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# ZYGOMATIC IMPLANTS: A 20-YEAR BIBLIOMETRIC ANALYSIS OF SCIENCE CITATION INDEX EXPANDED PUBLICATIONS (2001-2021)

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**Abstract:** Zygomatic implants provide a valuable treatment option for rehabilitation in severely resorbed maxilla. However, none of the several scientific papers on this topic have included a detailed analysis that characterized the research outputs regarding journals, authors, citations, and institutions. The purpose of this study was to evaluate the characteristics of publications on zygomatic implants published between 2001 and 2021. A systematic literature survey on zygomatic implants was performed on the Web of Science core collection. A bibliometric analysis of 520 studies retrieved from the survey, was conducted using Citespace IV and VOSviewer v1.6.16. The International Journal of Oral and Maxillofacial Implants had the highest number of publications and citations. The country with the most contributions to zygomatic implants between 2001 and 2021 was the United States. However, Shanghai Jiao Tong University in China was the largest contributor to the literature and the most cited institution. Aparicio was the most co-cited author on zygomatic implants. The bibliometric indicators in this study demonstrated upward trends in zygomatic implants. Further bibliometric analysis will also provide important guidance to authors wishing to contribute to the expanding literature on zygomatic implants.

**Keywords:** Zygomatic implants, Dental implants, Citations, Bibliometrics

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## 1. Introduction

Zygomatic implants were first reported by Brånemark in 1988, as an alternative surgical approach for patients with dramatically insufficient maxillary bone (Brånemark et al., 2004; Goker et al., 2020). Severely resorbed maxilla may prevent conventional dental implant procedures (Maló et al., 2008). There are many alternative surgical options for improving insufficient maxillary bone, such as iliac crest block bone graft, Le Fort I osteotomy, onlay bone grafting-techniques, and maxillary sinus lift procedures, etc. (Candel-Martí et al., 2012). However, these methods have many disadvantages: extra morbidity due to multiple surgeries; long graft consolidation and healing time; waiting for oral rehabilitation (Ferrara and Stella, 2004; Pi Urgell et al., 2008). Zygomatic implants provide a valuable treatment option for rehabilitation in severely resorbed maxilla due to reduced morbidity, invasivity, and a decreased final rehabilitation time (Balan et al., 2017; Lorusso et al., 2021).

Several research articles have been performed to explain and improve zygomatic implants whilst the popularity of these implants increased. As a result, many scientific papers have emerged; however, none have included a detailed analysis that characterized the research outputs regarding journals, authors, citations, and institutions.

Bibliometrics is a method of statistical analysis and is useful for monitoring the growth of literature, scientific activities, and journals' publication trends associated with a specific topic in a certain period. There are several parameters in this method such as journal, author, subject, institution, and citations (Balel and Tümer, 2021; Chaudhry et al., 2021). Bibliometric analysis allows researchers in a particular field to identify their focus of study and discover updated data in that field. Additionally, the citation rating of articles is significant in recognizing authors, institutions and countries of origin, and journals within a particular scientific community (Ma et al., 2020).

This study aims to evaluate the characteristics of publications on zygomatic implants between 2001 and 2021. The boundaries across this research period were identified and mapped. Meanwhile, the types of publications were analyzed, research collaborations constructed and research trends evaluated.

## 2. Materials and Methods

### 2.1. Search Strategy and Data Sources

A systematic literature survey of the Web of Science core collection (WoSCC) was entirely performed on the 5th of December 2021 to avoid bias due to daily database updating. MeSH was used for choosing the following

terms: ‘‘zygomatic implants’’ (Topic) OR ‘‘ZAGA’’ (Topic) OR ‘‘Quad zygoma’’ (Topic) OR ‘‘zygoma implant-supported’’ (Topic). Only articles in English were selected. The document types were refined as article, review, and early access. Only SCI-Expanded papers were included. The timespan of the surveys was 2001-01-01 to 2021-11-30 (Publication Date). A total of 520 studies were found. Bibliometric data from these articles were exported and downloaded in TXT format.

Raw data were analyzed using Excel 2016 (Redmond, WA, USA), CiteSpace IV (Drexel University, Philadelphia, PA, USA), and VOSviewer v1.6.16 (Leiden University, Leiden, Netherlands).

**2.2. Data Analysis**

The h-index of authors, countries, institutes, and impact factor (IF) of journals was determined via WoS. IF is the most widely dispersed bibliometric indicator and is based upon the citation relationship among journals (Moed, 2009). The definition of the h index can be made as a maximum h value so that the author/journal has published articles and where have each been cited at least h times (Bertoli-Barsotti and Lando, 2017).

Bradford’s law of scattering was also used for the analysis of journals. Bradford’s law of scattering describes how the literature on a particular topic is distributed in the journals (Viju and Ganesh, 2013). To decrease the percentage of error, a size-frequency measure, the Leimkuhler Model, was used. According to this, core journals with unique references in the first zone were identified and Bradford's multiplier (k) was measured, then the number of journals in the zones was calculated with multiples of Bradford multipliers (Borgohain et al., 2021). The multiplier (k) for the Leimkuhler distribution was determined using Egghe's mathematical method (Viju and Ganesh, 2013).

Analyses of the relationships among authors, institutes, countries, and collaborating teams were performed using Citespace IV. Following analysis, visualization maps (Figure 1-6) were created using Citespace IV. The visualization software VOSviewer v.1.6.16 was used for the graphical mapping of high-frequency keywords (Figure 7 and 8).

## 3. Results

**3.1. Annual Publication Analysis**

Table 1 shows the annual number of publications and citations. It was observed that there has been a steady and rapid increase in the number of publications and citations in the first ten years. At the beginning of the second decade, it is striking that the numerical increase continued even though there were small decreases and sluggish movements.

