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Mapping Out the Scientific Literature on Cerebral Palsy: A Web of Science-Based Analysis (1990-2020)

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Abstract: The study's main purpose was to map Cerebral Palsy (CP), a bibliometric analysis of the highly cited research output, 1990-2020. The web of science database was used to retrieve all records related to CP. The Impact Factor of the reviews has been taken from the 2019 issue of Clarivate Analytics' Journal Citation Report (JCR), named IF2019. The Hirsch Index (h-Index) has been compiled from the most active writers and organizations database. The co-citation networks between efficient authors of highly cited papers were used by Biblioshiny, ScientoPy, and VOS viewer. The study's main findings were that the USA was the most influential country in contributing articles, the Royal Children's Hospital Melbourne (Australia) being the most productive institution. Developmental Medicine and Child Neurology have published the highest number of articles on CP research. It may enable future research to investigate other aspects, such as mapping CP literature research output: a bibliometric analysis of the publication of articles in a particular country and the continent.

Keywords: Cerebral Palsy, Bibliometric, Botulinum Toxin, Acupuncture, Nerve Injury, Infant, Children, Brain, World-Wide.

1. Introduction

Cerebral Palsy (CP) results from a brain disorder that occurs before, during, or after birth, or after childhood (loss of motivational regulation). CP does not generally mean mental retardation; many children afflicted by CP are growing up to be socially stable individuals. However, any early-life brain condition may cause the resulting intellectual and emotional disorder to become affected, often severe. Epileptic attacks can occur in many children with CP in convulsive seizures, particularly in sections caused by paralysis. Mental delay and epileptic attacks are especially prevalent in spastic CP.

Moreover, CP is a slightly lower rate of extreme mental retardation, and exceptional convulsive seizures arise in the athetosis type of cerebral palsy. Children with athetosis can be sensitive and intelligent; however, they may also not articulate through intelligible language or signals because of repetitive gestures and dysarthria. Therefore, they can seem to be mentally impaired [1].

The CP causes are diverse and arbitrary, yet the complicated synaptic cycles of the basal ganglia and the cerebral cortex fall apart. Heredity plays only a small role. Neoplastic abnormalities in a nerve cell, brain interstitial tissues or blood vessel tumors, or abnormal brain chemistry may occur. It may occur in the liver. Fetal and embryonic disease induces CP more often than heredity. Parental blood type incompatibilities that lead to significant neonatal jaundice can lead to brain injury and are less certain of the causes of CP than previously thought. Infancy, infancy and childhood illnesses, heavy head injuries, and other causes of CP, particularly postnatal diseases, are less frequent [1].

Moreover, CP is caused by pre-, after- or after-born events. There are possible causes, including genetic mutations, prenatal exposure to toxins such as mercury or infections such as rubella, strokes in newborns, and oxygen interruption in the fetal brain (asphyxia). As symptoms are complex, people with CP can have manifestations all along the continuum, ranging from

moderate pain to severe impairments in driving, fine motor function, and other voluntary movements. As CP is not a progressive disorder, it includes long-term disability, including contractures and other musculoskeletal deformities.

Further, CP had been an unusual theme in literature and poetry until the latter half of the twentieth century when writers like Nolan and Brown helped to propel CP to the laity beyond the realms of passion and institutionalization. Electronic and other media also enabled people with CP and growing sporting ties and cultural organizations to share personal experiences. Images and ethnic connections from Egypt. People with CP have an important if the steadily accumulated impact on the community around them from Egyptian imagery and the rhetorical force of medieval miracles. You also have many social, medical, and cultural courses to teach [2].

Furthermore, CP is a category of disabilities that impair a person's ability to walk and keep calm and posture. CP is the main sensory disorder in infancy. It means the brain has to do with it. Paralysis involves muscle fatigue or complications. CP is caused by abnormal brain development or brain damage that affects a person's ability to control his or her muscles [3]. CP is a condition in which children are disabled. It is a muscle control disorder that causes difficulty in moving and positioning the body. A small part of the brain that controls movement would have been damaged early in life. This damage does not affect the children's muscles, which may cause them directly or the nerves connecting them to the spinal cord [4].

