Original Article

Bibliometric analysis of top-cited articles in Journal of Dental Sciences

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Abstract *Background/purpose:* Bibliometric analysis is a method for quantifying the article distribution, impact, and performance. The purpose of this study was to identify the most top-cited articles published in Journal of Dental Sciences (JDS) and further analyze their main characteristics.

Materials and methods: Web of Science, Journal Citation Reports database was searched to retrieve the most-cited articles in JDS published from 2007 to July 31, 2022. Among the included top-cited articles, the following parameters were recorded and analyzed: article title, article type, year, country, number of citations, and average citations pre year. Microsoft Excel was applied for the descriptive bibliometric analysis.

Results: 41 top-cited articles were filtered from total 1165 JDS articles in Web of Science database. The results showed that 41 top-cited articles were cited between 20 and 186 times from Journal Citation Reports. Most of the article types are original article (28/41, 68.29%) following by review article (7/41, 17.07%). The majority of articles were originated from Taiwan (23/41, 56.10%). The top 4 most cited articles were relative to the research topic on COVID-19, lateral canal, guided-tissue regeneration barriers, and platelet-rich fibrin, respectively. However, articles analyzed by the average citations per year since publication were focused on COVID-19 followed by artificial intelligence.

Conclusion: This bibliometric analysis illustrates the progress and trend of researches in JDS. The results may also offer a reference for recognizing the hot issues with the most citations in JDS.

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Introduction

Bibliometrics is a widely used systematic method for evaluating research output to analyze pertinent literature through the use of mathematical and statistical approaches.[1] Bibliometric analyses have been utilized in various scientific fields to map the literature, reveal the historical development of research fields, and evaluate the scientific research productivity of researchers, organizations, countries, and journals.[2-6] The bibliometric analysis of a specific journal is important as it provides insight far beyond the journal's scope.

Journal of Dental Sciences (JDS), the official journal of the Association for Dental Sciences of the Republic of China, Taipei, Taiwan, deals with all fields of basic and clinical dentistry. JDS is a leading journal indexed in 10 celebrated global databases. Previously, a bibliometric overview has been conducted and published that the publication characteristics and impactor of JDS will grow in the future.[4] From the Journal Citation Reports™ (Clarivate Analytics, Philadelphia, PA, USA), JDS has significantly improved its journal impact factor from 2.08 in 2020 to 3.719 in 2021 and stands on 23rd rank in the first Quartile (23/92).[7]

The analysis of citations may represent the quantify and impact of publication, author, country, or specialty. To date, there is no bibliometric analysis based on citations for evaluating the predominant research field as well as its impact of JDS. Therefore, this bibliometric study was performed to analyze the scientific impact of articles published in JDS by Web of Science, Journal Citation Reports database.

Materials and methods

An electronic literature search was performed from 2007 to July, 31, 2022 assessed on Web of Science (Clarivate Analytics, Philadelphia, PA, USA).[7] The search subject was "Journal of Dental Sciences" and "Elsevier" in the source title without restriction on study design of the article. The most top-cited articles were identified per citation counts that they have received in Web of Science. The selected articles were ranked in descending order on the basis of their citation counts.

Then, the most top-cited articles were extracted and their complete text was obtained. The following bibliometric parameters were recorded: article title, article type, year, country, total citations, and average citations per year.

To ensure the validity and reliability of this study, the author Dr. Liu carried out the screening and subsequent analysis of the filtered articles three times. In case of discrepancy, the opinion of a second author was requested to achieve the consensus. All extracted data were transferred into Microsoft Excel for this descriptive bibliometric analysis.

Results

Total 1165 articles were recruited from the Web of Science dated on July 31, 2022. The ranking of 41 most top-cited articles is shown in Table 1, including the article title, article type, year of publication, country of origin, total citations, and average citations per year. The top 1 most cited article is a short communication "The impact of the COVID-19 epidemic on the utilization of emergency dental services" published in 2020.[8] The total citation number was up to 186 during past 2 years. The top 2 most cited article is a letters to the editor "Is a filled lateral canal - A sign of superiority?" published in 2020.[9] The total citation number was 69 during past 2 years. The third most cited article is an original article "Non-shellfish chitosan from the fruiting body residue of *Ganoderma tsugae* for long-lasting antibacterial guided-tissue regeneration barriers?" published in 2007.[10] The total citation number was 68 during past 15 years. The fourth most cited article is also an original article "Platelet-rich fibrin modulates cell proliferation of human periodontally related cells in vitro" published in 2009.[11] The total citation number was 59 during past 13 years.

