Bibliometric Analysis of Dental Implantology Journals From 1991 to 2023

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Purpose: Dental implants are an established treatment option for varying edentulous conditions that has grown in popularity since the 1990s. This increased clinical application has shown a parallel increase in implant-related research. The objective of this paper was to perform a comprehensive bibliometric analysis of five dental implantology journals from 1991 to 2023. *Materials and Methods:* A search was done in the Web of Science database between 1991 and 2023 in five journals with a focus on dental implantology: *Clinical Oral Implant Research, Clinical Implant Dentistry and Related Research, Implant Dentistry, The International Journal of Oral & Maxillofacial Implants*, and *International Journal of Oral Implantology*. Results marked as a correction, retraction notice, retracted article, meeting abstract, or withdrawn publication were removed from the analysis. The time period analyzed was divided into four time periods, organized by decade: 1991 to 2000, 2001 to 2010, 2011 to 2020, and 2021 to 2023. Additionally, the top 100 cited papers were also exported separately. Authors and countries with most publications were tabulated from the Web of Science database. VOSviewer software was used to create network maps of keywords and title word occurrences for each of the time periods. HistCite software was used to analyze the number of publications and citation counts. *Results:* Network maps of keywords and title word occurrences suggested an early focus on osseointegration and titanium implants between 1991 and 2000. Publications between 2001 and 2010 saw a focus on in vivo studies, implant surface, and peri-implantitis. Publications from 2011 and later saw a focus on bone regeneration, complications, and zygomatic implants. The USA ranked highest in total number of publications in all analyzed time periods. *Conclusions:* Within the limitations of the present study, a comprehensive bibliometric analysis from 1990 to 2023 was reported. Trends in keywords and titles of implant publications were identified in these journals, which mirrored the trends seen in clinical practice. *Int J Periodontics Restorative Dent 2024;39:e193–e202. doi: 10.11607/jomi.10758*

Dental implants are now considered an established treatment option for varying degrees of edentulous conditions.[1–3] With the increase in clinical use and application of implants, the research interest and productivity has grown, as evidenced by an increase in the number of publications and journals dedicated to the field of dental and oral implantology since the 2000s.[4] There has also been a significant focus on material development, success and survival of different procedures, clinical techniques, and complications related to the field of dental implantology.[5] As the field and popularity of implant dentistry has grown, significant advances and evolutions have been seen over the last 3 decades.[5] Clinical decision-making in implant dentistry is in now largely based on evidence-based principles and methods.[6]

Scientific publications and high-quality literature contribute to evidence-based dentistry by raising and answering important preclinical and clinical questions.[7–9] Bibliometric analysis attempts a review process of published literature in a specific niche of medical and dental research.[10–12] Visualization techniques are used, as well as a systematic analysis on the nature and occurrence of keywords, citation networks, authors, and countries of publication[12–19] across different time points. Such studies are important and useful for setting priorities, understanding trends, and funding agencies.[11,20] Further, bibliometric studies are important in dental implantology because of the tremendous increase in publications, and such analyses help identify trends in key topics and areas.[14,21] Several studies have performed bibliometric analyses in the field of dental implantology[5,12–14,18,21,22] pertaining to specific topics or a shorter timeframe. However, a comprehensive bibliometric analysis from 1991 to date has not been performed for journals pertaining to the field of dental implantology. Thus, the aim of the present paper is to analyze the trends in keywords, titles, authors, and author-affiliated countries from 1991 to date and the top 100 cited papers in five dental implantology journals: *Clinical Oral Implant Research, Clinical Implant Dentistry and Related Research, Implant Dentistry, The International Journal of Oral & Maxillofacial Implants*, and *International Journal of Oral Implantology*.

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Table 1 Top 5 Authors and Countries by Number of Papers for All Time Periods

1991–2000		2001–2010		2011–2020		2021–2023	
Author/Country	n	Author/Country	n	Author/Country	n	Author/Country	n
Top 5 authors and papers							
Lang, NP	40	Lang, NP	97	Wang, HL	155	Wang, HL	44
Sennerby, L	25	Piattelli, A	51	Lang, NP	124	Sanz, M	21
Lekholm, U	21	Watzek, G	46	Botticelli, D	96	Thoma, DSS	21
Hammerle, CHF	19	Sennerby, L	45	Hammerle, CHF	91	Hammerle, CHF	18
Albrektsson, T	17	Eckert, SE	44	Jung, RE	85	Jung, RE	18
Top 5 countries and papers							
USA	196	USA	576	USA	1,276	USA	188
Sweden	153	Germany	335	Italy	803	China	131
Switzerland	87	Sweden	298	Brazil	695	Switzerland	120
Germany	74	Italy	297	Switzerland	664	Italy	117
Japan	44	Switzerland	262	Germany	636	Spain	97

MATERIALS AND METHODS

Data Source and Study Protocol
The data for this article were extracted from a search performed in the Web of Science database. The Standards for Reporting and Qualitative Research (SRQR) checklist[23] was followed. The current bibliometric study was exempt from institutional review board requirements because previously published data were used.

Search Strategy
The Web of Science database was accessed in July 2023. An electronic search was conducted on the following five journals: *Clinical Oral Implant Research*, *Clinical Implant Dentistry and Related Research*, *Implant Dentistry*, *The International Journal of Oral & Maxillofacial Implants*, *International Journal of Oral Implantology*. The search was done for articles published from 1991 to 2023, as there were relatively few publications before 1991. There were no filters used in relation to language or keywords. The search results were sorted according to most cited, then exported as RIS (Research Information Systems) files, using the full record option, and as .txt files, using the full record and cited references option. Articles marked as a correction, retraction notice, retracted article, meeting abstract, withdrawn publication, or addition/correction were removed from the analysis.

