

A Bibliometric Analysis of Serbian Dental Journal: 2002–2009

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SUMMARY

Introduction Serbian Dental Journal (SDJ) is a major source of formal communication for dentists in this region. The purpose of this bibliometric study was to examine articles published in SDJ in period 2002–2009, in reference to journal productivity and nature of authorships, citation patterns, most frequently cited scientific journals and the role of self-citations.

Material and Methods Bibliographic data, as well as metadata for all articles were taken from the Serbian national citation index SCIndeks. Bibliometric analysis of source articles included the number and type of article, author characteristics and cited literature. For each citation the following data was recorded: author(s), article title, journal title, monographic title, publication type, publication year and language.

Results In this period 193 articles were published and most of them were original research articles. In this period a total of 314 national and international authors cooperated, responsible for 538 authorships. The mean number of authors per article was 2.8. Most cited items in terms of publication type were journal articles (83.5 %), while the most frequently cited journals were just those most relevant in the field of dentistry. Results also indicate that the age of the cited literature is below the norm for medical literature.

Conclusion Obtained numerical indicators do not differ significantly when compared to other scientific and professional journals. However, it can be concluded that it is necessary to increase journal productivity and self-citation rate, as well as citation of current literature, up to five years old. This analysis allows evaluating patterns of scientific communication among dentists in this region, as well as journal's current management strategies in order to define useful future directions for the inclusion into the international system of scientific information exchange.

Keywords: bibliometrics; dentistry; scientific journal; Serbian Dental Journal

INTRODUCTION

Scientific journals are the primary model of communication in almost all scientific disciplines and play an important role in the knowledge creation, transmission and storage since the first journals of this type – Journal des Savants and Philosophical Transactions of the Royal Society – appeared in 1665. Scientific work creates the need for informing about the particular research field situation, work of other researchers and scientific developments in general, as well as comparison with the results of other researchers. As the primary dissemination channel and public record of new research results, journal publication is a vital ingredient of the scholarly workflow, and its key commodity, the original research article, is of primary importance out of all proportion to its intrinsic worth [1]. Many journals endeavor to be about more than publishing science or just simple reflection of what is happening in scientific communities. They act in order to lead, educate, promote and provide a forum for comprehensive discussions [2]. In addition to their central role in the information transfer and exchange process, scholarly journals are

also recognized as significant in assessing the value of researchers' scientific output, which today mainly affects their status and progress in the academic environment.

Objective estimation of a specific publication quality today is mostly based on indexation and citation criteria. The concept of impact factor is probably the most widely used bibliometric construction in a scientific and publishing society. As a measure of the frequency with which an "average article" has been cited in a particular period, impact factor is key to understanding the way journals are evaluated. National scientific journals are subjected to bibliometric analysis and permanent evaluation in terms of their impact, both within the national and international citation indexes, carried out by the Ministry of Science and Technology of the Serbian Government. However, it is a major challenge for all journals to be indexed by some preeminent international bibliographic databases [3].

Serbian Dental Journal (SDJ) is the official journal of the Dental Section of the Serbian Medical Society and from its inception in 1953 to the present it is a major source of formal communication in English and Serbian for dentists in this region. The inside cover of the journal states that

it publishes review articles, original research and professional articles, case reports, preliminary communications, informative and historical papers, summaries of papers presented on congresses and professional meetings, book reviews, comments and letters to the Editor, professional news and social chronicle. All manuscripts are subject to the scrutiny of eminent national and international experts in the field of dentistry. The journal is published according to its stated frequency (four times a year) thus maintaining timeliness of publication, which is a basic criterion for inclusion in international bibliographic databases. Since SDJ was already indexed in MEDLINE between 1966 and 1992, Editorial Board makes a lot of effort in order to renew the process of indexing in this database and to return it to its place as an international journal.

Since 2002 there have been numerous changes that greatly affected improvement of the quality of the journal itself as well as openness toward international scientific public. In 2003 a web presentation was set up, which enabled browsing through summaries of papers published since 2000. In 2004 the journal was technically improved (51st volume was printed in colour) and principle of Good Editorial Practice was applied in order to provide more standardised review of received works. In 2005 the journal was enriched in terms of content and English title of the journal started to be used Serbian Dental Journal, as well as bilingual printing of papers; Uniform Requirements for Manuscripts Submitted to Biomedical Journals, instructions for authors for preparation of manuscripts and form of the cited literature accepted throughout the world, were adopted. In 2006 the journal got its electronic form, which considerably improved visibility and availability of published articles; based on results of bibliometric analysis and the fact that the journal satisfied a certain quality level, and upon proposal of the Ministry of Science and Technology of Serbia, SDJ was incorporated into DOI system of Serbia and it was indexed in the Serbian national citation index – SCIndeks.

The aim of this article was to examine characteristics of articles published in SDJ as well as characteristics of their cited literature by applying bibliometric indicators. In this respect, the following is further defined: productivity of SDJ and nature of authorship; citation patterns, in terms of number, type, age and language of cited literature; the most influential journals and coverage of certain expert areas; the role of self-citations.

Practice in publishing and citing of SDJ may be the starting point for identification and description of scientific communication of dentists from Serbia and the region. By analysis of the aforementioned bibliometric indicators, evaluation of actual strategy of journal management was provided, based on which editorial staff could complete or redefine its mission and goals. Such study would also be useful for librarians and local distributors of scientific publications regarding purchase policy.

MATERIALS AND METHODS

The present study analyzes 8 volumes of SDJ, published during 2002–2009. This time span was selected because

of availability of all published articles both in print and electronic form.

In addition to published articles, metadata (cited literature) for all articles were taken from the Serbian national citation index SCIndeks. All references, including original and cited articles were imported into Microsoft Access[®] relational database for further analysis. The sample of 193 published articles consisted of review and original scientific papers, informative and historical papers, as well as case reports and preliminary communications. Book reviews, letters to the Editor, editorials, etc. were excluded on the grounds they were not research articles. Bibliometric analysis of source articles included the number and type of paper, author characteristics (total number of authors, affiliation, geographic origin) and cited literature (independent citations and self-citations).