On the contrary, it affects the brain's ability to control muscles. Depending on the location and degree of damage, CP can range from mild to severe [5], [6]. The muscles are given the wrong instructions from the damaged part of the brain. This makes them rigid or floppy. But the muscles are not paralyzed [7]. Sometimes the damage affects other parts of the brain, which may

cause difficulty in seeing, hearing, communicating, and learning [8]. CP affects children all their lives. Brain damage does not worsen, but as the child grows older, the loss of function appears to be more severe. Deformities can also develop [9]. At all, it is palliative, transitory, and of no use to treat so-called muscle-wrestling drugs. To make good the physical responsibility of children, they do have the basic treatment scheme for social management, education, and training to develop both sensory, motors, and intellectual properties.

Further, Cole and Eales researched the growth of literature employing using bibliographical references in comparative anatomy in 1917, respectively (Cole & Eales, 1917; Osareh, 1996) [10-11]. Likewise, during the year 1969, in the "statistical bibliography," the renowned British scientist Allen Prichard first suggested the term "Bibliometrics." This term is used to mark the official birth of bibliometrics [12].

At present, this work has received considerable attention. The most obvious benefit of bibliometrics is studying co-citations, regional distribution, and word frequency, enabling scholars to examine research fields and draw very useful conclusions. Bibliometrics was previously commonly used in hotspots [13]. In co-authorship [14] in co-citations and the growth of the fields (Merigó et al., 2017; Yeung et al., 2017b) [15-16]. The purpose of this study mapping of research output on CP a bibliometric analysis during the period 1990–2020.

2. Literature review

This study provides a systematic review of published literature on the topic "a bibliometric analysis of research productivity on cerebral palsy 1990 to 2020". The investigator reviewed only those studies which are related to the present study concerned. At present, this work has received considerable attention. Mu et al. (2012) [17] attempted to find global study patterns for three brain paralysis therapies for infants. The study's key findings were presented in journals

with an emphasis on neurology, such as Developmental Medicine and Child Neurology and the Child Neurology Journal. Botulinum toxin therapies for this population published in the Netherlands, the USA, and Australia.

Similarly, Hernandez-Reif et al. (2005) [18] study reveals that the twenty young children (mean age=32 month) received thirty minutes' massage or twice weekly reading for 12 weeks from early intervention services with cerebral palsy (CP). Children receiving massage therapy had fewer physical symptoms, including reduced spasticity, reduced muscle tone overall and in the arms, and improved fine and gross motor function. In comparison, the massage party increased memory, social, and dressing ratings on the developmental profile and displayed more optimistic facial gestures and lower limb behavior through face-to-face encounters. Likewise, Kurz et al. (2014) [19] study found that the motor performance of CP children was more errors while attempting to meet the target force, and this amount of error was negative. The first shows that children with CP have neural synchronization within the somatosensory cortices due to their engine performance errors. The same, Wu et al. (2020) [20] have studied the brain imaging was first interested among 50 widely cited papers in 2008 in the clinical treatment of children with CP. In CP diagnosis studies, the association between brain image output and functional disability was based (12/25). Two hundred two on brain imaging in children with CP have been listed among 6,137 published papers. CP recognition, diagnostics, and comprehension of its process using MR technology were the key topics of the highly cited papers.

The main objective of Fan & Pan's (2011) [21] study was to explore the current situation of acupuncture and moxibustion in domestic childhood cerebral palsy research published between 2000 and 2010. Moreover, the study Jabali et al. (2020) [22] attempts to analyze the overall image of the literature published in the field by drawing a bibliometric analysis. The article