Keyword, Title, Author, and Author-Affiliated Country Analysis
The exported references were sorted by four time periods (1991 to 2000, 2001 to 2010, 2011 to 2020, and 2021 to time of search), and the top 100 cited articles were identified. The VOSvewer software[24] (version 16.9,

Leiden University) was used to analyze keywords and title word occurrences and subsequently generate network maps. A pilot investigation was performed prior to generating final figures. The exported files in both formats (RIS and txt) were imported into VOSviewer, and the resultant term maps and occurrences were analyzed prior to final data collection. Term maps were used to visualize, as clusters, topic keywords in terms of occurrences for each of the four time periods and for the top 100 cited articles using author keywords and keyword plus options. For the network maps, only keywords that had 10 or more occurrences were used for the four time periods, and words that occurred at least 3 times were used for top 100 cited article keywords. Term maps utilizing different colors were used to identify unique clusters among the keywords. VOSviewer was also used to tabulate the word occurrences in the titles for each time period and for the top 100 cited articles. The titles of the included articles were analyzed for recurring terms, and term maps were constructed. For title word analysis, the full counting option was used, and words with at least 10 occurrences or more were included for each time period and at least two occurrences for the top 100 cited articles. Additionally, the top five keywords and words occurring in the title were tabulated using VOSviewer for each time period.

HistCite software (Clarivate) was used to aggregate publications by authors and countries. The total publications sorted by country and author were analyzed for each of the four time periods and the top 100 cited articles. The top five published authors and author-affiliated countries were tabulated for each time period. Additionally, data were analyzed for the total local citation count (the total publications citing the article within that publication set) and the total general citation count (total citations in all literature in Web of Science)

Table 2 Top 5 Keywords and Title Words by Occurrence for All Time Periods

1991–2000		2001–2010		2011–2020		2021–2023	
Word	n	Word	n	Word	n	Word	n
Top keywords and occurrences							
Dental implants	189	Dental implants	1,202	Dental implants	2,222	Dental implants	374
Bone	119	Titanium implants	384	Dental implant	719	Dental implant	148
Osseointegration	116	Bone	382	Osseointegration	693	Peri-implantitis	126
Osseointegrated implants	94	Osseointegration	341	Survival	608	Survival	108
Implants	93	Placement	276	Bone	602	Bone	81
Top 5 title words and occurrences							
Implant	206	Implant	654	Implant	1,034	Implant	200
Study	131	Study	266	Effect	570	Systematic review	93
Bone	74	Effect	230	Study	500	Year	76
Dental implant	72	Dental implant	218	Dental implant	360	Effect	75
Evaluation	65	Bone	193	Evaluation	344	Dental implant	66

for the top 100 cited articles. The citation counts for the top five authors and countries within the top 100 cited articles were reported.

RESULTS

General Characteristics
A total of 10,724 articles were identified. After removing retractions, corrections, additions, abstracts, meetings, and withdrawn publications, 10,610 articles remained. Two retracted publications were then removed manually, for a total of 10,608 articles at the time of the search.

Top Five Authors and Countries
The top five authors and countries that had the most published manuscripts were sorted for the time period between 1991 to 2023. Among the authors, Lang NP and Hammerle CHF were among the top five in three of the four time periods analyzed. Sennerby L, Wang HL, and Jung R appeared in two of the four time periods analyzed. Among the top five countries with the most manuscripts, the USA ranked first for all four time periods, with Switzerland being one among the top five countries for all time periods, and Italy and Germany appearing three times. From 2021 to 2023, Peoples Republic of China and Spain made it to the list of top five countries with most publications (Table 1).

Top Keywords and Title Words
For the top five keywords and the title words for the four time periods, *dental implants* and *implants* dominated the top positions, respectively. For the keywords, *bone* was within the top five position for all periods, and *osseointegration* was a top five word in three different time periods. Among the title words, *dental implant* was

Table 3 Top 5 Authors and Countries with the Most Publications in the Top 100 Cited Articles Between 1991 and 2023

	Papers, n	TLCS, n	TGCS, n
Authors			
Lang, NP	15	49	7,445
Buser, D	10	36	5,125
Zwahlen, M	9	11	4,528
Hammerle, CHF	8	11	2,689
Pjetursson, BE	7	11	3,602
Countries			
Switzerland	34	79	14,811
USA	21	42	8,759
Sweden	20	60	8,221
Italy	8	7	3,072
UK	8	11	3,001

TLCS = the number of times the author's paper in this selection was cited by other authors also included in this collection; TGCS = the number of times the author's paper in this collection was cited.

among the top five for all periods, with *study* and *effect* appearing in three of the four time periods (Table 2).