**3.2. Journal Distribution**

In this study, 520 academic studies were retrieved from the survey. These studies were published in 128 journals. The International Journal of Oral and Maxillofacial Implants, the Journal of Oral and Maxillofacial Surgery, the Journal of Craniofacial Surgery, the International Journal of Oral and Maxillofacial Surgery, the Clinical Implant Dentistry and Related Research proved to be the top five journals respectively, according to the total count of publications. The journal co-citation network can be seen in Figure 1.

**Table 1.** Annual number of publications and citations on zygomatic implants between 2001 and 2021

| Publication Years | Document Counts | Cumulative Counts | Citations | Cumulative Citations |
|---|---|---|---|---|
| 2001 | 10 | 10 | 0 | 0 |
| 2002 | 7 | 17 | 30 | 30 |
| 2003 | 11 | 28 | 46 | 76 |
| 2004 | 12 | 40 | 47 | 123 |
| 2005 | 14 | 54 | 85 | 208 |
| 2006 | 14 | 68 | 111 | 319 |
| 2007 | 18 | 86 | 169 | 488 |
| 2008 | 22 | 108 | 248 | 736 |
| 2009 | 16 | 124 | 307 | 1043 |
| 2010 | 33 | 157 | 380 | 1423 |
| 2011 | 23 | 180 | 333 | 1756 |
| 2012 | 21 | 201 | 449 | 2205 |
| 2013 | 27 | 228 | 600 | 2805 |
| 2014 | 33 | 261 | 631 | 3436 |
| 2015 | 32 | 293 | 595 | 4031 |
| 2016 | 37 | 330 | 643 | 4674 |
| 2017 | 35 | 365 | 667 | 5341 |
| 2018 | 30 | 395 | 548 | 5889 |
| 2019 | 30 | 425 | 768 | 6657 |
| 2020 | 47 | 472 | 1015 | 7672 |
| 2021 | 48 | 520 | 1114 | 8786 |

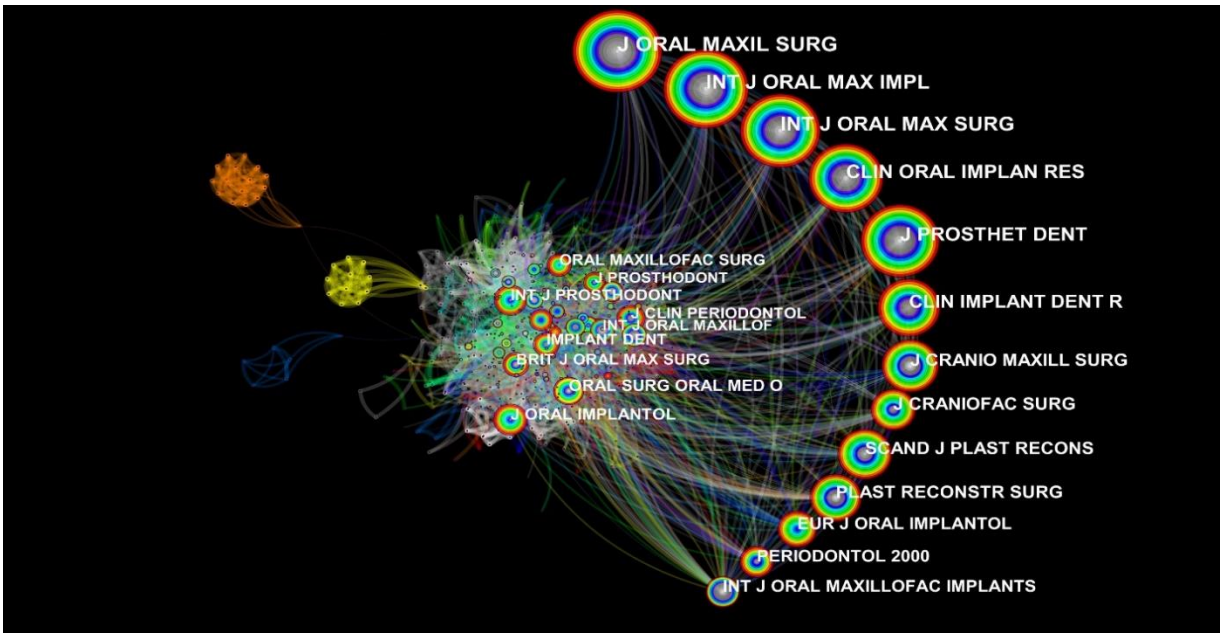


**Figure 1.** The visualization of journal co-citation network.

### 3.3. Country and Institute Profiles

Fifty-five countries have contributions to zygomatic implant research between 2000 and 2021. The top three countries are the USA, Spain, and Italy. Next come the People's Republic of China, Brazil, Sweden, Germany, Türkiye, and England. A map of the collaborative network of countries contributing to zygomatic implant research is shown in Figure 2.

A total of 715 institutes/organizations published studies on zygomatic implants between 2001 and 2021. Nine documents (1.731%) did not contain any institute/organizational data so could not be analyzed. Shanghai Jiao Tong University was both the largest contributor to the literature and the most cited institution. The publication and citation counts of the top five institutes are shown in Table 3. Additionally, Figure 3 shows collaboration between the institutions.

### 3.4. Author Profiles

A total of 1815 authors contributed to research on zygomatic implants. While Wu YQ, Wang F, Huang W were the authors with the most publications, Aparicio, Davo, and Malo were the top three authors with the highest number of citations (Figure 4). Author co-citation analysis explains how authors connect ideas between published works (Chen et al., 2001). Figure 4 shows the author's co-citation network that was created using Citespace IV. According to this, Aparicio, Brånemark, and Bedrossian were the most co-cited authors.

