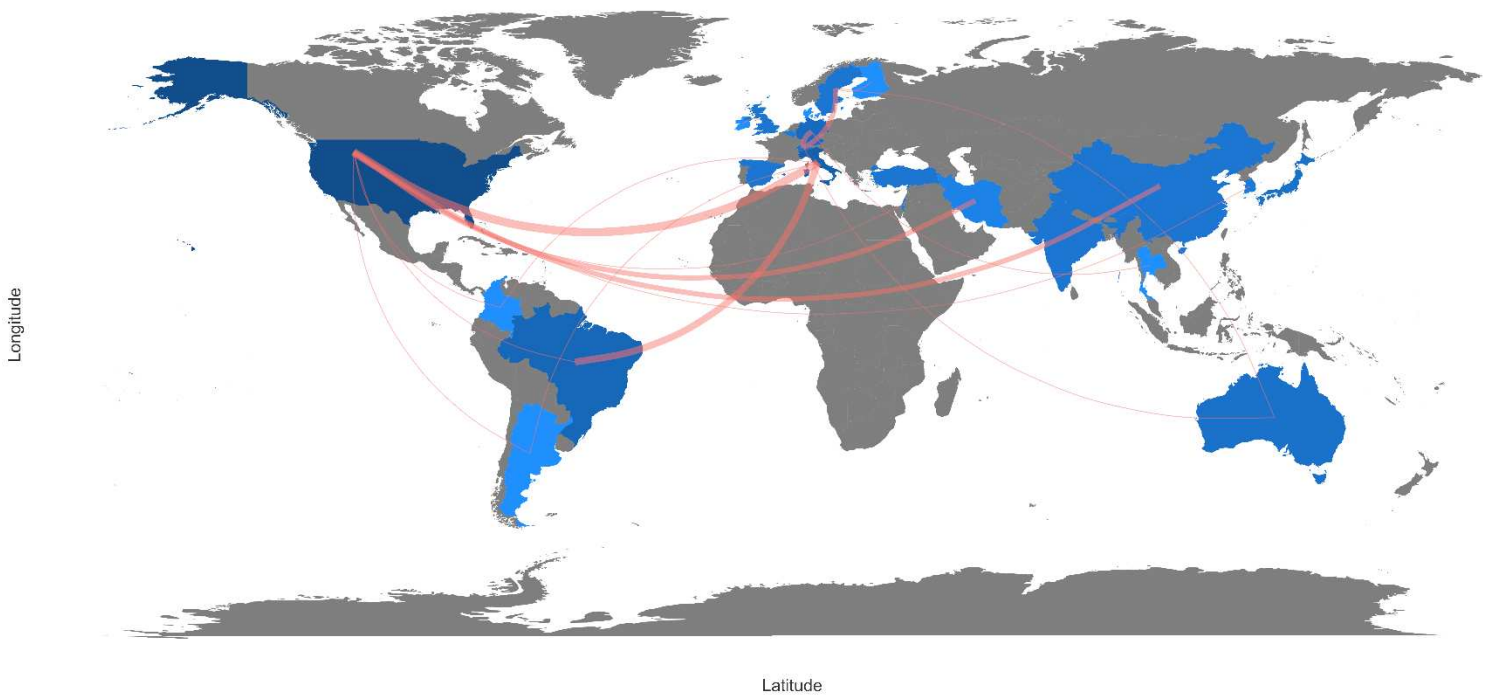






Figure 8. Chronological network map of the most relevant direct citations of the top-cited case reports and case series

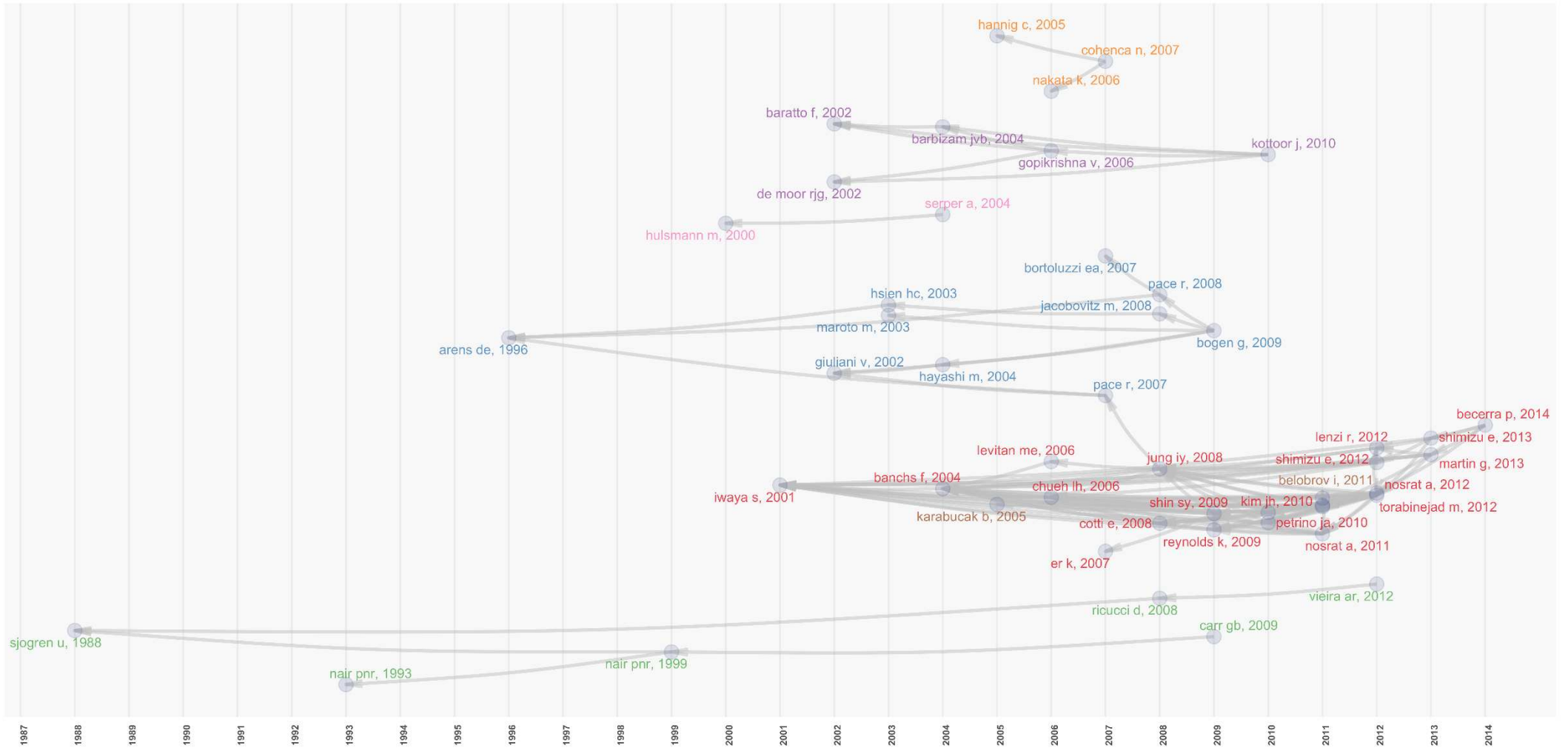


Figure 9. Sankey plot showing the relationship amongst countries, authors, journals, and research topics of the top 20 most cited case reports and case series

