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ORIGINAL ARTICLE

Emerging Trends in Polio Virus: A Multi-Dimensional Scientometric Analysis from 2015-2024

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ABSTRACT

The present study of the year-wise growth of Polio virus research publications during the 10-year study period between 2015 and 2024 with 4,267 research publications and 50,615 citations. From the study, it is identified that a maximum of 490 (11.48%) research publications are contributed in the year 2021, followed by 486 (11.39%) publications in the year 2023, and 465 (10.90%) publications in the year 2022. The authorship a maximum of 80 (16.06%) research publications are contributed by Thompson, K.M. the United States. The relative growth rate is 0.55 in the year 2016 and 0.09 in the year 2024. This study confirmed that the relative growth rate is decreasing trend. At the same time doubling time was found that 1.26 in the year 2016 and 7.86 in the year 2024 and it is confirmed that doubling time is an increasing trend. The document types a maximum of 3,048 (71.43%) research publications are contributed by Article, the journal of the maximum of 290 (32.69%) research publications are contributed by the Vaccine. The Institute a maximum of 389 (28.35%) contributions are Organization Mondiale de la Santé, the country, a maximum of 1421(38.00%) research publications are contributed by the United States. The time series analysis statistical application will be expected in the Polio virus research publications in the year 2025 is around equal to 466 and the year 2030 is around equal to 486. So that time serious analysis confirmed that the publications on Polio virus research are increasing trend. The maximum of 229 citations are received for the publication of Bhatnaga, R. S.; Dave K.; Venuganti V.V.K. (2017). Micro needles in the clinic, Journal of Controlled Release, 260, 16 4- 182, document type of Review.

KEYWORDS

• Scientometrics • Polio Virus • RGR • RCI • Time Series Analysis

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INTRODUCTION

Overview

In 1988, the World Health Assembly adopted a resolution for the worldwide eradication of polio, marking the launch of the Global Polio Eradication Initiative (GPEI), spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention (CDC) and UNICEF, and later joined by the Bill & Melinda Gates Foundation and Gavi, the Vaccine Alliance. Since then, the incidence of polio worldwide has been reduced by 99%, and the world stands on the threshold of eradicating a human disease globally for only the second time in history, after smallpox in 1980. Wild poliovirus cases have decreased by over 99% since 1988, from an estimated 3,50, 000 cases in more than 125 endemic countries then, to just two endemic countries 3).

Symptoms and risk: Polio is a highly infectious disease caused by a virus. It invades the nervous system and can cause total paralysis in a matter of hours. The virus is transmitted by person-to-person spread mainly through the faecal-oral route or, less frequently, by a common vehicle (for example, contaminated water or food) and multiplies in the intestine. Initial symptoms are fever, fatigue, headache, vomiting, stiffness of the neck and pain in the limbs. One in 200 infections leads to irreversible paralysis (usually in the legs). Among those paralysed, 5–10% die when their breathing muscles become immobilized. Polio mainly affects children under 5 years of age. However, anyone of any age who is unvaccinated can contract the disease. There is no cure for polio, it can only be prevented. Polio vaccine, given multiple times, can protect a child for life. There are two vaccines available: oral polio vaccine and inactivated polio vaccine. Both are effective and safe, and both are used in different combinations worldwide, depending on local epidemiological and programmatic circumstances, to ensure the best possible protection to populations can be provided.

Eradication: The strategies for polio eradication work when they are fully implemented. This is clearly demonstrated by the successful eradication of the disease in most countries of the world. The Polio Eradication Strategy lays out the roadmap to securing a lasting and sustained world, free of all polioviruses, and transition and polio post-certification efforts are ongoing to assure that the infrastructure built up to eradicate polio will continue to benefit broader public health efforts, long after the disease is gone. Key to success is ensuring the Strategy is fully implemented in all areas and is fully resourced. Failure to implement strategic approaches, however, leads to ongoing transmission of the virus. Endemic transmission of wild poliovirus is continuing in areas of Afghanistan and Pakistan.[1]

Scientometric Study

Scientometric is a study to measure the performance of researchers as well as the research publications. The research activities contain major changes over the last few decades and emerged as established research in the discipline of "Library and Information Science". The study of scientific literature has a long history dating back to the early decades of the past century. However, despite the number of research literature in this area, it was not until 1969, that the term bibliometrics first appeared in print (Pritchard 1969)[2] Definition of bibliometric was 'application of mathematical and statistical methods to books and other media of communication', particularly in North America, the term was quickly adopted and used (Wilson, 1999).[3] At the same time, Nalimov and Mulchenko (1969)[4] coined the term scientometrics to refer to 'the application of quantitative methods which are dealing with the analysis of science viewed as an information process. In contrast, this term was widely used in Europe (Wolfram, 2003)[5]. Initially, therefore, scientometrics was restricted to the measurement of science communication, whereas bibliometrics was designed to deal with more general information processes, Andres A (2009).[6]

