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Application of Mix Metrics and Scientometrics Analysis in the Indian Journal of Biochemistry and Biophysics

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This paper present a scientometrics study of the Indian Journal of Biochemistry and Biophysics (IJBB). The coverage of the whole article is 2011-2020. We have seen the distribution of keywords of the specific subject domain and also distributing the paper origin of the country and authorship pattern and format of the article. Some articles focus on current pandemic-related antimicrobial peptides. The purpose of this paper is to holistic analysis of the Journal of Biochemistry and Biophysics in terms of important bibliometrics, scientometrics aspect. Methodology: The methods are applied in this study analysis and metrics. And the application of different types of metrics like bibliometrics, scientometrics, etc Findings: We saw that most of the paper was an application of laboratory and clinical analysis related subject domain Value : a significant amount of bibliographical data analysis and this paper is valuable of the field of laboratory-related people to metrics of quantitative evaluation of IJBB articles.

Keywords: *Bibliometrics, Scientometrics , Mixmetrics, Indian Journal of Bicochemistry and Biophysics*

1 INTRODUCTION

In the modern age explosion of information have found in many disciplines. Biochemistry and Biophysics is no exception. But how these fields contributed in knowledge explosion can be found by examining a qualitative analysis of the articles published in this domain. This study reflects a quantitative analysis by using mixed methods of matrix and scientometrics analysis of the articles published in Indian Journal of Biochemistry and biophysics during last ten years (2011-2020). The basic goal of the study is to holistically analyse the journal in terms of important bibliometric aspects. Analyses were executed to illustrate authorship impact, citation patterns, subject coverage and visualization

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of citations' connections, co-authorship, among 512 articles published in this area in that particular journal during last ten years.

2 OBJECTIVES

1. To find the subject growth;
2. To investigate the growth pattern of biochemistry and biophysics reflected in IJBB;
3. To execute the quantitative analysis of all fields in biochemistry and biophysics;
4. To identify the national as well as foreign contribute in this area;
5. To analyse the citation in this area based on web of Science, Scopus, and Google Scholar;

3 REVIEW OF LITERATURE

The search result of "mix metrics and scientometrics analysis on the Journal" shows 33200 results in simple google search. Whereas the Google Scholar shows 13600 results. Ramanan and Ravikumar (2020) have made a study on the journal of the University Librarians' Association of Sri Lanka (2005 to 2019), where they illustrated authorship impact, citation patterns, subject coverage, and visualization of citations' connections, co-authorship, and co-occurrence network etc.

Salim and Basu (2017) carried out an analysis of PhD Thesis of engineering which shows that the highest number of uses of e-resources, authorship pattern, and country language literature used in civil engineering and they also identified the core journals used in these fields. Das, Das, and Dutta (2021) reviewed of bibliometrics study on Indian Physics and Astronomy research output. In this article, they investigated the growth patterns of Indian Physics and Astronomy and prepared a comparative bibliometrics and scientometrics study in this area.

Young, Wilkinson and Smith (2015) conducted a scientometrics analysis of the contents of the *Journal of Business-to-Business Marketing* from 1993 to 2014.

Veerabasavaiah (2014) analysed 6688 citations appended to 42 PhD. from Bangalore University. The study has shown that a higher number of citations appeared as first rank in the geographical distribution of citation.

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Veerabasavaiah (2014) analysed 6688 citations appended to 42 PhD. from Bangalore University. The study has shown that a higher number of citations appeared as first rank in the geographical distribution of citation. Das, A. K., Gopinath, D., & Dutta, B. (2021) carried out a PhD thesis in Economics. The

study of the theses has been the submitted year 2006. It has shown the authorship pattern and the highest number of citations. it is observed from the above literature that those are mainly describes the authorship pattern, year-wise distribution of citation of those articles.

4 SCOPE

Biochemistry and Biophysics an important discipline in science and has an interdisciplinary nature. This journal publishes original research articles in the allied subjects since 1964 by CSIR-NISCAIR New Delhi. The present study has limited its coverage of the publication of last ten years (2011-2020).

5 METHODOLOGY

The purpose of this paper is to holistic analysis of the Journal of Biochemistry and Biophysics in terms of important bibliometrics, scientometrics aspect in terms of Library and Information Science. To illustrate authorship impact, citation patterns, subject coverage, and visualization of citations, co-authorship etc., the analysis and metrics methods have been applied here.