Five Most Published and Cited Authors
In the top 100 cited articles from 1991 to 2023, the five most published authors were N. P. Lang with 15 papers and D. Buser with 10 papers, M. followed by Zwahlen, C. H. F. Hammerle, and B. E. Pjetursson with 9, 8, and 7 papers, respectively. The top three authors with the highest number of citations among the top 100 cited papers were N. P. Lang (n = 7,445 citations), D. Buser (n = 5,125 citations), and Zwahlen (n = 4,528 citations). The three countries with highest number of citations were Switzerland (n = 14,811), USA (n = 8,759), and Sweden (n = 8,221) based on the total global citation score (Table 3).
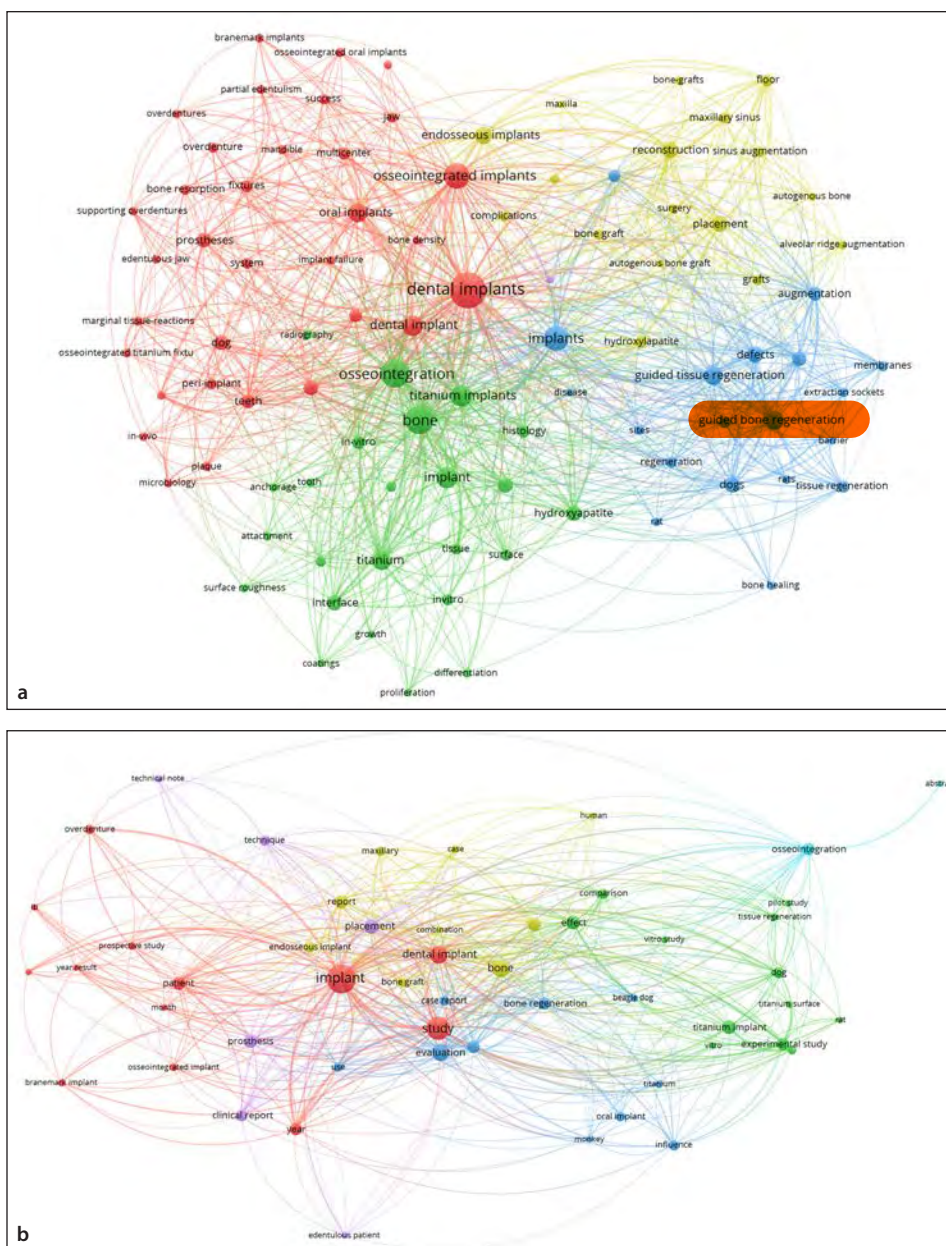
Fig 1 Keyword and title map for the manuscripts published between 1991 and 2000. *(a)* The keyword primarily focused on *dental implants*, with links to: *osseointegration* and *bone (green)*; *augmentation* and *bone grafts (yellow)*; and *guided bone regeneration* and *membranes (blue)*. *(b)* The title words primarily focused on *implants*, with links to: *animal studies (blue)*; *experimental study (green)*; *prospective studies (red)*; clinical report and *techniques (purple)*; and *osseointegration (teal)*.

Keywords and Tile Word Analysis

From 1991 to 2023, the network map analysis for keywords and title are shown as different groups, represented by varying colors and the links between them. The network analysis of keywords from 1991 to 2000 linked *dental implant* to some of the prominent keywords, such as *osseointegration*, *bone*, and *titanium implants*, as well as others, such as *augmentation*, *bone grafts*, *guided bone regeneration*, and *membranes*. The title words linked *implants* to research on animal studies, experimental studies, and prospective studies along with clinical reports and techniques and the word *osseointegration* (Fig 1).

The following decade (2001 to 2010), keyword focus was still seen on *titanium implants*, *bone*, and *regeneration*, along with links to in vivo and in vitro studies, along with other keywords *implant surface*, *peri-implantitis*, *reconstruction*, *immediate implant*, *stability*, *maxilla*, *implant survival*, and *immediate loading*. The title showed links to words such as *study*, *bone*, *patient*, *effect*, and *prosthesis* (Fig 2).

