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# A Citation Analysis of Serbian Dental Journal using Web of Science, Scopus and Google Scholar

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## SUMMARY

**Introduction** For a long time, The Institute for Scientific Information (ISI, now Thomson Scientific, Philadelphia, US) citation databases, available online through the Web of Science (WoS), had an unique position among bibliographic databases. The emergence of new citation databases, such as Scopus and Google Scholar (GS), call in question the dominance of WoS and the accuracy of bibliometric and citation studies exclusively based on WoS data. The aim of this study was to determine whether there were significant differences in the received citation counts for Serbian Dental Journal (SDJ) found in WoS and Scopus databases, or whether GS results differed significantly from those obtained by WoS and Scopus, and whether GS could be an adequate qualitative alternative for commercial databases in the impact assessment of this journal.

**Material and Methods** The data regarding SDJ citation was collected in September 2010 by searching WoS, Scopus and GS databases. For further analysis, all relevant data of both, cited and citing articles, were imported into Microsoft Access® database.

**Results** One hundred and fifty-eight cited papers from SDJ and 249 received citations were found in the three analyzed databases. 74% of cited articles were found in GS, 46% in Scopus and 44% in WoS. The greatest number of citations (189) was derived from GS, while only 15% of the citations, were found in all three databases. There was a significant difference in the percentage of unique citations found in the databases. 58% originated from GS, while Scopus and WoS gave 6% and 4% unique citations, respectively. The highest percentage of databases overlap was found between WoS and Scopus (70%), while the overlap between Scopus and GS was 18% only. In case of WoS and GS the overlap was 17%. Most of the SDJ citations came from original scientific articles.

**Conclusion** WoS, Scopus and GS produce quantitatively and qualitatively different citation counts for SDJ articles. None of the examined databases can provide a comprehensive picture and it is necessary to take into account all three available sources.

**Keywords:** citedness; citation databases; Web of Science; Scopus; Google Scholar; Serbian Dental Journal

## INTRODUCTION

Bibliometrics, a subfield of scientometrics or the science of science itself, offers a powerful set of methods and measures for studying the structure and processes of scholarly communication [1]. Citation analysis, the best known bibliometric approach, is widely used in research output evaluation for assessing research performance or impact of researchers, institutions, regions, articles, journals, etc. Despite its wide use, there are opinions that deny intrinsic value of the citation analysis outcomes [2-5]. Nevertheless, the selfsame author of the citation indexes Eugen Garfield pointed out that citation counts could not identify significance that was unrecognized by the scientific community [6]. For qualitative evaluation, as a reflection of the community's work and interests, citedness requires peer judgments. Validity and reliability of citation counts for research assessments, as well as their compatibility with peer reviews have been presented in details in previous studies [7-10]. Most of critics directed to validity of citation analysis refer to the problems associated with used data

sources, especially the Institute for Scientific Information (ISI, now Thomson Scientific, Philadelphia, US) citation databases [11].

ISI citation databases (Science Citation Index, Social Sciences Citation Index and Arts & Humanities Citation Index) have been widely recognized as the most comprehensive source of scientific information since early 1960s. The online version of ISI Citation Indexes, available through the Web of Science (WoS) and ISI Web of Knowledge portal, provides access to bibliographic data from over 10,000 of the most relevant multidisciplinary journals and over 120,000 conference proceedings. Besides its multidisciplinary nature, citation indexing was the major reason why this service had an unique position among bibliographic databases for more than 40 years [12].

After launching of new citation-enhanced databases in November 2004, (a) Scopus from *Elsevier*, as the primary competitor to the *Thomson Reuters* citation indexes in the information products market, and (b) *Google Scholar* (GS), developed by *Google Inc.*, still available in beta testing, the situation was considerably changed. Whereas WoS

and Scopus are only available to those academics whose institutions are able to bear quite substantial subscription costs, GS became particularly interesting for conducting citation analyses because it is freely accessible.

Scopus and WoS provide bibliographic data and cited reference lists only for the items originally indexed by them from 1996 and onwards. With over 17,000 peer-reviewed journals, including the titles published in less developed and developing countries, Scopus offers greater coverage of journals than Thomson Scientific's citation indexes. Scopus also covers more than 1,200 Open Access journals, as well as 600 trade publications, 350 book series and 3.7 million conference papers from proceedings and journals. On the other hand, GS does not disclose any explicit information about either number of records or its time coverage. The references are automatically extracted from freely available full texts located whether in preprint archives, institutional repositories or personal websites. Data from traditional, subscription based, academic journals are indexed by GS only if the publisher is willing to provide at least the abstract of the paper freely. It is significant that Google is ready to cooperate with libraries, and increasing number of libraries set their link resolvers to GS, providing direct and easy access to subscribed sources through GS [13]. Since KoBSON (Consortium of Serbian Libraries for Coordinated Acquisition) and Serbian Union Bibliographic-Catalogue Database (COBISS.SR) have their own link resolvers on GS, through GS searching users from Serbia can find full texts that Serbian academic institutions are currently subscribed.

One of well-known limitations of citation analysis is that validity of its results primarily depends on the coverage of a bibliographic database used as a tool for data collection and analysis. Differences in scope and journal coverage, document types and language, time span and currency, as well as size of the databases can bring in different citation results among databases [14, 15]. Some recent studies compared the results of citation analysis using various databases, including WoS, Scopus and GS, and yielded different and contradictory results [16-19]. Others concluded that a single database cannot provide comprehensive citing coverage and the selection of the „best“ citation analysis tool depends on item discipline and publication year [11, 20, 21].

Citation counts of scientific journals, as well as citation analysis using WoS, Scopus and/or GS are increasingly of concern to the academic community [14, 22, 23]. As Sember stated [22], for a small journal from a small country citation rate could greatly affect the increase of its scientific visibility and manuscript inflow, as well as providing the local financial support. For official citation analysis in Serbia, the data obtained from WoS is used as an important indicator in the research performance evaluation. The results of the study conducted in 2007 [24] indicated the need to include data from all existing relevant resources in order to assess the impact of individual scientist from Serbia. The emergence of new citation databases, such as Scopus and GS, call in question the dominance of WoS and the accuracy of bibliometric and citation studies exclusively based on WoS data. The aim of

this study was to determine whether there were significant differences in received citation counts for Serbian Dental Journal (SDJ) found in WoS and Scopus databases, or whether GS results differed significantly from those obtained by WoS and Scopus, and whether GS can be an adequate qualitative alternative for commercial databases in the impact assessment of this journal.

## MATERIAL AND METHODS

Serbian Dental Journal (SDJ), the official journal of the Dental Section of the Serbian Medical Society, is the major source of formal communication for dentists in this region. The journal is freely available within the Repository of the National Library of Serbia, Serbian national citation index – SCIndeks and its own homepage. It is indexed in SCIndeks database and incorporated into Cross-ref (DOI) system of Serbia, and based on that, it is involved in the process of evaluation and performance assessment at national level and co-financed through the Ministry of Science and Technological Development of the Republic of Serbia. SDJ was indexed on MEDLINE from 1966 to 1992, and 686 SDJ articles from this period are indexed in Scopus database which includes MEDLINE records. Neither WoS nor Scopus database indexed later volumes of SDJ.

SDJ citation data was collected in September 2010 by searching WoS, Scopus and GS databases. These three databases were selected because of the possibility for bibliographic searching and retrieval of cited references, the basic tool for citation analysis. Scopus and GS were also selected because they represent only real or potential competitors to WoS in the field of citation analysis and bibliometric research.

