



A Scientometric Study of npj vaccines

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Abstract

Abstract

The paper is based on Scientometric study of total 481 articles contributed by the authors in npj vaccine during 2021 -2023 on nature springer. Total three years time period It was found that in the degree of research collaboration was calculated and the degree of collaboration ranges from 0.82 to 0.84 I.e. it increased gradually in this study. Universities are the major contributors. In this context, we described various popular author, article, 5120 references appended to 481 articles contributed the findings revealed various aspects of the characteristics and patterns of contributions of the study

Keywords: scientometric, nature Springer, vaccine

1. Introduction

A vaccine is a biological preparation that provides active acquired immunity to a particular infectious or malignant disease. The safety and effectiveness of vaccines has been widely studied and verified. A vaccine typically contains an agent that resembles a disease-causing microorganism and is often made from weakened or killed forms of the microbe, its toxins, or one of its surface proteins. The agent stimulates the body's immune system to recognize the agent as a threat, destroy it, and recognize further and destroy any of the microorganisms associated with that agent that it may encounter in the future.

Vaccines can be prophylactic (to prevent or alleviate the effects of a future infection by a natural or "wild" pathogen), or therapeutic (to fight a disease that has already occurred, such as cancer). Some vaccines offer full sterilizing immunity, in which infection is prevented completely. The administration of vaccines is called vaccination. Vaccination is the most effective method of preventing infectious diseases; widespread immunity due to vaccination is largely responsible for the worldwide eradication of smallpox and the restriction of diseases such as polio, measles, and tetanus from much of the world. The World Health Organization (WHO) reports that licensed vaccines are currently available for twenty-five different preventable infections. The first

recorded use of inoculation to prevent smallpox occurred in the 16th century in China, with the earliest hints of the practice in China coming during the 10th century. It was also the first disease for which a vaccine was produced. The folk practice of inoculation against smallpox was brought from Turkey to Britain in 1721 by Montagu. The terms vaccine and vaccination are derived from Variolae vaccine (smallpox of the cow), the term devised by Edward Jenner (who both developed the concept of vaccines and created the first vaccine) to denote cowpox. He used the phrase in 1798 for the long title of his Inquiry into the Variolae vaccine Known as the Cow Pox, in which he described the protective effect of cowpox against smallpox. In 1881, to honor Jenner, Louis Pasteur proposed that the terms should be extended to cover the new protective inoculations then being developed. The science of vaccine development and production is termed vaccinology.

Scientometric analysis is a branch of Bibliometrics. It is an important research tool for understanding of the subject it aims at measuring the utility of documents and relationship between documents and fields. Results and Discussion.

2. Definition Analysis

Scientometric

Has been defined as the “quantitative study of science, communication in science, and science policy” (Hess, 1997)

Scientometrics may be defined as the information science that measures the impact of a scientific article. In a broad sense, when the impact of an article is measured by any index, it automatically drags the author; Scientometrics is the science that helps to find the impact of an article, an author, and a journal. Also, it helps in identifying institutions, universities, and country rank.

2.2. Scientometric Analysis

“The quantitative methods of the research on the development of science as an informational process” (Nalimov & Mulcjenko, 1971, p. 2). This field concentrates specifically on science (and the social sciences and humanities).

3. Springer Nature

Springer Nature or the Springer Nature Group is a German-British academic publishing company created by the May 2015 merger of Springer Science+Business Media and Holtzbrinck Publishing Group's Nature Publishing Group, Palgrave Macmillan, and Macmillan Education. The company originates from several journals and publishing houses, notably Springer-Verlag, which was founded in 1842 by Julius Springer in Berlin (the grandfather of Bernhard Springer who founded Springer Publishing in 1950 in New York). Nature Publishing Group, which has published Nature since 1869 and Macmillan Education, which goes back to Macmillan Publishers founded in 1843. In 2021, Springer Nature acquired Atlantis Press, an open access publisher founded in Paris in 2006, focusing on scientific, technical, and medical (STM) content, and publication of conference proceedings.

3.1. npj vaccines

Journal Information

Online-only and open access, *npj Vaccines* is dedicated to highlighting the most important scientific advances in vaccine research and development.

A vaccine is a suspension of weakened, killed, or fragmented microorganisms or toxins or other biological preparation, such as those consisting of antibodies, lymphocytes, or mRNA, that is administered primarily to prevent disease.

4. Methodology

Methodology means study of method or a system of methods and rule applicant to research or work. It is connected basically with what principles and technique to be follow for collecting data information and material for a given research project. (Kothari, 1990). For the present study quantitative research method is used.