Original articles published in SDJ generated 4,170 references. Each citation was given a unique identifier in order to link the source article to the citation and the following data was recorded: author(s), article title, journal title, monographic title, publication type, publication year and language. Publication types were categorized as journal articles, books and miscellaneous. Miscellaneous data included conference proceedings, book chapters, statistical publications, doctoral dissertations, master's thesis and web addresses. Self-citations were accounted as a sub-group of citations. If reference had been authored or co-authored by one of the authors of the citing article, it was considered self-cited. Cited item age was calculated by subtracting the cited item publication date from the citing article publication date. For each journal title cited two or more times, the appropriate subject discipline was determined by using the Institute for Scientific Information (ISI) Thomson 2008 Journal Citation Report database's categorizations. Since it is not unusual for a journal title to change its name, MEDLINE database was used to check each cited title in order to assign all citations to a specific title under the current title. Journals were also analyzed by Bradford's Law of Scattering [4], in order to generate a core list of most frequently used journal titles, and identify the scientific disciplines with which papers published in SDJ were related. On the basis of empirically determined Bradford's law, it was defined Zone 1, consisted of relatively few journals containing one-third of all cited articles.

RESULTS

Table 1 displays the total number, as well as types of articles published in SDJ between 2002 and 2009. In this period 193 papers were published and distributed among 32 issues. Most papers were published in 2003 (n=28), while the smallest number appeared in 2002 (n=20). The highest number of the original research articles was produced in 2003 and 2009 (n=16). The mean number of published papers per year was 24.1. Articles available only in Serbian language represent 38.3% of the total number of published papers. Since 2005 all articles are published bilingual in English and Serbian (61.7%).

Table 1. Number and types of published papers between 2002 and 2009.**Tabela 1.** Broj i tip objavljenih radova u periodu 2002–2009. godine.

Type of publication Tip rada	2002	2003	2004	2005	2006	2007	2008	2009	Total Ukupno
Original article Originalni rad	11	16	13	10	13	13	14	16	106
Case report Prikaz iz prakse	4	4	2	3	2	5	3	7	30
Informative article Informativni rad	5	6	6	10	8	6	7	0	48
Historiographic article Istoriografski rad	0	1	0	0	0	0	0	0	1
Review article Pregledni rad	0	1	2	1	0	0	0	0	4
Preliminary communication Prethodno saopštenje	0	0	3	0	1	0	0	0	4
Total Ukupno	20	28	26	24	24	24	24	23	193

Table 2. Distribution of author collaboration (number).**Tabela 2.** Raspodela saradnje autora (broj).

Authors Autori	Published papers Objavljeni radovi
205 (65.5%)	1
59 (18.8%)	2
27 (8.6%)	3
12 (3.8%)	4
4 (1.3%)	5
4 (1.3%)	6
1 (0.3%)	7
1 (0.3%)	12
1 (0.3%)	23

In period 2002–2009 the total number of authors was 314, responsible for 538 authorships. The mean number of authors per paper was 2.8. The majority of authors (65.5%) published only once and only 2.2% of authors contributed with more than five papers (Table 2). The most productive authors were Živković, S (n=23), Marković, D (n=12) and Blažić, L (n=7).

Among the overall number of authors, 85 authors are affiliated with international institutions (Table 3), while 229 are authors from Serbia (Table 4). Foreign contributors are from 14 different countries, primarily from Bosnia and Herzegovina, Brazil, Italy, Slovenia, Romania and Turkey. National institutions responsible for most part of the production of SDJ, besides School of Dentistry University of Belgrade (123), are Schools of Medicine from Nis, Belgrade and Novi Sad (106).

All articles published in SDJ contained cited literature, but one Case Report. The remaining 192 papers generated a total of 4,170 references. The average number of citations per article found in this study was 21.7. The majority of those cited items were journal articles (83.5%), with books and other materials accounting for 16.5% of the citations (Table 5).

In period 2002–2009 the most cited article in SDJ was: Yamada RS, Armas A, Goldman M, Lin PS. A scanning electron microscopic comparison of a high volume final flush with several irrigating solutions: Part 3. *J Endod.* 1983; 9(4):137–42; while the most cited Serbian authors article was: Blažić L, Živković S, Stojšin I. Application of different light sources for polymerization of restorative resins. *Serbian Dental Journal.* 2002; 49(3–4):95–100.

Table 3. Presence of international authors.**Tabela 3.** Učestalost autora iz inostranstva.

Country Država	Number of authors Broj autora
Bosnia and Herzegovina Bosna i Hercegovina	24
Brazil Brazil	15
Italy Italija	14
Slovenia Slovenija	10
Romania Rumunija	6
Turkey Turska	4
Germany Nemačka	3
Australia Australija	2
Bulgaria Bugarska	2
Canada Kanada	1
Montenegro Crna Gora	1
France Francuska	1
Croatia Hrvatska	1
Macedonia Makedonija	1

Author self-citedness rate in 2002–2009 was only 5% per annum. Authors who cite themselves, generally cite their journal articles (n=110), dissertations and conference proceedings (n=58), as well as books (n=18). From the 110 self-cited journal references, the most frequently self-cited journal titles are Serbian Dental Journal, Balkan Journal of Stomatology and Acta Stomatologica Naissi.

Total number of cited journal articles (n=3,483) came from 660 journals. When the cited journals were ranked by frequency of occurrence, the highly productive 8 journals were placed in Zone 1, Zone 2 included 40 moderately productive journals, and the remaining 612 journals were placed in less-productive Zone 3. Table 6 presents top ranked journal titles in Zone 1, containing the first third of the cited articles in SDJ in period 2002–2009 (n=1,183), primarily in the field of endodontics, prosthodontics,

Table 4. Presence of Serbian authors.**Tabela 4.** Učestalost autora iz Srbije.