Finding citations of journals, not originally indexed in WoS, can be achieved by searching the cited references. The articles from these journals are indexed in WoS according to the first author only and there is no a canonical form of journal title for them. Finding SDJ citations in WoS was conducted by using “Cited Reference Search” mode, based on all possible abbreviated forms of journal title: *stom\* gl\* OR serb\* dent\* OR strom\* glas\* s\* OR st\* gl\* srb\**, which are the result of inconsistencies in specifying the journal title. In the search statements “\*” designates the empty space or any characters string that can follow, while OR has the function of Boolean logical operators extracting records that contain any of these names. Variants *strom\* glas\* s\** and *st\* gl\* srb\** were included into search statement because by comparing citations found in WoS with citations from the other databases, it was revealed that some articles, which cited SDJ, specified the journal title in this way. 71 cited articles and 86 citations were found with 15 variants of the journal title. Due to errors in specifying the author's names, made by the authors of citing papers, verification of the results was conducted and it was found that 69 articles published in SDJ was cited 85 times. One citation, which was not the database error but appeared in that form in the citing paper, was not possible to verify and confirm, so it was excluded from the analysis.

Scopus search method was almost identical to the method used for searching WoS. Similar search statement (*stom\* glas\* s\* OR serbi\* dent\* j\**) and advanced search option with use of REFSRCTITLE code which returns documents where these character strings appear in the reference source title was used. Unlike WoS, Scopus does not allow to overview cited articles, but it is necessary to check all the citing articles manually and confirm the actual number of cited articles. As a result of a search, 155 cited documents appeared, while 68 cited articles and 94 citations, with 13 variants of SDJ title were confirmed.

Considering the fact that there are no clearly defined rules and guidelines for the GS search, to collect data on SDJ citations in this database the software Publish or Perish (also enable various statistical analyses) was used. By using the option *Journal impact analysis* and similar search statements, 177 cited articles with 417 citations were found. However, after removing duplicates and verification of citations, it was revealed that 117 SDJ articles were cited in GS, with 189 received citations.

To make sure that some of the citations were not missed out due to the errors in searching or indexing, bibliographic record for any citation not found in one or two databases was checked.

For further analysis, all relevant data of both, cited and citing articles, were imported into Microsoft Access® database. For cited articles, the following characteristics were recorded: authors, article title, journal title or some specified form of the SDJ title, year, volume, first page, document type and citation counts retrieved in all three databases. Afterwards, for comparison GS and SCIndeks, citation data in these databases were also imported. Recorded characteristics of citing articles were: authors, article title, journal title, year, document type and language. The citations from all three databases were analyzed and compared. The ones found in one database only, but not the other two, were defined as unique citations. Common citations were those found in all three databases. The overlap in the number of citations among all three databases, between WoS and Scopus, Scopus and GS, and WoS and GS was determined.

## RESULTS

Table 1 shows the number of SDJ articles cited in all three analyzed databases, the number of received citations, as well as self-citation rate. Out of total number of cited articles, 74% were cited in GS, 46% in Scopus and 44% in WoS. From all articles cited in WoS, 86% received only one citation. The number of one time cited articles in Scopus and GS was 81% and 56%, respectively (Table 2). The most cited article (n=7) was published in 1989 by Rak D.

Almost a half of cited articles in GS were original research articles (49%), while in other two databases, the percentage of original articles was higher: WoS 57% and Scopus 52% (Table 3). The greatest number of cited articles was published in the last decade of the 20th and first decade of the 21st century. The earliest article, cited in all three databases, dates from 1957 (KULJACA B. Osvrt

na razvoj zubne medicine. STOM GLAS S, 1957). Only 15-20% of cited articles were published before 1990.

Out of total number of received citations, 69-72% belonged to the group-authored articles (Table 4).

WoS and Scopus provide citation details since 1996, but Table 5 shows that 78% of the total number of citations in WoS was obtained since 2008, while in Scopus 68% of citations were obtained for the same period. From 2002 until today, GS received 97% of citations.

Original scientific articles represent 82% of the total number of citing articles, 8% are review articles, while 6% are conference proceedings and editorials (Table 6). Annexes, press releases, letters, book chapters and book reviews are present in the lowest percentage, especially in GS. Considering the language of citing papers, 41% were published in English, 35% in Serbian, while 20% were published bilingual. Compared to WoS and Scopus, GS gave greater number of citations from sources that are not in English. 42% of them were in Serbian and 5% in Chinese language (Table 7).

The accuracy of received citations is 99% in WoS, 89% in Scopus and 65% in GS.

The number of journals which cited SDJ articles in WoS is 30, in Scopus 39, while in GS there are 46 such journals. Among the total number of citations in WoS (n=85), the greatest percentage comes from journal Srpski arhiv za celokupno lekarstvo (Srp Arh Celok Lek) (36%), Vojnosanitetski preglad (Vojnosanitet Pregl) (11%), Collegium Antropologicum and Acta Veterinaria – Beograd (5%). The remaining 43% of

**Table 1.** Number of cited articles from SDJ, citation counts and self-citation rate by WoS, Scopus and GS database

**Tabela 1.** Broj citiranih radova SGS, broj primljenih citata i stopa samocitiranosti prema bazama *Web of Science (WoS)*, *Scopus* i *Google Scholar (GS)*

Parameter Parametar	WoS	Scopus	GS	Total Ukupno
Number of SDJ cited papers Broj citiranih radova	69	73	117	158
Citation counts Broj citata	85	94	189	249
Self-citation counts Broj samocitata	40	36	83	106

**Table 2.** Distribution of cited articles in relation to the number of citations received by WoS, Scopus and GS database

**Tabela 2.** Raspodela citiranih radova u odnosu na broj primljenih citata prema bazama *WoS*, *Scopus* i *GS*

WoS		Scopus		GS	
Number of cited articles Broj citiranih radova	Times cited Citirani puta	Number of cited articles Broj citiranih radova	Times cited Citirani puta	Number of cited articles Broj citiranih radova	Times cited Citirani puta
89	0	85	0	41	0
59	1	59	1	65	1
8	2	11	2	39	2
1	3	2	3	7	3
0	4	0	4	5	4
0	5	0	5	1	5
0	6	0	6	0	6
1	7	1	7	0	7

**Table 3.** Type of cited articles from SDJ**Tabela 3.** Tip citiranih radova časopisa SGS

Type of article Tip rada	WoS		Scopus		GS		Total / Ukupno	
	Number of cited papers Broj citiranih radova	Number of received citations Broj primljenih citata	Number of cited papers Broj citiranih radova	Number of received citations Broj primljenih citata	Number of cited papers Broj citiranih radova	Number of received citations Broj primljenih citata	Number of cited papers Broj citiranih radova	Number of received citations Broj primljenih citata
Informative article Informativni rad	13	14	18	22	23	43	32	55
Original scientific article Originalni naučni rad	39	50	38	50	57	86	76	119
Case report Prikaz slučaja	2	3	2	3	5	5	5	6
Proceedings Rad s kongresa	7	7	5	5	20	31	26	37
Review Revijski rad	4	6	4	6	7	16	8	17
Professional article Stručni rad	4	5	5	7	3	6	8	12
Preliminary communication Prethodno saopštenje	0	0	0	0	1	1	1	1
Article from praxis Rad iz prakse	0	0	1	1	0	0	1	1
Book review Prikaz knjige	0	0	0	0	1	1	1	1
Total Ukupno	69	85	73	94	117	189	158	249