entitled “Nonlinear model predictive control of glucose concentration in subjects with type 1 diabetes” by Hovorka R, published in 2004 in “Physiological Measurement,” is on the top of the list with 755 citations. Also, Shepherd et al.’s (2018) [23] study found that the 454 RCTs; data for cerebral palsy were available from 96 (21 percent) RCTs involving 15,885 children. In addition, Huang et al. (2012) [24] study indicates that the range of diseases of moxibustion therapy has 364 types of diseases. Missing position, diarrhea, and colitis are the best indications of moxibustion therapy. Urinary incontinence and dysmenorrhea are typical signs. Knee osteoarthritis, temporomandibular joint disturbance, soft tissue injury, heel pain, asthma, urinary retention, and herpes zoster are the next typical signs. Likewise, Haque et al. (2020) [25] point out that a total of 2759 publications on issues relating to Islamic economics, banking and finance for the period 1955 to 2020 in Scopus. The report identifies the consistency and quantity of analysis as possible challenges in Islamic economics, banking, and finance. It shows that 1955 was the year in which Islamic economics and finance were published.

Moreover, in Brown et al.’s (2017) [26] article, of the 6,486 papers published, 31 were marked as HCA. The American Journal of Occupational Therapy (n=8; 26 percent). Seven countries distributed the 31 HCA: United States (20 articles), Canada (3), United Kingdom (3), Australia (2), Netherlands (1), New Zealand (1), and Sweden (1). The three reviewers were S, with the highest Y-index. Page J., Clark F., W. Dunn: Dunn. The main purpose of the study conducted by Kocak et al. (2019) [27] was to elucidate the research is to present a “Neuroscience literature” science map. Increasingly research area in Turkey. This research presents maps of publications by scientists related to neuroscience research that enhances the accuracy of clustering and classification of science fields by incorporating algorithms and main bibliometric analysis. Anwar’s (2020) [28] study reveals that the largest number of research papers published in 2013

was 60 (31.08 %), and the lowest number of papers published in 2009 was 13 (6.73 %). 80 (41.45 %) were single authors, and 4 (2.07 %) were the least number of authors recorded. Likewise, Li et al. (2020) [29] study found that the most prominent newspaper in the world was Evid Based Complement Alternate Med (28) and Ann Intern Med (202). The most active country and institutions in this field were China (115) and the University of York (18). Hugh Macpherson (18) was the most prolific author, and Witt C the first to be cited by the authors. The first frequency rating article in the guide mentioned above is published by Scharf HP (54).

Similarly, Pei et al. (2019) [30] study explored that Neuropsychiatry and Clinical Neuroscience Journal ranked first in the frequency and timeliness of the cited journal. The number of publications in China was highest among the countries, and Hong Kong was one of the top three institutes. The most active authors were Chung KF and Yeung WF, and YEUNG WF was the first among the authors cited.

Therefore, Hussain & Fatima's (2011) [31] study found that the sixty-two articles in 10 issues of the Chinese Librarianship: An International Electronic Journal has been published for the study. The authors associated with the academic / research institutes published 44 papers (70.97 percent). Many scholars use a bibliometric review to study literature in a specific area. In 2007, the maximum number of contributions was shown in Chinese Librarianship: An International Electronic Journal. Similarly, Hussain's (2017) [32] study focused that Scientometrics study science, technology, and innovation calculation and analysis. The study shows that there has been an increasing pattern between 2004 and 2014 with the publication of papers in the King Saud University Journal, Computer, and Information Technology. The result shows that the highest numbers of contributors belong to Saudi Arabia, followed by India, Malaysia, Tunisia UK, Algeria, Egypt, the USA, Iran, Jordon, etc., from 2004 to 2014. Hussain et al. (2011) [33]

study analyzes a bibliometric study of 578 articles were published during the period January 1, 2000, to December 31, 2010, in the 'Electronic Library Journal.' Single authors contributed most of the articles, and most authors were librarians, faculty members, or researchers affiliated with academic or research institutions. It is also found that Stephen M. Mutula, Howard Falk, and Shien-Chiang Yu were the most prolific authors who have contributed eight articles, seven articles, and six articles each. Another most important article in the history of the journal can be found with bibliometric analysis. The observer studies were more than half done, RCTs 9%, and US authors 75%. In nearly 150 years, the journal had a profound impact. The authors have used the Web of Science and Scopus databases to detect the most widely cited papers from 1920 to 2018 [34]. Hussain & Fatima (2011) [35] examined all the information needed for the articles published in 2006 through 2010 and collected by the researchers. The study found that most of the papers were published by a single author. The United States has contributed more articles than any other country, such as South Africa, China, India, U.K., Korea, Canada, Australia, The Netherlands, etc.