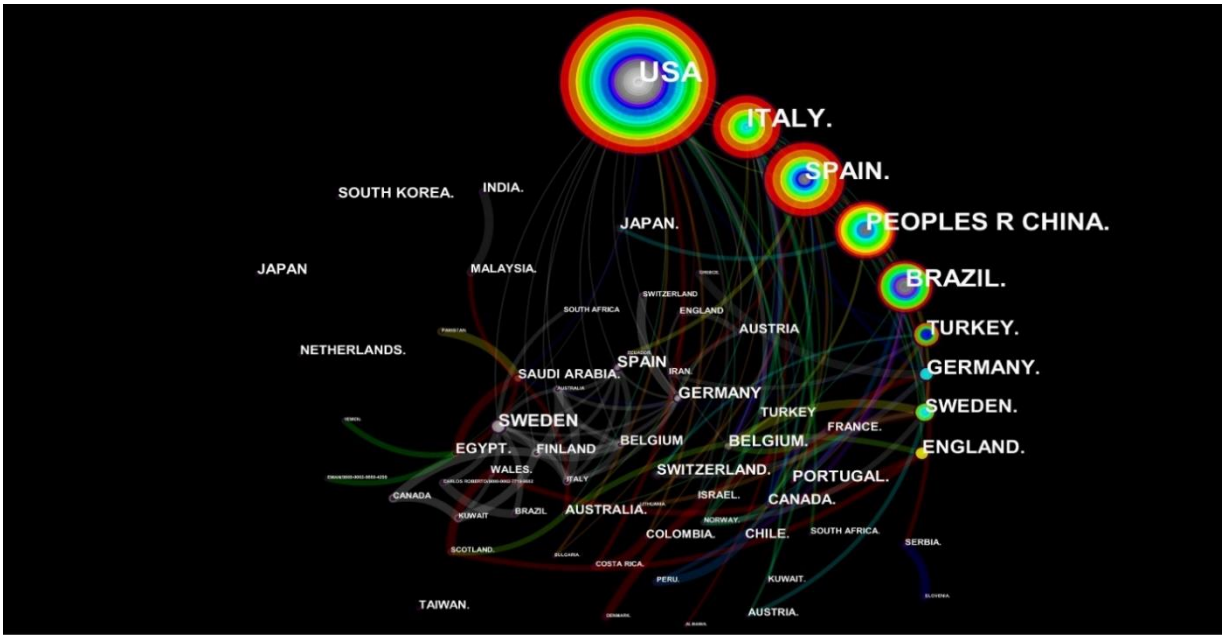


**Figure 2.** The map of collaboration network of the countries.

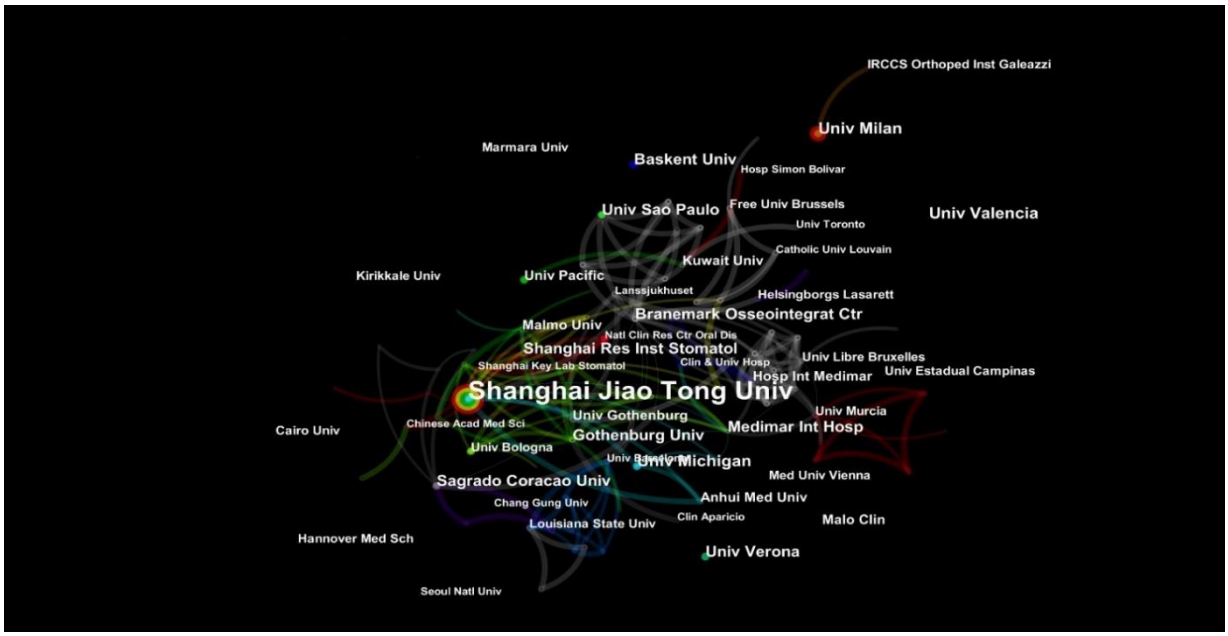


**Figure 3.** The map of collaboration network of the institutes/organizations.

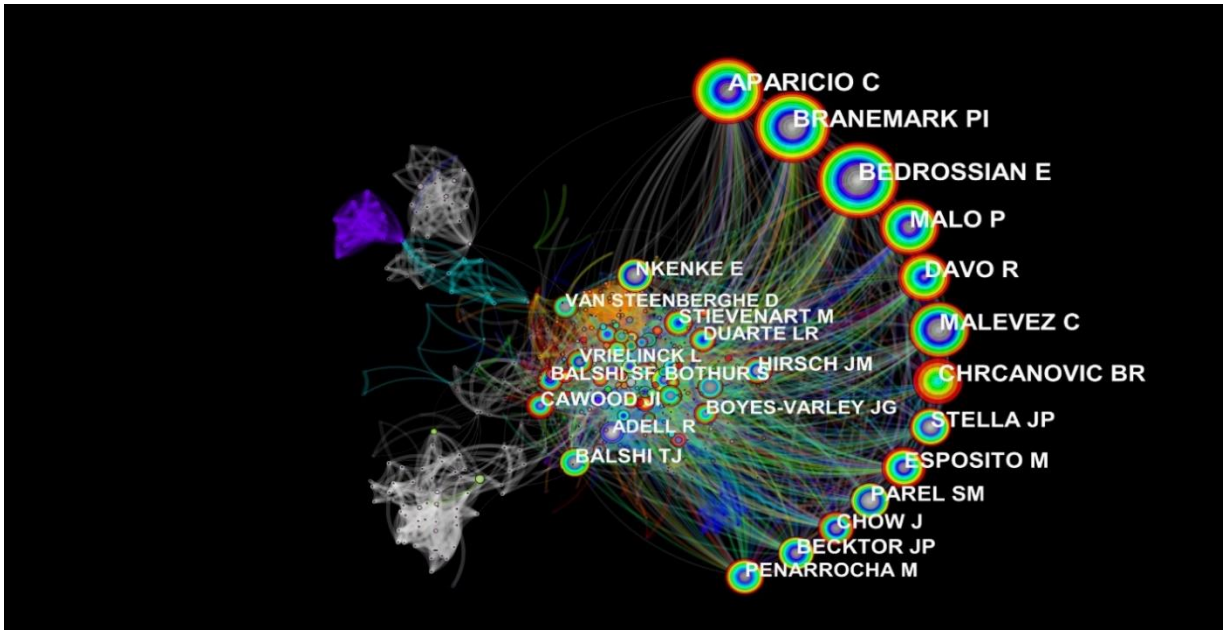


**Figure 4.** The visualization of author co-citation network.

### 3.5. Analysis of References

Figure 5 shows the co-citation network of references. The most co-cited articles were written by Chrcanovic et al. and Stievenart et. al. These studies play a key role in the study of zygomatic implants due to being at the forefront of research. The references with the strongest citation burst were determined in Figure 6.

The studies were automatically grouped into clusters using Citespace IV according to subject categories. In Figure 5, the following clusters which have the largest size can be seen: #0 DENTISTRY, ORAL SURGERY & MEDICINE, #1 MEDICINE, RESEARCH & EXPERIMENTAL, #2 ENGINEERING, BIOMEDICAL, #3 ENVIRONMENTAL SCIENCES.

### 3.6. Analysis of Keywords

A keyword co-occurrence network was created using VOSviewer v.1.6.16 (Figure 7). The size of the nodes indicates the usage rate of the keyword. Larger nodes mean more use of the keyword. In addition, the distance between the nodes shows the strength of the relationship between the two keywords. The increase in the thickness of the link lines between the nodes indicates that the frequency of using those keywords together is high. Figure 8 shows the top ten keywords with the strongest citation bursts.