**Table 4.** Number of received citations, depending on the nature of the cited reference authorship by WoS, Scopus and GS**Tabela 4.** Broj primljenih citata u zavisnosti od prirode autorstva citiranog rada prema bazama WoS, Scopus i GS

Parameter Parametar	WoS	Scopus	GS
Multiple authorship Grupno autorstvo	61	65	135
Individual authorship Individualno autorstvo	24	29	54
Total Ukupno	85	94	189

citations are from other relevant scientific journals with impact factor. About 72% of citing journals are from the field of dentistry, general and internal medicine, the rest are journals from surgery, anthropology, toxicology, materials science, geriatrics, otolaryngology and so on (according to JCR categorization). Among the citing authors, 53.6% are from Serbia and 15.3% from US. Then follow authors from Croatia, Scotland, Canada, Pakistan, Taiwan, Australia etc. Slightly more than 50% of the citing authors belong to the institutions of the University of

**Table 5.** Number of received citations and citing articles per year by WoS, Scopus and GS**Tabela 5.** Broj citata i citirajućih radova po godinama prema bazama WoS, Scopus i GS

Year Godina	WoS		Scopus		GS	
	Number of citations Broj citata	Number of articles Broj radova	Number of citations Broj citata	Number of articles Broj radova	Number of citations Broj citata	Number of articles Broj radova
2010	18	12	16	12	14	9
2009	23	13	24	14	35	22
2008	25	15	24	15	29	19
2007	1	1	3	3	11	11
2006	2	2	3	3	22	18
2005	1	1	4	4	23	17
2004	1	1	1	1	23	20
2003	1	1	5	4	13	11
2002	1	1	1	1	13	11
2001	0	0	3	2	2	2
2000	1	1	1	1	1	1
1999	4	4	4	4	0	0
1998	2	2	2	2	1	1
1997	3	2	3	2	0	0
1996	2	1	0	0	0	0
1995	0	0	0	0	1	1
1994	0	0	0	0	0	0
1993	0	0	0	0	1	1
Total Ukupno	85	57	94	68	189	144

**Table 6.** Number of citations received in relation to the type of citing document type by WoS, Scopus and GS**Tabela 6.** Broj primljenih citata u odnosu na tip citirajućeg rada prema bazama WoS, Scopus i GS

Type of article Tip rada	WoS	Scopus	GS	Total Ukupno
Article Članak	50	56	117	156
Review Revijijski rad	4	6	13	16
Editorial Editorijal	1	3	3	5
Proceedings Rad s kongresa	2	3	3	6
Miscellaneous* Razno*	0	0	8	8
Total Ukupno	57	68	144	191

\* letters, book chapters, book reviews, contributions and communications

\* pisma, poglavlja iz knjiga, prikazi knjiga, prilozi i saopštenja

**Table 7.** Number of citations received in relation to language citirajućeg of the WoS, Scopus and GS**Tabela 7.** Broj primljenih citata u odnosu na jezik citirajućeg rada prema bazama WoS, Scopus i GS

Language Jezik	WoS	Scopus	GS	Total Ukupno
English Engleski	40	47	39	78
Serbian Srpski	17	17	61	66
Bilingual Dvojezično	0	2	36	37
Other* Drugo*	0	2	8	10
Total Ukupno	57	68	144	191

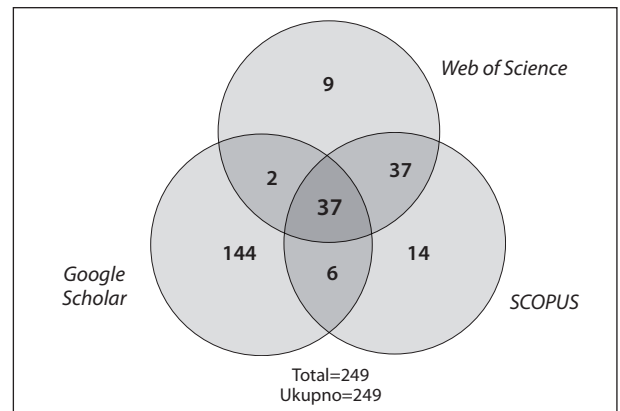
\* French, Italian, Chinese

\* francuski, italijanski, kineski jezik

Belgrade and Nis. The greatest number of citations in Scopus are also from Journal Srp Arh Celok Lek (31%), Vojnosanit Pregl (6%), International Journal of Oral and Maxillofacial Surgery (Int J Oral Max Surg) (5%), Acta Veterinaria – Beograd and Archive of Oncology (4%) etc. Scopus includes all journals indexed in WoS, plus 9 journal, Serbian and regional, not indexed in WoS. In GS, however, 36% of citations come from SDJ, Srp Arh Celok Lek (17%), Vojnosanit Pregl and Acta Stomatologica Naissi (5%).

Analysis of the distribution of unique and common citations in all three databases (Graph 1) showed that 15% out of 249 received citations were found in all three databases. The highest percentage of databases overlap was found between WoS and Scopus (70%), while the overlap between Scopus and GS was 18%, and WoS and GS 17% only. There was a significant difference in the percentage of unique citations between databases, 58% of them belonged to GS, 6% to Scopus and 4% to WoS.

A high overlap degree of SDJ citations between GS and SCIndeks databases was also observed – out of 117 articles cited in GS, 95 (81%) was cited also in other database. The remaining articles, not indexed in SCIndeks, were cited in international journals or in new numbers of local journals that have not yet been entered SCIndeks.

**Graph 1.** Distribution of unique and overlapped SDJ citations retrieved from WoS, Scopus and GS**Grafikon 1.** Distribucija jedinstvenih i zajedničkih citata SGS ostvarenih u bazama WoS, Scopus i GS

## DISCUSSION

Most of the previous studies have been primarily focused on comparing citation counts and WoS, Scopus and GS databases coverage, without analyzing the nature of citations themselves. In the current study, similarly to the several studies conducted after 2007 [11, 22, 25], beside the number of citations, the overlap between the citations in the three databases as well as the characteristics of unique citations in each database were examined.

The results of the current study confirmed a well-known fact that WoS was a selective source that covered the high-impact scientific journals only, while the coverage of Scopus and GS databases exceeded this limits, by including citations from additional regional and local sources. The degree of overlap of SDJ citations between the three databases was found 15%, confirming the previous studies conclusions that the degree of overlap between these three citations databases varied by field of study with no more than 31% of citations overlapping in all three databases [21].

Citation data collected from Scopus and WoS databases showed a significant overlap of 70%, exceeding the upper limit of expected 58% [11]. Scopus includes 9 (or 11%) more citations than WoS, directly suggesting that Scopus provides more comprehensive coverage. Combining citations from Scopus and WoS could have remarkable implications on journal's impact factor [26, 27], since common citations from those two databases increase the number of SDJ citations for 24% (from 85 to 105 citations). If only WoS was used to locate SDJ citations, almost a quarter of relevant citations found in both WoS and Scopus would be missed, while the percentage of missed SDJ citations would be 10.5% if only Scopus was used. The number of unique citations found in Scopus was slightly higher compared to WoS (20 or 19% in comparison to 11 or 10.5%, respectively). Although Scopus was built as a direct competitor to WoS with a clear ambition to index all publications already indexed by WoS, WoS unique citations not generated by Scopus indicate inconsistencies and errors of the latter database (eg. partial indexing of journal content or incomplete lists of references), whose accuracy in this work is

estimated at 89%. Scopus unique SDJ citations come from journals, international (n=8) and national (n=4) that are not indexed in WoS. In addition, at the time of searching a small number of Scopus unique citations came from journals that have not yet been entered in WoS database, which determined Scopus as more frequently updated source.

