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Research Article

Research Output on Co-Morbidities as Reflected in the Scopus Database: A Scientometric Analysis

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Abstract

The paper examined76798 publications on comrbidities, as covered in Scopus database during 2010-2020.The growth of literature is an increasing trend year after year and the highest research productivity is observed in 2020 (13633-17.75%)and the lowest number 2996 articles (3.90%) were published in 2010. On an average 15.27 % of the annualgrowth rate is observed during the study period and the highest 40.31% of the growth was reported in 2020 and minimum 6.93% in 2018. The maximum 8.32% of the CAGR was recorded in 2011. The RGR of the article has decreasing trend and doubling time of the article have increasing trend. Further, it is observed that research output in the area of co-morbiditiesis published in the form of research articles (60323-78.55%). The highest degree of collaboration (.983) is observed in this field dominating more number of multiple authors. The highest number of articles was contributed by the USA and more than 75% of the publications were contributed by USA, England, China and South Korea at the global level and most of publications are published in English language.The considerable collaborative research activity is taking place in the field of co-morbidities.

Kewwords: Scientometric Analysis, CAGR, Relative Growth Rate, Collaborative Research, Co-Morbidities.

1. Introduction

Scientometric has become standard tool of science policy and assessment of research output and identifies the emerging area of scientific productivity. All significant compilation of science indicators, to a large extent depends on research publications and citations analysis and other scientometrics indicators. “It is a quantitative technique, measures the scientific productions. “It dealswith the quantification of written communication which helps in the measurement of the published knowledge”(Gupta, 2011).

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“It offers a set of measures for studying the structure and process of scholarly communication”(Subramanian-1983). The many studies on science field have been reported during the last three decades. The aims of the studies were to measure national research performance in the international context or to describe development of a science field with the help of scientometrics. “It is defined as the study and measurement of publications pattern of all forms of written communication and their authorship in a given area

ofresearch"(Sengupta,1985). The paper deals with scientometric study which analyzes the growth rate of publications, authorship pattern, and degree of collaboration among the authors and find out the annual growth rate and cumulative growth rate of publications.

2. aboutCo-Morbidity

It is an epidemiologic phenomenon, relating to the characteristics of a population
It is nothing but a presence of more than one decease in a person for the specific period of time and can be examined using the current or the lifetime approach. Co morbidities is a co-occurrence of medical and psychiatric disorders, such as the dementia associated with organic conditions or endocrinopathies. "In psychiatry, co morbidity is generally take to mean the association of diagnosable psychiatric disorders. Psychiatricdisorders,and the reported co-morbidity of certain disorders in a population does not necessarily imply that they will be co-morbid in any given individual. However, observations of co-morbidity among populations may be extremely useful in informing the therapist's understanding of an individual patient"(https://www.sciencedirect.com/topics/medicine-and-dentistry/comorbidity). According to world health organization prevention and treatment of chronic diseases. Multimorbidity has been increasingly used to refer to "the co-occurrence of multiple chronic or acute diseases and medical conditions within one person" without any reference to an index condition (Bayliss EA, 2008).

3. Review of Literature

Many important quantities studies on scientometric area have been reported for the last three decade to assess the research output published across the world. The some of the important studies have been traced and reviewed in the following section. The classical works like Subramanian (1983), Snehagupta(1990) and Allen pilchard (2005) have assess the scientific research output through bibliometric indicators. In the mean time Arunachalam (2001) and Bhattacharya etal (1997) have analyzed research productivity and literature growth rate wisedistribution and their citations. Ramesh babu and Ramkrishanan (2007) studied Indian contribution to the field of Hepatitis (1984-2003) and used the Bradford law of scattering to identify the core journals. Krishnamurthy G and others (2009) have explored research productivity of diabetes (1995-2004) and studied the various bibliometric components of 13244 records, which are extracted from MEDLINE database and studied year wise growth, authorship pattern, relative growth rate and doubling time. Further author have prepared rank list of journals based on the quantum of research output on diabetes. The study observed that USA is largest contributor of literature in the field of diabetes research. Finally, he concluded that Bradford law of scattering followed in the field of diabetics.Hadagali and Gavisiddappa (2015) have applied various growth models for neurology literature published during 1961-2010. A total of 291,702publications on neurology, indexed in the Science Direct Database were downloaded for the study. Authors have studied the RGR, D(t) and various growth models for the given literature. The study indicate that the growth of literature in neurology follows closely the exponential growth model.Shantakumar R and Kaliyaperumal (2015) have studied the research output pattern of mobile technology literature as covered in Web of Science for the period of 2000-2013.The study reveals Average growth rate, Annual and Compound Annual growth rate of publications and also studied the authorship pattern in the field of mobile technology research.