LITERATURE REVIEW

Cabanillas-Lazo, Miguel *et al.* (2024)[7] were carried out a bibliometric study on Effect of Bariatric Surgery on Gut Microbiota, 595 numbers of data extracted from Scopus for the period 2016 to 2022. 47 were excluded due to an inconsistency of the availability of the metadata record. 552 papers were included in this study, data analysed through SciVal. Carel Le Roux was the most prolific author whereas Edi Prifti was most impactful. "National Institute of Health and Medical Research" is the best institution. United States

had the highest scientific production in this domain. Articles which having international collaboration had prolific impact. Since 2019 there has been consistent growth in the number of publications.

Y Chang and *et al.* (2023)[8] were carried out a bibliometric study on Global research tendency and connection between colorectal cancer and gut flora for the time 2001 to 2021, The articles and reviews were considered for this study and data extracted from the Web of Science. Data analysed using CiteSpace and VOSviewer for knowledge-map analysis. 2,707 publications were found, there was huge increase in publications in 2015. In this domain major contributors are the "United States" and "China. Jun, Yu. from the Chinese University of Hong Kong was the most productive author. High frequency keywords are "Intestinal flora" and "colorectal cancer,"

Nie, Kaidi MD *et al.* (2024)[9] were conducted a study on "Bibliometric and visual analysis of intestinal flora and immunity," data were extracted from the "Web of Science" database on Gut microbiota and immunity, and data was analysed using Microsoft Excel, Scimago, VOSviewer software etc. 16,611 publications were written in English out of which 10865 articles and 5746 reviews, time considered 2013 to 2022. University of California System is at the top in with 525 papers. Most productive journals are "Frontiers in Immunology, "Frontiers in Microbiology, and "PLOS ONE".

Lu Zhang *et al.* (2022)[10] were conducted "a bibliometric study of global trends in diabetes and gut flora research from 2011 to 2021", data extracted from "Web of Science" database. The extracted data (4,834 articles) were analysed using the software "Citespace.5.8. R3" and "Vosviewer1.6.17". In this field of study, there was involvement of 23365 authors, 4820 institutions, and 109 countries. In respect of publications United States was at the top with 1262 articles, with 134 articles the "University of Copenhagen" was at the top, and Patrice, D. Cani was the most prolific author with 52 publications.

Keya Ghosh *et.al.* (2024)[11] Global Research Output on Intestinal Flora and Health from 2000 - 2023: A Scientometric Analysis a Significant number of studies have been made on intestinal flora and health and it has flourished in the last 24years. In this study we have taken up an initiative to measure the literature outcome in intestinal flora using Scientometric analysis during the period 2000 to 2023 as extracted from SCOPUS interdisciplinary database. Total 6,913 numbers of scholarly publications have been fetched which sum up most advanced achievements in this field according to the objectives. This research aims to assess the global research productivity on "Intestinal flora." In respect of Literature Publications "China" is at the top among the world with publications (TP = 4773), followed by "Unites States" (TP = 468)", and "India (TP = 75)" is at the 11th position in this field during this time. "Frontiers in Microbiology" is the most prolific journal in the domain of "Intestinal flora" with 119 publications followed by "World Chinese Journal of Digestology" with 111 publications. Mostly Used Keywords are "Intestine Flora" (3,947) followed by "article" (3,157), then "non-human" (,2897), "human" (2,701) and so on.

Ravichandran S *et.al.* (2022)[12] examine the present study of scientometric analysis of Leukemia research output 2011 - 2020 from an Indian perspective. The year-wise growth of leukemia research publications during the 10-year study period between 2011 and 2020 with 5,474 research publications and 86,869 citations. A maximum of 692 (12.64%) research publications are contributed in the year 2020. and the CAGR is 5.37. Authorship pattern more than five authorship modes with 1,910 (34.89%) publications, the average degree of collaboration is 0.97. The average collaborative coefficient value is 0.76, the average collaboration index value is 4.30, and the average value is 4.3. A maximum of 128 (17.16%) research publications are contributed by Malhotra, P. India. a maximum of 3,837 (70.09%) research publications are contributed by Article. The Maximum of 266 (24.14%) research publications are contributed by the Indian Journal of Hematology and Blood Transfusion. Collaborator country a maximum of 4,62 (37.90%) research publications are collaborated by the United States of America. The highly cited paper of 18,098 citations is received by Ferlay, J (2015) Cancer incidence and mortality worldwide.