Institution Ustanova	Number of authors Broj autora
School of Dentistry, University of Belgrade Stomatološki fakultet Univerziteta u Beogradu	123
School of Medicine, University of Nis Medicinski fakultet Univerziteta u Nišu	27
School of Medicine, University of Belgrade Medicinski fakultet Univerziteta u Beogradu	23
School of Medicine, University of Novi Sad Medicinski fakultet Univerziteta u Novom Sadu	21
Military Medical Academy Vojnomedicinska akademija	13
Other institutions Druge ustanove	22

Table 5. Cited literature types by frequency of citations (number).**Tabela 5.** Tipovi citirane literature prema učestalosti navođenja (broj).

Cited literature type Tip citirane literature	Citations Citati
Journal article Članak iz časopisa	3483 (83.5%)
Book Knjiga	389 (9.3%)
Miscellaneous* Razno*	298 (7.1%)
Total Ukupno	4170 (100%)

* conference proceedings, book chapters, statistical publications, doctoral dissertations, master's thesis and web addresses

* zbornici s konferencija, poglavlja knjiga, statističke publikacije, odbranjene doktorske disertacije i magistarski radovi i veb-adrese

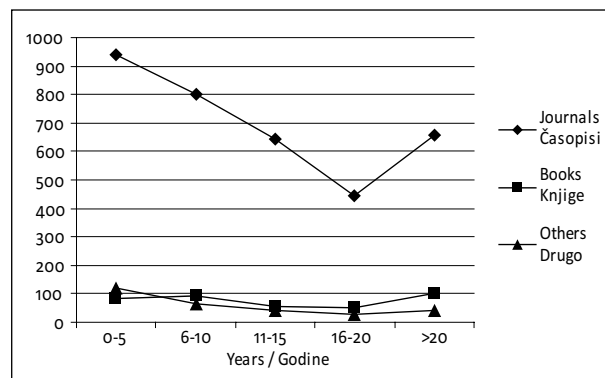
Table 6. Most frequently cited journals (Bredford Zone 1 titles).**Tabela 6.** Najčešće citirani časopisi (naslovi iz Bredfordove prve zone).

Journal Časopis	Number of citations Broj citata
J Endod	278
Int Endod J	168
J Prosthet Dent	165
Oral Surg Oral Med Oral Pathol Oral Radiol Endod	151
Quintessence Int	108
J Dent Res	106
Am J Orthod Dentofacial Orthop	106
J Periodontol	101

orthodontics and periodontology. The results showed that most of the cited papers are indexed by ISI-Thomson databases. SDJ is among the moderately productive journals in Zone 2 having been cited 84 times, with journal self-citation rate of only 2.4%.

On the basis of cited articles analysis in terms of specific subject areas representation, it was found that, as expected, 86.6% belong to field of dentistry, while the other related subject areas are general and internal medicine (1.6%), cell biology (1.2%), and oncology and surgery (1.1%). Other disciplines represented with less than 1 percent are materials science, otorhinolaryngology, biochemistry, microbiology, public, environmental and occupational health, etc. Furthermore, 32 additional subjects comprise the remaining 5.9%.

Age data were obtained for 99.9% of cited items. For five references, the publication date was not available.

**Graph 1.** Age of the cited literature in relation to cited publication type.
Grafikon 1. Starost literature u zavisnosti od tipa citirane literature.

The time span of citations ranges from 0 to 205 years. The oldest cited article was published 108 years ago, while the oldest cited book appeared 205 years ago. The total number of references five years old or less amount to 1,140 (Graph 1).

English language references (n=3,378, 89.2%) comprise the overwhelming majority of 3,786 citations. References in Serbian and German account for 339 and 53, while the remaining 16 cited items are written in 4 other languages.

DISCUSSION

Serbian Dental Journal is the most important dental journal at the national level, according to the results of bibliometric analysis and preliminary categorization by the Ministry of Science and Technology of Serbia. Therefore, the number of published works, observed as the first indicator of productivity, can simultaneously reflect the scope of activities of the domestic scientific and professional community [5]. Out of total number of published papers, 54.9% are the original scientific articles, which SDJ most certainly defines as a significant scientific publication. In comparison with certain dental journals within and outside the region, whose productivity of original scientific articles ranges from 62.2-72.3% [6, 7], a problem of insufficient number of received papers for review is detected and editorial staff of SDJ is dealing with it all these years. However, it is necessary to point out that the number of published scientific articles since 2005 is continually growing, which reflects a success.

In relation to data on total number of authors who cooperated (n=314) and average number of authors per published article ($\mu=2.8$), a certain statistical regularity was noticed as well as presence of law on distribution of scientific productivity [8]. Share of scientists with minimal productivity with only one article, which in ideal situation amounts to 60%, is represented in SDJ with value of 65.5%. Published researches on productivity of authors in dentistry [9], as well as results from this study, confirmed application of Lotka's law to dental literature. Journals such as Journal of Prosthetic Dentistry and Journal of Dental Research, on average published approximately 200 papers a year, with high percentage of authors who published several articles. SDJ is a journal which, with lesser number

of yearly published works, provides a lower percentage of authors who published several articles (2.2% of authors contributed with more than five works). Obtained average number of authors per article ($\mu=2.8$) completely corresponds to the values set in the study of 20 leading dental journals, that range from 1.4 for the British Dental Journal to 3.2 for authors per article for the Journal of Periodontal Research [9].

Considering that SDJ, as a periodic scientific publication, meets a certain level of quality and accepts Open Access as a publishing system, full texts of all articles from this eight-year period are available in electronic form in SCIndeks. International visibility of these articles and the fact that all articles are published bilingually since 2005 (in Serbian and English language), provide inclusion of the journal into international system of scientific information. Aspiration of the editorial policy that the SDJ becomes international is noticeable in growing presence of articles written by foreign authors. Data on institutional affiliation of authors indicate an exogenous structure of the SDJ, because 39.2% of total number of authors makes the teaching/scientific staff of the School of Dentistry, University of Belgrade, and the other, bigger part comes from other national and foreign institutions.

