Scientometric Analysis on Convalescent Plasma Research Output: A Global Perspective

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Abstract

The study explores Scientometric Analysis on Convalescent Plasma Research Output: A Global Perspective from 2011 – 2022, indexed in the PubMed database. "Convalescent Plasma" is a search term in the all field tag that fetches 2266 records and the study period. The study examined the maximum number of records (965) published in 2021 and the least in 2011 (7). The average exponential growth rate is 0.87 during the period of study on Convalescent Plasma research. It is analysed that the Cancer Medicine Journal is placed in th.e first position with 82 records. Massimo Franchini has contributed 74 records and is in first position in this research. This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa) in Convalescent Plasma research output; the value R is 0.9338. The USA was the most productive country in Convalescent Plasma Research; mean, median, mode and range values are identified in year-wise publications of this research study.

Keywords
Scientometrics; Convalescent Plasma; Exponential Growth Rate; Pearson's Correlation

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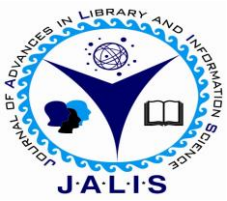

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Introduction

Scientometrics has been outlined as the "quantitative study of science, communication in science, and science policy" . Over twenty years have passed since Hess's definition, and currently it's been utilised in many various fields. In the realm of scientometrics, we will reference notable works such as the Science Citation Index (SCI) and the Academic Ranking of World Universities (ARWU), established by Shanghai Jiao Tong University in 2004, the h-index, g-index, and so on. Among these indicators, the h-index provides a straightforward impact metric for individual authors that may be utilised in online searching, for example, with Google Scholar, but is also incorporated into the foremost citation databases like the Web of Science and Scopus.

With an emphasis on academic publications from subject matter experts, the current study provides a scientometric assessment of Convalescent Plasma Research Output: A Global Overview from 2011 to 2022. To help researchers, scientists, and medical professionals understand the dynamics, advances, and progress of research in Convalescent Lassa, this study employs a variety of scientometric and bibliometric indicators.

Review of Literature

Yang,P., Wang,J., Zheng,R., Tan,R., Li,X., Liu,X.,.&Yu,J.(2022) have delved that an aggregate of 14 randomised controlled trials with 4543 cases were included in this meta-analysis. Compared to control, no significant difference was observed for either clinical enhancement(6 studies, RR1.07, 95 CI0.97 to 1.17, p = 0.16, moderate certainty) or mortality threat(14 studies, RR0.94, 95 CI0.85 to 1.03, p = 0.18, low certainty) in cases of convalescent tube feeding group. Fisher,D.L., Alin,P., &Malnick,S.(2021). The study examined that Convalescent tube therapy has been used successfully in history to treat respiratory infections. In SARS-Cov-2, there was originally strong substantiation in favour of convalescent plasma therapy from a large experimental study, but the substantiation from recent randomised controlled trials has been mixed. Still, two of those studies handed convalescent tube remedy on average 8 days after opinion, despite earlier data proving that the remedy is most effective when given within 3 days of opinion.Focosi, D., Anderson, A. O., Tang, J. W., &Tuccori, M. (2020). The study indicates that ongong COVID-19 pandemic has led to the scaling up of CP therapy to