Further it reveals that authors from USA have contributed maximum to the field of mobile technology. The University of California system (USA) is highly contributed institution in this field. Finally author observed that there is lot of collaborative research work is being taking place in the field of Mobile technology research. Similar study conducted by Sandhya Dwivedi (2016) on global allergy research during 1994-2013 analyzed 34783 papers which have indexed in science citations index, indicated that research output is generally increased over the years during the study period. Further it is observed that USA and Germany have published highest number of research article in field of allergy and publication activity is increased significantly during this period. Finally author observed that Harvard University of USA emerged as topmost research institution in the field of allergy research at the global level.Shridevi and GavisiddappaA(2018) have elaborate the nanotechnology research publications indexed in Web of Science and analyzed the characterstics of 7971 articles. The study reveals that various bibliometrics characteristics of literature such as average growth rate, type of documents, most productivity authors, and most productivity journals in the field of nanotechnology. Finally the author verified the zipf's law for the given data set, it does not followed in the field of nanotechnology. Ravi shukla (2019) has conducted study to assess the research output of genetic disorder productivity during 2008-2017. The study shows that there is positive growth rate of publication in the field of genetic disorder, the author observed that there has been a consistent increasing trend in the growth of literature year after year in the field of genetic disorders. Further researcher has observed that annual growth rate and compound annual growth rate were fluctuating in nature. Finally author opined that considerable researchactivityhas been taking place in the field of genetic disorders research.

4. Objectives of the study

The following objectives are designed for the study

1. To analyze the growth of literature in the field of co-morbidities.
2. Find out the Annual growth rate as well as Compound Annual Growth rate of publications.
3. To examine the Authorship Pattern and Degree of Collaboration in the field of co morbidities
4. To explore language, form and country wise distribution of publications

5. Methodology

The data set for the present study was retrieved and downloaded the publications on co morbidities of the world literature from the Scopus database (http://www://scopus.com) for eleven years from 2010 to 2020. Keywords such as Co- Morbidity, Multiple Co-Morbidities, Co-Morbid and Neuropsychiatric and their combination of the these words were used in string box and restricted to the period of 2010 to 2020 in the "Data Range Tag" was used for searching a global publications data, it is used as main search string. The search string further, restricted to "Subject Area Tag", later to get information on the distribution of publications by country wise, form wise and language wise have been extracted from the Scopus data base. The given data was tabulated with help of MS excel further tested through scientometric tools to achieve the stated objectives.

6.Data Analysis and Interpretation

There are 76798 publications were published at global level on co-morbidities, indexed in Scopus database during 2010-2020,this data set is used for the present study.

Table-1 Growth Rate of Publications

Sl No.	Year	No. of Publications	%age	Cumulative %
1	2010	2996	3.90	3.9
2	2011	3546	4.62	8.52
3	2012	4058	5.28	13.80
4	2013	5037	6.56	20.36
5	2014	6005	7.82	28.18
6	2015	6480	8.44	36.62
7	2016	8032	10.46	47.08
8	2017	8358	10.88	57.96
9	2018	8937	11.64	69.60
10	2019	9716	12.65	82.25
11	2020	13633	17.75	100.00
	Total	**76798** Average publication =**6981**	**100.00**	

Total % increase in publications during 11 years =

$$(\frac{Final\ value - Initial\ value)}{Initial\ value} X100 = \frac{13633 - 2996)}{2966} X100 = 78.02\%$$

Table-1 shows the year growth of publication in the field of co-morbidities during 2010 - 2020, the global level output is 76798 publications during the study period . The maximum publicationsof 13633 published in2020 and the minimum of 2996 were reported in 2010. The the average number of publications published per year was 6981. But it can be seen that there is an increasing trend of growth of literature during the study period. Further it is found that there is an increase of 78.02% of the growth of literature in the field of co-morbidities in between 2010 to 2020. Finally it can be reveals that thereis a consistent increased trend towards growth of literature in the field of co-morbidities.