Review of cited literature in articles published in the SDJ in period from 2002 to 2009 can also provide data on scientific quality, that is, maturity of original works. One of the first indicator is the relation between the number of published articles without cited literature and those with references [10]. Since the SDJ has only one article without cited literature published as a Case Report, it can be said that it completely meets this scientific standard. The next measure for examination of scientific nature of the literature is the average number of citations per article. According to actual classification by Price, every article with 10-20 references belongs to category of scientific work, while articles with more than 20 citations are considered as review articles [11]. Average number of citations per article defined in this study is 21.7, which shows a very distinct degree of science in this corpus of literature.

The fact that 83.5% of cited literature are articles from journals completely confirms a well established theory that scientific communication in medical sciences is mostly carried out through this medium and it is in accordance with numerous studies [12-16]. It is important to emphasize that in the age of electronic information only one reference relates to the electronic source, which is a web site.

Ranking of journals according to Bradford zones states the level of their significance for authors who cite them, but at the same time for the discipline they refer to [17]. There are 3,483 articles in total that were cited in the SDJ and published in 660 journals. Based on Bradford distribution, the core Zone 1 was defined; it consists of 8 journals where one third of total number of cited articles were published. SDJ was self-cited 84 times and it is on the second place, in the Zone 2. Since the rate of self-citations of scientific articles is on average 20% [18], percentage of 2.4%, in case of SDJ, presents a very low

value and gives possibility of greater and more free citation of papers published in SDJ. This could obtain shifting the journal from the periphery to the core of the most important dental journals, without fear that such a move would endanger the scholarly status. Self-citations of authors who published articles in SDJ in this period are also at low values and represent only 5% of total literature cited in SDJ. This data is considerably lower compared to the generally acceptable average values that, depending on scientific discipline, range from 10-30% in relation to the total number of citations [6, 10, 18].

Results obtained by calculating age of the cited literature, indicate some citation patterns that are not completely inherent to scientific literature of natural sciences. Total percentage of actual cited literature (age of five years or less) in SDJ is 27.4%, which is slightly increased value compared to the percentage of cited literature aged 6-10 years (23%). It is well-known that, according to Price's index [11], it is expected from scientific disciplines of natural and applied sciences that at least 43% of totally cited literature is within the last five years. SDJ with its 27.4% of current referenced literature does not show any sign of actuality to the extent that should exist due to its discipline [10, 11, 18].

It would be very useful to analyse the content of this corpus of literature in future research, in order to determine directions of dentistry in this region. Citation analysis could define citation of articles published in SDJ and in such manner present the influence of all these articles on the development of scientific community.

CONCLUSION

The results of this comprehensive bibliometric analysis of articles published in SDJ in period 2002-2009 confirm that Journal has a stable and relevant editorial policy, committed to the clear goals with expressive aspiration to achieve them. Timeliness of publication, improved basic journal publishing standards and technical quality, international diversity of the Editorial Board, application of international standards and availability of articles in electronic form in English, provide necessary conditions for inclusion in a global flow of scientific information. Obtained numerical indicators do not differ significantly when compared to other scientific and professional journals. To ensure even better results, it is necessary to increase journal productivity, which could be to some extent improved through more active cooperation with young authors in order to enrich their knowledge of the rules of scientific publishing as well as of writing skills. The extremely low journal self-citation rate should be enhanced through greater and freer citation of articles published in SDJ. This will favourably affect shifting the journal from the periphery to the core of the most important dental journals, without fear that the journal scholarly status would be endangered. It would be also useful to cite actual literature, up to five years age, even more.

In order to achieve the basic editorial policy aspiration – indexation of SDJ in some of the international biblio-

graphic databases – based on the experiences of others, perhaps the most important would be implementation of an online submission and editorial system, which would significantly increase the participation of foreign peer-reviewers and associates. This system allows authors an immediate distribution of manuscripts and tracking the manuscript status in the much faster review process. It also would be very useful if all clinical trials published in SDJ are indexed in the Cochrane Library. That would indicate that they are conducted according to the highest standards of evidence-based medicine.

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Received: 01/03/2010 • Accepted: 28/05/2010

Bibliometrijska analiza radova objavljenih u Stomatološkom glasniku Srbije u periodu 2002–2009. godine

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KRATAK SADRŽAJ

Uvod Časopis Stomatološki glasnik Srbije (SGS) je glavni izvor formalne komunikacije stomatologa s ovih prostora. Cilj ovog rada je bio da se primenom bibliometrijskih pokazatelja provere osobenosti radova objavljenih u SGS, produktivnost časopisa, priroda autorstava, obrasci citiranja, najčešće citirani naučni časopisi i uloga autocitata u periodu 2002-2009. godine.

Metode rada Podaci o objavljenim radovima i metapodaci preuzeti su iz Srpskog citatnog indeksa (SCIndeks). Bibliometrijska analiza izvornih članaka uključila je broj i tip objavljenih radova, podatke o autorima i citiranu literaturu. Za svaki citat zabeleženi su sledeći podaci: autor(i), naslov rada, časopisa i monografske publikacije, tip dokumenta, godina objavljivanja i jezik.

Rezultati U posmatranom periodu u SGS su objavljena 193 članka, od kojih većinu čine originalni naučni radovi. Kooperiralo je ukupno 314 autora iz zemlje i inostranstva, odgovornih za 538 autorstava. Prosečan broj autora po radu bio je 2,8. Najčešće citirani tip literature su članci iz časopisa (83,5%), dok su najčešće citirani naučni časopisi upravo oni najcenjeniji na polju stomatologije uopšte. Podaci o starosti citirane literature ukazuju na citiranje koje je nešto ispod norme za medicinsku literaturu.