unprecedented levels. Compared with historical usage, pathogen reduction technologies have now added an extra layer of safety to the use of CP, and new manufacturing approaches are being explored. This review summarizes historical settings of application, with a focus on betacoronaviruses, and surveys current approaches for donor selection and CP collection, pooling technologies, pathogen inactivation systems, and banking of CP. We additionally list the ongoing registered clinical trials for CP worldwide and discuss the trial results published thus far. Umeokafor,N., Umar,T., &Evangelinos,K.(2022), the study have been discovered the bibliometric and scientometric analyses and critical review of construction health and safety(H&S) exploration in developing countries(DCs) over the once 31 times, identifies its trends, dispersion, knowledge gaps, study counteraccusations, and direction of unborn exploration. These are area overlooked. This exploration fills the knowledge gap by using a wisdom mapping approach, involving methodical bibliometric analysis of the Scopus database and scientometric analysis with VOS Bystander software. Lai, H., Chen, G., Zhang, W., Wu, G., & Xia, Z. (2023). The study analysed that the research theme on PRP in the treatment of wounds was dissected comprehensively. The United States has made the most outstanding contribution in this field. Although China has a sizable number of publications, the quality of some of these papers may need to be improved. The latest research progress could be searched in Wound Repair Regen., Int. J. Mol. Sci. and J. Periodont. Alan T Nurden, Barry L. Eppley, and Fa-Ming Chen are prominent researchers in the area. Ajiferuke, I., Burell, Q., & Tague, J. (1988) have investigated that the mean number of authors per paper or the proportion of multiple-authored papers is inadequate to measure the degree of collaboration in a discipline. A measure which combines some of the merits of both measures is suggested and derived. This measure, called the Collaborative Coefficient, is derived for four commonly used probability distributions.

Objectives

- To identify the year-wise distribution of Convalescent Plasma research output from 2011 to 2022.
- To Measure the exponential growth rate on Convalescent Plasma research publications.
- To identify the core journals in field of Convalescent Plasma research.
- To identify the most prolific authors and authorship patterns and author productivity
- To calculate the Pearson's Correlation Coefficient value for single and multi-authored research output on Convalescent Plasma

3. Data Collection and Methodology

The relevant data for the study were gathered from the PubMed dataset from 2011 to 2022. It shows that 2266 can only freely access full-text bibliographic records in the Convalescent Plasma field over 12 years. The author used "Convalescent Plasma" to extract data from the PubMed database. An aggregate of 2266 records was downloaded and investigated by exploiting the Histcite and VOS spectator programming applications according to the examination destinations. A portion of the scientometric strategies and devices is used to discover the nature of the examination. The retrieved data have been changed to an MS-Excel Spreadsheet, and it is separated according to the outlined destinations of the study.Pearson's Correlation Coefficient is applied for Single vs. Multi-Author Publications.

Where,
X: X Values
Y: Y Values
M_x: Mean of X Values
M_y: Mean of Y Values
$X - M_x$&$Y - M_y$: Deviation scores
$(X - M_x)^2$&$(Y - M_y)^2$: Deviation Squared
$(X - M_x)(Y - M_y)$: Product of Deviation Scores

Result details and Calculation
X Values
$\sum = 45$
Mean = 3.75
$\sum(X - M_x)^2 = SS_x = 152.25$
Y Values
$\sum = 2221$
Mean = 185.083
$\sum(Y - M_y)^2 = SS_y = 1082184.917$

4. Data Analysis and Interpretations

The present study aims to break down the scientometric examination of Convalescent Plasmaresearch output worldwide from 2011 to 2022. The examination endeavours to divide the exploration profile of world researchers, the presentation-based

examination yield, the kind of distributions, the dramatic development rate, geological examination yield, creator efficiency, origin design, and so on

Table 1: Year-wise distribution on Convalescent Plasma Research Output

Sl. No.	Year	No. of Publications	Percentage	Mean	Median	Mode	Range
1	2011	7	0.31%	188.83	36.5	18	958
2	2012	18	0.79%				
3	2013	18	0.79%				
4	2014	20	0.88%				
5	2015	33	1.46%				
6	2016	44	1.94%				
7	2017	29	1.28%				
8	2018	28	1.24%				
9	2019	17	0.75%				
10	2020	599	26.43%				
11	2021	965	42.59%				
12	2022	488	21.54%				
Total		**2266**	**100**				