6 DATA COLLECTION

The data for the present study are collect from NISCAIR online periodical repository. Here we have been collected all raw data from the Indian Journal of Biochemistry and Biophysics (IJBB) during 2011-2020. We have been found the different laboratory-based clinical methods related articles have covered in this journal.

7 ANALYSIS OF DATA

The analysis of cited works of literature in Biophysics and Biochemistry reveals the following findings:

71 SUBJECT DOMAIN-BASED ANALYSIS:

By studying all the articles in the selected Journal during 2011-2020, we have identified total 3010 facets. Out of 3010 facets thirteen subjects were used more than ten times. “Antioxidants” (27.42%) facet was used sixty times. The facet “Cancer” (13.08%) has appeared thirty-one times. The “Oxidative Stress” (9.70 %) facet was visualised twenty times. Least no of subject domain is three same number of subject domains all are (5.48%). The rank list of the top-cited thirteen facets have presented and distributed in descending order shown in the table-1 and figure-1.

Name of Subject Domain	*Number of used*	*% Ofused*	*Cumulative no of domain*	*%*
Antioxidants	65	27.42	65	4.8
Cancer	31	13.08	96	7.10
Oxidative stress	23	9.70	119	8.80
Molecular docking	20	8.43	139	10.28
Myeloperoxidase (MPO)	17	7.17	156	11.54
Apoptosis	17	7.17	173	12.80
Oryza sativa	15	6.32	188	13.91
Molecular modelling	13	5.48	201	14.87
Heat shock	13	5.48	214	15.84
Alzheimer's disease	13	5.485232		0.24

Table 1

Subject Domain

Table 1 Top 10 facets appeared in IJBB during 2011-2020

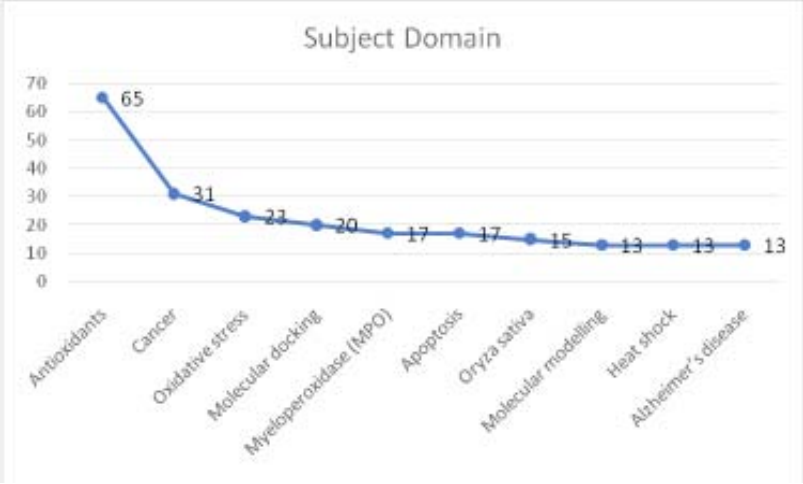

Fig. 1 *Top 10 facets*

72 COUNTRY-WISE CONTRIBUTION

By studying the country wise contribution shown in the table -2 it is found that India holds the top position contributed 70.64 % of the total publication followed by China (7.19%) Turkey (5.89%), Soudi Arabia (3.02%). Interestingly it is found that USA's contribution is only 0.08%. It probably doesn't mean that research output in this field in USA (1.15%) is poor, but it may be the reason that researchers in this area from USA are not really interested to send their paper in IJBB.

From there we understand that India is in the top position of the world. And in the second position of China, we get Turkey and in the number three, we get Saudi Arabia. In IJBB just as we get the contribution of many states in our country, we can see that the contribution of foreign countries is not less in any part.