3. Research Methods

Bibliometric research was used to analyze the publication trends and patterns in cerebral palsy literature in the world. In this respect, the web of science database was chosen to extract the applicable data on cerebral palsy. The web of science (WoS) is the largest indexing and abstracting database of academic literature in social science. A systematic search plan has been outlined, restricting the maximum and applicable data to authors' keywords and title areas. The following search query was used in the title and author keyword area of the advanced search option of the WoS database.

All literature searched for TS=("Cerebral Palsy" AND (Athetoid OR Atonic OR Congenital OR "Diplegic Infantile" OR Dyskinetic OR Dystonic-Rigid OR Hypotonic OR Mixed OR "Monoplegic Infantile" OR "Quadriplegic Infantile" OR "Rolandic Type" OR Spastic OR Congenital OR "Diplegia Spastic" OR "Diplegic Infantile" OR "Infantile Diplegic" OR "Infantile Monoplegic" OR "Infantile Quadriplegic" OR "Little Disease" OR "Little's Disease" OR Monoplegic OR "Monoplegic Infantile" OR "Quadriplegic Infantile" OR "Spastic Diplegia"))

We choose various citations indexes such as Science Citation Index Expanded (SCI-EXPANDED), Social Science Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index-Science (CPCI-S), Conference Proceedings Citation Index - Social Sciences & Humanities (CPCI-SSH), Emerging Sources Citation Index (ESCI), Current Chemical Reactions (CCR-Expanded) and Index Chemicus (IC) from the WoS for the present study. Though we downloaded 5696 documents, the number of files will change as further papers are published. All document types are articles, book chapters, conference proceeding papers, review, and review book chapters.

While we downloaded 5696 records, the number of files might change when more articles are published. All document types: articles, book chapter, proceeding papers, review, and review book chapter. This study researcher used various bibliometric tools, that is, RStudio, HistCite, and VOS Viewer. The read file and bibliometrix convert2df functions are used. When loading and converting text data into UTF-8 format through the read file feature, convert2df extracts and generates a data frame that is the same for the analytics unit in the WoS export file. Finally, bibliographic data is produced by the biblioAnalysis function. By the generic function (plot) in R, the results can be drawn.

4. Research Questions

A bibliometrics and co-citation analysis of the study is to answer the following research questions:

1. What is the main information in the Cerebral Palsy research during 1990-2020?
2. What has the publishing and citation trend been followed in the CP?
3. What are the most productive and highly cited countries, organizations, and authors?
4. What are the preferred journals, authorship patterns, and collaborative research patterns?
5. What are the most frequently used author Keywords patterns and highly cited articles?

5. Results

5.1 Year Wise Distribution

Table 1 and figure 1 show the distribution of Cerebral Palsy research articles published in the journals during the year 1900-2020. A total of 5696 research articles was published during this period of these years. Out of 5696 articles, the highest number of research articles (TP = 1531) was published in the year 2016-2020, followed by 2011-2015 with 1472 articles, 2006-2010 with 1136 articles, 2001-2005 with 754 articles, and the lowest number of articles were published in the year 1996-2000 with 520 articles. Total Global Citation Sources (33786) was the highest in 2006-2010, followed by Total Global Citation Sources (30924) in 2001-2005 and further followed by TC (23246) in 2011-2015.