OBJECTIVES THE STUDY

The main objective of this study was to use Scientometrics to analyze the Polio virus Research Output covered in the Scopus database during 2015 – 2024.

- To identify and analyze the growth rate of world research in Polio virus research output publications
- To analyze the author's, and relative growth rate and doubling time research output publications
- To analyze the subject of research output publications
- To analyze the time series research output publications
- To know the global research output of document-wise distribution of publications
- To assess the institution-wise and journals research concentration
- To examine the country-wise distribution of publications
- To analyze the key word and funding agencies supported Polio virus research publications
- To analyze highly cited papers of research publications

METHODOLOGY

The study retrieved and downloaded 10 years of publications data on the global output in Polio virus research output from the Scopus database covering the period of 2015 - 2024. The present study aims to analyze the research output of Researchers in the field of Polio virus Research Output. The growth rates of output in terms of research productivity were analyzed during the study period. (TITLE-ABS-KEY ("Polio") AND PUBYEAR > 2014 AND PUBYEAR < 2025). The data have been extracted and tabulated in the form of tables and figures and it is also analytical in nature strengthening the empirical validity due to the application of suitable statistical tools. The data was collected on 12.09.2024 and the Micro Soft excel format was downloaded.

DATA ANALYSIS AND INTERPRETATIONS

Year-wise growth of Polio Virus research publications

Table 1: Year-wise growth of Polio Virus research publications

Year	Publications	%	Cum	%	Citations	%	H-index	CPP	RCI
2015	364	8.53	364	1.58	371	0.73	9.00	1.02	0.09
2016	441	10.34	805	3.48	1,735	3.43	17.00	3.93	0.33
2017	464	10.87	1,269	5.49	2,871	5.67	24.00	6.19	0.52
2018	365	8.55	1,634	7.07	4,557	9.00	29.00	12.48	1.05
2019	398	9.33	2,032	8.79	5,175	10.22	33.00	13.00	1.10
2020	431	10.10	2,463	10.66	5,380	10.63	38.00	12.48	1.05
2021	490	11.48	2,953	12.78	6,976	13.78	39.00	14.24	1.20
2022	465	10.90	3,418	14.79	7,929	15.67	43.00	17.05	1.44
2023	486	11.39	3,904	16.89	7,702	15.22	45.00	15.85	1.34
2024	363	8.51	4,267	18.46	7,919	15.65	45.00	21.82	1.84
Total	**4,267**	**100.00**	**23,109**	**100.00**	**50,615**	**100.00**			

Table 1 shows the year-wise growth of Polio virus research publications during the 10 - year study period between 2015 and 2024 with 4,267 research publications and 50,615 citations. From the study, it is identified that a maximum of 490 (11.48%) research publications are contributed in the year 2021, followed by 486 (11.39%) publications in the year 2023, and 465 (10.90%) publications in the year 2022. The average research publication per year is 426.7. During the 10 - year study it is identified that a total number of 4,267 publications received 50,615 citations. Out of that maximum of 7,929 (15.67%) citations received 465 publications in the year 2022. Followed by 7,919 (15.65%) citations received 363 publications in the year 2024. From the study, out of ,4267 publications. The maximum citation per paper is 21.28 in the year 2024, followed by CPP is 17.05 in the year 2022, and by CPP is 15.85 in the year 2023. The maximum RCI is 1.84 in the year 2024 and the minimum RCI is 0.09 in the year 2015.

Top 10 Authors 'Contributions to Polio Virus research publications

Table 2: Top 10 Author's Contributions to Polio Virus research publications

Authors	Country	Publications	%	Citations	%	H-Index	CPP	RCI
Thompson, K.M.	United States	80	16.06	1,479	14.37	23	18.49	0.89
Bandyopadhyay, A.S.	India	59	11.85	1,501	14.58	22	25.44	1.23
Oberste, M.S.	United Kingdom	55	11.04	1,612	15.66	22	29.31	1.42
Weldon, W.C.	Switzerland	49	9.84	1,348	13.09	20	27.51	1.33
Kalkowska, D.A.	Pakistan	44	8.84	748	7.27	17	17.00	0.82
Nsubuga, P.	China	44	8.84	422	4.10	12	9.59	0.46
Aaby, P.	Nigeria	43	8.63	1,065	10.34	17	24.77	1.20
Mkanda, P.	France	42	8.43	529	5.14	13	12.60	0.61
Mach, O.	Netherlands	41	8.23	497	4.83	14	12.12	0.59
Pallansch, M.A.	Germany	41	8.23	1,094	10.63	17	26.68	1.29
Total		**498**	**100.00**	**10,295**	**100.00**			