The network analysis from 2011 to 2020 shows the keywords focus on linking *dental implants* to *augmentation*, *bone regeneration*, *osseointegration*, *titanium*, *restoration*, and *complication*, along with links to *placement*, *accuracy*, and *peri-implantitis*. The primary title word was *implant*, which showed links with *evaluation*,
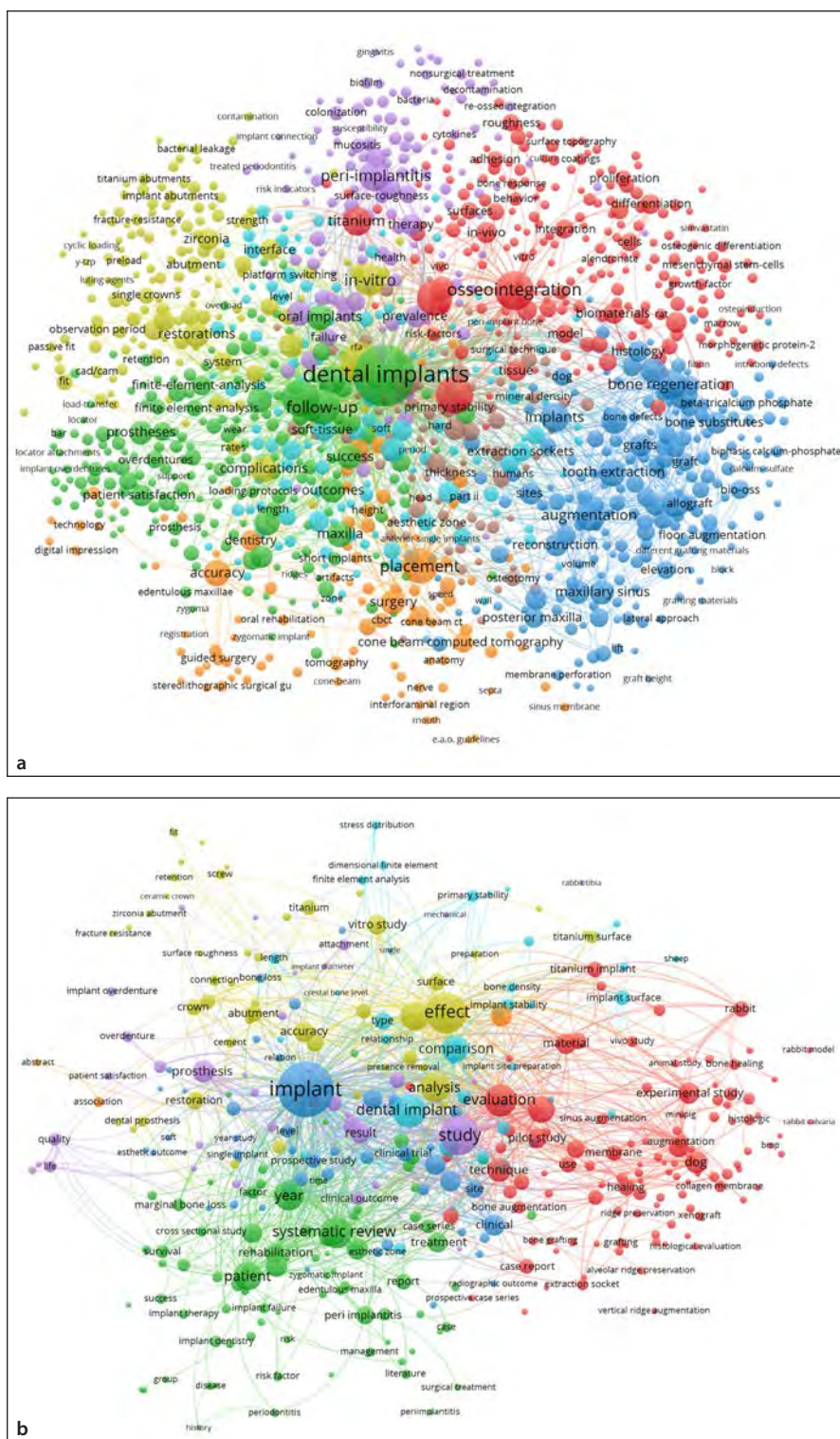
Fig 2 Keyword and title map for the manuscripts published between 2001 and 2010. *(a)* The keywords primarily focused on *dental implants*, with links to: *titanium implants, in vitro, in vivo, implant surface*, and *peri-implantitis (blue)*; *bone grafts, regeneration*, and *reconstruction (red)*; *immediate, stability*, and *maxilla (yellow)*; and *osseointegrated implants*, survival, and *immediate loading (green)*. *(b)* The title words focused on *implants*, with links to: *study* and *implant stability (blue)*; *bone, experimental study*, and *case report (red)*; effect and *surface (yellow)*; *patient* and *maxilla (brown)*; *prosthesis (purple)*; and *systematic review* and *survival (orange)*.
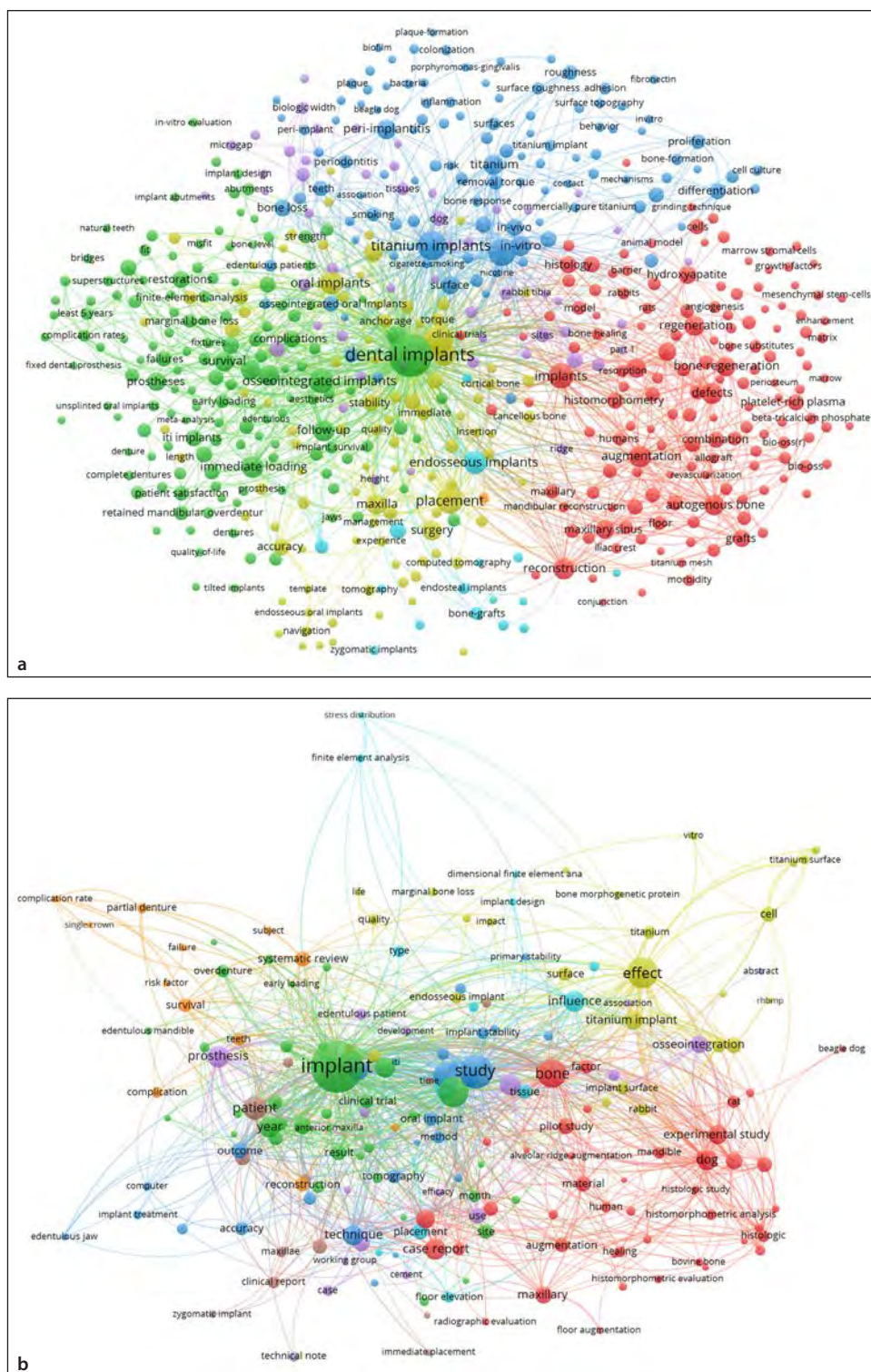
experimental study, technique, prosthesis, result, effect, analysis, systematic review, patient, comparison, and *primary stability* (Fig 3).