Table 1

Year Wise Distribution

PY	TP	TC
1990-1995	283	11075
1996-2000	520	20046
2001-2005	754	30924
2006-2010	1136	33786
2011-2015	1472	23246
2016-2020	1531	5580

Note: PY= Year Published, TP=Total Publications, TC=Total Citation

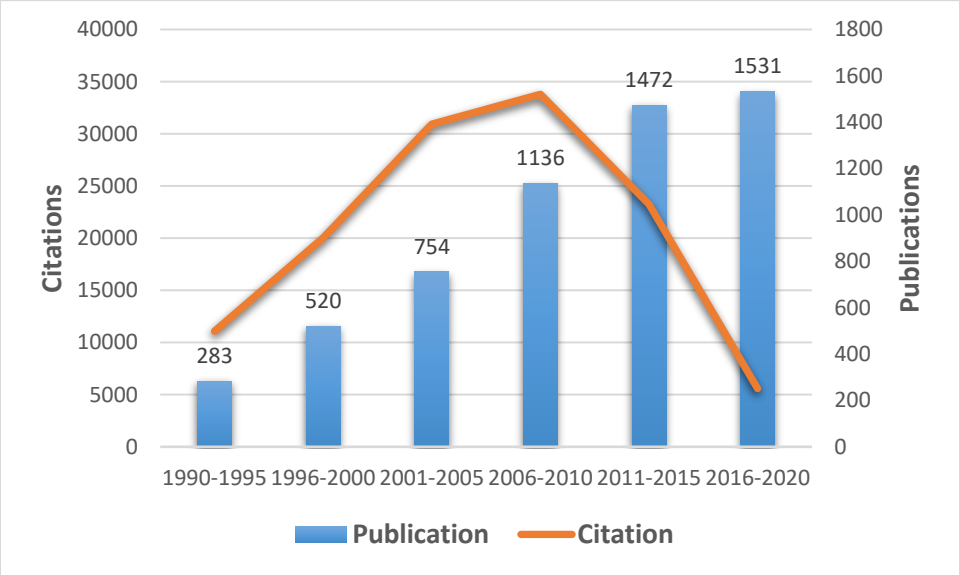

Fig. 1

Year Wise Distribution

5.2 Document types

In total, 5696 documents met the selection criteria. Seven document types were found in these publications, article (4857) was the most frequent form of publication, followed by Review

(456), Proceeding's paper (156), Article; Proceedings Paper (153), Editorial material (71); Article; Book Chapter was contributing (2). And review; Book chapter (1). The most frequent documents like the article, it was Web of Science Core Collection Times Cited Count (34517), followed by review (13880), further followed by Article; Proceedings Paper (5653). Most of the Usage Count (Since 2013) is 34517) while the review is (5997)—moreover, Article; Proceedings Paper (894) (Table 2).

Table 2

Document Type

DT	TP	TC	U2>2013
Article	4857	104472	34517
Review	456	13880	5997
Proceedings Paper	156	211	304
Article; Proceedings Paper	153	5653	894
Editorial Material	71	398	254
Article; Book Chapter	2	9	9
Review; Book Chapter	1	34	23

Note: TP=Total Publications, TC=Total Citation, U2=Usage Count (Since 2013)

5.3 Affiliations

Table 3 focused that the Royal Children's Hospital Melbourne (Australia) was the most productive institution to publish 129 articles, followed by Vrije University Amsterdam (the Netherlands), the second most productive institution to publish 118 articles, and the third most productive institution to publish 108 articles, Shriners Hospital for Children (USA).

However, Citation Count the Royal Children's Hospital Melbourne ranked first with 4437. Followed by Melbourne University (3185) and Shriners Hospital for Children (USA) is 2488.

Table 3

Affiliation

Institution	Country	TP	TC
The Royal Children's Hospital Melbourne	Australia	129	4437
Vrije University Amsterdam	Netherlands	118	1658
Shriners Hospital for Children	USA	108	2488
University of Melbourne	Australia	102	3185
University of Queensland	Australia	87	2163
Katholieke University Leuven	Belgium	85	1530
Yonsei University	South Korea	72	1259
McGill University	Canada	70	2490
Karolinska Institute	Sweden	69	2210
McMaster University	Canada	69	2049

Note:TP=Total Publications, TC=Total Citation

5.4 Highly Productive Countries

Table 4 highlights that the contribution of the first author shall be standard as the main contribution to the work. A total of 5696 articles from 59 nations have been published. The study finds that while the United States is ranked 1st with its 1554 articles contribution, the United Kingdom is ranked 2nd with 494 articles, and The Netherlands is ranked 3rd with 440 articles. The Science Core Collection Times Cited Count, USA is ranked 1st with 45576 citations, the US is ranked 2nd with 13862 citations, and Australia is ranked 3rd with 12043 (see Table 4).