Table 2 identified the top 10-author contributions for the research publications on Polio virus research from the Scopus database. From the study, it is identified that a maximum of 80 (16.06%) research publications are contributed by Thompson, K.M. the United States, followed by Bandyopadhyay, A.S. India with 59 (11.85%) research publications, Oberste, M.S. United Kingdom with 55 (11.04%) research publications. The highest citations were 1612 (15.66%) from the Oberste, M.S. and the CPP is 29.31, the H-Index is 22, and RCI is 1.42 Followed by Bandyopadhyay, A.S. with 1,501 (14.58%) research publications, and the CPP is 25.44, the H-Index is 22 and RCI is 1.23, and the Thompson, K.M., with 1,479 (14.37%) research publications. the CPP is 18.49, H-Index is 23 and RCI is 0.89. The lowest citations of 497 (4.83%) Mach, O., and the CPP is 12.12, H-Index is 14 and RCI is 0.59. During 10- the year study period Top 10 institutions are contributed by 498 (100%) research publications.

Relative Growth Rate of Publications

The relative growth of publications was analyzed by using the two parameters namely relative growth rate and doubling time originated by **Mahapatra (1985)**[13]. RGR is a measure to study the increases in the number of articles over a period of time. It is calculated as

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

Whereas

R (a) = RGR = the mean relative growth rate over the specific period of interval

W_1 = the logarithm of the beginning number of publications/pages

W_2= the logarithm of the ending number of publications/pages after a specific period of interval

$T_2 - T_1$ = the unit difference between the beginning time and the ending time.

Doubling Time

The doubling time is the time taken for the doubling of the number of records actually published within a stipulated period. The doubling time is calculated from the relative growth rate and the natural logarithm number is used, the difference has a value of 0.693. Thus the corresponding doubling time can be calculated by the following formula,

Relative Growth Rate and Doubling Time of Polio Virus research publications

Table 3: Relative Growth Rate and Doubling Time of Polio Virus research publications

Year	Publications	Cumulative	W1	W2	RGR	Dt
2015	364	463		6.14		
2016	441	805	6.14	6.69	0.55	1.26
2017	464	1,269	6.69	7.15	0.46	1.53
2018	365	1,634	7.15	7.40	0.25	2.75
2019	398	2,032	7.40	7.62	0.22	3.19
2020	431	2,463	7.62	7.81	0.19	3.62
2021	490	2,953	7.81	7.99	0.18	3.84
2022	465	3,418	7.99	8.14	0.15	4.76
2023	486	3,904	8.14	8.27	0.13	5.24
2024	363	4,267	8.27	8.36	0.09	7.83
Total	**4,267**					

The relative growth rate and the doubling time (Dt) were calculated and the results are presented in table 3. From the study, it is identified that the relative growth rate is 0.55 in the year 2016 and 0.09 in the year 2024. This study confirmed that the relative growth rate is decreasing trend. At the same time doubling time was found that 0.1.26 in the year 2016 and 7.86 in the year 2024 and it is confirmed that doubling time is an increasing trend.

Subject wise of Polio Virus research publications

Table 4: Subject wise of Polio Virus research publications

Subject area	No. of articles	%
Medicine	3,258	49.07
Immunology and Microbiology	1,080	16.27
Biochemistry, Genetics and Molecular Biology	696	10.48
Pharmacology, Toxicology and Pharmaceutics	343	5.17
Social Sciences	321	4.83
Veterinary	316	4.76
Health Professions	180	2.71
Multidisciplinary	156	2.35
Environmental Science	155	2.33
Arts and Humanities	135	2.03
Total	**6,640**	**100.00**

Table 4 identified the top ten subject contributions for the research publications of Polio virus research from the Scopus database. From the study it is identified that a maximum of 3,258 (49.07%) research publications are contributed by Medicine, followed by Immunology and Microbiology with 1,080 (16.27%) research publications, Biochemistry, Genetics and Molecular Biology with 696 (10.48%) research publications. The lowest subject is Arts and Humanities with 135 (2.03%). Research publications.