TABLE 2

Country wise distribution

Name of the States	*No of Contributors*	*%*
Armenia	1	0.14
Australia	3	0.43
Bangladesh	1	0.14
Brazil	6	0.86
Chania	50	7.19
Chicago	1	0.14
Coimbatore	4	0.57
Czech Republic	1	0.14
Egypt	11	1.58
England	2	0.28
India	491	70.64
Indonesia	2	0.28
Japan	2	0.28
Korea	14	2.01
Malaysia	6	0.86
Mexico	6	0.86
Pakistan	2	0.28
Romania	1	0.14
Russia	5	0.71
Saudi Arabia	21	3.02
Serbia	10	1.43
Spain	2	0.28
Sri Lanka	3	0.43
Srinagar	1	0.14
Turki	41	5.89
USA	8	1.15
Total	695	100

73 STATE -WISE CONTRIBUTION

State wise distribution is very important because has contributed the greatest number of contributors to this to this journal through this distribution. State wise distribution is shown here. West Bengal has largest number of states in India during this period (2011-2020), West Bengal (23.48%) of the topmost contributor in this field among India. Many states in India are provided with

their article for publication to JBB. Here we see 97 contributors from West Bengal writing in JBB Journals.Delhi is in second place (12.59%). Jammu and Kashmir and Gujrat are same position (7.02%) is thenext place followed by Arunachal Pradesh (7.2%). There are many foreign countries and their contributions such as England, Egypt, Brazil, China etc,

TABLE 3

State wise contributor

Name of the Country	*No of Contributors*	*%*
Andhra Pradesh	19	4.60
Arunachal Pradesh	30	7.26
Assam	1	0.24
Bihar	1	0.24
Chandigarh	15	3.63
Delhi	52	12.59
Goa	2	0.48
Gujarat	29	7.02
Haryana	9	2.17
Himachal Pradesh	2	0.48
Jammu and Kashmir	29	7.02
Jharkhand	2	0.48
Karnataka	10	2.42
Kerala	3	0.72
Panjab	1	0.24
Madhya Pradesh	9	2.17
Maharashtra	21	5.08
MadhyaPradesh	2	0.48
Orissa	6	1.45
Panjab	11	2.66
Rajasthan	11	2.66
Telangana	21	5.08
Uttar Pradesh	22	5.32
Uttarakhand	4	0.96
West Bengal	97	23.48
Total	413	100

74 YEAR-WISE DISTRIBUTION OF PAPER

Here we see the number of papers of IJBB and its percentage. In this case we see the number of papers in a year are increasing of every year. 2019 (10.92%) and 2020 (15.48%) we are slowly getting the year wise drawing but the number are lower in 2016(4.32%) and 2017 (5.82 %) because some article came out in marge of the issue.

TABLE 4

Year-wise distribution

Year	*Number of Paper*	*%*
2020	85	15.48
2019	60	10.92
2018	50	9.10
2017	32	5.82
2016	24	4.37
2015	41	7.46
2014	69	12.56
2013	72	13.11
2012	59	10.74
2011	57	10.38
Total	549	100

Table 4 shows that figure 2 that can indicate the distribution of Biochemistry and Biophysics every year.

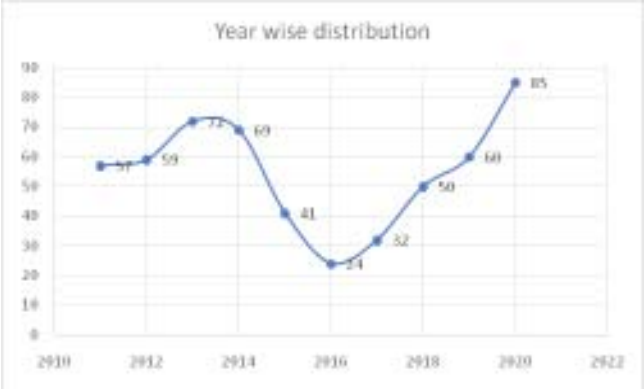

Fig. 2 *Year-wise growth rate*

75 CHANGING RESEARCH METHODS OF THE APPLICATION IN ALL ARTICLES

Here we have been seen different types of methodology are applying in this article. If we take a good look at IJBB Journal, we can see the application of different types of research methods in its methodology. If we take a good look at these different types of research, we can see that most of the research paper are related to clinical and laboratory based.Most of the laboratory methodshave been used in these articles or another over the year. Here, we see two types of research methods most commonly used, Clinical Method and experimental and statistical study methods are same (12.22%)Experimental (9.44%).