Regarding the type of documents where the citations were found, more than 80% of the total number of citations retrieved in these two databases originated from original scientific papers. While in some studies Scopus retrieved considerably more citations from conference proceedings than WoS [11], a significant difference was not observed in the current study and only 4% of the total citations found by both WoS and Scopus came from conference proceedings. Since 78% and 68% of all SDJ citations generated by WoS and Scopus respectively are gained in last three years, the possible reason for increased SDJ citation rate is the inclusion of Serbian journals *Srpski arhiv za celokupno lekarstvo* and *Vojnosanitetski preglad* in SCI Expanded list in 2008. However, comprehensive data analysis showed that a third of the actual citations were from those journals, while most of them came from the papers published in other relevant international journals. This fact points directly to Serbian author's increased productivity and achieved success in this three-year period.

In order to get more accurate assessment of SDJ impact by citations, one should employ both WoS and Scopus results because these two databases, despite a relatively high overlap, mostly complement rather than replace each other.

A comparison of the number of SDJ citations found in all three databases revealed very clear differences between the first two commercial databases and GS. GS produced significantly more unique citations (n=144), which corresponded to previous studies results [11, 16, 20, 21]. Although it was expected that GS retrieves significantly more citations from non-traditional online documents, including master theses, doctoral dissertations, book chapters, books or non-peer-reviewed Web sites [11, 23], 0.7% only of GS unique citations, originated from books, while all remaining GS unique SDJ citations came from papers published in scientific journals, mainly of regional character. Since some prestigious publishers have denied GS access to their archives (such as Elsevier), many significant citations from relevant peer-reviewed journals were completely missed [15]. Therefore, one could conclude that GS is completely superfluous to using both WoS and Scopus databases to generate SDJ citation counts, especially when the focus of the study is on citations in high quality peer-reviewed journals. Whereas citations received from internationally recognized journals are decisive for increasing the visibility of small journals, it is useful to follow their visibility and achieved impact in the global scientific society [22]. GS may serve as relevant complementary tool for accessing this type of citation data.

Since GS relies exclusively on the online availability of full text documents (also shown in other studies) [11], all citations found through GS come from documents published after 1993. After conversion of older materials to digital format and publishing on the Internet, retro-

spective GS coverage and received citation counts will increase. Institutional repositories or personal Web pages that provide free access to dissertations, books, reports, etc. are still very rare in Serbia. As GS currently identifies only citations found in journal full text items, available within the national citation index – SCIndeks and national repository published since 2002, 97% of the total number of GS unique citations originates exclusively from this period. Knowing that only 17.4% of GS unique citations come from international journals, and the rest of the citations are indexed in SCIndeks database, a high overlapping degree of retrieved citations between these two sources is not surprising.

Unlike WoS and Scopus, which almost exclusively cover anglophone sources only, GS provides significantly better coverage of non-English language materials, in particular papers published in Serbian language or bilingual (Serbian/English) (67%). It is interesting that 4.9% of total GS citations come from articles published in Chinese, a fast-rising language of scientific communication [28]. Considering the number of included local sources, GS may be particularly relevant in areas where scientific output is not transmitted exclusively in English.

Results showed that GS identified 84 (or 80%) more SDJ citations than WoS and Scopus combined (n=105), indicating that the combining citations from WoS, Scopus and GS databases would increase the number of citations to SDJ as a whole for 137% (from 105 to 249 citations). However, including a greater number of data sources to perform citation analysis does not necessarily lead to more valid assessments of scientific contributions [29]. Used tools need to be examined carefully, both in regard to their potential as well as limitations. With respect to GS, it is necessary to bear in mind that this database has remained in beta status since its release, with poor capability to recognize the metadata and consolidate the matching records, which greatly inflated both the number of hits and the citedness score. The process of removing errors and duplicates from the results is a Sisyphean task, even for users with extensive citation databases experience. Neither Publish nor Perish software, the tools that provide essential output features of GS, could exclude errors and duplicate entries. They could only facilitate their identification.

## CONCLUSION

Based on conducted citation analysis for Serbian Dental Journal (SDJ) through WoS, Scopus and GS databases, it can be concluded that the significant overlap of citations received in WoS and Scopus databases (70%) exists, while the presented difference in citation rate between these sources is the result of the difference in coverage. Although Scopus provides more comprehensive citation coverage of SDJ, WoS remains an indispensable source of citation data from the most prestigious journals. The current study found insignificant citation overlap between the first two complementary databases and GS (15%). A large number of GS unique citations came from papers

published in scientific journals, mainly of lower impact and regional character. Despite its free access, GS is not an adequate substitute for commercial databases such as WoS and Scopus. Limited to open access sources and sources publishers made available, GS provides extensive SDJ citation counts in scientific journals of lower importance, and largely ignores citations from the highly influential journals of esteemed publishers, otherwise covered by WoS and Scopus databases.

The results of this study might be of importance in the selection of appropriate bibliographic database to conduct literature search, as well as the most appropriate tools to generate more precise citation counts and assessments of research impact achieved in a global society. Although a smaller scale, the results of this study, along with all other conducted studies, might contribute to the overall sense and comprehensive picture of the composition and dimensions of the existing citation databases.

Even though insufficient to generalize, the results of this study clearly indicate that none of the examined databases can provide a comprehensive picture and be a substitute for the other two sources. In order to collect the most complete data on existing citations, it is necessary to take into account all three available sources.

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# Citatna analiza časopisa „Stomatološki glasnik Srbije” prema bazama Web of Science, Scopus i Google Scholar

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## KRATAK SADRŽAJ

**Uvod** Dugo vremena citatne baze Instituta za naučne informacije u Filadelfiji (ISI; sada Thomson Scientific), dostupne i u elektronskom obliku preko servisa Web of Science (WoS), zauzimale su jedinstvenu poziciju među bibliografskim bazama. Nastanak novih baza i alata koji omogućuju pronalaženje citata, kao što su Scopus i Google Scholar (GS), dovodi u pitanje dominantnost baze WoS i preciznost bibliometrijskih studija zasnovanih isključivo na podacima preuzetim iz ovog izvora. Cilj ovoga rada je bio da se utvrdi da li postoje značajne razlike u broju dobijenih citata časopisa „Stomatološki glasnik Srbije” (SGS) preko baza WoS i Scopus, odnosno da li se rezultati GS značajno razlikuju od onih dobijenih preko WoS i Scopus i da li GS može biti adekvatna kvalitativna zamena komercijalnim bazama podataka u proceni učinka ovoga časopisa.

**Materijal i metode rada** Pretraživanjem baza WoS, Scopus i GS prikupljeni su podaci o broju ostvarenih citata za SGS. Svi relevantni podaci, kako citiranih, tako i citirajućih radova, uneti su u Microsoft Access bazu podataka i zatim analizirani i upoređivani.

**Rezultati** U sve tri analizirane baze pronađeno je 158 citiranih radova SGS, kao i 249 primljenih citata. Od ukupnog broja citiranih radova, 74% je citirano na GS, 46% na Scopus, a 44% na WoS. Najveći broj citata (189) potiče iz GS, dok zajednički citati pronađeni u sve tri baze čine samo 15%. Značajna je razlika u procentu jedinstvenih citata među bazama, gde na GS 58% čine jedinstveni citati, a Scopus i WoS imaju 6%, odnosno 4%. Najveće poklapanje u broju i obeležjima pronađenih citata uočeno je između baza WoS i Scopus (70%), zatim između Scopus i GS (18%), pa WoS i GS (17%). Većinu ostvarenih citata SGS (82%) čine originalni naučni radovi.