Document Types of Polio Virus research publications

Table 5: Document Type of Polio Virus research publications

Document type	No. of articles	%	Cumulative	%
Article	3,048	71.43	3,048	5.85
Review	482	11.30	3,530	6.78
Book Chapter	216	5.06	3,746	7.19
Note	160	3.75	3,906	7.50
Letter	123	2.88	4,029	7.74
Conference Paper	89	2.09	4,118	7.91
Editorial	60	1.41	4,178	8.02
Erratum	35	0.82	4,213	8.09
Short Survey	25	0.59	4,238	8.14
Book	24	0.56	4262	8.19
Conference Review	3	0.07	4,265	8.19
Data Paper	1	0.02	4,266	8.19
Retracted	1	0.02	4,267	8.20
Total	**4,267**	**100.00**	**52,066**	**100.00**

Document types identified during the 10-year study period on Polio virus research publications are shown in table 5. From the study, it is identified that a maximum of 3,048 (71.43%) research publications are contributed by Article, followed by 482 (11.30%) research publications are Review and third placed in the book chapter with 216 (5.06%) research publications. The lowest document type of Data Paper and Retracted with 1 (0.02%) research publications. This study confirmed that more than 82.73% of research publications are contributed by Article and Review. Remaining nearby 18.27% of research publications are identified in the other form documents.

Top 10 Journal's Contributions to Polio Virus research publications

Table 6: top 10 Journal's Contributions to Polio Virus research publications

Journal	No. of articles	%	Citations	%	H-Index	CPP	RCI
Vaccine	290	32.69	5,484	39.33	34	18.91	1.20
Journal of Infectious Diseases	109	12.29	1,502	10.77	20	13.78	0.88
BMC Public Health	73	8.23	1,205	8.64	19	16.51	1.05
Human Vaccines and Immunotherapeutics	71	8.00	827	5.93	15	11.65	0.74
Pan African Medical Journal	68	7.67	408	2.93	11	6.00	0.38
Vaccines	66	7.44	340	2.44	10	5.15	0.33
Plos One	64	7.22	729	5.23	16	11.39	0.72
Lancet Infectious Diseases	53	5.98	958	6.87	17	18.08	1.15
Morbidity and Mortality Weekly Report	51	5.75	1,223	8.77	21	23.98	1.53
Clinical Infectious Diseases	42	4.74	1,266	9.08	16	30.14	1.92
Total	**887**	**100.00**	**13,942**	**100.00**			

Table 6 shows the top 10 journals' contributions in the field of Polio virus research. From the study, it is identified that the maximum of 5,521 (33.63%) research publications are contributed by the Vaccine, followed by Journal of Infectious Diseases with 109 (12.29%) research publications, third-placed in the BMC Public Health with 73 (8.23%) research publications. The highest citations were 5,484 (39.33%) from the Vaccine, and the CPP is 18.91, the H-Index is 34, and RCI is 1.20 Followed by Journal of Infectious Diseases with 1,502 (10.77%) research publications, and the CPP is 13.78, the H-Index is 20, and RCI is 0.88, and the Clinical Infectious Diseases with 1,266 (9.08%) research publications. the CPP is 30.14, H-Index is 16and RCI is 1.92. The lowest citations of 340(2.44%) Vaccines, and the CPP is 5.15, H-Index is 10 and RCI is 0.33. During 10- the year study period Top 10 institutions are contributed by 887 (100%) research publications.

Top 10 Institution contributions to Polio Virus research publications

Table 7: Top 10 Institution's contributions to Polio Virus research publications

Institutions	Publications	%	Citations	%	H-Index	CPP	RCI
Organisation Mondiale de la Santé	389	28.35	5,604	21.29	33	14.41	0.75
Centers for Disease Control and Prevention	342	24.93	6,421	24.39	42	18.77	0.98
Bill & Melinda Gates Foundation	137	9.99	2,323	8.82	25	16.96	0.88
London School of Hygiene & Tropical Medicine	99	7.22	3,179	12.08	26	32.11	1.67
National Center for Immunization and Respiratory Diseases	90	6.56	1,964	7.46	26	21.82	1.14
Johns Hopkins Bloomberg School of Public Health	76	5.54	1,260	4.79	17	16.58	0.86
UNICEF	69	5.03	1,636	6.21	16	23.71	1.24
Imperial College London	64	4.66	1,772	6.73	25	27.69	1.44
Syddansk Universitet	54	3.94	1,226	4.66	19	22.70	1.18
Statens Serum Institute	52	3.79	940	3.57	16	18.08	0.94
Total	**1,372**	**100.00**	**26,325**	**100.00**			