TABLE 5

Application of Research methods

Research methods	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*	*%*
Biochemical Study	3	2	1	2	2	1	2	2	4	2	21	3.88
Biosynthesis Study	2	3	3	3	1	1	2	1	2	2	20	3.70
Case Study	2	1	3	1	2	-	1	2	2	6	20	3.70
Clinical Experiment	1	2	13	2	2	1	1	2	2	5	31	5.74
Clinical Model	11	6	5	6	5	1	7	7	7	11	66	12.22
Clinical Pathologies	6	11	2	11	1	2	1	1	1	2	38	7.03
Experimental and Statical Study	7	7	3	7	3	3	4	8	10	14	66	12.22
Experimental Study	7	1	14	1	5	3	2	5	7	6	51	9.44
Experimental Research	1	7	2	7	4	1	1	4	4	8	39	7.22
Review Literature	2	1	1	1	2	-	-	2	2	3	14	2.59
Experimental Study	1	2	1	2	1	4	1	1	2	2	17	3.14
Extensive Research	2	2	1	2	1	1	1	2	1	2	15	2.77
General Experiment	2	1	2	1	1	-	1	1	2	1	12	2.22

Research methods	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*Total*	*%*
General Experiment	1	2	1	2	1	2	2	-	1	1	13	2.40
Genotype Experiment	1	2	2	2	1	-	-	1	1	-	10	1.85
Laboratory Experimental	2	1	12	1	5	3	5	5	6	6	46	8.51
Measurement of Experimental Study	1	2	1	2	1	-	-	1	2	2	12	2.22
Self-Deconvolution Technique	1	2	1	2	1	-	1	2	1	3	14	2.59
Statistical Analysis	1	1	1	1	1	-	-	1	1	5	12	2.22
Statistical Hypothesis	2	2	2	2	1	-	-	1	1	2	13	2.40
Structural Modelling	1	1	1	1	1	1	-	1	1	2	10	1.85
Total											540	100

76 AUTHORSHIP PRODUCTIVITY OF THE YEAR

We can see that 289 authors have been contributed in 2020. This statistic is the highest in the last 10 years at 11.38 per cent. Then we see in 2011 this satisfaction paper wrote 57 (%9.63). Also, good enough with the statistic of 2014 and 2013 (%13.79 and 12.22) we see it. The geographical variation of the cumulative number of the authors with the cumulative paper can see in this table. If we see no of paper we have been seen (15.48 %) of the no papers. And 2nd position of the paper 13.11% in year of 2013. Least of product in the year of 2016 (4.37%).

TABLE 6

Authorship Productivity of Year

Year	*No of Papers*	*% of Paper*	*Total no of Author*	*% of Author*
2020	85	15.4827	289	12.65878
2019	60	10.92896	260	11.38852
2018	50	9.107468	204	8.935611
2017	32	5.82878	142	6.219886
2016	24	4.371585	112	4.905826
2015	41	7.468124	217	9.505037
2014	69	12.56831	279	12.22076
2013	72	13.11475	315	13.79763
2012	59	10.74681	245	10.73149
2011	57	10.38251	220	9.636443
Total	549	100	2283	100

77 AUTHOR PRODUCTIVITY ANALYSIS

Collaborative Index as per Lawlaniapplication (Jainab,2009) the collaborative Index is the most effective of these fields. Here we can see the quotatives measure of research collaboration. Collaboration Index is the total number of authors divided by the total no of papers in a year. Here we have been applying the author's productivity of Subranayam propounded that the Degree of Collaboration. Degree of Collaboration is the total no of multi authors by the total no of authors [4]. Lotka Laws is one of the Basic studies, based on Lotka Law we have been seen the constant value of Authors productivity. Here we can see that now included work accordingly to the constant value of productivity are 2020,2014,2013 is more than others years.