Zaključak Dobijeni podaci se ne razlikuju značajno od numeričkih pokazatelja za druge naučne i stručne časopise. Ipak se može zaključiti da je neophodno povećati produktivnost i autocitiranost časopisa, kao i korišćenje aktuelne literature stare do pet godina. Ova analiza omogućava valorizaciju naučne komunikacije stomatologa s ovih prostora, ali i evaluaciju aktuelne strategije vođenja ovoga časopisa, kako bi se definisale korisne smernice za uključivanje u međunarodni sistem razmene naučnih informacija.

Ključne reči: bibliometrija; stomatologija; naučni časopis; Stomatološki glasnik Srbije

UVOD

Naučni časopisi su primarni model komunikacije u gotovo svim naučnim disciplinama i igraju veoma važnu ulogu u procesu kreiranja, prenosa i skladištenja znanja još od 1665. godine, kada su se pojavili prvi časopisi ovoga tipa – *Journal des Savants* i *Philosophical Transactions of the Royal Society*. Naučnoistraživački rad nameće potrebu za upoznavanjem stanja u određenoj naučnoj oblasti, rada drugih istraživača i naučnih kretanja uopšte, odnosno poređenje sopstvenih rezultata s nalazima drugih istraživanja. Osnovni put za prenos i razmenu informacija je objavljivanje radova i časopis pri tome predstavlja najbitniji deo naučnih tokova. S druge strane, njegov ključni proizvod – originalni istraživački rad – u najvećoj meri utiče na njegovu suštinsku vrednost [1]. Mnogi časopisi teže tome da budu više od publikovanja naučnih radova i proste refleksije onoga što se dešava u naučnim zajednicama, već nastupaju s ciljem da vode, obrazuju, promovišu i obezbede pogodan poligon za vođenje dubljih rasprava [2]. Osim uloge u prenosu i razmeni informacija, ovaj vid naučnih publikacija ima značajan udeo i u proceni rezultata rada naučnika, od čega danas uglavnom zavise položaj i napredovanje u akademskoj sredini.

Objektivna procena kvaliteta određenih publikacija danas je većim delom zasnovana na kriterijumima indeksiranja i citiranja. Pojam faktora uticaja (engl. *impact factor*) je u naučnom društvu i izdavačkoj delatnosti verovatno najšire upotrebljavana bibliometrijska konstrukcija. Kao mera učestalosti citiranja „prosečnog članka” nekog časopisa u određenom periodu, faktor uticaja jeste ključ za razumevanje načina na koji su pojedini časopisi vrednovani. Uticajnost domaćih časopisa utvrđuje se bibliometrijskom analizom koju vrši Ministarstvo za nauku i tehnološki razvoj Vlade Republike Srbije na osnovu citata ostvarenih u nacionalnom i međunarodnim citatnim indeksima. Međutim, referisanje u nekoj od nadmoćnih

međunarodnih bibliografskih baza podataka glavni je izazov za sve časopise [3].

Stomatološki glasnik Srbije (SGS), časopis Stomatološke sekcije Srpskog lekarskog društva, od svog nastanka 1953. godine predstavlja glavni izvor formalne komunikacije (na engleskom i srpskom jeziku) stomatologa na ovim prostorima. Časopis objavljuje: originalne naučne i stručne radove, pregledne radove, prikaze iz prakse, saopštenja, informativne i edukativne radove, istoriografske radove, izveštaje s kongresa i stručnih sastanaka, prikaze knjiga, komentare i pisma uredništvu, stručne vesti i društvenu hroniku. Svi rukopisi podležu recenziji, koju vrše eminentni stručnjaci iz oblasti stomatologije iz zemlje i inostranstva. Izlazi četiri puta godišnje i ima kontinuitet u izlaženju, što je jedan od glavnih uslova za indeksiranje u međunarodnim bazama podataka. Kako je u periodu 1966-1992. godine SGS bio referisan na *MEDLINE*, uređivački odbor ulaže mnogo truda ne bi li se obnovio proces indeksiranja u ovoj bazi i časopis vratio na mesto koje mu pripada.

Od 2002. godine izvršene su brojne izmene koje su u velikoj meri uticale na podizanje kvaliteta samog časopisa i otvorenost ka međunarodnoj naučnoj javnosti. U 2003. godini postavljena je veb-prezentacija časopisa, koja omogućava vidljivost sažetaka radova objavljenih od 2000. godine. U 2004. godini časopis je tehnički poboljšana (51. volumen je štampan u boji) i istaknuta je primena principa Dobre uredničke prakse, kako bi se obezbedilo izvođenje standardizovanijeg procesa recenzije primljenih radova. U 2005. godini časopis je sadržinski obogaćen i započeto je korišćenje naziva na engleskom jeziku (*Serbian Dental Journal*) i dvojezično štampanje radova; usvojen je akt *Uniform Requirements for Manuscripts Submitted to Biomedical Journals*, uputstva autorima za pripremu rukopisa i oblik citirane literature, prihvaćen širom sveta. U 2006. godini časopis dobija svoju elektronsku formu, što značajno doprinosi vidljivosti i dostupnosti objavljenih radova; na osnovu rezultata

bibliometrijske analize i činjenice da časopis zadovoljava određeni nivo kvaliteta, na predlog Ministarstva za nauku Srbije SGS je uključen u DOI sistem Srbije i referiše se u srpskom nacionalnom citatnom indeksu – bazi SCIndeks.

Cilj ovog rada je bio da se primenom bibliometrijskih pokazatelja ispituju osobenosti radova objavljenih u SGS i odlike njihove citirane literature. S tim u vezi bliže su definisani: produktivnost SGS, priroda autorstava, obrasci citiranja (broj, tip, starost i jezik citirane literature), najuticajniji časopisi, zastupljenost određenih stručnih oblasti i uloga autocitata.

