Evaluating the Trend of Four Dental Public Health Specialty Journals from 2001 to 2021 Using Bibliometric Analysis

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ABSTRACT

The aim of the paper is to evaluate the trend related to the academic performance of the four dental journals associated with the specialty of dental public health from 2001 to 2021 using bibliometric indicators. The data on eight bibliometric indicators for all the four dental journals [Journal of Public Health Dentistry (JPHD), Journal of Community Dentistry and Oral Epidemiology (JCDOE), Journal of Community Dental Health (JCDH) and International Dental Journal (IDJ)] were extracted from 2001 to 2021 using the SCImago Portal website. In order to determine the statistical trends over the years, linear regression was used. The probability value of less than 0.05 was considered statistically significant. The trend of SCImago Journal Rank was highest for JCDOE and was statistically significant for the JCDH and IDJ. The number of year-wise total documents was increased for JCDOE with a raise in 2012 and a highest peak in 2021 compared to the remaining three journals but was not statistically significant. All the journals showed significant annual increase in the citable documents (3 years). The year-wise total references showed a significant upward trend annually for all the dental journals from 2001 to 2021 except for JCDH. There was majorly a significant upward trend for most of the bibliometric indicators concerning the journals of dental public health specialty. These findings might serve as value addition for the editors and publishers of the dental journals to enhance their direction towards the success of their respective journals.

Keywords: Dental Public Health, Bibliometric Analysis, Bibliometric Indicators, Scientific Journals.

INTRODUCTION

In congruence with the medical field, where new development occurs every day, the field of dentistry also had taken its shift towards evidence-based dentistry. The role of scientific journals had prime importance in the dissemination of the data pertaining to the field of research (Momen, 2004). The five distinct parts of journals were identified by Schaffner, which had a role to play in scholarly communities (Schaffner, 1994). They include 'building a collective knowledge base, communicating information, validating the quality of research, distributing rewards, and building scientific communities' (Schaffner, 1994; Solomon, 2007). To achieve this, maintaining the quality of the journal is essential and mandatory.

In 1839, the first dental journal in the world, The American Journal of Dental Science, started its publication (Ring, 1986). Since then, the dental journals not only act as a source of knowledge but also serve as a mode of communication within the field of dentistry

and other disciplines. These journals provide a scientific basis to professionals in hunting for the better quality of life standards for the population (Poletto and Faraco Junior, 2010).

In search of a scientific instrument to assess the quality or the standard of a journal, we can find Bibliometrics to be an appropriate answer. The word Bibliometrics was first coined and defined by Pritchard as "The application of mathematics and statistical methods to books and other media of communication"(Pritchard, 1969). Inherently, this term means "the application of quantitative analysis and statistics to publications such as journal articles and accompanying citation counts" (Reuters, 2008). This analysis type could be useful in assessing the impact of publications on different levels.

The literature regarding the bibliometric analysis of scientific journals was scarce and was not updated for many years (Ding *et al.*, 1998; Kevin *et al.*, 2009; Poletto and Faraco Junior, 2010; Thanuskodi, 2010; Zainab *et al.*, 2009). However, in recent years, the bibliometric studies concerning dentistry had been publishing frequently (Abdou *et al.*, 2023; Almotairy, 2023; García *et al.*, 2022; Mishra *et al.*, 2016; Praveen *et al.*, 2022; Singh *et al.*, 2022; Skrzypczak *et al.*, 2022) and most of the published studies had used Scopus and Web of Science databases as a source of data

collection with various bibliometric indicators to analyze the data. None of the published literature in the dental public health specialty used SCImago portal as a source for data collection to perform a bibliometric analysis. Also, the authors were triggered by the constant world-wide growth of the academic article production; hence the initiation of the study by choosing the current research is a dire need. With keen interest towards the specialty of dental public health, that involves the assessment of the major dental health needs and comes up with effective solutions to improve the oral health of the population, the Journal of Public Health Dentistry (JPHD), Community Dentistry and Oral Epidemiology (CDOE), Community Dental Health (CDH) and International Dental Journal (IDJ) were included in this study since their use was accustomed. Hence, it is necessary to compare and evaluate the areas of improvement of these journals through bibliometric analysis. Therefore, this study aims to evaluate the trends related to the academic performance of the four dental journals associated with the specialty of dental public health in the 21st century using bibliometric indicators. The objectives of the research were to know the statistical trends over the years for all the four journals and to compare the trend of all the four dental journals using bibliometric indicators.