**Zaključak** WoS, Scopus i GS daju i kvantitativno i kvalitativno različite podatke o citiranosti SGS. Za prikupljanje kompletnih podataka o citiranosti SGS nijedna od ispitanih baza ne može da pruži sveobuhvatnu sliku, te je neophodno u obzir uzeti sva tri raspoloživa izvora.

**Ključne reči:** citiranost; citatne baze; Web of Science; Scopus; Google Scholar; Stomatološki glasnik Srbije

## UVOD

Bibliometrija, podoblast scientometrije i uopšteno nauke o nauci, nudi moćan skup metoda i mera koje se mogu primeniti u izučavanju strukture i procesa naučnih komunikacija [1]. Citatna analiza, kao jedan od najpoznatijih bibliometrijskih pristupa, najčešće je korišćena u procesu ocene rezultata naučnog rada, postignutog učinka i uticaja istraživača, institucija, regija, članaka, časopisa itd. Uprkos širokoj primeni, postoje mišljenja koja osporavaju stvarni značaj rezultata citatne analize [2-5]. Međutim, sâm tvorac citatnih indeksa Judžin Garfield (Eugen Garfield) isticao je da puko brojanje citata ne može identifikovati značaj koji nije prepoznat u naučnoj zajednici [6]. Citiranost, posmatrana kao odraz rada i interesa naučne zajednice, za kvalitativno vrednovanje zahteva i procenu recenzentata. Opravdanost i pouzdanost primene citata u proceni naučnog rada, kao i njihova usaglašenost s ocenama recenzentata iscrpno su predstavljeni u ranijim istraživanjima [7-10]. Većina kritika usmerenih na validnost rezultata citatne analize zapravo se odnosi na probleme u vezi sa korišćenjem izvora podataka, posebno na citatne baze Instituta za naučne informacije u Filadelfiji (Institute for Scientific Information – ISI; sada Thomson Scientific) [11].

Još od početka sedamdesetih godina dvadesetog veka ISI citatne baze (Science Citation Index, Social Sciences Citation Index i Arts & Humanities Citation Index) su poznate kao opšte priznate i najobimniji izvor naučnih informacija. Onlajn verzija ISI citatnih indeksa, koja je danas dostupna preko servisa Web of Science (WoS) u okviru portala ISI Web of Knowledge, obezbeđuje bibliografske podatke za nešto više od 10.000 najrelevantnijih časopisa iz svih oblasti nauke, kao i za više od 120.000 radova

sa stručnih konferencija. Multidisciplinarna priroda same baze i činjenica da, osim osnovnih bibliografskih podataka, sadrži i podatke o citiranoj literaturi svakog indeksiranog rada jesu glavni razlozi zbog kojih je WoS nešto više od 40 godina zauzimao jedinstvenu poziciju među bibliografskim bazama [12].

Novembra 2004. godine situacija se značajno promenila pokretanjem novih baza namenjenih praćenju citata: Scopus, koji je pripremio Elsevier, glavni konkurent korporaciji Thomson Reuters na tržištu informacionih proizvoda, i Google Scholar (GS), proizvod kompanije Google, ali koji je i dalje dostupan u svojoj beta verziji. Kako su WoS i Scopus dostupni samo onim naučnicima čije su institucije u mogućnosti da izdvoje znatne sume za cenu pretplate, GS je postao posebno zanimljiv izvor za izvođenje citatnih analiza upravo zbog slobodnog pristupa. Scopus, kao i WoS, obezbeđuje bibliografske i podatke o citiranoj literaturi za period od 1996. godine do tekućeg datuma, i to samo za radove koji su izvorno indeksirani u ovoj bazi. Opseg baze Scopus nešto je veći od baze WoS i obuhvata više od 17.000 recenziranih časopisa, kao i naslove koji potiču iz manje razvijenih i zemalja u razvoju. Scopus takođe referiše više od 1.200 časopisa dostupnih u otvorenom režimu, kao i 600 komercijalnih publikacija, 350 serija knjiga i 3,7 miliona radova sa stručnih konferencija. S druge strane, GS ne daje precizne informacije ni o broju obuhvaćenih zapisa, niti o vremenskom periodu koji pokriva. Poznato je da se podaci, odnosno reference automatski ekstrahuju iz izvora koji se u punom tekstu nalaze u slobodnom pristupu na internetu, bilo da je reč o arhivama reprinta, institucionalnim repozitorijumima ili ličnim internet sajtovima. Kada je reč o tradicionalnim oblicima naučne literature i izdavačima koji naplaćuju pristup radovima, podaci se indeksiraju samo kada je izdavač voljan da omogući slobodan pristup



barem sažetku rada. Značajno je to da je *Google* spreman za saradnju sa bibliotekama i da sve veći broj biblioteka postavlja svoje razrešivače linkova na *GS*, obezbeđujući direktan pristup svojim izvorima i na ovaj način [13]. *KoBSON* (Konzorcijum biblioteka Srbije za objedinjenu nabavku) i uzajamni katalog biblioteka Srbije (*COBISS.SR*) takođe su povezani sa *GS*, što korisnicima iz Srbije omogućava da pretražuju ovu bazu i nađu pune tekstove radova za koje je plaćen pristup iz naučnih institucija.

Jedno od dobro poznatih ograničenja citatne analize jeste činjenica da validnost njenih rezultata zavisi pre svega od pokrivenosti bibliografske baze koja je korišćena kao sredstvo za prikupljanje podataka i analizu. Razlike u području i časopisima koje obuhvataju, tipovima i jeziku dokumenata, vremenskim okvirima i aktuelnosti, kao i razlike u veličinama samih baza mogu u velikoj meri uticati na dobijanje različitih rezultata u bazama [14, 15]. Neke skorašnje studije su, poredeći rezultate citatnih analiza dobijenih korišćenjem baza *WoS*, *Scopus* i *GS*, prikazale veoma različite i oprečne rezultate [16-19], dok su druge jedinstvene u zaključku da nijedna od ovih baza ne može pružiti sveobuhvatnu pokrivenost citata i da izbor „najboljeg” alata zavisi od redovnosti i godine objavljivanja publikacije [11, 20, 21].

Podaci o citiranosti naučnih časopisa i analiza dobijenih citata korišćenjem baza *WoS*, *Scopus* i *GS* sve više su predmet interesovanja akademske zajednice [14, 22, 23]. Kako navodi Šember [22], stopa citiranosti manjih časopisa iz manjih zemalja može u velikoj meri uticati kako na povećanje naučne vidljivosti i veći priliv radova za objavljivanje, tako i na obezbeđivanje lokalne finansijske podrške. U Srbiji se za citatnu analizu, kao važan pokazatelj u vrednovanju naučnog učinka, zvanično koriste podaci dobijeni na osnovu *WoS*, a rezultati studije izvedene 2007. godine [24] ukazuju na potrebu uključivanja podataka iz svih relevantnih postojećih izvora, da bi se valorizovao učinak individualnih naučnika u Srbiji. Nastanak novih citatnih baza, kao što su *Scopus* i *GS*, dovodi u pitanje dominantnost baze *WoS* i preciznost bibliometrijskih i citatnih studija zasnovanih isključivo na podacima preuzetim iz ove baze.