Navike u publikovanju i citiranju SGS mogu biti polazna tačka za prepoznavanje i opisivanje tokova naučne komunikacije stomatologa Srbije i regiona. Analizom navedenih bibliometrijskih pokazatelja omogućena je i evaluacija aktuelne strategije upravljanja časopisom, na osnovu čega bi Uredništvo moglo da upotpuni ili redefiniše svoju misiju i ciljeve. Ovakva studija će takođe koristiti bibliotekarima i lokalnim distributerima naučnih publikacija u formulisanoj nabavne politike.

MATERIJAL I METODE RADA

U istraživanju je analizirano osam godišta časopisa SGS objavljenih od 2002. do 2009. godine. S obzirom na to da su radovi iz ovog perioda dostupni u elektronskoj formi, za analizu je primenjen ovaj vremenski okvir.

Podaci o objavljenim radovima, kao i metapodaci (citirane reference), preuzeti su iz baze SCIndeks. Sve reference, uključujući i izvorne i citirane radove, uvezene su u *Microsoft Access* relacionu bazu podataka radi analize. Uzorak od 193 objavljenih rada sastojao se od originalnih naučnih radova, preglednih, informativnih i istoriografskih radova, kao i prikaza iz prakse i preliminarne saopštenja. Iz analize su isključeni prikazi knjiga, pisma uredništvu i uvodne reči urednika. Bibliometrijska analiza izvornih članaka uključuje broj i tip objavljenih radova, podatke o autorima (ukupan broj autora, afilijacije, zemlja porekla) i citiranoj literaturi (nezavisni citati i autocitati).

Radovi objavljeni u SGS dali su 4.170 referenci. Svakom citatu dodeljen je jedinstven identifikacioni broj i zabeleženi su sledeći podaci: autor(i), naslov rada, naslov časopisa, naslov monografske publikacije, tip dokumenta, godina objavljivanja i jezik. Citirane publikacije su po tipu razvrstane u tri grupe: članci, knjige i razno (zbornici s konferencija, poglavlja knjiga, statističke publikacije, odbranjene doktorske disertacije i magistarski radovi i veb-adrese). Autocitati su posmatrani kao podgrupa u okviru citirane literature. Svaka referenca među čijim autorima se nalazi barem jedan od autora rada koji je navodi tretirana je kao autocitat. Starost citiranih referenci izračunata je oduzimanjem godine objavljivanja citiranog rada od godine objavljivanja izvornog rada. Samo za reference iz časopisa koji su citirani dva ili više puta na osnovu liste Instituta za naučne informacije *Thomson 2008 Journal Citation Report* navedena je i odgovarajuća naučna disciplina. Budući da promena naziva časopisa nije neobična pojava, korišćena je baza MEDLINE za proveru svakog citiranog naslova, kako bi se svi citati određenog časopisa sveli pod jedan, trenutno aktuelni naziv. Časopisi su takođe analizirani prema Bredfordovom zakonu distribucije [4] s ciljem da se generiše lista vodećih naslova i utvrde naučne discipline s kojima su radovi objavljeni u SGS povezani. Na osnovu empirijski utvrđenog Bredfordovog zakona, izdvojena je prva zona

najznačajnijih naslova, u kojoj se nalazi relativno mali broj časopisa koji sadrže trećinu od ukupnog broja svih citiranih članaka.

REZULTATI

U tabeli 1 prikazani su ukupan broj i tipovi radova objavljenih u periodu 2002-2009. godine. Publikovana su 193 rada u okviru 32 sveske. Najviše radova objavljeno je 2003. godine (28), a najmanje 2002. godine (20). Najviše originalnih naučnih radova objavljeno je 2003. i 2009. godine (16). U proseku je godišnje objavljivano po 24,1 rad. Od ukupnog broja svih objavljenih radova u posmatranom periodu, 38,3% dostupno je samo na srpskom jeziku. Od 2005. godine radovi se objavljuju dvojezično – na engleskom i srpskom (61,7%).

Od 2002. do 2009. godine svoje radove je poslalo ukupno 314 autora, koji su odgovorni za 538 autorstava. Prosečan broj autora po radu je 2,8. Većina autora ima objavljen po jedan rad (65,5%), dok je samo 2,2% autora doprinelo sa po više od pet radova (Tabela 2). Najproduktivniji autori su Slavoljub Živković (23), Dejan Marković (12) i Larisa Blažić (7).

Među autorima koji su objavljivali radove u SGS, 85 su iz inostranstva (Tabela 3), dok je 229 autora iz Srbije (Tabela 4). Inostrani autori dolaze iz 14 zemalja, prevashodno Bosne i Hercegovine, Brazila, Italije, Slovenije, Rumunije i Turske. Naši autori su uglavnom sa Stomatološkog fakulteta u Beogradu (123), odnosno Medicinskog fakulteta u Nišu, Beogradu i Novom Sadu (106).

Od ukupnog broja objavljenih radova samo jedan prikaz iz prakse nema citiranu literaturu. U preostala 192 rada navedeno je ukupno 4.170 citata. Prosečan broj citata po radu je 21,7. Većinu citirane literature čine članci iz časopisa (83,5%), dok su u 16,5% slučajeva zastupljene knjige i ostali oblici publikacija definisani pod „razno” (Tabela 5).

Najcitiraniji rad inostranih autora je *Yamada RS, Armas A, Goldman M, Lin PS. A scanning electron microscopic comparison of a high volume final flush with several irrigating solutions: Part 3. J Endod. 1983; 9(4):137-42*, dok je najčešće citiran rad domaćih autora *Blažić L, Živković S, Stojšin I. Primena različitih svetlosnih izvora za polimerizaciju restaurativnih materijala. Stomatološki glasnik Srbije. 2002; 49(3-4):95-100*.