The final time period, 2021 to 2023, showed some new primary keywords, such as *survival, classification, rehabilitation, surgery, soft tissue, zygomatic implants*,

and *anterior maxilla*. *Peri-implantitis* became more prominent between 2001 and 2023. The title words on studies published between 2021 and 2023 also showed new primary terms, such as *influence, retrospective study, comparison, accuracy, systematic review*, and *clinical trial* (Fig 4).

Fig 3 Keyword and title map for the manuscripts published between 2011 and 2020. *(a)* The keyword primarily focused on *dental implants*, with links to: *augmentation* and *bone regeneration (blue)*; *osseointegration*, *primary stability*, and *titanium (red)*; *restoration, zirconia*, and *complication (yellow)*; *placement, CBCT*, and *accuracy (orange)*; *peri-implantitis*, *surface roughness*, and *mucositis (purple)*. *(b)* The title words focused on implants, with links to *evaluation, experimental study, augmentation*, and *technique (red)*; *study, result*, and *prosthesis (purple)*; *effect, analysis*, and *accuracy (yellow)*; *systematic review, patient, rehabilitation*, and *peri-implantitis (green)*; *dental implant, comparison*, and *primary stability (teal)*.

The top 100 cited papers showed the keywords to be focused on *dental implants*, interlinking with *osseointegration*, *titanium*, *immediate implants*, *surgery*, and *regeneration* (bone and tissue), along with *hard tissue augmentation*, *sinus lifts*, *long-term stability*, *complication*, and *peri-implantitis*. The title words included *evaluation*, *experimental study*, *systematic review*, *observation period*, *prevalence*, *incidence*, *implant placement*, *complication*, and *resonance frequency measurement* (Fig 5).
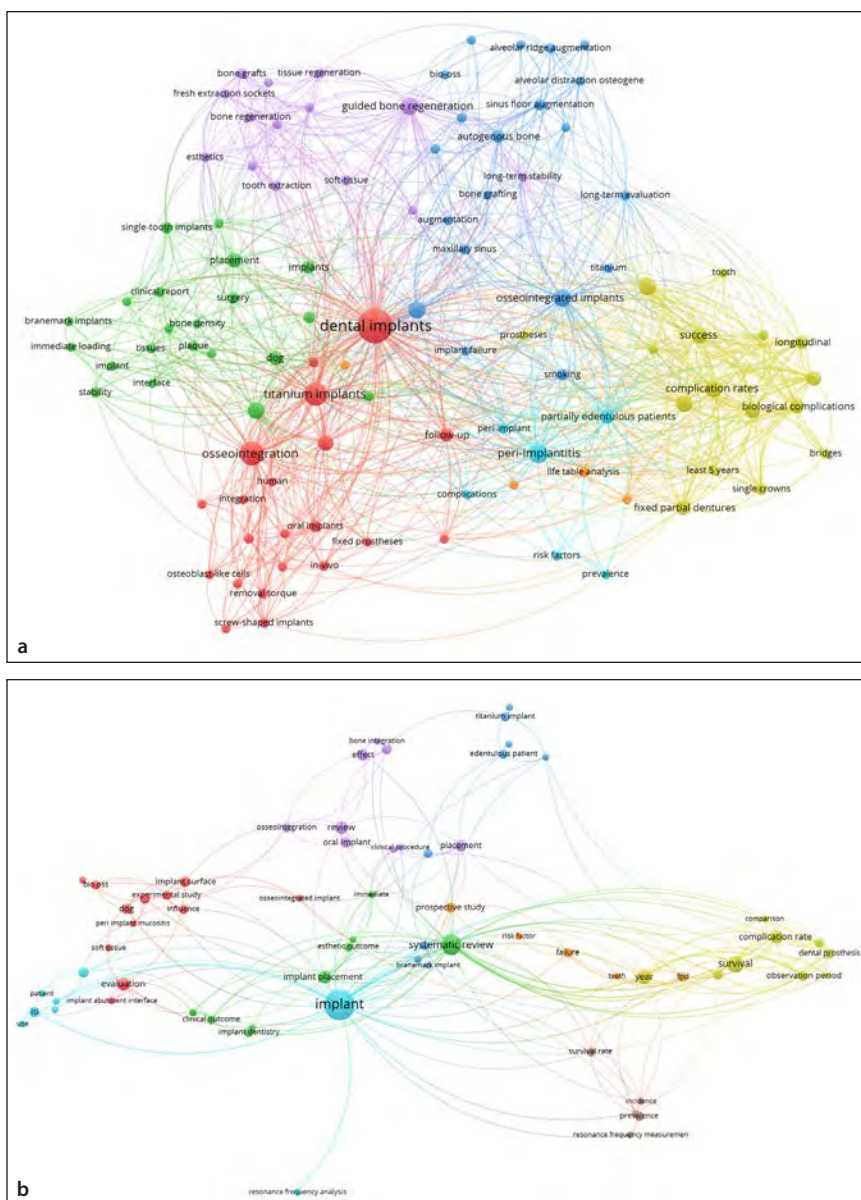
Fig 4 Keyword and title map for the manuscripts published between 2021 and 2023. *(a)* The keyword primarily focused on *dental implants*, with links to: *survival, osseointegration*, and *zirconia* (green); *augmentation, CBCT*, and *bone regeneration* (red); *peri-implantitis, surgical treatment*, and *classification* (yellow); *rehabilitation, overdentures*, and *zygomatic implants* (purple); *placement, accuracy, surgery*, and *guided surgery* (teal); and *soft tissue, outcomes, anterior maxilla*, and *extraction sockets* (blue). *(b)* The title words focused on implants, with links to: *influence, patient*, and *retrospective study* (red); *implant placement, comparison*, and *accuracy* (purple); *year, evaluation*, and *clinical trial* (yellow); *effect, randomized clinical trial*, and *outcome* (green); and *systematic review, peri-implantitis*, and *treatment* (blue).
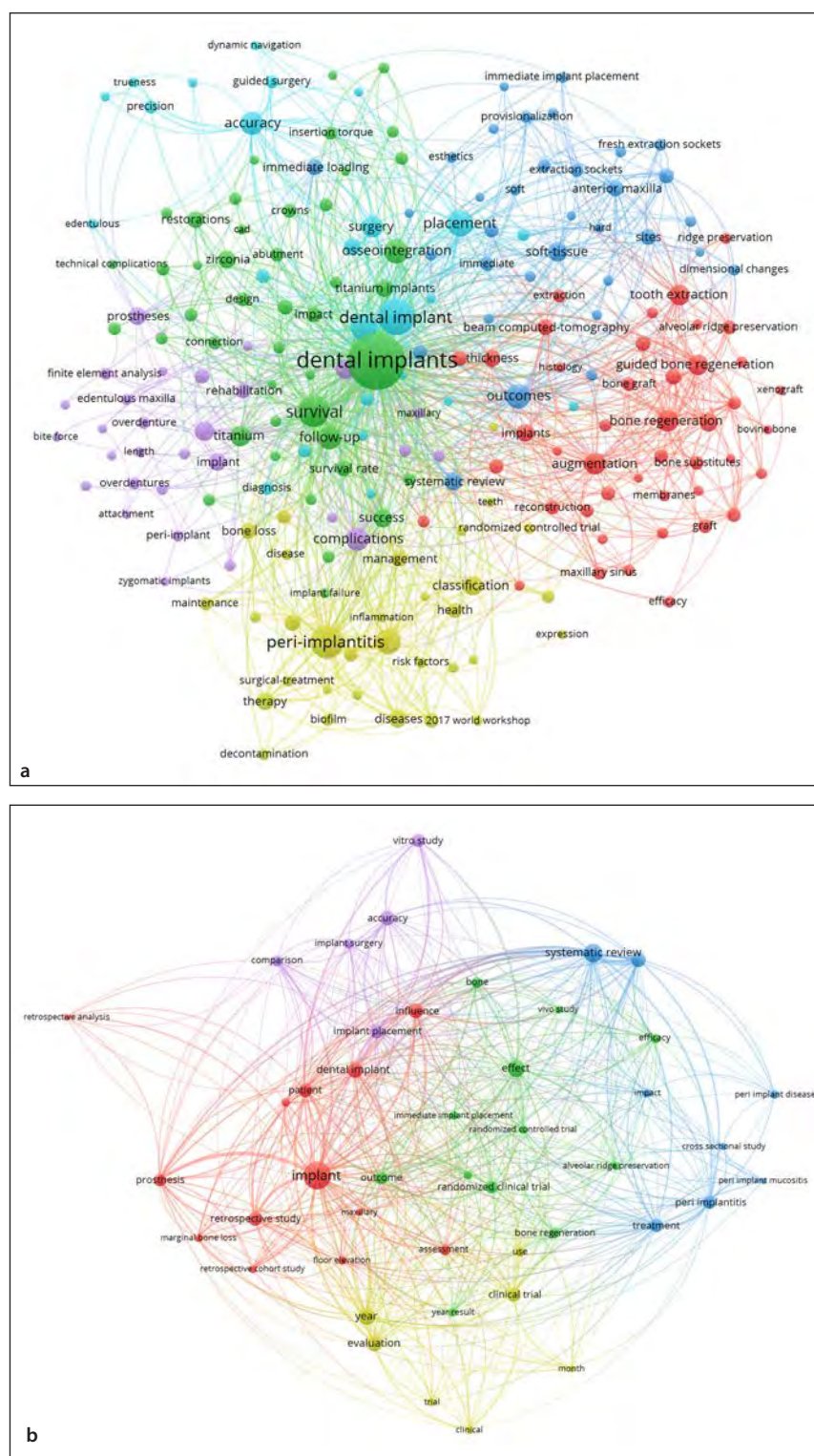
DISCUSSION