Cilj ovog rada je bio da se utvrdi da li postoje značajne razlike u broju dobijenih citata za časopis „Stomatološki glasnik Srbije” (*SGS*) preko baza *WoS* i *Scopus*, odnosno da li se rezultati *GS* značajno razlikuju od onih dobijenih preko *WoS* i *Scopus* i da li *GS* može biti adekvatna kvalitativna zamena komercijalnim bazama podataka u proceni učinka ovog časopisa.

## MATERIJAL I METODE RADA

*SGS* je časopis Stomatološke sekcije Srpskog lekarskog društva i glavni izvor formalne komunikacije stomatologa na ovim prostorima. Nalazi se u slobodnom pristupu u okviru Repozitorijuma Narodne biblioteke Srbije, baze Srpskog nacionalnog citatnog indeksa (*SCIndeks*) i sopstvene internet stranice. Referisan je u *SCIndeks* bazi, odnosno u sistemu *Cross-ref* (*DOI*), na osnovu čega podleže vrednovanju i proceni učinka u nacionalnim okvirima i ostvaruje pravo na sufinansiranje Ministarstva za nauku i tehnološki razvoj Srbije. Kako je od 1966. do 1992. godine *SGS* bio referisan na *MEDLINE*, 686 radova *SGS* iz tog perioda nalazi se indeksirano u bazi *Scopus*, koja obuhvata i zapise s *MEDLINE*. Kasnija godišta *SGS* nisu izvorno referisana ni u bazi *WoS*, ni u *Scopus*.

Prikupljanje podataka o citiranosti radova *SGS* vršeno je u septembru 2010. godine pretraživanjem baza *WoS*, *Scopus* i *GS*. Ove tri baze su izabrane zbog mogućnosti bibliografskih pretraživanja i pronalazjenja citiranih referenci, što je osnovni alat za izvođenje citatne analize. *Scopus* i *GS* su izabrani jer predstavljaju jedine realne ili potencijalne konkurente bazi *WoS* na polju citatne analize i bibliometrijskih istraživanja.

Pronalazjenje citata za časopise koji nisu izvorno indeksirani na *WoS* moguće je ostvariti pretraživanjem citiranih referenci. Radovi iz tih časopisa su na *WoS* referisani samo na osnovu prvog autora i za njih ne postoji kanonski oblik naslova časopisa. Pronalazjenje citata *SGS* na *WoS* vršeno je pomoću opcije *Cited Reference Search*, na osnovu svih mogućih skraćenih oblika naslova časopisa: *stom\* gl\* OR serb\* dent\* OR strom\* glas\* s\* OR st\* gl\* srb\**, koji su rezultat nedoslednosti u navođenju naslova časopisa. U izrazu za pretraživanje zvezdica (\*) označava prazno mesto ili bilo koji niz karaktera koji se može pojaviti posle navedenih niski, dok *OR* (ili) vrši funkciju Bulovih logičkih operatora izdvajajući zapise koji sadrže bilo koji od navedenih naziva. Varijante *strom\* glas\* s\** i *st\* gl\* srb\** uključene su u izraz, jer je tokom upoređivanja citata pronađenih na *WoS* sa citatima iz drugih baza ustanovljeno da postoje radovi kod kojih je naziv časopisa naveden na ovaj način. Kao rezultat pretraživanja dobijen je 71 citiran rad i 86 citata, sa 15 varijanti naslova *SGS*. Zbog grešaka u navođenju autora, podaci su provereni; utvrđeno je da je 69 radova objavljenih u *SGS* na *WoS* citirano 85 puta. Jedan citat koji ne predstavlja grešku baze i za koji je ustanovljeno da je u tom obliku naveden u samom citirajućem radu nije bilo moguće proveriti i potvrditi, pa je on izbačen iz analize.

Metoda pretraživanja baze *Scopus* gotovo je istovetna načinu pretraživanja baze *WoS*. Korišćeni su sličan izraz za pretraživanje (*stom\* glas\* s\* OR serbi\* dent\* j\**) i opcija naprednog pretraživanja pomoću koda *REFSRCTITLE*, koji vrši pretragu po naslovima citiranih časopisa. Međutim, za razliku od *WoS*, *Scopus* ne daje mogućnost sagledavanja citiranih radova, već je neophodno manuelno izvršiti proveru svih citirajućih radova i utvrditi stvaran broj citiranih članaka. Kao rezultat pretraživanja javilo se 155 citiranih dokumenata, nakon čega su podaci provereni; potvrđeno je 68 citiranih radova, 94 citata, sa 13 varijanti naslova *SGS*.

S obzirom na to da ne postoje jasno definisana pravila i uputstva za pretraživanje *GS*, za prikupljanje podataka o citiranosti *SGS* u ovoj bazi korišćen je program *Publish or Perish*, koji istovremeno omogućava i vršenje različitih statističkih analiza. Korišćenjem opcije *Journal impact analysis* i sličnih izraza za pretraživanje, dobijeno je 177 citiranih radova, sa 417 citata. Međutim, nakon uklanjanja duplikata i verifikacije citata, ispostavilo se da je na *GS* citirano 117 radova *SGS*, sa 189 primljenih citata.

Kako bismo bili sigurni da neki od citata nije propušten zbog grešaka u pretraživanju ili indeksiranju, provereni su bibliografski zapisi za svaki citat koji nije pronađen u jednoj ili dve baze.

Svi relevantni podaci, kako citiranih, tako i citirajućih radova, uneti su u *Microsoft Access*® bazu podataka radi analize. Za citirane radove beleženi su autori, naziv rada, naziv časopisa, odnosno navedeni oblik naziva *SGS*, zatim godina, volumen, početna strana, tip rada i podaci o broju citata u sve tri baze. Naknadno su, zbog poređenja *GS* i *SCIndeksa*, uneti i podaci o citiranosti u okviru ove baze. Beležene karakteristike citirajućih

radova su: autori, naslov rada, časopis, godina, tip rada i jezik. Zatim su dobijeni citati u sve tri baze analizirani i upoređeni. Kao jedinstveni citati definisani su oni koji su pronađeni samo u jednoj bazi, a ne u druge dve. Zajednički citati su oni koji su pronađeni u sve tri baze. Utvrđeno je preklapanje u broju citata između sve tri baze, zatim preklapanje između baza WoS i Scopus, Scopus i GS, kao i WoS i GS.

## REZULTATI

U tabeli 1 prikazani su broj radova SGS citiranih u sve tri analizirane baze, broj primljenih citata i stopa samocitiranosti. Od ukupnog broja citiranih radova, 74% je citirano na GS, 46% u bazi Scopus, a 44% u bazi WoS. Ukupno 86% radova citiranih na WoS primilo je samo jedan citat, dok je na Scopus jednom citirano 81% radova, a na GS 56% radova (Tabela 2). Najviše citiran rad (sedam puta), autora „Rak D”, objavljen je 1989. godine.

Na GS 49% citiranih radova čine originalni naučni članci, dok je u druge dve baze procenat citiranih originalnih naučnih radova nešto veći: WoS 57% i Scopus 52% (Tabela 3). Najveći broj citiranih radova objavljen je u poslednjoj deceniji 20. i prvoj deceniji 21. veka. Najstariji rad, koji je citiran u sve tri baze, potiče iz 1957. godine (“KULJACA B. Osvrt na razvoj zubne medicine. STOM GLAS S, 1957”). Samo 15–20% citirane literature čine radovi objavljeni pre 1990. godine.