Autocitiranost ukupnog broja autora je 5% na godišnjem nivou. U najvećoj meri su autocitirani članci (110), zatim disertacije i radovi s kongresa (58) i knjige (18). Od ukupne vrednosti autocitata autora, u 35,2% slučajeva citirani su članci objavljeni u SGS, zatim u časopisu *Balkan Journal of Stomatology* i *Acta Stomatologica Naissi*.

Ukupan broj citiranih članaka (3.483) objavljen je u 660 časopisa. Kada su citirani časopisi rangirani prema učestalosti pojavljivanja, osam naslova našlo se u prvoj zoni (visoko produktivnih časopisa), 40 naslova činilo je drugu zonu (umereno produktivnih časopisa), dok je preostalih 612 naslova smešteno u treću zonu (najmanje produktivnih časopisa). U tabeli 6 navedeni su časopisi prve zone koji obuhvataju prvu trećinu ukupnog broja članaka citiranih u SGS u periodu 2002-2009. godine (1.183), prevashodno iz oblasti endodoncije, protetike, ortodoncije i parodontologije. Rezultati pokazuju da je većina citiranih časopisa referisana u ISI-Thomson bazama. SGS se nalazi u drugoj zoni i citiran je 84 puta, uz stopu autocitiranosti od samo 2,4%.

Analizom citiranih članaka na osnovu učestalosti određenih predmetnih oblasti, utvrđeno je da je 86,6% citirane literature iz oblasti stomatologije, dok su ostale discipline interna i opšta medicina (1,6%), biologija ćelije (1,2%), onkologija (1,1%) i hirurgija (1,1%). Ostale oblasti čine manje od po jednog procenta (nauka o materijalima, ORL, biohemija, mikrobiologija, javno zdravlje). Osim toga, još 32 discipline čine preostalih 5,9%.

Podaci o starosti referenci dostupni su za 99,9% citirane literature. Za pet navedenih referenci podatak o godini izdavanja nije dostupan. Uočeni vremenski razmak kreće se od 0 do 205 godina starosti. Najstariji citirani članak objavljen je pre 108 godina, a knjiga pre 205. Referenci do pet godina starosti ukupno je 1.140 (Grafikon 1).

Reference na engleskom jeziku (3.378; 89,2%) preovlađuju među ukupno 3.786 citiranih radova. Na srpskom jeziku napisano je 339 citata, na nemačkom 53, dok je na još četiri jezika objavljeno 16 referenci.

DISKUSIJA

SGS je, prema rezultatima bibliometrijske analize i preliminarne kategorizacije Ministarstva za nauku Srbije, najznačajniji stomatološki časopis na nacionalnom nivou. Stoga broj objavljenih radova, posmatran kao prvi pokazatelj produktivnosti, može istovremeno odraziti i opseg aktivnosti domaće naučne i stručne zajednice [5]. Od ukupnog broja objavljenih radova, 54,9% čine originalni naučni članci, što SGS sigurno profiliše kao značajnu naučnu publikaciju. Poređenjem s određenim stomatološkim naučnim časopisima u okviru i van regiona čija je produktivnost originalnih naučnih radova 62,2-72,3% [6, 7], uočljiv je problem nedovoljnog broja prispelih radova za recenziju, na čijem rešavanju uredništvo SGS predano radi svih ovih godina. Ipak, potrebno je istaći da se broj objavljenih naučnih radova od 2005. godine stalno povećava, što odražava određeni uspeh svih uloženi napora.

U odnosu na podatke o ukupnom broju autora koji je kooperirao (314) i prosečnom broju autora po objavljenom radu (2,8), uočena je statistička pravilnost i utvrđen stabilan zakon raspodele naučne produktivnosti [8]. Udeo naučnika s minimalnom produktivnošću od samo jednog članka, koji u idealnom slučaju iznosi 60%, u okviru SGS predstavljen je sa 65,5%. Obavljena istraživanja o produktivnosti autora u oblasti stomatologije [9], kao i rezultati dobijeni ovom studijom, potvrđuju primenu Lotkinog zakona na stomatološku literaturu. Časopisi kao što su *Journal of Prosthetic Dentistry* i *Journal of Dental Research* u proseku objavljuju približno 200 radova godišnje, s visokim procentom autora koji su objavili po nekoliko članaka. SGS pripada grupi časopisa koji s manjim brojem objavljenih radova tokom godine ima niži procenat autora koji su objavili nekoliko članaka (2,2% autora doprinelo je sa po više od pet radova). Dobijeni prosečan broj autora po radu (2,8) potpuno odgovara vrednostima iz studije dvadeset vodećih stomatoloških časopisa: od 1,4 autora po radu za *British Dental Journal* do 3,2 autora po radu za *Journal of Periodontal Research* [9].

S obzirom na to da SGS, kao periodična publikacija naučnog tipa, zadovoljava određeni nivo kvaliteta i prihvata otvoreni pristup kao režim publikovanja, svi radovi iz ovog osmogodišnjeg perioda dostupni su u elektronskom obliku u punom tekstu kroz bazu SCIndeks. Međunarodna vidljivost ovih članaka

i činjenica da se svi radovi od 2005. godine objavljuju i na srpskom i na engleskom jeziku obezbeđuje uključenost časopisa u međunarodni sistem naučnih informacija. Težnja uredničke politike da SGS izađe iz lokalnog okvira vidljiva je i u sve većem broju radova autora iz inostranstva. Podaci o institucionalnoj pripadnosti autora ukazuju na egzogenu strukturu SGS, jer 39,2% ukupnog broja autora je nastavno-naučno osoblje Stomatološkog fakulteta Univerziteta u Beogradu, dok drugi, veći deo potiče iz drugih domaćih i stranih ustanova.