METHODOLOGY

Data source

SCImago portal website provides a number of bibliometric indicators to rank the scholarly output and impact on the country and journal-level based on Scopus publication and citation data. Hence, this was used as a source to extract the raw data regarding the academic performance of all the four dental journals starting from 21st century i.e., from 2001 to 2021. The year 2021 was used as the endpoint because the latest data available was of this year.

The description of the bibliometric indicators as per the publishers was mentioned below.

SCImago Journal Rank [SJR] – It is expressed as "the average number of weighted citations obtained in the selected year by the documents that are published in the selected journal in the previous three years."

Total Documents [Total Docs] (year wise) – It is "the output of the selected period." All the types of documents are considered, including citable and non-citable documents.

Total documents (3 years) – "The number of published documents in the three previous years (selected year documents are excluded)." Both citable and non-citable documents are considered.

Total References (year wise) – "It includes all the bibliographical references in a journal in the selected period."

Total Citations [Total Cites] (3 years) – "The number of citations received in the selected year by a journal to the documents published in the previous three years."

Citable Documents [Citable Docs] (3 years) – "The number of citable documents published by a journal in the three previous years. Exclusively articles, reviews, and conference papers".

Citations per document [Cites per Doc] (2 years) – "The average number of citations per document in a two-year period". It is computed as the number of citations received by a journal in the current year to the documents published in the previous two years.

References per document [References per Doc] (year wise) – "The average number of references per document in the selected year".

Data analysis

All the necessary statistical tests were performed using IBM (International Business Machines) SPSS (Statistical Package for Social Sciences) version 25.0 software. In order to determine the statistical trends over the years, linear regression was used. In the analysis, each bibliometric indicator was used as the dependent variable, and each year was used as the predictor variable. The same method was followed by Abente and Muñoz-Tinoco(López-Abente & Muñoz-Tinoco, 2005). This has also been used in other clinical disciplines for analyzing bibliometric data trends (Coronado *et al.*, 2011; de Araújo *et al.*, 2012; Kurmis and Kurmis, 2006; Lee *et al.*, 2011; Lim *et al.*, 2012; Loria and Arroyo, 2000). The slope of the regression equation, its coefficient of determination (R^2), and its significance was noted. The slope of the regression (β) indicates the average annual change of the concerned bibliometric indicator, and the R^2 value represents how well the regression line fits the data. The *p*-value of less than 0.05 is considered statistically significant.

RESULTS

The changes in the key bibliometric indicators of all the four dental journals, i.e., Journal of Public Health Dentistry (Table 1), Journal of Community Dentistry and Oral Epidemiology (Table 2), Journal of Community Dental Health (Table 3), and International Dental Journal (Table 4) were presented.

The trend of SCImago Journal Rank was statistically significant for JCDH and IDJ, with the highest for the journal of Community dentistry and oral epidemiology (Figure 1). The number of year-wise total docs was increased for JCDOE with a peak in 2012 and 2021 compared to the remaining three journals but was not statistically significant (Figure 2, Table 2). In terms of the total docs (3 years) indicator, the highest annual increase was observed for JCDOE (β=2.077, *p*=0.002), which was raised significantly from 2011 to 2013 and on the other hand, JCDOE exhibited a gradual decrease from 2015 to 2016 (Figure 3). The year-wise

Table 1: Key Bibliometric Indicators of Journal of Public Health Dentistry.

Bibliometric Indicator	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	Beta value	R^2	p value
SJR	0.539	0.767	0.58	0.596	0.648	0.697	0.929	0.762	0.677	0.714	0.486	0.006	0.066	0.261
Total Docs	34	60	38	41	42	82	47	49	56	44	62	0.730	0.134	0.103
Total Docs (3 Years)	136	123	156	148	135	141	210	162	142	151	161	1.445	0.150	0.083
Total References	662	546	814	791	1110	1663	1232	1292	1897	1239	1928	60.01	0.653	0.000*
Total Cites	89	134	157	130	160	204	322	213	229	279	342	9.899	0.675	0.000*
Citable Docs	132	118	150	141	126	136	162	138	138	149	156	1.104	0.278	0.014*
Cites Per Doc	0.35	1.03	0.75	0.73	1.3	1.36	1.93	1.36	1.62	1.85	2.09	0.062	0.721	0.000*
References Per Doc	19.47	9.1	21.42	19.29	26.43	20.28	26.21	26.37	33.88	28.16	31.1	0.877	0.579	0.000*

*p Value less than 0.05 – statistically significant.