During the 10-year study period, the top 10 institutions' contributions are identified in table 7 from the study the maximum of 389 (28.35%) contributions are Organisation Mondiale de la Santé, followed by Centers for Disease Control and Prevention with 342 (24.93%) research publications, Bill & Melinda Gates Foundation contributed with 137 (9.99%) research publications. The lowest research publications are Statens Serum Institute with 52 (3.797%) research publications. The highest citations were 6,421 (24.39%) from the Centers for Disease Control and Prevention, and the CPP is 18.77, the H-Index is 42, and RCI is 0.98 Followed by Organisation Mondiale de la Santé with 5604 (21.29%) research publications, and the CPP is 14.41, the H-Index is 33, and RCI is 0.0.75, and the London School of Hygiene & Tropical Medicine with 3,179 (12.08%) research publications. the CPP is 32.11, H-Index is 26 and RCI is 1.67. The lowest citations of 940 (3.57%) Statens Serum Institute, and the CPP is 18.08, H-Index is 216 and RCI is 0.94. During 10- the year study period Top 10 institutions are contributed by 1,37 2(100%) research publications.

Top 14 - countries' Contributions to Polio Virus research publications

Table 8: Country-wise Contributions to Polio Virus research publications

Country	No. of articles	%	Citations	%	H- Index	CPP	RCI
United States	1,421	38.00	24,035	40.13	65	16.91	1.06
India	419	11.21	4,142	6.91	27	9.89	0.62
United Kingdom	401	10.72	9,189	15.34	47	22.92	1.43
Switzerland	284	7.60	5,387	8.99	35	18.97	1.18
Pakistan	276	7.38	3,231	5.39	28	11.71	0.73
China	241	6.45	2,458	4.10	20	10.20	0.64
Nigeria	208	5.56	2,062	3.44	22	9.91	0.62
France	175	4.68	2,197	3.67	24	12.55	0.78
Netherlands	162	4.33	4,379	7.31	32	27.03	1.69
Germany	152	4.07	2,820	4.71	24	18.55	1.16
Total	**3,739**	**100.00**	**59,900**	**100.00**			

Table 8 shows the top 10 countries' research publications for Polio virus research during the study period from 2015 - 2024. From this study, it is identified that a maximum of 1,421 (38.00%) research publications are contributed by the United States, followed by India with 419 (11.21%) research publications, and third place is the United Kingdom with 401 (10.72%) research publications. The lowest research publications are Germany with 152 (4.07%) research publications. During ten-year study period the highest number of citations was 24 035 (40.13%) in the United States, the CPP is 16.91, the H-index is 65 and RCI is 1.06. Followed by the United Kingdom with 9189(15.34%) research publications, the CPP is 22.92, the H-index is 47 and RCI is 1.43 The lowest citations of were 2,062 (3.44%) in Nigeria, The CPP is 9.91, the H-index is 22 and RCI is 0.62. The top 10 countries contributed 3,739 (100 %) research publications.

Top 10- Funding agency's Contributions to Polio Virus research publications

Table 9: top 10 Funding agency's Contributions to Polio Virus research publications

Keyword	No. of articles	%
Bill and Melinda Gates Foundation	279	22.68
World Health Organization	208	16.91
Centers for Disease Control and Prevention	164	13.33
U.S. Department of Health and Human Services	164	13.33
National Institutes of Health	146	11.87
European Commission	71	5.77
National Institute of Allergy and Infectious Diseases	71	5.77
Medical Research Council	47	3.82
Well come Trust	44	3.58
UNICEF	36	2.93
Total	**1,230**	**100.00**

Table 9 shows the top 10 funding agencies' research publications for Polio virus research during the study period from 2015 - 2024. From this study, it is identified that a maximum of 279 (22.68%) research publications are contributed by the Bill and Melinda Gates Foundation, followed by World Health Organization with 208 (16.91%) research publications, and third place is the Centers for Disease Control and Prevention with 164 (13.33%) research publications. The lowest research publications is UNICEF with 36 (2.93%). The top 10 funding agencies contributed 1,230 (100%) research publications.