The discussions related to bibliometrics started in the early 1950s, but it is in recent times that bibliometrics has been used more often due to the increase in research and scientific literature.[25,26] The purpose of the current study was to look at publications in five journals specific to implant dentistry and analyze the keywords, title words, author contributions, and countries of publication over a period of 33 years. It was found that a majority of top five authors and author-affiliated countries dominated in most analyzed time periods, and it

Fig 5 Keyword and title map for the top 100 cited papers from 1991 to 2023. *(a)* The keyword primarily focused on *dental implants*, with links to: *titanium implants, osseointegration,* and *removal torque (red); Brånemark implants, immediate loading, surgery, placement,* and *dog (green); bone regeneration, tissue regeneration, tooth extraction, esthetics,* and *soft tissue (purple); augmentation, alveolar distraction, long-term stability, maxillary sinus, long-term evaluation,* and *osseointegrated implants (blue); success, complication rates,* and *biological complications (yellow);* and *partially edentulous patients* and *peri-implantitis (teal). (b)* The title words focused on implants, with links to: *evaluation, experimental study,* and *technique (red); review, oral implant, effect,* and *placement (purple); titanium* and *edentulous patient (blue); systematic review* and *implant placement (green); survival, complication rate, year,* and *observation period (yellow);* and *prevalence, incidence,* and *resonance frequency measurement (brown).*

was in recent years that countries like Peoples Republic of China and Spain made an appearance. This may suggest that far more research related to dental implants is occurring in newer hubs coming up globally. A study on the patent landscape in implants from year 2000 to 2020 show a shift in the development of implant technology from the USA and Europe to a more recent increased growth in Eastern Asian countries.[27] Among the top five countries with most publications in the top 100 cited articles, countries like those within the United Kingdom were present. The emergence of newer countries could be attributed to collaboration between authors from different parts of the world. A bibliometric analysis done in the PubMed database for global dental publications found that countries with a larger number

of corresponding authors ranked higher in terms of citations and number of published documents.[28]

The network analysis for the keywords from 1991 to 2000 was focused on key questions of early implant studies, including *osseointegration, bone, titanium implants,* and *osseointegrated implants,* which are seen in a larger font in the network figure (see Fig 1). From 2001 to 2010, these keywords then shifted toward *in vivo* and *in vitro* studies, *regeneration, implant surface,* and *peri-implantitis.* In addition, this period also saw the importance of *reconstruction, immediate implant, stability, immediate loading,* and *implant survival* (see Fig 2). This highlights the fact that from 1991 to 2010, the research began to evolve, with a later emphasis on factors related to implant survival, early implant restorability, and implant-related disease, which mirrored the

trends observed in clinical practice. It is also interesting to note that *peri-implantitis was more prominently featured in keywords in publications from 2001 to 2023.* Similar trends were reported in the recently published bibliometric analysis of top 100 cited research articles on peri-implantitis.[12]

2011 to 2020 keywords showed a focus similar to previous years, with *augmentation*, *bone integration*, *osseointegration*, *restoration*, *titanium*, and *peri-implantitis* dominating, along with new additions, such as *complications*, *placement*, and *accuracy*. The last few years (2021 to 2023) have seen a focus on newer keywords, such as *classification*, *rehabilitation*, *surgery*, *soft tissue*, and *anterior maxilla.* The title words from 2011 to 2020 focused on retrospective studies, systematic reviews, and clinical trials, which shows the impetus toward trends adapting to evidence-based treatment protocols. These findings align with the latest guidelines of the European Federation of Periodontology, which emphasizes the importance of clinical practice aimed toward preserving the health and increasing the longevity of implants and peri-implant tissue.[29] The network analysis for keywords and title words of the top 100 cited papers captured all of the important keywords and title words that were prominent in each time period.

The study is not without limitations. Because it is an aggregation of published data, statistical analysis was not performed. Additionally, citation and publication counts had minor variations based on the software used. Pilot testing was performed for three different bibliometric software (VOSviewer, Bibliometrix, and Histcite) and compared it with WoS and Scopus; minor discrepancies were found, and due diligence must be used when utilizing this information. In this case, Histcite software was chosen for the citation and publication counts. A report by van Eck and Waltman based on the citation analysis of software reports inconsistencies with databases. While missing and inaccurate references were problems of WoS, duplicate publications were problem with Scopus.[30] The various bibliometric software's use a variety of artificial intelligence tools to aggregate date exported from WoS and depending on the nature of the data and the programming of the tool, some discrepancies may arise.

CONCLUSIONS

Within the limitations of the present study, a comprehensive bibliometric analysis was reported of five dental implantology journals from 1991 to 2023. Trends in keywords and publication titles were identified in these journals, which mirrored the trends seen in clinical practice. Studies from earlier time periods focused on osseointegration and titanium implants, while studies from later years focused on anterior implants, immediate implants, and peri-implantitis. Analysis of countries with most publications revealed that the USA was at the top of the list for all time periods studied.