Table 2: Key Bibliometric Indicators of Journal of Community Dentistry and Oral Epidemiology.

Bibliometric Indicator	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	Beta value	R^2	p value
SJR	0.894	1.085	1.201	1.56	1.496	1.349	1.181	1.424	1.039	0.984	0.823	0.001	0.000	0.954
Total Docs	58	65	58	62	62	63	65	64	69	65	125	1.535	0.306	0.009*
Total Docs (3 Years)	199	176	189	176	169	180	229	233	199	220	214	2.077	0.398	0.002*
Total References	1639	1771	1856	2292	2192	2123	2562	2455	2801	2522	4826	88.678	0.599	0.000*
Total Cites	291	342	403	426	505	495	525	653	465	529	716	15.634	0.733	0.000*
Citable Docs	197	174	183	171	165	176	222	227	192	206	210	1.745	0.326	0.007*
Cites Per Doc	1.45	1.72	1.97	2.16	3.15	2.38	2.15	2.92	2.13	2.25	2.98	0.053	0.501	0.000*
References Per Doc	28.26	27.25	32	36.97	35.35	33.7	39.42	38.36	40.59	38.8	38.61	0.506	0.522	0.000*

*p Value less than 0.05 – statistically significant.

Table 3: Key Bibliometric Indicators of Journal of Community Dental Health.

Bibliometric Indicator	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	Beta value	R^2	p value
SJR	0.571	0.908	0.886	0.815	0.52	0.417	0.578	0.493	0.47	0.433	0.387	-0.019	0.459	0.001*
Total Docs	45	38	47	35	44	64	49	50	48	47	50	0.374	0.080	0.215
Total Docs (3 Years)	148	134	123	125	118	141	176	163	152	143	139	1.168	0.177	0.058
Total References	852	762	1019	659	726	1163	1026	1102	1051	1381	1400	17.405	0.124	0.118
Total Cites	112	131	175	143	114	117	184	152	152	171	205	2.304	0.242	0.024*
Citable Docs	12	108	107	107	108	130	163	148	138	129	126	3.130	0.397	0.002*
Cites Per Doc	1	1.16	1.31	0.93	0.9	0.8	0.98	0.9	1.01	0.67	1.41	-0.003	0.004	0.789
References Per Doc	18.93	20.05	21.68	18.83	16.5	18.17	20.94	22.04	21.08	29.8	28	0.131	0.020	0.540

*p Value less than 0.05 – statistically significant.

Table 4: Key Bibliometric Indicators of International Dental Journal.

Bibliometric Indicator	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021	Beta value	R^2	*p* value
SJR	0.429	0.609	0.477	0.429	0.524	0.557	0.761	0.655	0.637	0.665	0.678	0.015	0.627	0.000*
Total Docs	67	66	66	70	48	74	67	47	60	78	105	0.526	0.060	0.286
Total Docs (3 Years)	171	201	216	193	179	165	184	178	162	182	216	-0.364	0.018	0.564
Total References	1320	1917	1502	2108	1642	2369	1275	1654	1948	2004	3802	38.644	0.194	0.046*
Total Cites	121	184	227	193	195	202	300	255	251	328	531	13.757	0.678	0.000*
Citable Docs	171	199	214	191	174	157	173	167	152	166	183	-1.506	0.302	0.010*
Cites Per Doc	0.57	0.71	0.89	0.94	0.71	1.1	1.6	1.24	1.3	1.84	2.11	0.073	0.840	0.000*
References Per Doc	19.7	29.05	22.76	30.11	34.21	32.01	19.03	35.19	32.47	25.69	36.21	0.292	0.135	0.102