Table-2 Annual Growth rate of Research Productivity

Year	Number of articles	Annual Growth Rate
2010	2996	-
2011	3546	18.36
2012	4058	14.44
2013	5037	24.13

2014	6005	19.22
2015	6480	7.92
2016	8032	23.95
2017	8358	4.06
2018	8937	6.93
2019	9716	8.72
2020	13633	40.31
Total	76798	Average growth rate = 15.27

The annual growth rate of publication as shown in the table-2. The AGR is given by

$$AGR= (\frac{Final\ value - Initial\ value)}{Initial\ value} X100 \text{------(1)}$$

The annual growth rate of publications is calculated year wise as shown in table -2 column -3, there is lot of fluctuation throughout the study period (2010-2020). The AGR was calculated by using the above formula (1). The AGR in increasing trend from 4.06% in the year 2018, sudden increased to 40.31% in the year 2020. Further,15.27% of the average annual growth was observed during the study period. Initially three year it was increasing trend later it was decreasing trend in 2014, 2015, and 2019 and again increased in 2020. Since lot of fluctuation is observed in AGR because of no constant growth of publications in every year during the study period.

6.1 Compound Annual Growth Rate of the Publications (CAGR)

The Compound annual growth rate was calculated by taking the nth root of the total percentage of the growth rate, where N is the number of years considered for the study. The compound annual growth rate can be calculated by using the following formula

$$CAGR= ((\frac{\boldsymbol{Ending\ value}}{\boldsymbol{Intial\ vaue}})^{\frac{1}{N}} - 1) \quad \text{--- (2)}$$

Table-3 Compound Annual Growth Rate of Publications

Sl No.	Year	No. of Publications	Cumulative Frequency	CAGR	% CAGR
1	2010	2996	2996	0.000	0.00
2	2011	3546	6542	0.088	8.79
3	2012	4058	10600	0.046	4.60
4	2013	5037	15637	0.056	5.55
5	2014	6005	21642	0.036	3.58
6	2015	6480	28122	0.013	1.28
7	2016	8032	36154	0.031	3.11
8	2017	8358	44512	0.005	0.50
9	2018	8937	53449	0.007	0.75

10	2019	9716	63165	0.008	0.84
11	2020	13633	76798	0.031	3.13
	Total	**76798**			

It is observed from the table -3 that the compound annual growth rate of the publications are gradually decreases from 8.79% in the year 2011 to 3.13% in the year 2020. Over all, there is decreasing trend in CAGR of the publications in the field of co-morbidities. From the table 2 and 3 observed that year wise output is increasing year after year but the compound annual growth rate is in the down ward trend.

6.2 Relative Growth Rate and Doubling Time of the publications

The relative growth rate is defined as " RGR is the increase in number of articles or pages per unit of time"(Hunt, R, 1982). Further, the mean RGR of publications over specific period can be calculated by using the formula.

$R = \frac{W2 - W1}{T2 - T1}$ ------- (3)

Where R= Relative Growth Rate of articles over specific period of time.

W_2= Log W_2 (Natural log of the final number of publications)

W_1= Log W_1 (Natural log of the initial number of publications)

T_2= Log T_2 (Final times in years)

T_1= Log T_1 (Initial times in years).

Doubling time (Dt):

The doubling time is the given period required for quantity to double in size or value. It is related to RGR,where RGR is constant. The quantity is undergoes exponential growth and has a constant doubling time or period which can be calculated directly from growth rate. It can be calculated by using the following formula.

$D(t)(P) = \frac{Loge^2}{R(p)} = \frac{.693}{R(p)}$

Where D(t) = Average doubling time of publications.