The demographic characteristics of the top 41 most cited articles is shown in Table 2. Most of the article types are original article (28/41,68.29%) following by review article (7/41,17.07%). The citation rate pre article type is shown on Fig. 1. In this study, short communication has received the 103.5 cations per article. The distribution of the top 41 most cited articles based on published year was illustrated in Fig. 2. The year 2013 had the 7 articles within top 41 most cited articles. As shown in Fig. 3, the correspondence authors from Taiwan have the most achievements in top 41 most cited articles.

The top 10 most average citations per year articles published in JDS is shown in Table 3. The top 1 most cited articles per year is a short communication "The impact of the COVID-19 epidemic on the utilization of emergency dental services" published in 2020 with 62 citation/year.[8] The second article is an original article "Innovation of dental education during COVID-19 pandemic" published in 2021 with 28.5 citation/year.[12] The third article is a Letters to the Editor "Is a filled lateral canal - A sign of superiority?" published in 2020 with 23 citation/year.[9] The fourth article is a review article "Developments, application, and performance of artificial intelligence in dentistry - A systematic review?" published in 2021 with 21.5 citation/year.[13] The fifth article is a review article "Comparing saliva and nasopharyngeal swab specimens in the detection of COVID-19: A systematic review and meta-analysis" published in 2021 with 7.5 citation/year.[14] The sixth articles are two review articles "Acquired salivary pellicle and oral diseases: A literature review" published in 2021[15] and "Scope and performance of artificial intelligence technology in orthodontic diagnosis, treatment planning, and clinical decision-making - A systematic review" published in 2021[16] with 7 citation/year, respectively. The eighth article is a perspective article "Salivary diagnostics in COVID-19: Future research implications" published in 2020 with 6.67 citation/year.[17] The ninth article is a review article "Orthodontic wires and its corrosion-The specific case of stainless steel and beta-titanium" published in 2015 with 5.75 citation/year.[18] The tenth article is an original article "Increasing salivary IgA and reducing *Streptococcus mutans* by probiotic *Lactobacillus paracasei* SD1: A double-blind, randomized, controlled study" published in 2019 with 5.5 citation/year.[19]

Table 1 The top 41 most-cited articles in Journal of Dental Sciences based on total citations.