5. Review of Literature

Khparde & Pawar (2013) studied the authorship pattern and author's collaborative research in Information Technology with a sample of 17917 articles collect from LISA during 2000-2009. The average number of authors per article is 1.80. In the study the degree of collaboration (C) during the overall 10 years (2000-2009) is 0.71 but the year wise degree of collaboration is almost same in all the years of mean value 0.49. According to 10 years of period, the multi- authorship articles are higher and predominant on single authorship. The study found that the researches in Information Technology are keep toward team research or group research rather than solo research

Tupe and Khparde (2016) stated in study Mapping of Physics Periodicals: A Bibliometrics Study. Total 2131 periodicals in Physics published in 50th edition of Ulrich Periodical Directory, 2012 was considered to the present study. In this study 77 Countries published 2131 Physics Periodicals. Periodicals of different continents, at the comprehensive level, the European continent stood in the first place with the highest publication 973 (45.66%) and other periodicals published in other five continents. The State wise distribution of periodicals 48 Periodicals Published in India. Kerala is at the top position with highest 13 (27.08%) periodicals.

Khparde V S (2013) the paper studied the Bibliometric Analysis of Research Publication of Department of Chemistry, Dr. Babasaheb Ambedkar Marathwada University, from 1975 to 2012. It analyzed all the 774 research publications from the 144 journals. It examines year wise distribution of papers, authorship pattern, journal in which author publish, it revealed that the number of publications has increased consistently from the year 1975 to the year 2012. 25% of the total publications have been made in 2009, 2010, and 2011. And the majority of the publications are made with 4 authors. And also the majority of the research paper published in journal of heterocyclic chemistry

Gaikwad Deepa N. and Khaparde Vaishali .S. (2019) were studied in scientometric analysis on mapping of plagiarism research output in India. The Study analysed the plagiarism research performance of India in national as well as global Context, Focused on geographical distribution that the most of the publication are from USA with 19.32% the study explained that the solo Research is predominant than the collaborative research and the degree of collaboration is 0.87 also shows that the Relative growth rate [R (A) is (0.346) while the Doubling time DT (A) gradually increased from (1.548) that shows rate of publication was decreased, the Doubling time was increased.

6. Objectives of the study

1. To study the year-wise distribution of publication
2. To find out Annual growth rate wise contribution of publication
3. To analyze Authorship Pattern Distribution of contributions.
4. To find out the author's degree of collaboration pattern in the publication
5. To study the Author's Productivity
6. To find out country-wise distribution of publication
7. To examine the references wise distribution of articles

7. Scope and Limitation of the Study

The present study is based on the A Scientometric study in on a nature Springer npj vaccines journal with the help of Excel on total no of articles 481 contributions during 2021 -2023

8. Data Collection

Data can be numerically expressed that is quantified quantifiable or objective (Fasibs off and Dely, 1990) the data was collected from, nature Springer with the help of Excel. Total 481 articles during 2021 -2023.

9. Data Analysis and Interpretation

Table No. 01: Year-Wise Distribution of Contributions

Sr No	Year	Frequency	Percentage
1	2021	117	19.56
2	2022	174	29.09
3	2023	190	31.77
	Total	481	100

It can be observed from table no 01 out of the total 481 contribution majority of the contributions ie 190 contributions were contributed in 2023 than following ie 174 contributions were contributed in 2022 were as maximum contributions ie 117 contributions were contributed 2021

Table No. 02 Annual growth rate (AGR) of publications

Sr No	Year	Frequency	AGR
1	2021	117	51.94
2	2022	174	48.71
3	2023	190	8.42
	Total	481	100

The growth rate is a measurement which is essential in any field. In meaning the growth of the number of publications in a particular discipline, this is often a measure of the annual increase or decrease. Here, the AGR has been determined as per the formula given below.

$$\text{AGR} = \frac{\text{End value} - \text{First Value}}{\text{First Value}} \times 100$$

In this study end value is 174 in the year 2022 the first value is 117 in the year 2021 Table No 2 shows that the year on the change in the number of documents was 48.71 % in 2022, 8.42 % over the respective next year and all remaining year AGR are shows in this table No.02

Sr .No	Authorship Pattern	Frequency	Percentage
1	Single author	41	8.52
2	Two authors	105	21.82
3	Three authors	41	8.52
4	Four authors	63	13.09
5	Five authors	55	11.43
6	Six authors	32	6.65
7	Seven authors	39	8.1
8	Eight authors	30	6.23
9	Nine authors	26	5.4
10	Ten authors	17	3.53
11	More Than Ten authors	32	6.65
	Total	481	100

Table No. 3. Authorship pattern

Table No 03 identifies the distribution of articles according to the number of contributors. The number of Two authors is highest and it accounts for 105 (21.82 %) and then number of three time authors i.e. 41(8.52%) and the single time author is 41(8.52 %) and the lowest ten time authors it accounts for 17 (3.53 %). From this Authorship pattern table shows Collaborative research is predominant than solo research

Degree of Author's Collaboration

Various methods have been proposed to calculate the degree of research collaboration. Here, in this study the formula proposed by Subramanyam (1983) has been used. Table No-4 Year-Wise Publication Productivity and Collaboration Rate

The degree of collaboration $C = \frac{Nm}{Nm + Ns}$

Where, C= Degree of collaboration in a discipline

Nm = number of multi- authored papers in the discipline

Ns= number of single- authored paper in the discipline

Here, Nm = 670

$N_s = 84$

$$C = \frac{670}{670 + 84} = 0.88$$

So, in the study the degree of collaboration during the overall 3 years (2021 - 2023) is = 0.88