Table-4 Relative Growth Rate and Doubling time of the Publications

Sl No.	Year	No. of Publications	Cumulative frequency	W1	W2	RGR	D(t)
1	2010	2996	2996	-	8.0	-	-
2	2011	3546	6542	8.17	8.78	0.78	0.887
3	2012	4058	10600	8.30	9.26	0.48	1439
4	2013	5037	15637	8.52	9.65	0.38	1.78
5	2014	6005	21642	8.70	9.98	0.32	2.13

6	2015	6480	28122	8.77	10.24	0.26	2.64
7	2016	8032	36154	8.99	10.49	0.25	2.69
8	2017	8358	44512	9.03	10.70	0.20	3.33
9	2018	8937	53449	9.09	10.88	0.18	3.78
10	2019	9716	63165	9.18	11.05	0.16	4.14
11	2020	13633	76798	9.52	11.24	0.19	3.54
	Total	**76798**	**2996**		**8.00**		

The relative growth rate and doubling time of the publications are derived and presented in table -4. There are 76798 publication contributed in the field co-morbidities for the period of 2010 to 2020. It can be noticed that relative growth rate of publications R(P) decreased from .78 in 2011 to .19 in 2020. There is decrease trend in RGR during the study period. At the same time, the corresponding doubling time for different years D(p) gradually increased from .887 in 2011 to 3.54 in 2020. Hence, it can be concluded that relative growth rate of publications is gradually decreases over the years, on the other hand doubling time of the publications is increases gradually year after year during the study period.

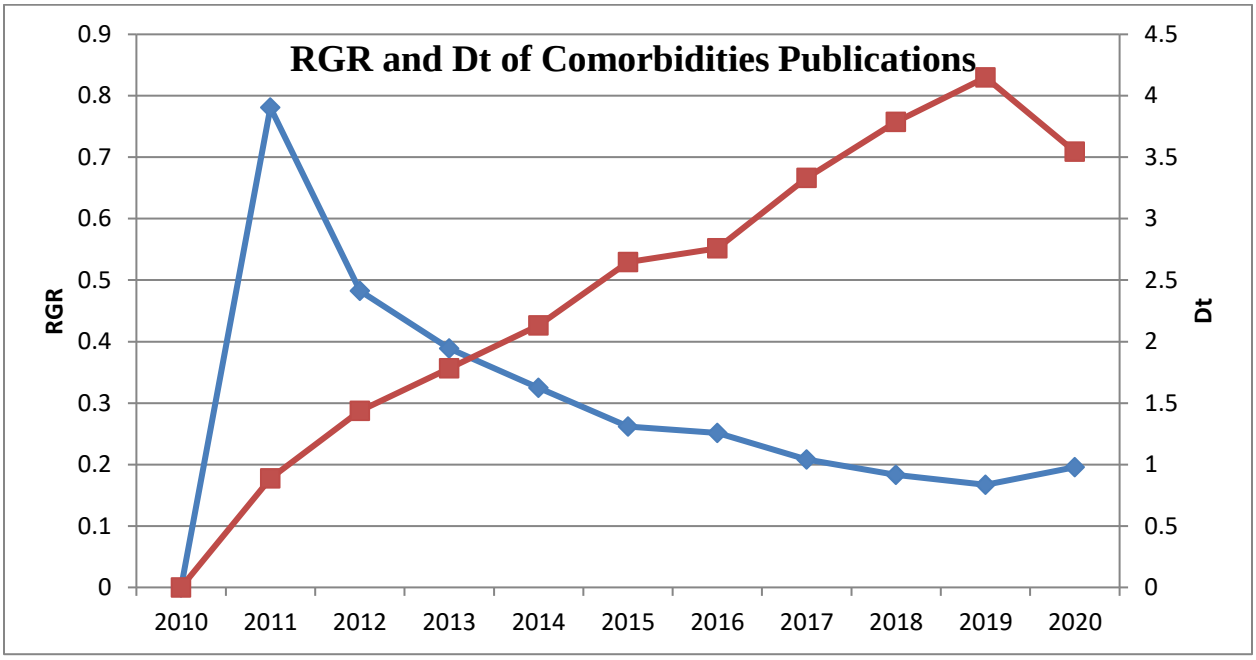

Table-5 Document wise distribution of publications

Sl No.	Type of documents	No. of Publications	%age of publications
1	Research Articles	60323	78.55
2	Review	9750	12.70
3	Letter	2869	3.74
4	Conference Paper	1152	1.50

5	Book Chapter	768	1.00
6	Editorial	690	0.90
7	Note	614	0.80
8	Short Survey	461	0.60
9	Book	154	0.20
10	Article in Press	17	0.02
	Total	**76798**	100.00

Table-5 shows that document wise distribution of research publication during the period of eleven years (2010-2020). It is observed from the table-5 that, it has been clearly reveals that large majority of the research documents (60323-78.55%) are available in the form of research articles and significant number of publication (9750-12.70%) also published in the form of Review. Another 3.74% of publications were brought out in the form of letters and conference papers. However, only few publications also published in the form of Books chapters and editorials and notes respectively.