Od ukupnog broja dobijenih citata 69–72% pripada radovima sa grupnim autorstvom (Tabela 4).

Na WoS i Scopus citiranost je dostupna od 1996. godine, ali se u tabeli 5 vidi da je 78% ukupnog broja citata u bazi WoS dobijeno posle 2008. godine, dok je na Scopus u istom periodu dobijeno 68% citata. U GS 97% dobijenih citata potiče od 2002. godine do danas.

Od ukupnog broja citirajućih radova 82% čine originalni naučni članci, 8% pregledni radovi, a 6% radovi s kongresa i uvodne reči (Tabela 6). Najmanje je priloga, saopštenja, pisama, poglavlja i prikaza knjiga, i to na GS. Kada je reč o jeziku, 41% citirajućih radova objavljeno je na engleskom, 35% na srpskom, dok je 20% objavljeno dvojezično. GS je, u odnosu na WoS i Scopus, dao mnogo veći broj citata iz izvora koji nisu na engleskom jeziku: 42% je bilo na srpskom i 5% na kineskom jeziku (Tabela 7).

Tačnost pronađenih citata u slučaju WoS iznosi 99%, Scopus 89%, a GS 65%. Na WoS 30 časopisa citira radove objavljene u SGS, na Scopus ih je 39, dok ih na GS ima 46. Od ukupnog broja citata sa WoS (85) 36% je iz časopisa „Srpski arhiv za celokupno lekarstvo” (Srp Arh Celok Lek), 11% iz „Vojnosanitetskog pregleda” (Vojnosanitet Pregl) i po 5% iz časopisa *Collegium Antropologicum* i *Acta Veterinaria – Beograd*. Preostalih 43% citata dolazi od drugih referentnih časopisa sa impakt faktorom. Iz oblasti stomatologije i opšte i interne medicine je 72% citirajućih časopisa, dok su ostali naslovi iz oblasti hirurgije, antropologije, toksikologije, nauke o materijalima, gerijatrije, otorinolaringologije itd. (prema JCR kategorijama). Od citirajućih autora 53,6% je iz Srbije, a 15,3% iz Sjedinjenih Američkih Država. Slede autori iz Hrvatske, Škotske, Kanade, Pakistana, Tajvana, Australije. Nešto više od 50% citirajućih autora pripada institucijama univerziteta u Beogradu i Nišu. Na Scopus najveći broj citata potiče takođe iz *Srp Arh Celok Lek* (31%); slede *Vojnosanitet Pregl* (6%), *Int J Oral Max Surg* (5%), *Acta Veterinaria – Beograd* i *Archive of Oncology* (4%). Scopus obuhvata sve časopise referisane na WoS i još devet srpskih i regionalnih

naslova koji nisu indeksirani u ovoj bazi. Na GS pak 36% citata dolazi iz SGS, 17% iz *Srp Arh Celok Lek*, *Vojnosanitet Pregl* i *Acta Stomatologica Naissi* (5%).

Analizom distribucije jedinstvenih i zajedničkih citata sve tri baze (Grafikon 1) uočeno je da je od 249 dobijenih citata samo 15% pronađeno u sve tri baze. Najveće preklapanje je između WoS i Scopus (70%), dok se Scopus i GS, kao i WoS i GS preklapaju u samo 18%, odnosno 17% slučajeva. Značajna je i razlika u procentu jedinstvenih citata među bazama, gde na GS 58% čine jedinstveni citati, dok Scopus i WoS imaju 6%, odnosno 4%.

Uočeno je i veliko preklapanje GS i SCIndeksa – od 117 radova citiranih na GS, 95 (81%) je citirano i u drugoj bazi. Preostali radovi, koji nisu referisani na SCIndeksu, citirani su ili u međunarodnim časopisima ili u novim brojevima domaćih časopisa koji još nisu uneti u ovu bazu.

## DISKUSIJA

U većini prethodnih radova autori su prevashodno bili usredsređeni samo na utvrđivanje dobijenog broja citata i pokrivenost baza WoS, Scopus i GS, ne zalazeći u analizu prirode samih citata. U ovoj studiji, kao i u nekoliko studija urađenih posle 2007. godine [11, 22, 25], nisu upoređeni samo brojevi citata, već su proučena i preklapanja između citata i obeležja jedinstvenih citata svake od baza.

Rezultati dobijeni u ovom radu ukazuju na već dobro poznatu sliku o WoS kao selektivnom izvoru, koji obuhvata samo naučne časopise s visokim faktorom uticajnosti, dok pokrivenost Scopus i GS baza prevazilazi ove granice, uključujući i citate iz časopisa regionalnog i lokalnog tipa. Stepenn preklapanja ovih baza na primeru citata SGS je 15%, što potvrđuje zaključke prethodnih studija koje su pokazale da stepenn preklapanja citata između ove tri baze varira u zavisnosti od polja istraživanja, ali da nikada ne prelazi 31% ukupnog broja pronađenih citata [21].

Upoređivanjem podataka prikupljenih iz baza Scopus i WoS ustanovljeno je značajno preklapanje od 70%, što prevazilazi gornju očekivanu granicu od 58% [11]. Scopus uključuje devet citata (11%) više nego WoS, što direktno ukazuje na obimniju pokrivenost baze. Korišćenje baze Scopus uz bazu WoS može značajno uticati na povećanje impakt faktora časopisa [26, 27], što potvrđuju i pronađeni zajednički citati koji povećavaju citiranost SGS za 24% u odnosu na citate samo sa WoS (sa 85 na 105 citata). To znači da bi korišćenjem samo baze WoS skoro četvrtina relevantnih citata pronađenih i na WoS i na Scopus bila propuštena, dok bi u slučaju korišćenja samo Scopus pronađenih citata bilo 10,5%. Broj jedinstvenih citata pronađenih na Scopus je nešto veći nego broj citata dobijen preko WoS: 20 (19%) u poređenju sa 11 (10,5%). Iako se Scopus izgrađuje kao direktni konkurent bazi WoS, s jasnom težnjom da obuhvati sve zapise sa WoS, jedinstveni citati WoS koji se ne pojavljuju u bazi Scopus ukazuju na nedoslednosti i greške same ove baze (npr. delimično indeksiranje sadržaja časopisa ili nepotpuna lista referenci), čija je preciznost u ovom radu procenjena na 89%. Jedinstveni citati sa Scopus potiču iz međunarodnih (8) i nacionalnih (4) časopisa koji nisu indeksirani na WoS. Osim toga, u vreme pretraživanja mali broj jedinstvenih citata sa Scopus poticao je iz radova koji još nisu bili uneti u bazu WoS, što ističe kvalitet baze Scopus kao ažurnijeg izvora.

Kada je reč o tipu citirajućeg dokumenta, više od 80% ukupnog broja citata pronađenih u ove dve baze su originalni naučni članci. Dok je u nekim studijama u bazi *Scopus* uočeno mnogo više radova saopštenih na kongresima [11], u našem istraživanju te razlike nisu uočene; u obe baze citati iz radova s kongresa čine 4% ukupnog broja dobijenih citata. Budući da je 78% citata SGS ostvarenih na *WoS* i 68% citata na *Scopus* iz poslednje tri godine, moguć razlog povećane stope citiranosti je uključivanje časopisa „Srpski arhiv za celokupno lekarstvo” i „Vojnosanitetski pregled” na proširenu *SCI* listu 2008. godine. Međutim, detaljnom analizom podataka je utvrđeno da zapravo samo trećina ostvarenih citata potiče iz ovih časopisa, a veći deo dolazi iz radova objavljenih u drugim relevantnim međunarodnim publikacijama. Ova činjenica direktno ukazuje na uvećanu produktivnost i uspeh autora iz Srbije u ovom trogodišnjem periodu.