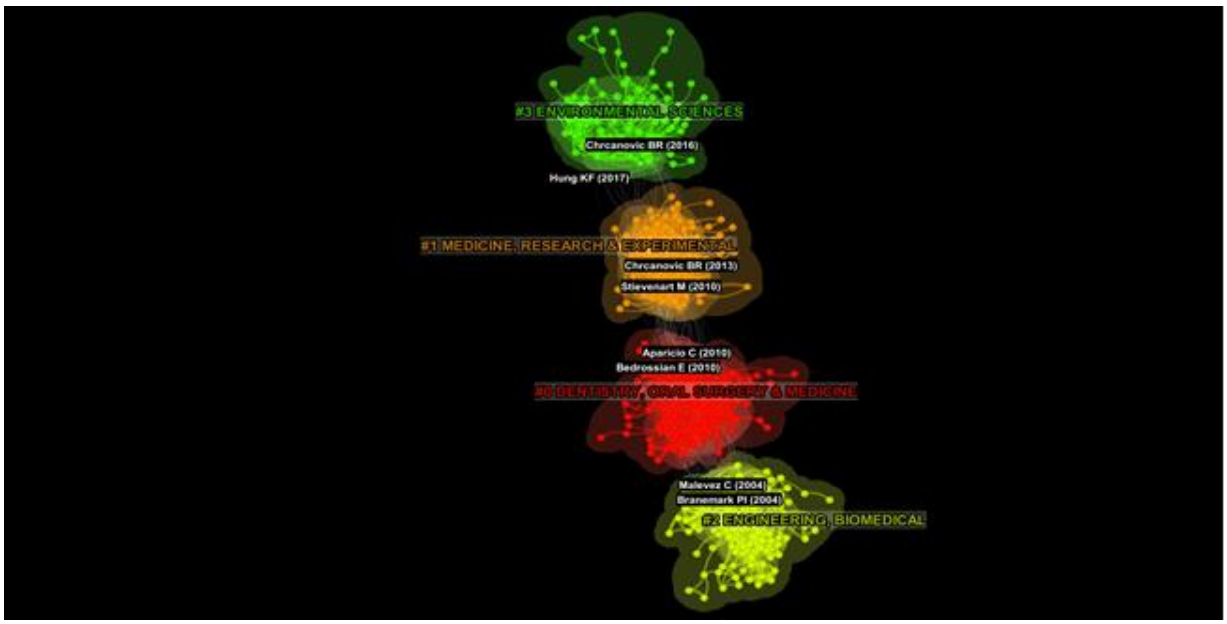


**Figure 5.** The co-citation network of references divided into clusters according to subject category.

**Top 10 References with the Strongest Citation Bursts**

| References | Year | Strength | Begin | End | 2001 - 2021 |
|---|---|---|---|---|---|
| Chrcanovic BR, 2016, J ORAL MAXIL SURG, V74, P1949, DOI 10.1016/j.joms.2016.06.166, DOI | 2016 | 18.86 | 2017 | 2021 | |
| Stievenart M, 2010, INT J ORAL MAX SURG, V39, P358, DOI 10.1016/j.ijom.2010.01.009, DOI | 2010 | 13.03 | 2012 | 2015 | |
| Malevez C, 2004, CLIN ORAL IMPLAN RES, V15, P18, DOI 10.1046/j.1600-0501.2003.00985.x, DOI | 2004 | 12.74 | 2005 | 2009 | |
| Chrcanovic BR, 2013, ORAL MAXILLOFAC SURG, V17, P81, DOI 10.1007/s10006-012-0331-z, DOI | 2013 | 11.75 | 2015 | 2018 | |
| Aparicio C, 2010, CLIN IMPLANT DENT R, V12, P55 | 2010 | 11.7 | 2011 | 2015 | |
| Bedrossian E, 2002, INT J ORAL MAX IMPL, V17, P861 | 2002 | 10.91 | 2003 | 2007 | |
| Bedrossian E, 2006, INT J ORAL MAX IMPL, V21, P937 | 2006 | 10.16 | 2008 | 2011 | |
| Branemark PI, 2004, SCAND J PLAST RECONS, V38, P70, DOI 10.1080/02844310310023918, DOI | 2004 | 9.78 | 2004 | 2009 | |
| Hirsch JM, 2004, J ORAL MAXIL SURG, V62, P22, DOI 10.1016/j.joms.2004.06.030, DOI | 2004 | 9.39 | 2005 | 2009 | |
| Bedrossian E, 2010, INT J ORAL MAX IMPL, V25, P1213 | 2010 | 9.3 | 2013 | 2015 | |