*p Value less than 0.05 – statistically significant.
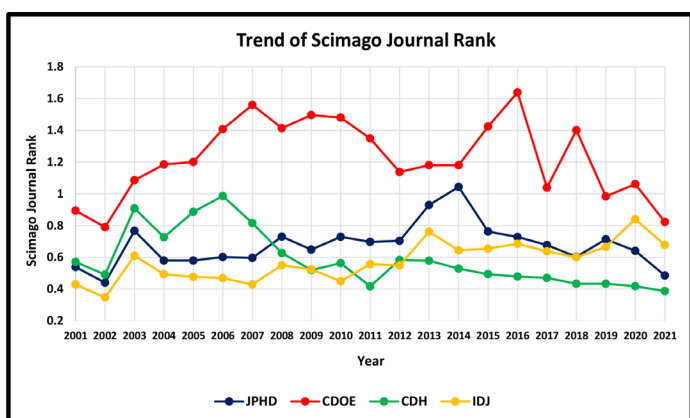
Figure 1: Depicting the trend of SCImago Journal Rank of all the four dental journals.
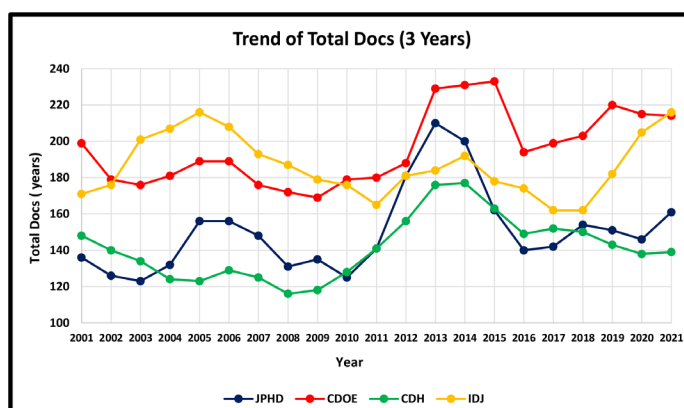

Figure 3: Depicting the trend of total documents (3 years) of all the four dental journals.
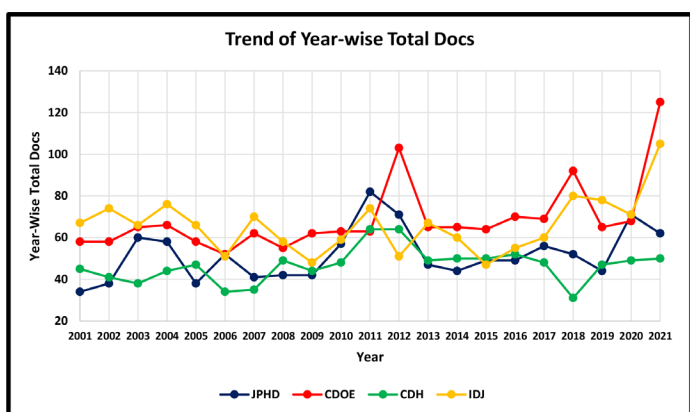

Figure 2: Depicting the trend of year-wise total documents of all the four dental journals.
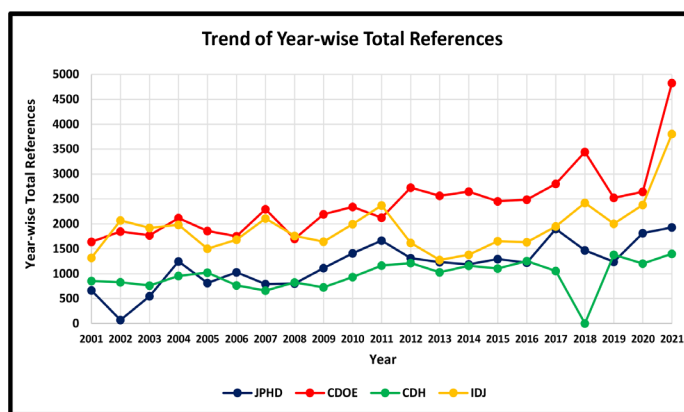

Figure 4: Depicting the trend of year-wise total references of all the four dental journals.

total references showed a significant upward trend annually for JCDOE (β=88.678, *p*=0.000) from 2001 to 2021, and for JPHD (*p*=0.000), there was a significant decline from 2001 to 2002 and an increase from 2007 to 2011 and again a peak was observed at 2017, but for JCDH, there was a decline at a glance from 2016 and reached the baseline at 2018 (Figure 4). For all the dental journals, the trend of total cites (3 years) was statistically significant with a probability value of less than 0.05 (Figure 5). The JCDH (β=3.13,