Table No 04 Degree of Author's Collaboration

The Degree of Collaboration of authors by year wise is presented in the Table No.4. The degree of collaboration

Year	Total no. of articles	Total no. of authors	No. of single authors articles	% of articles	No. of Multi authored Articles	% of article	Degree of collaboration
2021	117	295	31	6.40	264	0.39	0.82
2022	174	260	28	5.82	232	0.63	0.83
2023	190	199	25	5.19	174	0.95	0.86
Total	481	754	84	17.41	670	1.97	0.84

ranges from 0.82 to 0.84. The average degree of collaboration is 0.84 during the period 2018– 2022 and it brings out clearly that there exists a higher level of collaboration in this publication output

Table No. 05 Author Productivity

Sr.No.	Year	No. of Articles	No. of Author	AAPP	PPA
1	2021	117	295	2.52	0.40
2	2022	174	260	1.49	0.63
3	2023	190	199	1.04	0.95
Total		481	754	5.05	1.98

The data pertaining to author productivity has presented in the Table No.05 shows that the total average number of authors per paper is 5.05 for the relatively equal average number of authors per article when compared the total average number of authors per article. The average productivity per author is 1.98 during the year 2021 – 2023. Productivity has been calculated with the following formula.

Average Authors per Article = No. of Authors / No. of Article

Productivity per Author = No. of Papers / No. of Author

Table No.06 – Geographical distribution of the article

Sr No	Country	Frequency	Percentage
1	USA	93	19.33
2	China	46	9.56
3	India	37	7.69
4	Australia	33	6.86
5	Japan	32	6.65
6	Korea	25	5.19
7	Canada	18	3.74
8	Italy	16	3.32
9	Argentina	13	2.7
10	Belgium	10	2.7

11	Spain	9	1.87
12	Norway	9	1.87
13	New York	8	1.66
14	Singapore	8	1.66
15	United Kingdom	7	1.45
16	Moscow	7	1.45
17	Russia	5	1.03
18	The Netherlands	5	1.03
19	Denmark	5	1.03
20	France	6	1.24
21	Greece	6	1.24
22	Indonesia	4	0.83
23	Turkey	4	0.83
24	Nigeria	3	0.62
25	Malaysia	3	0.62
26	Two Time Country(2*23)	23	4.78
27	One Time Country (1*46)	46	9.56
	Total	481	100

It can be observed from Table No. 06 that majority of articles 93 (19.33%) have been contributed form USA. Following to these, countries from china has contributed 46 articles (9.56%) and then India 37 (7.69 %) And one time countries are 46 (9.56 %) **Where in which hypothesis no.01 is valid, “Majority of the contributions are contributed by USA”**

Table No 07 Institution Wise Contributions of Distribution (Institution-Wise)

Year	University	Institute	College	School	Department	Research Center	Laboratory	Division	Total
2021	62	29	29	10	14	2	24	4	174
2022	47	31	22	9	16	9	16	6	156
2023	51	24	19	8	18	8	19	4	151
Total	160	84	70	27	48	19	59	14	481

Table No.07 shows distribution of Institutions wise contribution University wise at the national level followed by Institute It was seen that university wise contribution were maximum (160) Follows by institute wise (84) and then (59) contributions were contributed by the Laboratory . Table No.09 shows that the highest number of contributions is of university level

Table No. 08 Number of references wise distribution of the articles

Year	Web Ref	Print Ref Total	Total	Percentage
2019	91	972	1063	20.76
2020	86	874	960	18.75
2021	97	893	990	19.33
2022	86	981	1067	20.83

2023	78	962	1040	20.31
	438	4682	5120	100

Out of 481 contributions, it is seen that the maximum references 1067(20.83%) in the year of 2022, while the minimum references were 960 (18.75%) in the year of 2020. It was seen the Maximum references used print references i.e.4682;whereas 438 references were web references.

Findings

1. Majority of the contributions i.e. 190 contributions were contributed in the year 2023
2. The average degree of collaboration is 0.88 during the period 2021- 2023
3. The average number of authors per paper is 17.41. for average number of authors per article.
4. The average productivity per author is 1.98 during in the year 2021 – 2023.
5. Majority of the contributions are contributed by USA .93 (19.33%)
8. The university wise contribution were maximum (160).
- 9 It was seen the maximum references used print references i.e.4682 whereas 438 references were web references.

CONCLUSION:

Scientometrics is relatively new subject of Information. It helps to evaluate information & to handle the information in libraries and information centers by the quantitative analyzed information. Scientometric analysis is the major techniques of Bibliometric which is used in the further study. Considering published literature present study has used quantitative method. Scientometric is relatively new subject of information. It helps to evaluate information & to handle the information in libraries and information centers by the quantitative analyzed information. It deals with the mathematical and statistical analysis. This is an umbrella term used for many studies where quantitative method or techniques are used to investigate various aspect of written document. This study is completed with the help of MS -Excel..

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