**Figure 6.** Top 10 references with the strongest citation bursts.

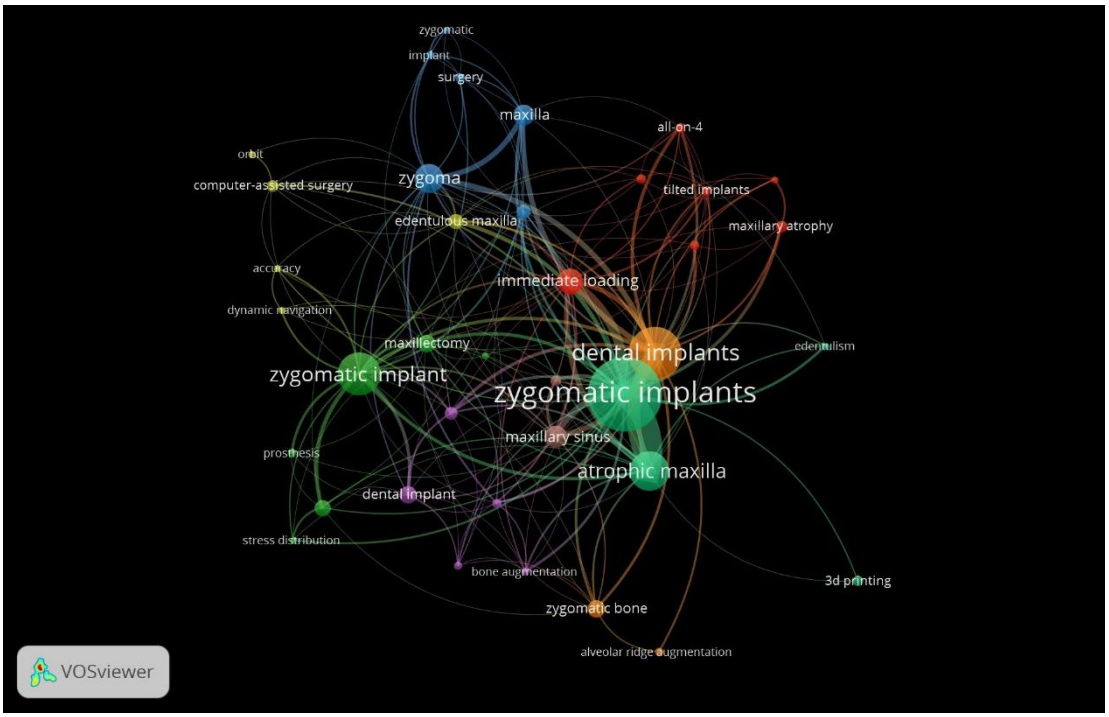


**Figure 7.** The visualization of keyword co-occurrence network.

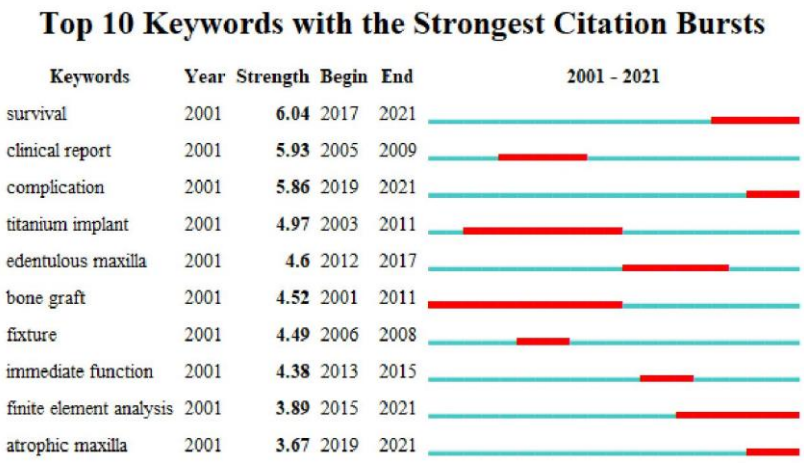


**Figure 8.** Top 10 keywords with the strongest citation bursts.

## 4. Discussion

Initially, zygomatic implants were introduced by Brånemark for the rehabilitation of patients with resected maxilla and congenital or traumatic maxillary defects (Brånemark et al., 2004; Aparicio et al., 2014). Furthermore, zygomatic implants provided an alternative treatment for patients who had previously experienced dental implant failures, even in association with advanced bone regeneration techniques, as a graftless approach (Freedman et al., 2013; Sharma and Rahul, 2013; Balan et al., 2017). As these implants' popularity grew over time, new techniques and modifications were developed (Stella and Warner, 2000; Aparicio and Antonio, 2020) Parallel to this, an increasing number of clinical and biomechanical studies have been conducted, thus the literature on zygomatic implants has expanded and been enriched.

Among methods of statistical analysis, bibliometric analysis is a valuable tool that provides insight into how the literature grows up. In this way, it helps authors to determine the strategy to follow while conducting a scientific study. Despite several systematic reviews and meta-analyses, a comprehensive bibliometric analysis on zygomatic implants has not been done before. This study aims to eliminate this deficiency in the field of zygomatic implants.

Due to a significant acceleration in the increase in the number of publications after 2001, this study was carried out from 2001 to 2021. Certainly, studies in this field before 2001 exist in the literature, however, the size of the data files from studies before 2001, was not large enough to alter the consequences of the current bibliometric analysis. Considering the annual course of the 520 studies on zygomatic implants that were published in the last 20 years, a regular and almost constant rate of increase was seen until 2020. However, a significant increase was observed in 2020 and 2021. While the majority of studies between 2010 and 2019 were case reports and clinical studies, the number of systematic reviews and meta-analysis studies has increased in the last two years. This increase in systematic reviews is thought to be related to the expansion of the literature on zygomatic implants over the years. In addition, disruption to dental practices triggered by the global Covid-19 pandemic may have caused a decline in the number of clinical studies (van der Tas et al., 2020; Nijakowski et al., 2021).

The number of publications and co-citation of journals is valuable information in determining high-quality journals. Bradford's law of scattering describes a quantitative relationship between the journals and their publications (Nash-Stewart et al., 2012). According to this, only a small number of core journals will provide one-third of all articles, followed by a second larger set of journals making up another one-third, and a much larger set of journals in the final third (Brookes, 1977). In this bibliometric analysis, when Bradford's law of scattering formulations was used, the core journal group, which contained one-third of the 520 articles, consisted of four journals: the International Journal of Oral Maxillofacial Implants, the Journal of Oral And Maxillofacial Surgery, the Journal of Craniofacial Surgery, the International Journal of Oral And Maxillofacial Surgery (Figure 9). These highly productive journals were also on the list of the top ten most co-cited journals. Consequently, it can be said that they will provide the main guidance and resources for writers who wish to gain knowledge on zygomatic implants.

In this study, the USA was seen to be the country that had the most contributions to zygomatic implants research. This was similar to several other bibliometric analyses that were conducted on implantology and other fields of oral and maxillofacial surgery (Tarazona et al., 2017; Balel, 2021; Balel and Tümer, 2021). European countries made up the majority of the top publishing countries. However, Shanghai Jiao Tong University in China was the most prolific organization. It was followed by the University of Gothenburg in Sweden; having one of the oldest traditions of implant dentistry may also play a role in Sweden being among the top contributors. In the

results of this study, although Italy was the country with the second most contributions, the citation counts of authors from Italy were not high. On the other hand, the authors Ruben Davo and Carlos Aparicio from Spain (the country with the third most contributions) had both high publication counts and high citation counts.

The two documents that had the largest number of co-citations belong to Chrcanovic et. al. (Chrcanovic and Abreu, 2013; Chrcanovic et al., 2016). Both of these studies are systemic reviews of zygomatic implant survival and complication rate. Following Chrcanovic's studies, Stievenart M. (Stiévenart and Malevez, 2010), Malevez C. (Malevez et al., 2004), and Aparicio C. (Aparicio et al., 2010) were the other most cited documents, respectively. The common point of these three studies was that they were clinical studies. Among these studies, Aparicio (2010) can be counted as a pioneering study in the development of the zygoma anatomy-guided approach (ZAGA) in terms of its method and results. Keywords are useful for identifying research topics and analyzing research focal points, as well as for observing research border crossings of a particular field of knowledge (Bahsi et al., 2021). The term of burst keyword refers to a keyword that has a large frequency change in a short period (Gao et al., 2021). In the current bibliometric, the keyword 'survival' made a recent and the strongest citation burst. In addition, the earliest and the longest burst keyword was 'bone graft'. Its burst occurred between the years 2001-2011. Figure 8 shows clearly the top ten keywords with the strongest citation burst and their burst durations.