ACKNOWLEDGMENTS

REFERENCES

1. Berglundh T, Armitage G, Araujo MG, et al. Peri-implant diseases and conditions: Consensus report of workgroup 4 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. J Clin Periodontol 2018;45(suppl 20):s286–s291.
2. Derks J, Tomasi C. Peri-implant health and disease. A systematic review of current epidemiology. J Clin Periodontol 2015;42(suppl 16):s158–s171.
3. Rakic M, Galindo-Moreno P, Monje A, et al. How frequent does peri-implantitis occur? A systematic review and meta-analysis. Clin Oral Investig 2018;22:1805–1816.
4. Russo SP, Fiorellini JP, Weber HP, Niederman R. Benchmarking the dental implant evidence on MEDLINE. Int J Oral Maxillofac Implants 2000;15:792–800.
5. Huang X, Bai J, Liu X, et al. Scientometric analysis of dental implant research over the past 10 years and future research trends. Biomed Res Int 2021;2021:6634055.
6. Flemmig TF, Beikler T. Decision making in implant dentistry: An evidence-based and decision-analysis approach. Periodontology 2000 2009;50:154–172.
7. Borges GA, Dini C, Medeiros MMD de, Rodrigues Garcia RCM, Barão VAR, Mesquita MF. Bibliometric assessment in implant-retained overdenture articles: Mapping citation and journal impact factor trends. J Prosthet Dent 2022;S0022-3913(22)00691-6.
8. Geminiani A, Ercoli C, Feng C, Caton JG. Bibliometrics study on authorship trends in periodontal literature from 1995 to 2010. J Periodontol 2014;85:e136–e143.
9. Pandis N. The evidence pyramid and introduction to randomized controlled trials. Am J Orthod Dentofacial Orthop 2011;140:446–447.
10. Alkhayyat S, Khan M, Ahmad T, Haroon, Tariq H, Baig M. A bibliometric analysis of the top 100 most cited papers and research trends in breast cancer related BRCA1 and BRCA2 genes. Medicine (Baltimore) 2022;101:e30576.
11. Ellegaard O, Wallin JA. The bibliometric analysis of scholarly production: How great is the impact? Scientometrics 2015;105:1809–831.
12. Sabri H, Wang H. Peri-implantitis: A bibliometric network analysis of top 100 most-cited research articles. Clin Implant Dent Rel Res 2023;25:284–302.
13. Alarcón MA, Esparza D, Montoya C, Monje A, Faggion CM. The 300 most-cited articles in implant dentistry. Int J Oral Maxillofac Implants 2017;32:e1–e8.
14. Alonso-Arroyo A, Tarazona-Alvarez B, Lucas-Dominguez R, Peñarrocha-Oltra D, Vidal-Infer A. The funding sources of implantology research in the period 2008–2017: A bibliometric analysis. Clin Implant Dent Relat Res 2019;21:708–714.
15. Ordinola-Zapata R, Peters OA, Nagendrababu V, Azevedo B, Dummer PMH, Neelakantan P. What is of interest in endodontology? A bibliometric review of research published in the International Endodontic Journal and the Journal of Endodontics from 1980 to 2019. Int Endod J 2020;53:36–52.

16. Patil SS, Sarode SC, Sarode GS, et al. A bibliometric analysis of the 100 most cited articles on early childhood caries. Int J Paediatr Dent 2020;30:527–535.

17. Sengupta N, Sarode SC, Sarode GS, Gadbail AR, Gondivkar S, Patil S, et al. Analysis of 100 most cited articles on forensic odontology. Saudi Dent J 2020;32:321–329.

18. Tarazona B, Vidal-Infer A, Alonso-Arroyo A. Bibliometric analysis of the scientific production in implantology (2009–2013). Clin Oral Implants Res 2017;28:864–870.

19. Tarazona-Álvarez B, López-Roldan A, Vidal-Infer A, López-Padilla D, Alonso-Arroyo A. Bibliometric analysis of the scientific production of literature on peri-implant diseases in the Web of Science. Clin Implant Dent Relat Res 2021;23:625–634.

20. Glasziou P, Vandenbroucke JP, Chalmers I. Assessing the quality of research. BMJ 2004;328:39–41.

21. Dini C, Pereira MMA, Souza JGS, de Avila ED, Barão VAR. Mapping the trends and impact of research collaboration between countries in oral implantology publications: A bibliometric analysis from 1999 to 2019. J Prosthet Dent 2022;S0022-3913(22)00653-9.

22. Barão VAR, Shyamsunder N, Yuan JCC, Knoernschild KL, Assunção WG, Sukotjo C. Trends in funding, internationalization, and types of study for original articles published in five implant-related journals between 2005 and 2009. Int J Oral Maxillofac Implants 2012;27:69–76.

23. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: A synthesis of recommendations. Acad Med 2014;89:1245–1251.

24. van Eck NJ, Waltman L. Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics 2010;84:523–538.

25. Wallin JA. Bibliometric methods: Pitfalls and possibilities. Basic Clin Pharmacol Toxicol. 2005;97:261–275.

26. Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. J Bus Res 2021;133:285–296.

27. Kim WJ, Cho YD, Ku Y, Ryoo H-M. The worldwide patent landscape of dental implant technology. Biomater Res 2022;26:59.

28. Yahya Asiri F, Kruger E, Tennant M. Global dental publications in PubMed Databases between 2009 and 2019—A bibliometric analysis. Molecules. 2020;25:4747.

29. Herrera D, Berglundh T, Schwarz F, et al. Prevention and treatment of peri-implant diseases—The EFP S3 level clinical practice guideline. J Clinic Periodontology 2023;50:4–76.

30. van Eck NJ, Waltman L. Accuracy of citation data in Web of Science and Scopus. In: Qiu J, Rousseau R, Sugimoto CR, Xin F (eds). Scientometrics and Informetrics [Proceedings of the 16th International Conference of the International Society for Scientometrics and Informetrics, 16–20 Oct 2017, Wuhan, China]. ISSI Society, 2017:1087–1092.