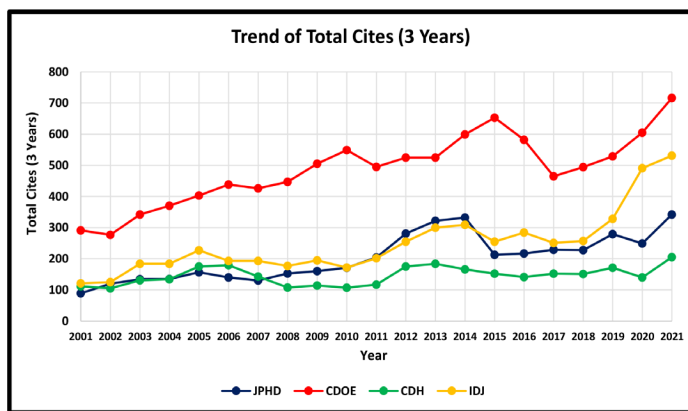**Figure 5:** Depicting the trend of total cites (3 years) of all the four dental journals.
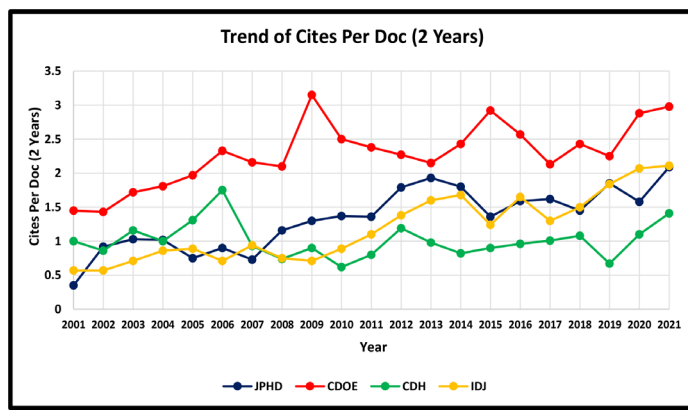

Figure 7: Depicting the trend of cites per document (3 years) of all the four dental journals.
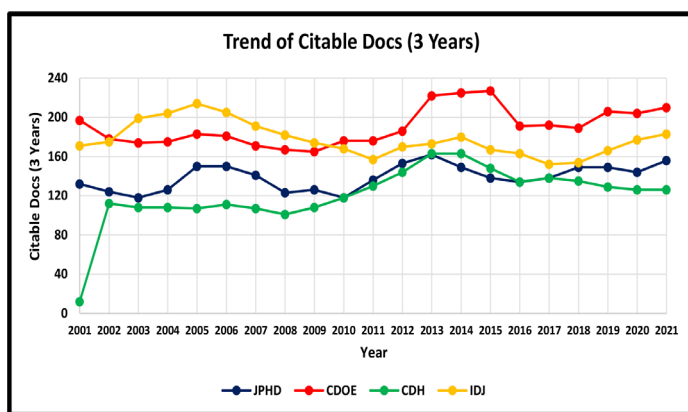

Figure 6: Depicting the trend of citable docs (3 years) of all the four dental journals.
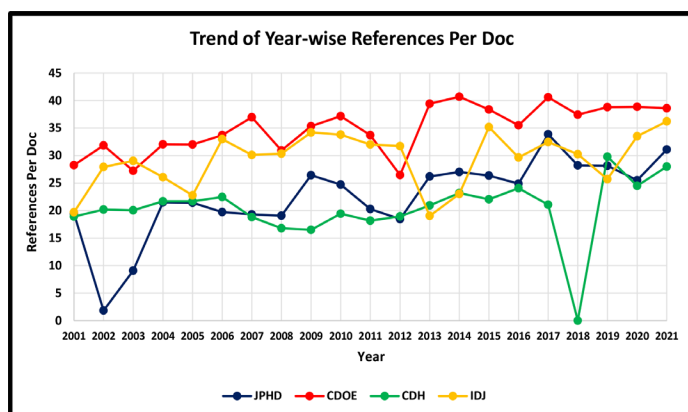

Figure 8: Depicting the trend of year-wise references per document of all the four dental journals.

p=0.002) showed the highest significant annual increase in the citable docs (3 years) compared to the other journals, where there was a decline in the IDJ (β=-1.506) annually, and this finding was found to be statistically significant (Figure 6). The trend of cites per doc (2 years) showed a sharp rise in 2009 and again in 2015 for JCDOE, but for the remaining dental journals, finally, there was an increase in 2021 from 2001 except for JCDH which exhibited a fluctuating trend (Figure 7). The year-wise references per doc indicator experienced a fluctuating trend from 2001 to 2021 for all the four dental journals, and the JCDH reached the baseline in 2018 (Figure 8).