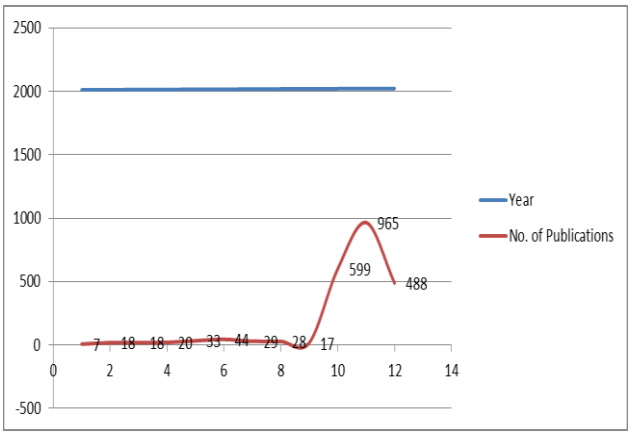

Figure 1:Year: Year-wise distribution of Convalescent Plasma Research Output

The above table exposes the year-wise distribution of Convalescent Plasma research output from 2011 to 202. The author has retrieved 2266 data for the study worldwide on Convalescent Plasma. It is noted that 965 articles were published in 2021 with predominant position followed by 599 papers in 2020, 488 research output in 2022, 44 articles in 2016, 33 research papers in 2015, 29 papers in 2017, 28 contributions in 2018, 20 articles in 2014, 18 articles in 2012 and 2013, 17 articles in 2019 and only 7 papers published in 2011 in the field of Convalescent Plasma research, The mean value is 188.83, median is 36.5, mode is 18 and range is 958.

Table 2: Exponential Growth Rate on Convalescent Plasma Research Output

Sl. No.	Year	No. of Publications	EGR
1	2011	7	-
2	2012	18	0.39
3	2013	18	1.00
4	2014	20	0.90
5	2015	33	0.60
6	2016	44	0.75
7	2017	29	1.51
8	2018	28	1.04
9	2019	17	1.64
10	2020	599	0.02
11	2021	965	0.62
12	2022	488	1.97
Total		**2266**	10.44

Average of EGR is **5.22**

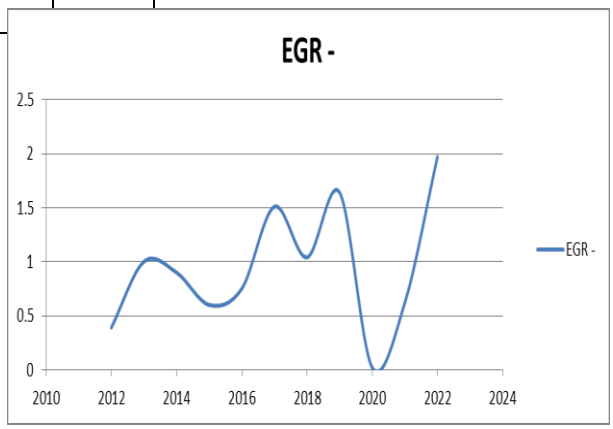

Figure 2: Exponential Growth Rate on Convalescent Plasma Research Output

The above table indicates the exponential growth pace of distributions in Convalescent Plasma research over twelve years. A remarkable development in a number of distributions was seen from 2011 to 2022. The most noteworthy development rate (1.97) was found during 2022 with 488 distributions, followed by (1.64) with 17 distributions during 2019, and during 2017 (1.51) with 17 articles. The average of the exponential growth rate is 5.22 during the period of study on Convalescent Plasma research.

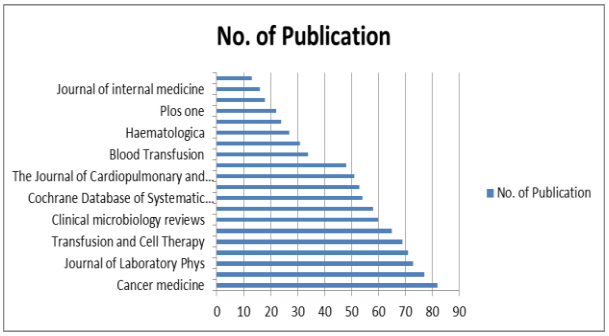

Figure 3:Journal- Journal-wise distribution of Convalescent Plasma Research Output (top 20)

The above figure describes that the medical scientists produced 2266 records scattered over 87 journals from 2011 to 2022; the top twenty journals are shown in the above figure. It is confirmed that cancer medicine is placed in the first position with 82 records, followed by Transfusion and Apheresis Science, which is placed second with 77 articles, and the Journal of Laboratory Physics. It is ranked in third position with 73 articles. Infection & chemotherapy has published 71 articles in fourth place, and other journals have published below 70 papers in the domain of Convalescent Plasma research during the study period. Further, it is stressed that these twenty journals have published more or less 41.7% of papers.