Table 4

Highly Productive Countries

Country	TP	R(TP)	TC	R(TC)
USA	1554	1	45576	1
UK	494	2	13862	2
Netherlands	440	3	11013	4
Australia	436	4	12043	3
Canada	371	5	10185	5
Germany	313	6	7259	7
Italy	243	7	5418	8
South Korea	226	8	2912	10
Sweden	221	9	8925	6
Japan	199	10	3136	9

Note: TP=Total Publications, TC=Total Citation, R=Rank

5.5 Author Productivity

HK (University of Melbourne, Australia) was the most successful author of 72 articles published in 1994, followed by Becher JG (Department of Rehabilitation Medicine, MOVE Research Institute Amsterdam, Amsterdam, The Netherlands) 67 articles in 2005. In 1993, 62 papers were written, led by Miller F (Department of Orthopedic Surgery in Jacksonville, United States).

Graham HK ranked first with 3841 citations in 1994. Miller F (Department of Orthopedic Surgery, Jacksonville, United States) ranked second with 1504 citations in 1993, and Boyd RN (University of Queensland, Brisbane, Australia) ranked third with 1265 citations in 2001.

On the author's quality parameters h_index, and g_index, Graham HK ranked first with h_index value 34 and g_index value 61 in 1994. Miller F ranked second with h_index value 23, and g_index value 37 in 1993, and Boyd RN ranked third with h_index value 21, and g_index value 34 (Table 6).

Table 5

Authorship pattern

Author	Affiliation	Country	h_index	g_index	TC	TP	PY
Graham HK	University of Melborne	Australia	34	61	3841	72	1994
Becher JG	Department of Rehabilitation Medicine, MOVE Research Institute Amsterdam, Amsterdam,	Netherlands	21	31	1212	67	2005
Miller F	Department of Orthopaedic Surgery	Jacksonville, US	23	37	1504	62	1993
Boyd RN	The University of Queensland	Brisbane, Australia	21	34	1265	51	2001
Desloovere K	Department of Rehabilitation Sciences	Leuven, Belgium	16	27	814	51	2004
Molenaers G	Department of Development and Regeneration	Leuven, Belgium	17	32	1108	50	1995
Dreher T	University of Zurich,Department of Pediatric Orthopaedics	Zürich, Switzerland	13	21	531	49	2006
Gordon AM	Department of Biobehavioral Sciences, Columbia University	New York City, US	19	28	850	49	2004
Wolf SI	Department of Orthopedics and Traumatology, Universität Heidelberg,	Heidelberg, Germany	12	19	420	41	2006
Doderlein L	OrthopaedicKinderklinik, PaediatricOrthopaedics,	Germany	12	21	520	39	2001

Note: TP=Total Publications, TC=Total Citation, PY= Year Published

5.6 Source Impact

Table 6 show that the Developmental Medicine and Child Neurology (Wiley-Blackwell, United States) IF=3.532 has published the highest number of articles (626) on CP with the highest number of citations, 22173, followed by Journal of Pediatric Orthopedics (Lippincott Williams & Wilkins, United States) IF=0.610 with the total article published 195, the total number of citations is 4937. The third most productive source of publication was Gait & Posture Elsevier (Netherlands) IF=2.912 with 185 papers and a total of 3822.

On the author's quality parameters h index and g index, the Journal Developmental Medicine and Child Neurology ranked first with the value h index 75 and the value g index 102. Journal of Pediatric Orthopedics ranked second with h index value 39, g index value 58, and Archives of Physical Medicine and Rehabilitation (W.B. Saunders Co., United Kingdom) ranked third with h index value 36, and g index value 56.