DISCUSSION

Community Dentistry and Oral Epidemiology is a specialty journal with an objective to serve as a forum for scientifically based information in the field of Public Health Dentistry internationally. Community dental health is a specialty journal concerned with dental public health and related subjects. The journal of public health dentistry is committed to the advancement of public health dentistry through the expedition of related research, practice, and policy developments. The international

dental journal is the Federation Dentaire Internationale's primary scientific publication that focuses on international public health, practice-related research, and inter-professional education and practice. Thus, all the journals were of the same discipline of dental public health.

To the best of the authors knowledge, it is the only study that quantitatively evaluated the academic performance through bibliometric indicators of these four dental journals related to the specialty of dental public health.

Most of the bibliometric indicators are based on the citations and documents. However, these alone are not an actual reflection of the performance of a particular journal. Some may cite the article, and others may not, even if they have discussed it with their colleagues. Articles should determine the journal citation rate and not vice-versa.

The majority of the key bibliometric indicators demonstrated an average increase annually. The highest total cites increase annually with 15.634 for JCDOE, and it is lowest for JCDH with an average of 2.304 annually. This could be due to a wide variety of reasons. One of them could be the widespread use of the

internet, which facilitates the spreading of knowledge that would have contributed to the rise in weighted citation counts, which in turn contributes to a rise in SJR except for JCDH, where there is an average annual decrease in SJR.

On the other hand, the number of citable documents (3 years) has the highest annual average for JCDH with 3.13 and had a decrease annually with an average of 1.506 for IDJ. This could suggest that the articles, reviews, and conference papers published in the IDJ could be lower than JCDH, and to overcome that, IDJ could have published other types of publications.

The average increase of year wise total documents was highest in JCDOE, and JCDH had the lowest. The same total documents (3 years) demonstrated a greater annual increase in JCDOE and annual decrease in IDJ.

One of the key findings of the present study was that there was an average annual increase in the number of total references for the four dental journals but was not statistically significant for JCDH. The year-wise total references and year wise references per document explain the similar trend between the journals. The former is the total references, and the latter was the average number per document. The total number of references for JCDOE was highest with an average annual increase of 88.678, where JCDH was lowest with 17.405 references, and the average references per document annually were highest for JPHD and were lowest for JCDH. This could be supported by a possible explanation that the number of references in the article could escalate the chances of the article being published, and failure to sufficiently cite others work may reduce the chances of publication. But you need to meet all the needs without overwhelming the reader with too many references. Only the most relevant and recent articles need to be cited, and this might be the reason for the lowest average annual references for JCDH.

The studies available in the literature compared different dental public health specialty journals using a different data source and methodology with various bibliometric indicators that are not identical to the present study (Jain *et al.*, 2014; Karishma *et al.*, 2021; Kumar *et al.*, 2022). Hence, the results of this study cannot be compared with more published literature as there were no available published studies with similar methodology to support or refute the findings. But as the author's perspective, the usage of the journal can be dependent on many factors and some of them include the popularity of the publisher, well-liked author, published country, availability of hard copies in the institutional libraries, famous publication organization, and a word-of-mouth promotion which can influence the usage of the journals that might cause a high-quality journal to be looked upon as of low quality.

One of the limitations of the present study is that it did not include all the bibliometric indicators. Hence, the complete evaluation of the journals solely based on some indicators is not possible. The other is that the data was obtained through a single source.

CONCLUSION

With the given limitations, there was majorly a significant upward trend of most of the bibliometric indicators for the journals related to the specialty of dental public health. With respect to all the indicators of all the four dental journals, the trend of JCDOE remains highest for most of the bibliometric indicators compared to the remaining journals. These findings would be of value addition to the editors and publishers of the dental journals to enhance their direction towards the success of their respective journals. Further bibliometric studies for various journals in the specialty of dental public health are required by considering all the sources and bibliometric indicators in order to evaluate the academic performance which will in turn help in raising the quality and standard of scientific journals.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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