Table 3: Prolific authors according to their highest research productivity on Convalescent Plasma Research with citations (top 15)

Sl. No.	Name of the Authors	No. of Publication	No. of Citations
1	Massimo Franchini	74	8489
2	Bethany Brown	71	1400
3	Jeffrey McCullough	66	2474
4	Patrick W Johnson	63	4112
5	Pascale Richard	58	1664
6	Jing Wang	53	8102
7	Giuseppe Marano	51	6292
8	Penglei Yang	46	6552
9	Giovanni Di Minno	44	8041
10	Liviana Catalan	39	3001
11	Enric Contreras-Barbeta	35	290
12	Sumit Saha	32	58
13	Dairong Xie 1	27	41
14	Giuliano Grazzini	22	2894
15	Stephen Malnick	20	50
	Total	**701(30.94 %)**	**53460**

The above table indicates the most prolific authors in the Convalescent Plasma research field during the study period. It is assessed that Massimo Franchini has contributed 74 (8489 citations) records and is in the first position. Bethany Brown was in the second position with 71 records (1400 citations), Jeffrey McCullough was published 66 papers(2474 citations) with third rank, Patrick W Johnson was published 63 articles(4112 citations) with fourth place, Pascale Richard is published 58(1664 citations) papers with fifth rank, Jing Wang is contributed 53(8192 citations) papers with sixth rank, Giuseppe Marano was produced 51(6292 citations) papers with seventh place. Other authors have published fewer than 50 papers in Convalescent Plasma research during the study period. It is noted that the above 15 authors have produced 30.94% of the articles in this research.

Table 4: Authorship Pattern of Convalescent Plasma Research Output

Sl. No.	Year	Single Author Records	2 – 5 Authors Records	6 – 10 Authors Records	>10 Authors Records	Total No. of Publications
1	2011	2	2	3	0	7
2	2012	3	5	6	4	18
3	2013	2	4	5	7	18
4	2014	2	5	7	6	20
5	2015	4	7	9	13	33
6	2016	3	6	9	26	44
7	2017	1	3	4	21	29
8	2018	2	5	7	14	28
9	2019	0	3	2	12	17

10	2020	7	53	172	367	599
11	2021	14	183	278	490	965
12	2022	5	84	153	246	488
Total		**45 (1.99%)**	**360 (15.88%)**	**655 (28.91%)**	**1206 (53.22%)**	**2266 (100)**

The above table shows that more than ten authored contributions (53.22%) are found to be most prime, followed by 6 to 10 authored communications (28.91%), and 2 to 5 authored publications (15.88%). However, single-authored contributions occupied the least (1.99%) in Convalescent Plasma research.

Table 5: Single Author Vs Multi-Authors Publication

Sl. No.	Year	Single Authors Publications	Multi-Authors Publications	Total
1	2011	2	5	7
	2012	3	15	18
3	2013	2	16	18
4	2014	2	18	20
5	2015	4	29	33
6	2016	3	41	44
7	2017	1	28	29
8	2018	2	26	28
9	2019	0	17	17
10	2020	7	592	599
11	2021	14	951	965
12	2022	5	483	488
Total		**45 (1.99%)**	**2221 (98.01%)**	**2266 (100)**

The above table shows that multi-authored publications are more predominant (98.01%) than single-authored papers (1.99%) in Convalescent Plasma research output.