Rank	Article title	Article type	Year	Country	Total citations	Average citations per year
1	The impact of the COVID-19 epidemic on the utilization of emergency dental services	Short Communication	2020	China	186	62
2	Is a filled lateral canal - A sign of superiority?	Letters to the Editor	2020	India	69	23
3	Non-shellfish chitosan from the fruiting body residue of *Ganoderma tsugae* for long-lasting antibacterial guided-tissue regeneration barriers	Original Article	2007	Taiwan	68	4.25
4	Platelet-rich fibrin modulates cell proliferation of human periodontally related cells in vitro	Original Article	2009	Taiwan	59	4.21
5	Innovation of dental education during COVID-19 pandemic	Original Article	2021	Taiwan	57	28.5
6	Effects of aluminum oxide addition on the flexural strength, surface hardness, and roughness of heat-polymerized acrylic resin	Original Article	2012	Iran	49	4.45
7	Orthodontic wires and its corrosion-The specific case of stainless steel and beta-titanium	Review Article	2015	Portugal	46	5.75
8	Relationship between oral health literacy and oral health behaviors and clinical status in Japanese adults	Original Article	2013	Japan	44	4.4
9	Developments, application, and performance of artificial intelligence in dentistry — A systematic review	Review Article	2021	Saudi Arabia	43	21.5
10	First detection, characterization, and application of amorphous calcium phosphate in dentistry	Review Article	2012	China	40	3.64
11	Fracture resistance and failure modes of CEREC endo-crowns and conventional post and core-supported CEREC crowns	Original Article	2009	Taiwan	40	2.86
12	The role of hypochlorous acid as one of the reactive oxygen species in periodontal disease	Review Article	2009	Taiwan	39	2.79
13	Effects of implant threads on the contact area and stress distribution of marginal bone	Original Article	2010	Taiwan	37	2.85
14	Patient satisfaction analysis: Identifying key drivers and enhancing service quality of dental care	Original Article	2013	Taiwan	35	3.5
15	Oral health problems and mortality	Original Article	2013	USA	35	3.5
16	Stress distribution of two commercial dental implant systems: A three-dimensional finite element analysis	Original Article	2013	Taiwan	34	3.4
17	Fractographic analysis of fractured dental implant components	Original Article	2013	Taiwan	32	3.2
18	5-Aminolevulinic acid-mediated photodynamic therapy for oral cancers and precancers	Review Article	2012	Taiwan	27	2.45
19	Fabrication and characterization of polycaprolactone and tricalcium phosphate composites for tissue engineering applications	Original Article	2017	Taiwan	26	4.33
20	Prevalence and etiology of molar-incisor hypomineralization (MIH) in the city of Istanbul	Original Article	2018	Turkey	25	5
21	Hematinic deficiencies and anemia in gastric parietal cell antibody-positive and -negative oral submucous fibrosis patients	Original Article	2018	Taiwan	25	5
22	Effects of orthodontic treatment with fixed appliances on oral health status: A comprehensive study	Original Article	2011	Turkey	25	2.08
23	Effects of different surface treatments on the color stability of various dental porcelains	Original Article	2011	Turkey	24	2
24	Comparison of host inflammatory responses between calcium-silicate base material and IRM	Original Article	2014	Taiwan	23	2.56
25	Age-related changes in salivary biomarkers	Original Article	2014	Japan	23	2.56
26	Clinical application of platelet-rich fibrin as the sole grafting material in periodontal intrabony defects	Case Report	2011	Taiwan	23	1.92
27	Clinical and histologic evaluations of healing in an extraction socket filled with platelet-rich fibrin	Case Report	2011	Taiwan	23	1.92
28	Increasing salivary IgA and reducing *Streptococcus mutans* by probiotic *Lactobacillus paracasei* SD1: A double-blind, randomized, controlled study	Original Article	2019	Thailand	22	5.5
29	Isolation and characterization of human gingiva-derived mesenchymal stem cells using limiting dilution method	Original Article	2016	China	22	3.14
30	Modeling viscoelastic behavior of periodontal ligament with nonlinear finite element analysis	Original Article	2013	Taiwan	22	2.2

#	Title	Article type	Year	Country		
31	Prevalence of and risk factors for musculoskeletal complaints among Taiwanese dentists	Original Article	2012	Taiwan	22	2
32	Smad signal pathway in BMP-2-induced osteogenesis — a mini review	Review Article	2008	Taiwan	22	1.47
33	Serum thyroid autoantibodies are not associated with anemia, hematinic deficiencies, and hyperhomocysteinemia in patients with Behcet's disease	Original Article	2018	Taiwan	21	4.2
34	Chinese dental students' knowledge and attitudes toward HIV/AIDS	Original Article	2016	China	21	3
35	Investigation of the spreading characteristics of bacterial aerosol contamination during dental scaling treatment	Short Communication	2014	Taiwan	21	2.33
36	Comparative analysis of guided bone regeneration using autogenous tooth bone graft material with and without resorbable membrane	Original Article	2013	South Korea	21	2.1
37	Effects of different denture cleaning methods to remove *Candida albicans* from acrylic resin denture based material	Original Article	2011	Taiwan	21	1.75
38	Maximum mouth opening of ethnic Chinese in Taiwan	Original Article	2009	Taiwan	21	1.5
39	Salivary diagnostics in COVID-19: Future research implications	Perspective	2020	India	20	6.67
40	Quorum quenching: Signal jamming in dental plaque biofilms	Review Article	2016	India	20	2.86
41	Comparison of antibacterial activities of root-end filling materials by an agar diffusion assay and Alamar blue assay	Original Article	2012	Taiwan	20	1.82

Table 2 The parameters of 41 top-cited articles in Journal of Dental Sciences.