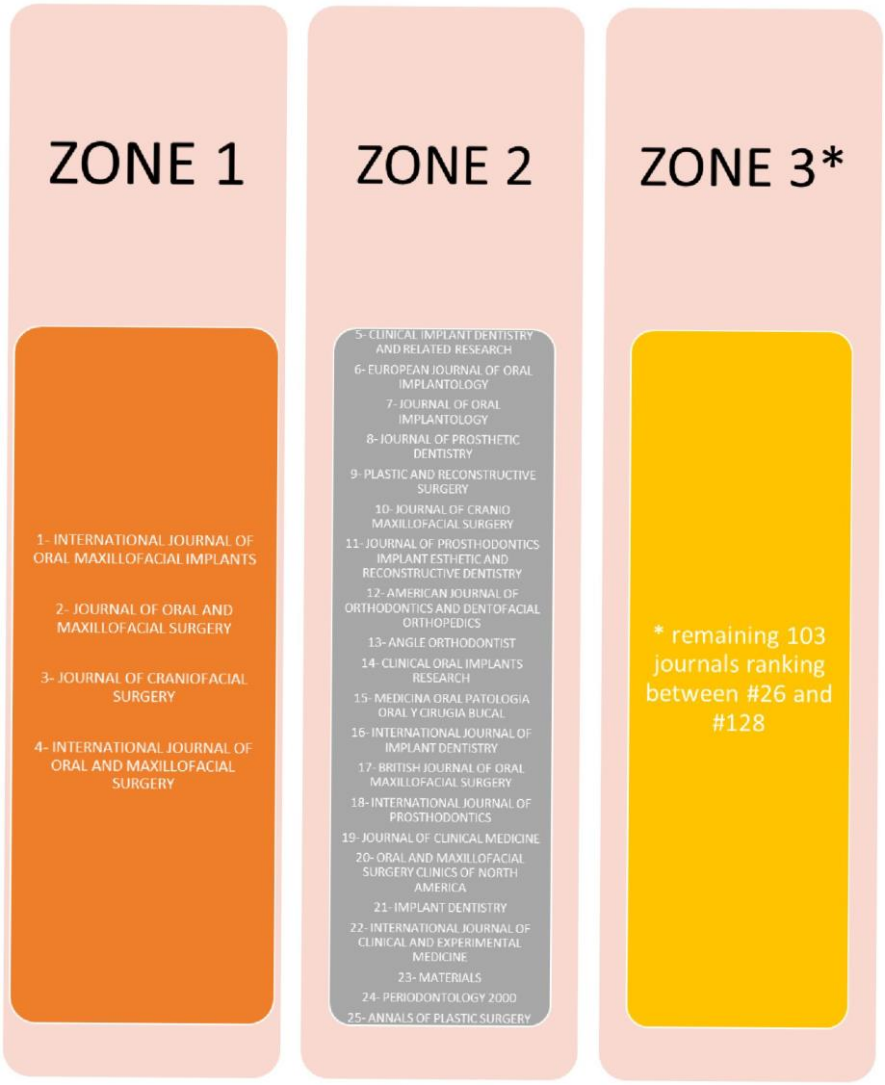


**Figure 9.** Distribution of journals according to Bradford's Law of Scattering Zones.

## 5. Conclusion

In conclusion, the bibliometric indicators in this study demonstrated upward trends on zygomatic implants. As in almost every field of medical health care, scientific literature and clinical practice are in a close bilateral relationship that supports each other in the discipline of dental implantology. Clarifying and answering questions that arise with an increase in zygomatic implant applications, with scientific research, increases the level of knowledge and paves the way for this method to be used more widely and more safely. Such further bibliometric analysis will also provide important guidance to authors wishing to contribute to the expanding literature on zygomatic implants.

**Author Contributions**

The percentage of the author contributions is present below. The author reviewed and approved final version of the manuscript.

| | T.K. |
|---|---|
| C | 100 |
| D | 100 |
| S | 100 |
| DCP | 100 |
| DAI | 100 |
| L | 100 |
| W | 100 |
| CR | 100 |
| SR | 100 |
| PM | 100 |
| FA | 100 |

C=Concept, D= design, S= supervision, DCP= data collection and/or processing, DAI= data analysis and/or interpretation, L= literature search, W= writing, CR= critical review, SR= submission and revision, PM= project management, FA= funding acquisition.

**Conflict of Interest**

The author declared that there is no conflict of interest.

**Ethical Approval/Informed Consent**

Ethics committee approval was not required for this study because of there was no study on animals or humans.

## References


Aparicio C, and Antonio S. 2020. Zygoma anatomy-guided approach" scarf graft" for prevention of soft tissue dehiscence around zygomatic implants. Int J Oral Maxillof Implants, 35(2): e21.

Aparicio C, Manresa C, Francisco K, Claros P, Alández J, González-Martín O, Albrektsson T. 2014. Zygomatic implants: indications, techniques and outcomes, and the zygomatic success code. Periodontol, 66(1): 41-58.

Aparicio C, Ouazzani W, Aparicio A, Fortes V, Muela R, Pascual A, Codesal M, Barluenga N, Manresa C, Franch M. 2010. Extrasinus zygomatic implants: three year experience from a new surgical approach for patients with pronounced buccal concavities in the edentulous maxilla. Clin Implant Dentist Related Res, 12(1): 55-61.

Bahsi A, Tekin AM, Bahsi I. 2021. A bibliometric keyword and term analysis of the articles published in the Journal of Craniofacial Surgery between 1995 and 2020. J Craniofac Surg, 32(7): 2263-2265.

Balan I, Di Girolamo M, Lauritano D, Carinci F. 2017. Treatment of severe atrophic maxilla with zygomatic implants: a case series. Oral Implantol, 10(3): 317.

Balel Y, Tümer MK. 2021. A bibliometric analysis of international publication trends in total temporomandibular joint replacement research (1986–2020). J Oral Maxillofac Surg, 79(7): 1458.e1-1458.e12.

Balel Y. 2021. A bibliometric analysis of international publication trends in impacted third molar surgery research (2000–2020). British J Oral Maxillofac Surg, 59(10): 1220-1226.

Bertoli-Barsotti L, Lando T. 2017. The h-index as an almost-exact function of some basic statistics. Scientometrics, 113(2): 1209-1228.