Table 6: Application of Pearson's Correlation Coefficient for Single vs. Multi-Author Publications

Sl. No.	Year	Single Authors Publications (X)	Multi Authors Publications (Y)
1	2011	2	5
2	2012	3	15
3	2013	2	16
4	2014	2	18
5	2015	4	29
6	2016	3	41
7	2017	1	28
8	2018	2	26
9	2019	0	17
10	2020	7	592
11	2021	14	951
12	2022	5	483

$X - M_x$	$Y - M_y$	$(X - M_x)^2$	$(Y - M_y)^2$	$(X - M_x)(Y - M_y)$
-1.750	-180.083	3.062	32430.007	315.146
-0.750	-170.083	0.562	28928.340	127.562
-1.750	-169.083	3.062	28589.174	295.896
-1.750	-167.083	3.062	27916.840	292.396
0.250	-156.083	0.062	24362.007	-39.021
-0.750	-144.083	0.562	20760.007	108.062
-2.750	-157.083	7.562	24675.174	431.979
-1.750	-159.083	3.062	25307.507	278.396
-3.750	-168.083	14.062	28252.007	630.312
3.250	406.917	10.562	165581.174	1322.479
10.250	765.917	105.062	586628.340	7850.646
1.250	297.917	1.562	88754.340	372.396
Mx: 3.750	My: 185.083	Sum: 152.250	Sum: 1082184.917	Sum: 11986.250

X and Y Combined
$N = 12$
$\sum(X - M_x)(Y - M_y) = 11986.25$

R Calculation
$r = \sum((X - M_y)(Y - M_x)) / \sqrt{((SS_x)(SS_y))}$

$r = 11986.25 / \sqrt{((152.25)(1082184.917))} = 0.9338$

Meta Numerics (cross-check)
$r = 0.9338$

The value of **R is 0.9338**.

This is a strong positive correlation, which means that high X variable scores go with high Y variable scores (and vice versa) in Convalescent Plasma research output during 2011-2022.
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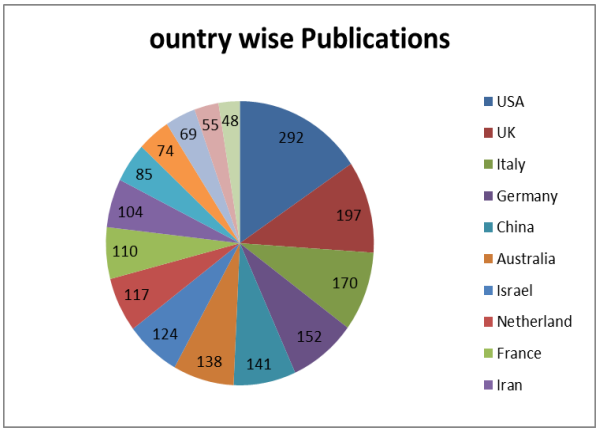

Figure 3: Country-wise Publications on Convalescent Plasma research output (top 15).

The above figure reveals that a total of 46 countries contributed their publications in the field of Convalescent Plasma research. USA was the most productive country with 262 records, UK is in the second position with 197 records, Italy is in the 3rd position with 170 articles, Germany is in the 4th position with 152 records, China is contributed 141 papers with 5th rank, Australia was produced 138 papers with 6th place, Israel has produced 124 records with 7th rank, Netherland was published 117 papers with 8th rank, France is produces 110 articles with 9th place and Iran was published 104 papers with 10th rank. The remaining countries produce fewer than 90 articles in the field of Convalescent Plasma research.

Conclusion

The present research examined 965 (42.59%) records published in 2021 out of 2266 publications and is the most predominant. It is revealed that the most noteworthy development rate (1.97) was found during 2022, with 488 distributions in exponential growth; the average exponential growth rate is 0.87 during the period of study on Convalescent Plasma research. It is confirmed that Cancer medicine is placed in the first position with 82 records. It is highlighted that twenty journals produce about 41.7% of papers out of 2266 publications during the period of study. Massimo Franchini has contributed 74 records and shows in the first position out of top 15 prolific authors. It is identified that ten authored contributions (53.22%) are found to be the most prime. It is noted that multi-authored publications are more predominant (98.01%) than single-authored papers. It is focused that Pearson's Correlation Coefficient value for single Vs multi-authored publications is 0.9338. The USA was the most productive country, with 262 records out of the top fifteen countries, based on research publications on Convalescent Plasma research. We strongly believe that the study will be a helpful resource to the medical scientists and LIS Professionals for their academic and research activities.

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