	Number (%)
Article type	
Perspective	1 (2.44%)
Review Article	7 (17.07%)
Original Article	28 (68.29%)
Case Report	2 (4.88%)
Short Communication	2 (4.88%)
Letters to the Editor	1 (2.44%)
Publication year	
2007	1 (2.44%)
2008	1 (2.44%)
2009	4 (9.76%)
2010	1 (2.44%)
2011	5 (12.20%)
2012	5 (12.20%)
2013	7 (17.07%)
2014	3 (7.32%)
2015	1 (2.44%)
2016	3 (7.32%)
2017	1 (2.44%)
2018	3 (7.32%)
2019	1 (2.44%)
2020	3 (7.32%)
2021	2 (4.88%)
Country	
China	4 (9.76%)
India	3 (7.32%)
Taiwan	23 (56.10%)
Iran	1 (2.44%)
Portugal	1 (2.44%)
Japan	2 (4.88%)
Saudi Arabia	1 (2.44%)
USA	1 (2.44%)
Turkey	3 (7.32%)
Thailand	1 (2.44%)
South Korea	1 (2.44%)

Discussion

JDS is the most prestigious dental journal in Taiwan. Being the only one dental journal with impact factor, it is necessary to assess these articles for their impact on research and development in dental field. The citation count received by a scientific article is one of the indicators of its impact within a field. Therefore, a bibliometric analysis was applied to evaluate the impact of articles published in JDS.