Kako bi se dobila što preciznija procena učinka SGS na osnovu citata, trebalo bi uključiti rezultate i *WoS* i *Scopus*, jer su ove dve baze, iako imaju relativno visok stepen preklapanja, pre komplementarne nego što bi mogle biti zamena jedna drugoj.

Poređenjem broja citata pronađenih u sve tri baze vrlo jasno se otkrivaju razlike između prve dve komercijalne baze i *GS*, u okviru kojeg je dobijeno znatno više jedinstvenih citata (144), što je u skladu s rezultatima prethodnih studija [11, 16, 20, 21]. Iako se očekuje da *GS* uglavnom prikazuje citate iz ne-tradicionálnih elektronski dostupnih dokumenata, kao što su magistarske teze, doktorske disertacije, poglavlja iz knjiga, knjige ili neregistrirane internet stranice [11, 23], samo neznatnih 0,7% citata *GS* potiče iz knjiga, dok su svi ostali jedinstveni citati *GS* u okviru ove baze iz radova objavljenih u naučnim časopisima, prevashodno regionalnih. Budući da neki renomirani izdavači (npr. *Elsevier*) nisu ustupili svoje podatke kompaniji *Google*, mnogi značajni citati iz relevantnih recenziranih časopisa su potpuno propušteni [15]. Stoga se može zaključiti da je praktično izlišno koristiti i *GS* uz baze *WoS* i *Scopus* prilikom izrade citiranosti za *GS* u visokokvalitetnim recenziranim časopisima. Osim činjenice da su citati primljeni iz međunarodno priznatih časopisa presudni za povećanje vidljivosti „malih” časopisa, vrlo je korisno pratiti i njihovu vidljivost i postignut uticaj u globalnom naučnom društvu [22], gde *GS* može poslužiti kao relevantan dodatni alat za pristup podacima o citiranosti ovoga tipa.

S obzirom na to da se u pronalaganju citata *GS* oslanja isključivo na elektronski dostupne cele tekstove, kao i u drugim studijama [11], svi citati sa *GS* dolaze samo iz radova objavljenih posle 1993. godine. Tek nakon konverzije starijih materijala u digitalni format i njihovog postavljanja na internet retrospektivno će se povećavati *GS* baza i broj dobijenih citata. Osim toga, u Srbiji su i dalje veoma retki primeri postojanja institucionalnih repozitorijuma ili ličnih internet stranica pomoću kojih je omogućen slobodan pristup disertacijama, knjigama, izveštajima itd. Dakle, *GS* trenutno prepoznaje citate samo kroz pune tekstove radova koji su dostupni u okviru nacionalnog citatnog indeksa – *SCIndeksa* i nacionalnog repozitorijuma od 2002. godine, što objašnjava činjenicu da je 97% ukupnog broja jedinstvenih citata ostvarenih na *GS* upravo iz tog perioda. Budući da samo 17,4% jedinstvenih citata *GS* dolazi iz međunarodnih časopisa, dok su ostalo citati referisani u *SCIndeksu*, uočeno je visok stepen preklapanja ova dva izvora.

Za razliku od *WoS* i *Scopus*, koji gotovo ekskluzivno pokrivaju samo anglofone izvore, *GS* daje značajno bolju pokrivenost

radova objavljenih na drugim jezicima, posebno na srpskom ili dvojezično (srpski/engleski) (67%). Zanimljivo je da 4,9% ostvarenih citata potiče iz radova objavljenih na kineskom jeziku, koji sve više postaje važan jezik naučne komunikacije [28]. S obzirom na broj lokalnih izvora koje obuhvata, *GS* može biti posebno relevantan u oblastima u kojima se naučni rezultati ne prenose isključivo na engleskom jeziku.

Rezultati pokazuju da *GS* pronalazi 84 (80%) citata SGS više nego baze *WoS* i *Scopus* zajedno (105), što ukazuje na to da korišćenje sve tri baze uvećava broj citata *GS* za 137% (sa 105 na 249 citata). Ipak, uključivanje većeg broja izvora za izvođenje citatne analize ne mora nužno voditi validnijoj proceni naučnog doprinosa [29], već je potrebno, pre svega, pažljivo ispitati sve mogućnosti i ograničenja korišćenog alata. Kada je reč o *GS*, neophodno je imati u vidu da je ova baza i dalje dostupna samo u svojoj beta verziji (test-verzija), sa slabim sposobnostima prepoznavanja metapodataka i ujedinjavanja pronađenih zapisa, što u velikoj meri lažno uvećava broj pogodaka i stopu citiranosti. Sam proces uklanjanja grešaka i duplikata iz dobijenih rezultata je Sizifov posao čak i za korisnike sa bogatim iskustvom u radu sa citatnim bazama. Ni primena programa *Publish or Perish*, alata namenjenog za prikazivanje rezultata baze *GS*, ne isključuje greške i duplikate, već samo olakšava njihovo prepoznavanje.

## ZAKLJUČAK

Na osnovu citatne analize za časopis *GS* u bazama *WoS*, *Scopus* i *GS*, može se zaključiti da postoji značajno preklapanje citata dobijenih u bazama *WoS* i *Scopus* (70%), dok je razlika u broju citata rezultat različitih pokrivenosti baza. Iako *Scopus* pruža nešto sveobuhvatniju pokrivenost citata *GS*, baza *WoS* ostaje nezamenljiv izvor podataka o citiranosti u najprestižnijim publikacijama. Utvrđen je nizak stepen preklapanja citata dobijenih u prve dve komplementarne baze i *GS* (15%). Veliki broj jedinstvenih citata *GS* potiče iz radova objavljenih u naučnim časopisima manje uticajnosti i prevashodno regionalnog tipa. Uprkos slobodnom pristupu, *GS* se ni u kom slučaju ne može smatrati adekvatnom zamenom za komercijalne baze *WoS* i *Scopus*. Ograničen samo na izvore koji su u slobodnom pristupu i za koje su izdavači dali saglasnost, *GS* pruža iscrpne podatke o citiranosti *GS* u naučnim časopisima manje uticajnosti, a u velikoj meri izostavlja citate iz visokouticajnih časopisa renomiranih svetskih izdavača koji su pokriveni bazama *WoS* i *Scopus*.

Rezultati ove studije bi mogli biti značajni pri izboru baza za bibliografsko pretraživanje literature, odnosno pri izboru najprikladnijeg alata za prikupljanje preciznijih podataka o citiranosti i procenu ostvarenog naučnog učinka u globalnom društvu. Iako manjih razmera, rezultati ovog istraživanja mogu doprineti stvaranju opšteg utiska i opsežne slike o sastavu i veličini postojećih citatnih baza podataka. Oni, premda nedovoljni za donošenje opštevažećih zaključaka, jasno ukazuju na to da nijedna od ispitanih baza ne može da pruži sveobuhvatnu sliku i bude zamena za druga dva izvora. Kako bi se prikupili što potpuniji podaci o postojećim citatima, neophodno je uzeti u obzir sva tri raspoloživa izvora.

Povećanje stope citiranosti *GS* direktno bi uslovlilo njegovo uključivanje u *WoS* listu časopisa, od čega bi najviše koristili imali pre svega autori naše akademske zajednice.