TABLE 7

Authorship Proactivity Analysis

Year	Total Number of Papers (p)	Total no of Author (tp)	% Of Author	Multi-Author contributes in a year (mac)	Single Author contribute in multi work and different time in a year (sacmw)	Collaboration Index (tp/p)	Degree of Collaboration (mac/tp)	Lotka's Constant Value of Productivity (sacmw/mac)
2020	85	289	2.89	19	44	3.4	0.065744	0.431818
2019	60	260	2.6	8	16	4.333333	0.030769	0.5
2018	50	204	2.04	1	2	4.08	0.004902	0.5
2017	32	142	1.42	2	4	4.4375	0.014085	0.5
2016	24	112	1.12	-	-	4.666667	-	-
2015	41	217	2.17	2	4	5.292683	0.009217	0.5
2014	69	279	2.79	9	19	4.043478	0.032258	0.473684
2013	72	315	3.15	10	22	4.375	0.031746	0.454545
2012	59	245	2.45	4	8	4.152542	0.016327	0.5
2011	57	220	2.2	6	12	3.859649	0.027273	0.5
Total	549	2283	100	61	131			

78 PRODUCTIVITY OF THE CUMULATIVE ARTICLE IN CONTEXT RANGE OF THE YEAR

Here it is seen that the productivity of the article is the highest 2020 and lowest in 2016. In the cumulative number of articles from 2010 to2019 we see only 118 products, but in 2020-2021whose numbers has increased to 522.

TABLE 8

Productivity of the article in context range of the year

Year	No of article	Cumulative article	Cumulative article %	Cumulative no of the article (2010-2019)	Cumulative no of the article (2020-2020)
2020	85	85	2.78	2500	522
2019	60	145	4.75		
2018	50	195	6.38		
2017	32	230	7.53		
2016	24	254	8.32		
2015	41	295	9.66		
2014	69	365	11.95		
2013	72	436	14.28		
2012	59	495	16.21		
2011	57	552	18.08		

791 DISTRIBUTION OF THE PAPER IN DIFFERENT CITATION DATABASES:

Indian Journal of Biochemistry and Biophysics started in 1964. The first issue IJBB that we see online mode is in 1984. Every year since 1999 continuously until. However, from Google Scholar and JCR, we see the cited value of the site called the High Site paper of IJBB.

TABLE 9.1

Distribution of the paper in the different citation database

Year	Google Scholar Cited	Web of Science Cited (JCR)	Scopus
2020	22	1.918	-
2019	-	-	-
2018	-	-	-
2017	-	-	-
2016	-	-	-
2015	-	-	-
2014	-	-	-
2013	-	-	-
2012	-	-	-
2011	-	-	-

792 VARIATION OF THE NUMBER OF PAPERS AND NUMBER OF AUTHORS

Here Subir Kumar Das is the 1st Ranked and Vijoy Kumar Kutala is also the same ranked and last three-person Shabdhi Ghosh, Tapathi Chakraborty and Shaik Mohammad Nusad are all 2nd Position the ranked by hold.

TABLE 9.2

Variation of the number of papers and number of authors

Sl No	Rank	Name of the top Author	No of Paper
1	1	Subir Kumar Das	6
2	1	Vijoy Kumar Kutala	6
3	2	Shatabdi Ghosh	3
4	2	Tapathi Chakraborty	3
5	2	Shaik Mohamad D Nusad	3

793 FACTS OF DIFFERENT BIBLIOGRAPHICAL CONTEXT ANALYSES

In terms of References, the number of references in the year 2020is much Higher. Later in 2015, the number of references was less but the number of references is much higher which is 1742 (11.95 %). Thus continuously 2016,2017 (11.20% and 11.95%) are to increase. In this Table, the 2020 (12.70%) largest producer of references, the fifth place we have to find are occupied respectively.

TABLE 9.3

Facts of different bibliographical context analysis

Year	No of reference	%Of Reference
2020	1851	12.70593
2019	1360	9.33553
2018	1532	10.5162
2017	1485	10.19357
2016	1632	11.20264
2015	1742	11.95772
2014	1324	9.088413
2013	1254	8.607908
2012	1236	8.484349
2011	1152	7.907743

794 AUTHORSHIP PATTERN

We see the number 4.70% in the single author between 2011 and 2020. And two author in a journal 13.44% three 18.31% four authors 15.96% five author 11.42%, Thus in total we see that 595 authors have written on this subject in this journal. An increasing series of the value are growing of every year. Here we are constantly seeing that the number of good from the multi author onwards issue high that it effects the numbers in every issue of the article.