Due to the limited published number in JDS, only 41 top-cited articles were selected and analyzed their main features. In this study, the most article type is original article following by review article, short communication/ case report, and perspective/letters to the editor. However, the top 1 and the top 2 most cited article was short communication and letters to the editor, respectively. It seems that COVID-19 and lateral canal were the most attractive topics in dental research field during recent two years.
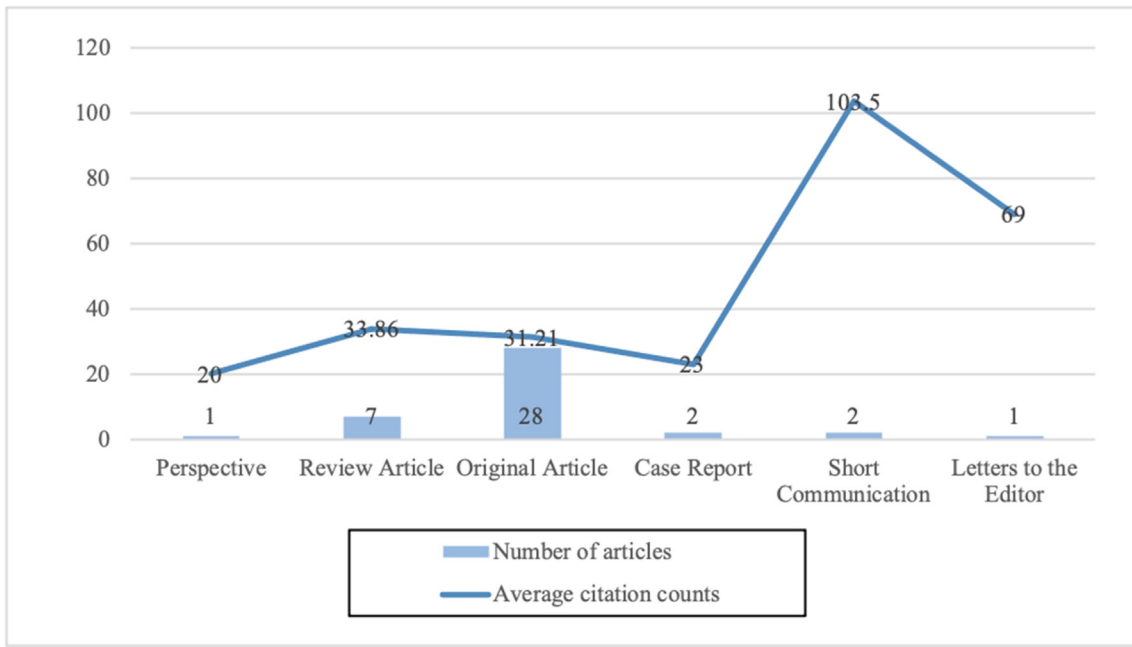
Figure 1 The distribution of article types published in Journal of Dental Sciences.
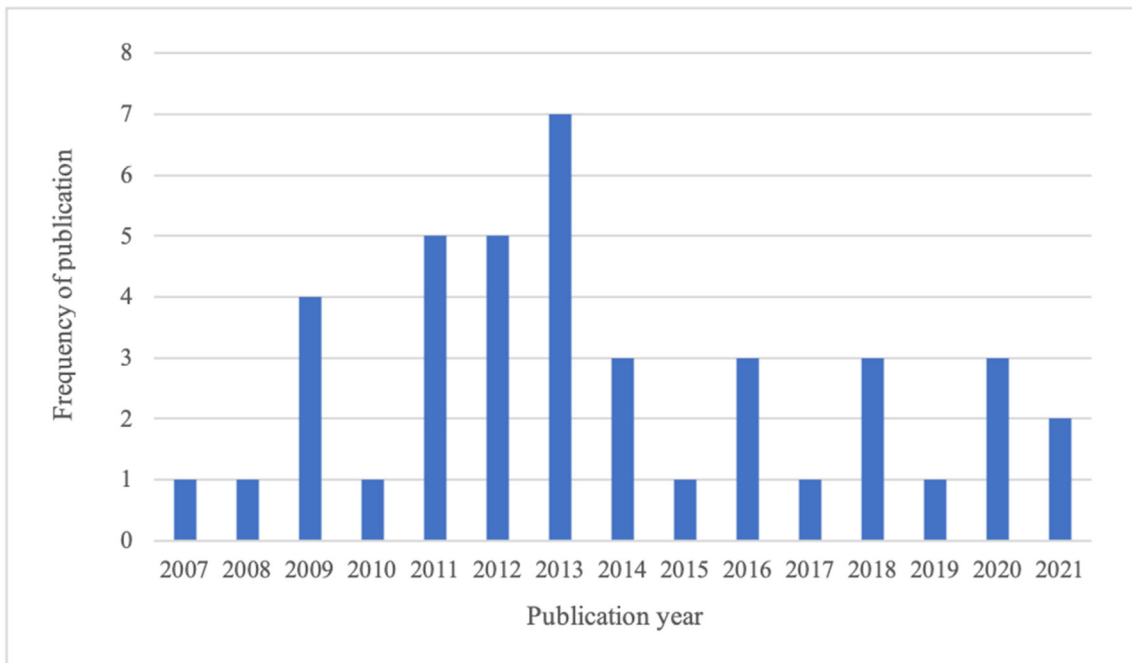

Figure 2 The distribution of article published frequency in Journal of Dental Sciences.

In the present study, the articles were cited between 20 and 186 times from Web of Science. The relative wide range in total citations was noted in this bibliometric analysis. An article having ≥400 citations is considered as a "classic" article based on the field of research such as implantology,[20] oral and maxillofacial surgery,[21] and endodontology.[22] The relatively fewer citations in JDS published articles compared with other specialties could be attributed to the multidisciplinary nature of JDS.