Degree of Collaboration

To measure the collaborative research pattern a simple indicator called collaborative coefficient is used. It is the ratio of the number of collaborative research papers against the single authored papers during a certain period of time.collaborative coefficient can be calculated by the formula given by Subramanian (1983). The value of C is found between 0 and 1. It can be calculated by using the following formula.

The Degree of Collaboration is given by

$C=\frac{N_m}{N_{m+N_s}} = \frac{75978}{75978+820} = .9803$

Where, C=Degree Collaboration

Nm= Multiple authored papers,

Ns= Single authored papers

Table-6 Authorship pattern of Publications

Sl No.	**No. of authors**	**No of publications**	**%age of publications**
1	Sole author	820	1.07
2	Double authors	2716	3.54
3	Three authors	3698	4.82
4	Four authors	4325	5.63
5	Five authors	4587	5.97
6	Six authors	7654	9.97
7	Seven authors	11048	14.39
8	Eight authors	13564	17.66
9	Nine authors	15612	20.33
10	Ten or > 10 Authors	12774	16.63
	Total	**76798**	100.00

Table-6 shows the authorship pattern in the field of co-morbidities, it is noticed that highest number of papers are written by nine authors (15612, 20.33%) and then followed the second highest number of publication are written by eight authors (13564, 17.66%), ten authors (12774, 16.63%) and seven authors(11048, 14.39%) respectively. Single authored papers constitute only 1.07% to the total publication. Further, highest degree of collaboration is observed (r=.9803). Out of total publications, 98.03% of contributions were collaborated with multi authorship. It is good practice for the researcher to share and extended their scientific knowledge for the better promotion of collaborative research culture in scientific production in the field of medicine.

Table-7 Geographical wise Distribution of Publications

Sl No.	Country	No of publications	%age of publications	Cum %
1	USA	29951	39.00	39
2	China	8447	11.00	50
3	South Korea	6911	9.00	59
4	England	16120	20.99	79.99
5	Taiwan	3850	5.01	85
6	Germany	5371	6.99	91.99
7	India	1766	2.30	94.29
8	Japan	3839	5.00	99.29
9	Italy	230	0.30	99.59
10	Spain	153	0.20	99.79
11	Australia	76	0.10	99.89
12	France	45	0.06	99.95
13	Others	39	0.05	100
	Total	**76798**	100.00	39

It is analyzed on the bases of contribution of the authors from different countries as shown in the table-7. It is observed that more than 50 countries have contributed to the growth of the subject, which nearly contribute 76798 publications in the field of co-morbidity at the global level during 2010 to 2020. Out of total76798 publications USA and England have contributed highest number of articles constituting nearly 60% of the total publications in the field of comorbidities. China and South koreaare found to be the next highest countries contributed nearly 15378 publications. It can be concluded that top four ranked countries have all together made nearly 80% contributionto the total publications in this field. The above analysis indicates that 80% of the research productivity in the field of comorbidities is only reported from the top four countries in the world namely USA, England, China and South Korea.

Table-8 Language wise Distribution of Publications

Sl No.	Language	No of publications	%age of publications
1	English	63894	83.20
2	German	2566	3.34
3	Spanish	1600	2.08

4	Chinese	1200	1.56
5	French	789	1.03
6	Portuguese	544	0.71
7	Czech	486	0.63
8	Hungarian	354	0.46
9	Turkish	259	0.34
10	Polish	146	0.19
11	Russian	650	0.85
12	Japanese	2566	3.34
13	Others	39	0.05
	Total	**76798**	100.00

Table -8 gives the language wisedistribution of publications; it is observed that greater majority (63894, 83.20%) of the research publications have been published in English language, followed by German language with 2566 publications (3.34%). Spanish language ranks third position with 1600 publications (2.08%). The reaming languages like Chinese, French, Portuguese and Czech are contributed negligibly. The above analysis shows that large majority of the research publications are published in English language, since, it is international language, preferred to disseminate and communicate the research output in English language.