Top 10-Keyword Contributions to Polio Virus research publications

Table 10: top 10 Keyword Contributions to Polio Virus research publications

Keyword	No. of articles	%
Human	3,196	18.40
Humans	2,558	14.73
Poliomyelitis	2,226	12.81
Article	1,966	11.32
Vaccination	1,520	8.75
Female	1,301	7.49
Poliomyelitis Vaccine	1,278	7.36
Male	1,197	6.89
Child	1,108	6.38
Poliomyelitis Virus	1,021	5.88
Total	**17,371**	**100.00**

Table 10 shows the top 10 funding agencies' research publications for Polio virus research during the study period from 2015 - 2024. From this study, it is identified that a maximum of 3,196 (18.40%) research publications are contributed by the Human, followed by Humans with 2,558 (14.73%) research publications, and third place is the Poliomyelitis with 2,226 (12.81%) research publications. The lowest research publications are Poliomyelitis Virus with 1,021 (5.88%) The top 10 funding agencies contributed 1,7317 (100%) research publications.

Time Series Analysis

Time series analysis reveals the estimated growth values are identified based on previous data. A straight–line equation is adapted to measure the future values based on previous data. Time series analysis used by **Jeyshankar and Ramesh babu (2013)[14] Ravichandran (2020)[15]**

Time Series Analysis of Polio Virus research publications

Table 11: Time Series Analysis of Polio Virus research publications

Year	Count (Y)	X	X2	XY
2015	364	-5	25	-1820
2016	441	-4	16	-1764
2017	464	-3	9	-1392
2018	365	-2	4	-730
2019	398	-1	1	-398
2020	431	1	1	431

table cont....

Year	Count (Y)	X	X2	XY
2021	490	2	4	980
2022	465	3	9	1,395
2023	486	4	16	1,944
2024	363	5	25	1,815
Total	4,267		110	461

Table 11 shows that the time series analysis formula has been predicted for Polio virus research publications for the years 2025 and 2030

The straight Line Equation is

$Y = a + bx$

Here,

$\sum Y = 4,267$, $\sum X^2 = 110$, $\sum XY = 461$

$a = \sum Y/N = 4,267/10 = 426.7 = 426$

$b = \sum XY/ \sum X^2 = 461/110 = 4.09 = 4$

Estimated publications in the year 2025 are when X=2025-2015=10

$Y = a + bx$

$= 426 + (4*10) = 426+40 = 466$

Estimated literature in 2030 is when X=2030-2015=15

$$Y = a + bx$$

$$= 426 + (4*15) = 426+ 60 = 486$$

The estimated growth based on a time series analysis statistical application will be expected in the Polio virus research publications in the year 2025 is around equal to 466 and the year 2030 is around equal to 486. So that time serious analysis confirmed that the publications on Polio virus research are increasing trend.

Highly Cited paper of Polio Virus research publications

Table 12: Highly Cited paper of Polio Virus research publications

S. no	Titles	Citations	Document Type
1	Bhatnaga, R. S.; Dave K.; Venuganti V.V.K. (2017). Micro needles in the clinic, Journal of Controlled Release, 260, 164 - 182.	229	Review
2	Lund N.; et.al. (2015). The Effect of Oral Polio Vaccine at Birth on Infant Mortality: A Randomized Trial, 61(10): 1504 - 1511.	137	Article
3	Chen, B.; Zi B.; et.al. (2019). Knee exoskeletons for gait rehabilitation and human performance augmentation: A state-of-the-art, Mechanism and Machine Theory, 134, 499 - 511.	114	Review
4	Restrepo-Méndez, M.C.; et.al. (2016). Inequalities in full immunization coverage: Trends in low- and middle-income countries, Bulletin of the World Health Organization, 9 4(11): 794 - 805.	113	Article
5	Anand, A.; et.al. (2015.) Early priming with inactivated poliovirus vaccine (IPV) and intradermal fractional dose IPV administered by a micro needle device: A randomized, Vaccine controlled trial, 33 (48): 6816 - 6822.	91	Article
6	Hussain, S.F.; Boyle P.; Patel P.; Sullivan R. (2016). Eradicating polio in Pakistan: An analysis of the challenges and solutions to this security and health issue, Globalization and Health, 12 (1), article No 63.	81	Review
7	Chuang, Y.-Y.; Huang Y.-C. (2019). Enter viral infection in neonates, Journal of Microbiology, Immunology and Infection, 52 (6): 851 - 857.	78	Review
8	Vincent, T.L.; Wann A.K.T. (2019). Mechanoadaptation: articular cartilage through thick and thin, Journal of Physiology, 597 (5): 1271 - 1281.	78	Review
9	Pawlowski, C.; et.al. (2021). Exploratory analysis of immunization records highlights decreased SARS-CoV-2 rates in individuals with recent non-COVID-19 vaccinations, Scientific Reports, 11 (1): Article No 4741.	74	Article
10	Klapsa, D.; et.al. (2022). Sustained detection of type 2 poliovirus in London sewage between February and July, 2022, by enhanced environmental surveillance, The Lancet, 400 (10362): 153 1- 1538.	72	Article