The main potential limitation of bibliometric analysis is that the older published article has the more time to receive citations. Therefore, the authors extracted the articles according to the average citations per year since publication. The results demonstrated an altered order of the articles compared with those articles listed with total citations. It is not surprised that 4 articles were related to COVID-19 research.[6,10,12,15] The followings were 2 articles focus on the artificial intelligence in dentistry.[12,14] Taken
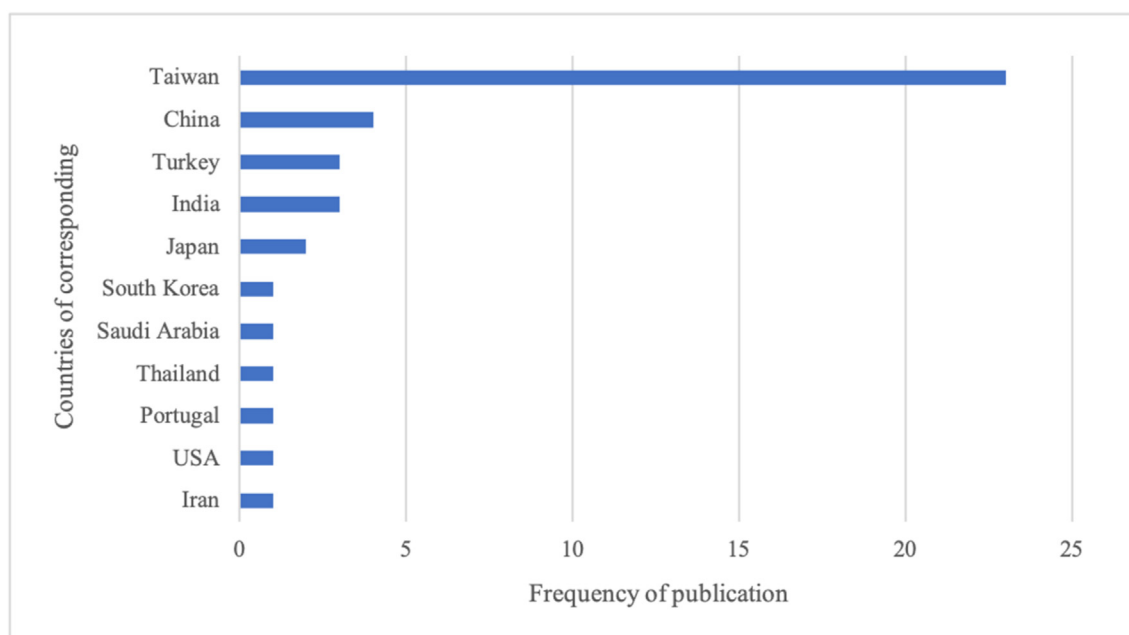
Figure 3 The distribution of countries with their articles published in Journal of Dental Sciences.

Table 3 The top 10 most-cited articles in Journal of Dental Sciences based on the average citations pre year.

Rank	Article title	Article type	Year	Country	Total citations	Average citations per year
1	The impact of the COVID-19 epidemic on the utilization of emergency dental services	Short Communication	2020	China	186	62
2	Innovation of dental education during COVID-19 pandemic	Original Article	2021	Taiwan	57	28.5
3	Is a filled lateral canal — A sign of superiority?	Letters to the Editor	2020	India	69	23
4	Developments, application, and performance of artificial intelligence in dentistry — A systematic review	Review Article	2021	Saudi Arabia	43	21.5
5	Comparing saliva and nasopharyngeal swab specimens in the detection of COVID-19: A systematic review and meta-analysis	Review Article	2021	Germany	15	7.5
6	Acquired salivary pellicle and oral diseases: A literature review	Review Article	2021	Hong Kong	14	7
7	Scope and performance of artificial intelligence technology in orthodontic diagnosis, treatment planning, and clinical decision-making — A systematic review	Review Article	2021	Saudi Arabia	14	7
8	Salivary diagnostics in COVID-19: Future research implications	Perspective	2020	India	20	6.67
9	Orthodontic wires and its corrosion-The specific case of stainless steel and beta-titanium	Review Article	2015	Portugal	46	5.75
10	Increasing salivary IgA and reducing *Streptococcus mutans* by probiotic *Lactobacillus paracasei* SD1: A double-blind, randomized, controlled study	Original Article	2019	Thailand	22	5.5

together, the extracted article may represent its impact of the content and the trend of current researches.

There are some limitations in this bibliometric analysis of JDS. First, only one database Web of Science was adopted. Articles written in books, or conference proceedings were not covered in Web of Science. More databases such as Scopus and Google scholar would be added to compare the differences in the future. Second, the majority of Web of Science are in English, which may generate linguistic prejudice and miss other languages.

Finally, the number of citations might reflect the impact or influence the article. However, this method is potential lack of in-depth analysis of each article.

In conclusion, within the limitations of this study, the findings still provided a helpful perspective on the impact and evolving research trends of JDS over the past 15 years. In-depth analysis is required to assess the quality of evidence of the articles in the further study.

Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

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