Conclusion

The present study is investigated the co-morbiditydisorders research output in the world as reflected in the Scopus database for the period of 2010 to 2020 using Scientometric tools. The findings of the study show that there is lot of research activities is being taking place in the field of co-morbidity. The study shows research growth rate continuously increasing from 2010 to 2020 observedthat nearly78% of overall increase in the publicationfor the period of eleven years.The maximum annual growth rate was observed at 40.23% in the year 2020 and compound annual growth rate was recorded at 8.79% in the year 2011. The study reveals that USA leads in terms of research productivity with 39% of the total output. Majority of the publications are published in the form of research articles and published in English language. Further, it is observed that multiple authored papers are dominating in the field of co-morbidity. Finally, it can be concluded that there is acollaborative research trend in the field of co-morbidities.

References

1. Bayliss EA, Edwards AE, Steiner JF, Main D S (2008). Process of care desired by elderly patients with multimorbidities. Fam pract. , 25(4), 287-293.
2. Garrison,H(1992).Measuring Characteristics of Scientific Research: A Comparison of Bibliographic and Survey data.Scientometrics, 24(2), 359-70.
3. Gupta B M and Dhawn, S M (2009). Status of Physics Research in India: An Analysis of a research output during 1993-2000, Scientometrics, 78(2), 295-315.
4. Gururaj S Hadagali and GavisiddappaA(2015).Modeling the Growth of Neurology Literature. Journal of Information science, Theory and Practice, 3(3), 45-63.
5. Hunt, R(1982). Plant Growth Analysis, second derivates and compounded second derivates of splinted plant growth curves. Annals of Botany, 50,317-328.

6. Krishnamurthy G, Ramakrishna and Devi S (2009). Bibliometric Analysis of Literature on Diabetes (1995-2004), Annals of Library and Information Studies. 56(3), 150-155.
7. Ramesh Babu and Ramkrishanan (2007). Indian contribution to the field of Hepatitis(1984-2003):A Scientometric Study. In the 73rd international Conference on Webometrics, Informatics Scientometrics Science and Society and English COLLNET meeting, 2007 ICAR, Symposium Hall, National Agriculture science complex, New Delhi (India), pp.22-32.
8. Ravi Shukla(2019).Indian Research Output on Genetic Disorder Publications using the Scopus database: A Scientometric Study. COLLENET Journal of scientometrics and Information Management, 13 (1), 91-102.
9. Sandhya Dwivedi (2016). Global Allergy Research during 1994-2013: A Scientometric Study, Annals of Library and Information Studies, 63(1), 16-23.
10. Sengupta, I. N (1985). Bibliometrics: A Bird's Eye View. IASLIC Bulletin, 30,(4), 167-174.
11. Shantakumar R and Kaliyaperumal(2015). A Scientometric Analysis of Mobile Technology Publications, Scientometrics, 921-939.
12. Subbramanian, K (1983). Bibliometric Studies of Research Collaboration : A Review. Journal of Information Science (6)38.
13. (https://www.sciencedirect.com/topics/medicine-and-dentistry/comorbidity) accessed on 27.05.201.
14. Chatterjee, P., et al. "Grip strength: an alternative for measuring osteoporosis in elderly." Int J Med Pharm Sci 4.2 (2014): 91-100.
15. MORE, SHYAM, et al. "A STUDY OF PREVALENCE OF OBESITY IN ADOLESCENTS OF A SELECT PRIMARY URBAN HEALTH CENTRE OF NAVI MUMBAI."International Journal of Medicine and Pharmaceutical Science (IJMPS) 5.6, Dec 2015, 39-42
16. RASOOL, ROOHI, et al. "POLYSENSITIZATION TO AEROALLERGENS IN PATIENTS WITH NASOBRONCHIAL ALLERGY IN KASHMIR VALLEY."International Journal of Educational Science and Research (IJESR) 7.5, Oct 2017, 7- 16
17. Senthilkumar, R., and M. Muthukrishnan. "Scientometric analysis of the journal "pediatric blood and cancer" during 2005–2015." Internat J LibrarySci Res (IJLSR) 6.3 (2016): 17-26.
18. HIREMATH, RUDRAMUNI, and GURURAJ S. HADAGALI. "A Scientometric study of nanocomposites: a global perspective." International Journal of Library Science and Research (IJLSR) 4.3 (2014).