Table 12 the highly cited top 10 Polio virus research publications during the selected 10 - year study period. From the study, it is identified that a maximum of 229 citations are received for the publication of Bhatnagar S.; Dave, K.; Venuganti V.V.K. (2017). Microneedles in the clinic, Journal of Controlled Release, 260, 164 - 182. Followed by 137 citations by Lund, N.; *et. al.* (2015). The Effect of Oral Polio Vaccine at Birth on Infant Mortality: A Randomized Trial, 61 (10): 1504 - 1511., and 114 Chen B.; Zi B.; et.al. (2019). Knee

exoskeletons for gait rehabilitation and human performance augmentation: A state-of-the-art, Mechanism and Machine Theory, 134, 499 - 511. The top 10 highly cited publications are covered by 05 articles and 05 review.

Major Finding

- During the year-wise growth of Polio virus research publications during the 10 - year study period between 2015 and 2024 with 4,267 research publications and 5,0615 citations. From the study, it is identified that a maximum of 490 (11.48%) research publications are contributed in the year 2021, followed by 486 (11.39%) publications in the year 2023, and 465 (10.90%) publications in the year 2022
- During the authorship a maximum of 80 (16.06%) research publications are contributed by Thompson, K.M. the United States. The relative growth rate is 0.55 in the year 2016 and 0.09 in the year 2024. This study confirmed that the relative growth rate is decreasing trend. At the same time doubling time was found that 1.26 in the year 2016 and 7.86 in the year 2024 and it is confirmed that doubling time is an increasing trend.
- During the subject a maximum of 3,258 (49.07%) research publications are contributed by medicine, the keyword is a maximum of 279 (22.68%) research publications contributed by the Bill midinda Gates Foundations.
- The document types a maximum of 3,048 (71.43%) research publications are contributed by Article, the journal of the maximum of 290 (32.69%) research publications are contributed by the Vaccine.
- During the Institute a maximum of 389 (28.35%) contributions are Organisation Mondiale de la Santé, the country, a maximum of 1,421 (38.00%) research publications are contributed by the United States, and the funding agency is a maximum of 3,196 (18.40%) research publications contributed by the Human.
- The time series analysis statistical application will be expected in the Polio virus research publications in the year 2025 is around equal to 466 and the year 2030 is around equal to 486. So that time serious analysis confirmed that the publications on Polio virus research are increasing trend.
- During the maximum of 229 citations are received for the publication of Bhatnagar, R. S.; Dave K.; Venuganti, V.V.K. (2017). Micro needles in the clinic, Journal of Controlled Release, 260, 164 - 182, document type of Review.

CONCLUSION

Permanent elimination of the threat of paralytic poliomyelitis caused by poliovirus cannot be guaranteed by hunting down the virus, and can only be achieved by maintaining a high rate of population immunity. The approach proposed here focuses on preventing disease rather than getting rid of the virus. This approach will help move the programme forward, guided by new benchmarks of success focusing on disease. In this paper studied the authorship a maximum of 80 (16.06%) research publications are contributed by Thompson, K.M. the United States. The relative growth rate is 0.55 in the year 2016 and 0.09 in the year 2024. This study confirmed that the relative growth rate is decreasing trend. At the same time doubling time was found that 1.26 in the year 2016 and 7.86 in the year 2024 and it is confirmed that doubling time is an increasing trend. The document types a maximum of 3,048 (71.43%) research publications are contributed by Article, the journal of the maximum of 290 (32.69%) research publications are contributed by the Vaccine. The Institute a maximum of 389 (28.35%) contributions are Organisation Mondiale de la Santé, the country, a maximum of 1,421 (38.00%) research publications are contributed by the United States. The modified strategy should be a part of the next phase of the polio eradication campaign that should better synergise and be merged with other global immunization programmes. Although the history of the campaign clearly shows that success cannot be guaranteed regardless of how close it appears to be, we believe that this new strategy will lead to a sustained elimination of paralytic poliomyelitis caused by poliovirus.

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