Borgohain DJ, Verma MK, Nazim M, Sarkar M. 2021. Application of Bradford's law of scattering and Leimkuhler model to information science literature. COLLNET J Scientomet Info Manag, 15(1): 197-212.

Brånemark PI., Gröndahl K, Öhrnell LO, Nilsson P, Petruson B, Svensson B, Engstrand P, Nannmark U. 2004. Zygoma fixture in the management of advanced atrophy of the maxilla: technique and long-term results. Scandinavian J Plastic Reconst Surg Hand Surg, 38(2): 70-85.

Brookes BC. 1977. Theory of the Bradford law. J Documentat, 33(3): 180-209.

Candel-Martí E, Carrillo-García C, Peñarrocha-Oltra D, Peñarrocha-Diago M. 2012. Rehabilitation of atrophic posterior maxilla with zygomatic implants. J Oral Implantol, 38(5): 653-657.

Chaudhry K, Bali RK, Kaur A, Tiwari RV, Patnana AK. 2021. Level of evidence analysis in Journal of Maxillofacial Oral Surgery: A twelve-year bibliometric analysis of 1300 publications (2009–2020). J Maxillofac Oral Surg, 20: 364-372.

Chen C, Paul RJ, O'Keefe B. 2001. Fitting the jigsaw of citation: Information visualization in domain analysis. J American Soc Info Sci Tech, 52(4): 315-330.

Chrcanovic BR, Abreu MHNG. 2013. Survival and complications of zygomatic implants: a systematic review. J Oral Maxillofac Surg, 17(2): 81-93.

Chrcanovic BR, Albrektsson T, Wennerberg A. 2016. Survival and complications of zygomatic implants: an updated systematic review. J Oral Maxillofac Surg, 74(10): 1949-1964.

Ferrara ED, Stella JP. 2004. Restoration of the edentulous maxilla: the case for the zygomatic implants. Oral Maxillofac Surg, 62(11): 1418-1422.

Freedman M, Ring M, Stassen L. 2013. Effect of alveolar bone support on zygomatic implants: a finite element analysis study. Oral Maxillofac Surg, 42(5): 671-676.

Gao K, Dou Y, Lv M, Zhu Y, Hu S, Ma P. 2021. Research hotspots and trends of microRNA in periodontology and dental implantology: a bibliometric analysis. Annals Translational Medic, 9(14): 1122.

Goker F, Grecchi E, Del Fabbro M, Grecchi F. 2020. Clinical outcome of 302 zygomatic implants in 110 patients with a follow-up between 6 months and 7 years. Clin Implant Dentist Related Res, 22(3): 415-423.

Lorusso F, Conte R, Inchingolo F, Festa F, Scarano A. 2021. Survival rate of zygomatic implants for fixed oral maxillary rehabilitations: A systematic review and meta-analysis comparing outcomes between zygomatic and regular implants. Dentist J, 9(4): 38.

Ma L, Gao X, Liu W. 2020. Bibliometric analysis of the top-100 cited articles on oral potentially malignant disorders to guide research topic and direction. J Dent Sci, 15(4): 479-485.

Malevez C, Abarca M, Durdu F, Daelemans P. 2004. Clinical outcome of 103 consecutive zygomatic implants: a 6–48 months follow-up study. Clin Oral Implants Res, 15(1): 18-22.

Maló P, de Araujo Nobre M, Lopes I. 2008. A new approach to rehabilitate the severely atrophic maxilla using extramaxillary anchored implants in immediate function: a pilot study. J Prosthetic Dent, 100(5): 354-366.

Moed HF. 2009. New developments in the use of citation analysis in research evaluation. Archivum Immunol et Therapiae Exp, 57(1): 13-18.

Nash-Stewart CE, Kruesi LM, Del Mar CB. 2012. Does Bradford's law of scattering predict the size of the literature in cochrane

reviews? J Medic Library Assoc, 100(2): 135.

Nijakowski K, Cieślik K, Łaganowski K, Gruszczyński D, Surdacka A. 2021. The impact of the COVID-19 pandemic on the spectrum of performed dental procedures. Int J Environ Res Pub Health, 18(7): 3421.

Pi Urgell J, Revilla Gutiérrez V, Gay Escoda C. 2008. Rehabilitation of atrophic maxilla: a review of 101 zygomatic implants. Medic Oral Patol Oral y Cirugia Bucal, 13(6): 363-370.

Sharma A, Rahul G. 2013. Zygomatic implants/fixture: a systematic review. J Oral Implantol, 39(2): 215-224.

Stella JP, Warner MR. 2000. Sinus slot technique for simplification and improved orientation of zygomaticus dental implants: a technical note. Int J Oral Maxillofac Implants, 15(6): 889-893.

Stiévenart M, Malevez C. 2010. Rehabilitation of totally atrophied maxilla by means of four zygomatic implants and fixed prosthesis: a 6–40-month follow-up. Int J Oral Maxillofac Surg, 39(4): 358-363.

Tarazona B, Vidal-Infer A, Alonso-Arroyo A. 2017. Bibliometric analysis of the scientific production in implantology (2009–2013). Clin Oral Implants Res, 28(7): 864-870.

van der Tas J, Dodson T, Buchbinder D, Fusetti S, Grant M, Leung YY, Roethlisberger E, Aniceto GS, Schramm A, Bradley Strong E. 2020. The global impact of covid-19 on craniomaxillofacial surgeons. Craniomaxillofacial Trauma Reconst, 13(3): 157-167.

Viju VGW, Ganesh V. 2013. Application of Bradford's law of scattering to the literature of library & information science: A study of doctoral theses citations submitted to the universities of Maharashtra, India. Library Philosophy Pract, 2013: 1054.