Pregledom citirane literature u radovima objavljenim u SGS u periodu 2002-2009. godine mogu se pružiti i podaci o naučnom kvalitetu, odnosno zrelosti izvornih radova. Važnim pokazateljem se smatra odnos broja objavljenih radova koji nemaju citiranu literaturu i onih s referencama [10]. S obzirom na to da SGS ima samo jedan rad (prikaz iz prakse) bez citirane literature, može se reći da potpuno zadovoljava ovaj standard naučnosti. Sledeća mera za ispitivanje naučne prirode literature je prosečan broj citata po radu. Prema još aktuelnoj Prajsovoj klasifikaciji, svaki rad koji ima između 10 i 20 referenci pripada kategoriji naučnog rada, dok članci sa po više od 20 navoda pripadaju preglednim radovima [11]. Prosečan broj citata po radu utvrđen ovom studijom je 21,7, što ukazuje na veoma izražen stepen naučnosti ovoga korpusa literature.

Činjenica da 83,5% citirane literature čine radovi iz časopisa potvrđuje dobro ustanovljenu teoriju da se naučna komunikacija u medicinskim naukama uglavnom odvija kroz ovaj medijum i u skladu je s mnogim već izvedenim studijama [12-16]. Značajno je reći da se u ovom dobu elektronskih informacija samo jedna referenca odnosi na elektronski izvor, tj. veb-stranicu.

Izvršeno rangiranje časopisa prema Bredfordovim zonama izražava nivo njihovog značaja za autore koji ih citiraju, ali istovremeno i za disciplinu koju odražavaju [17]. Ukupno 3.483 članka citirana u SGS objavljena su u 660 časopisa. Na osnovu Bredfordove raspodele izdvojeno je jezgro i definisana prva zona, koja se sastoji od osam časopisa u kojima je objavljena trećina ukupnog broja citiranih radova. SGS je autocitiran 84 puta i nalazi se na drugom mestu u drugoj zoni. S obzirom na to da je stopa autocitiranosti naučnih časopisa u proseku 20% [18], vrednost od 2,4% u slučaju SGS je veoma mala i pruža mogućnost većeg i slobodnijeg citiranja radova objavljenih u SGS. Ovo bi moglo uticati na pomeranje časopisa s periferije u samo jezgro najznačajnijih stomatoloških časopisa bez bojazni da će time biti ugrožen status naučnosti. Autocitati autora koji su objavljivali u SGS u ovom periodu takođe su izraženi veoma niskom vrednošću i predstavljaju samo 5% ukupne literature citirane u SGS. Ovaj broj značajno je niži u odnosu na opšte prihvatljive prosečne vrednosti koje su, u zavisnosti od naučne discipline, od 10% do 30% u odnosu na ukupan broj citata [6, 10, 18].

Rezultati dobijeni računanjem starosti citirane literature odražavaju neke obrasce citiranja koji nisu potpuno svojstveni naučnoj literaturi prirodnih nauka. Ukupan procenat aktuelne citirane literature (starosti pet godina ili manje) na primeru SGS je 27,4%, što je samo blago povišena vrednost u odnosu na broj citirane literature starosti 6-10 godina (23%). Poznato je da se od naučnih disciplina prirodnih i primenjenih nauka, prema Prajsovom indeksu, očekuje da barem 43% ukupne citirane literature bude mlađe od pet godina. SGS sa svojih 27,4% aktuelne referisane literature ne pokazuje znake aktuelnosti u onoj meri u kojoj bi, s obzirom na disciplinu kojoj pripada, trebalo da ima [10, 11, 18].

U budućim istraživanjima bi bilo veoma korisno da se analizira sadržaj ovog korpusa literature, kako bi se utvrdili pravci kretanja stomatološke nauke kod nas. Na osnovu citatne analize mogla bi se utvrditi citiranost radova objavljenih u SGS i na taj način predstaviti uticaj koji su ovi radovi imali na razvoj naučne zajednice.

ZAKLJUČAK

Rezultati bibliometrijske analize radova objavljenih u SGS od 2002. do 2009. godine pokazuju da SGS vodi stabilnu uređivačku politiku s jasno postavljenim ciljevima i izraženom težnjom da se oni realizuju. Kontinuitet u izlaženju, odlična tehnička opremljenost, međunarodna raznolikost uređivačkog odbora, primena međunarodnih standarda i dostupnost radova u elektronskom obliku na engleskom jeziku obezbeđuju neophodne uslove za uključivanje u opšte tokove naučnih informacija. Numerički pokazatelji ne odudaraju značajno u poređenju s drugim naučnim i stručnim časopisima. Da bi rezultati bili još bolji, neophodno je povećati produktivnost časopisa, na šta

se u određenoj meri može uticati aktivnijom saradnjom s mlađim autorima, s ciljem da se bolje upoznaju s pravilima publikovanja i usavrše veštine u pisanju naučnih radova zadovoljavajućeg kvaliteta. Izrazito nisku stopu autocitiranosti SGS treba da popravi većim i slobodnijim citiranjem radova objavljenih u SGS. To će povoljno uticati na pomeranje časopisa s periferije u samo jezgro najuticajnijih stomatoloških naslova našeg okruženja bez bojazni da će time biti ugrožen status naučnosti. Takođe je potrebno u većoj meri citirati aktuelnu literaturu, ne stariju od pet godina.

Kako bi se ostvarila osnovna težnja uređivačke politike da SGS bude indeksiran u nekoj od vodećih svetskih baza sekundarnih publikacija, a na osnovu iskustava drugih, možda bi najvažniji sledeći korak bilo uvođenje *online* sistema za podnošenje radova i proces recenzije, čime bi se značajno povećalo učesće stranih saradnika. Ovakav sistem autorima omogućava neposrednu distribuciju rukopisa i praćenje statusa u mnogo bržem procesu recenzije. Takođe bi bilo veoma korisno da se sva klinička ispitivanja objavljena u SGS indeksiraju u Kohranovoj biblioteci (*Cochrane Library*), što bi ukazivalo na to da su rađena po najvišim standardima medicine zasnovane na dokazima.