795 DEGREE OF COLLABORATION

from the application of degree of collaboration Subramanyam 1983 article we have seen that single author collaboration is law than multi author. Degree of collaboration is much higher in the case of Multi authors (Ravikumar M N and Ramanan, T. (2020).

TABLE 9.5

Degree of collaboration

Authorship	2011-12	2013-14	2015-16	2017-2018	2019-20	Total	%
Single Author Article	10	9	1	2	6	28	4.705882
Multi Author Article	87	149	94	125	112	567	95.29412
Degree of Collaboration	0.896907	0.943038	0.989474	0.984252	0.949153		

796 AUTHOR PRODUCTIVITY IN BASED ON LOTKA LAW'S

Here author productivity is measured from lotka's law where we see in this investigation that scientific productivity is constantly represented on the specific subject domain within a certain period of time and this is a particular research method that use all in different types of productivity. Scientist have further enhanced their resourcefulness with a particular environment (Ravikumar M N and Ramanan, T. 2020). Objects are very productive in terms of productivity of the context of the article and author point of view.

TABLE 9.6

Author Productivity in Based on Lotka Law,s

No of article C	Total no of Author n	n^2	Lotka Law $F(n)=C/n^2$	Expected % of Lotka Law
1	28	784	784	7.047191
2	80	6400	3200	28.76404
3	109	11881	3960	35.59551
4	95	9025	2256	20.27865
5	68	4624	925	8.314607

797 ANNUAL GROWTH RATE (AGR) OF PUBLICATION

Annual Growth of collaboration of the publication are increase. So, growth rate is high in 2020 (41.66). In 2019 we see that in addition to its gratitude 41.66, If we look at the annually, we see that in 2011(57) and 2018(56.25) if gratitude is pretty much but we get more in 2020.Thus 2014 to 2017 are less minus position of those years

TABLE 9.4
Authorship pattern

Authorship	*2011-12*	*2013-14*	*2015-16*	*2017-2018*	*2019-20*	*Total*	*%*
Single	10	9	1	2	6	28	4.70
2 Authors	12	22	6	15	25	80	13.44
3 Authors	19	38	10	21	21	109	18.31
4 Authors	16	19	11	28	21	95	15.96
5 Authors	14	15	8	8	23	68	11.42
6 Authors	8	14	9	18	10	59	9.91
7 Authors	6	11	4	11	9	41	6.89
8 Authors	10	4	1	3	3	21	3.52
9Authors	1	2				3	0.50
10 Authors	1	8				9	1.51
More than 10		16	45	21		82	13.78
Total	97	158	95	127	118	595	100

TABLE 9.7

Year	*No of Publication*	*AGR*
2011	57	57
2012	59	3.5
2013	72	22.03
2014	69	-4.16
2015	41	-40.57
2016	24	-0.41
2017	32	-0.21
2018	50	56.25
2019	60	20
2020	85	41.66

8 FINDINGS OF THE STUDY

The following are the major findings drawn from the study.

1. The analysis of the subject domain Antioxidants is top of the subject;
2. Country-wise statistics we have been seen India and West Bengal are the main products of the country.
3. All sides of the analysis of the paper we have been seen 2020 is the best of all things.
4. Clinical Method and experimental and statistical study methods are most useful application of research methods have applied in this Journal.
5. Authorship productivity of the year in 2020 and paper productivity 289 is greatest than all products.
6. Collaboration index is more in 2015, Degree of collaboration are most in 2020 and value of productivity is more in 2014.
7. Productivity of the cumulative article in context range of the year are year wise increase.
8. Variation of the Number of papers and number of authors, single and multi-author analysis we get that most multi author are used.
9. Degree of collaboration we have seen that single author collaboration is law than multi author.

10. Author Productivity in Based on Lotka Law's we found 35.59 is more.
11. Annual Growth Rate (AGR) of Publication is more than 4165 in 2020.

9 CONCLUSION

The presents study is based on the productivity of the article of IJBB. IJBB journal is an original research article in different subjects like biomolecular, protein -DNA, Gene-cloning – gene expression, glycobiology etc. So, which is the continuing focus is the main authorship pattern, scientometrics analysis and author and article productivity of the IJBB journal. we hope that in the future the production and growth of IJBB journal will be much better higher and also that the subject domain of this Journal will improve in the more scientific greater extent.

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