Table 6

Source Impact

Source	Publisher and Country	h_index	g_index	TC	Source	Publisher and Country
Developmental Medicine and Child Neurology	Wiley-Blackwell (United States)	75	102	22173	626	3.532
Journal of Pediatric Orthopedics	Lippincott Williams & Wilkins (United States)	39	58	4937	195	0.610
Gait & Posture	Elsevier (Netherlands)	36	50	3822	185	2.912
Research in Developmental Disabilities	Elsevier Ltd (United Kingdom)	21	31	1598	116	2.376
Journal of Child Neurology	SAGE Publications (United Kingdom)	27	41	2192	115	2.285

Archives of Physical Medicine and Rehabilitation	W. B. Saunders Co. (United Kingdom)	36	56	3626	106	3.618
Disability and Rehabilitation	Taylor & Francis (United Kingdom)	23	39	1763	80	2.054
Journal of Pediatric Orthopaedics-Part B	Lippincott Williams & Wilkins (United States)	16	27	940	72	0.610
European Journal of Paediatric Neurology	W.B.Saunders Co.(United States)	21	32	1246	67	2.371
Pediatric Neurology	Elsevier BV (Netherland)	20	30	1160	66	2.326

Note: TC=Total Citation

5.7 Most Cited Documents

The highest cited documents received were 686 'Long-Term Medical and Social Consequences of Preterm Birth' by Moster D, published in the New England Journal of Medicine in 2008. The second most cited document (TC = 545) was 'Maternal Infection and Cerebral Palsy Infants of Normal Birth Weight' by Grether JK published in the Journal of the American Medical Association (JAMA) in 1997. The third most cited document (TC = 461) was 'The Epidemiology of Cerebral Palsy: Incidence, Impairments, And Risk Factors' by Odding E, published in Disability and Rehabilitation in 2006.

Moreover, the list numbers of cited documents (TC = 362) were "Origin and Timing of Brain Lesions in Term Infants with Neonatal Encephalopathy" and "Classification and Definition of Disorders Causing Hypertonia in Childhood" by Cowan F and Sanger T D, are published in Lancet and Pediatrics journal in 2003 (see Table 7).

Table 7

Most Cited Documents

Title	Author	ST	PY	TC
Long-term medical and social consequences of preterm birth	Moster D	New Engl J Med	2008	686
Maternal infection and cerebral palsy in infants of normal birth weight	Grether JK	Jama-J Am Med Assoc	1997	545
the epidemiology of cerebral palsy: incidence, impairments, and risk factors	Odding E	DisabilRehabil	2006	461
The toll-like receptor tlr4 is necessary for lipopolysaccharide-induced oligodendrocyte injury in the CNS	Lehnardt S	J Neurosci	2002	455
Reproductive technologies and the risk of birth defects	Davies MJ	New Engl J Med	2012	409
Practice parameter: evaluation of the child with global developmental delay - report of the quality standards subcommittee of the American academy of neurology and the practice committee of the child neurology society	Shevell M	Neurology	2003	407
Can magnesium-sulfate reduce the risk of cerebral palsy in very-low-birth-weight infants	Nelson KB	Pediatrics	1995	376
Neonatal cytokines and coagulation factors in children with cerebral palsy	Nelson KB	Ann Neurol	1998	373
Origin and timing of brain lesions in term infants with neonatal encephalopathy	Cowan F	Lancet	2003	362
Classification and definition of disorders causing hypertonia in childhood	Sanger TD	Pediatrics	2003	362

Note: ST= Source Type, TC=Total Citation, PY=Year Published

5.8 Network visualization-authorship pattern

Figure 2 depicted the network visualization - authorship pattern. Authors have selected co-authorship from types of analysis and authors from the unit of analysis. The minimum number of documents and citations of an author was 15 and 5. There was a total of 16137 authors and, 95 meet the threshold. For each of the 95 authors, the total strength of the co-authorship links with other authors will be calculated. The authors with the greatest total link strength will be

calculated. The number of the author to be selected is 95. The total items were 95, Clusters 17, Links 277, and total link strength 1309.

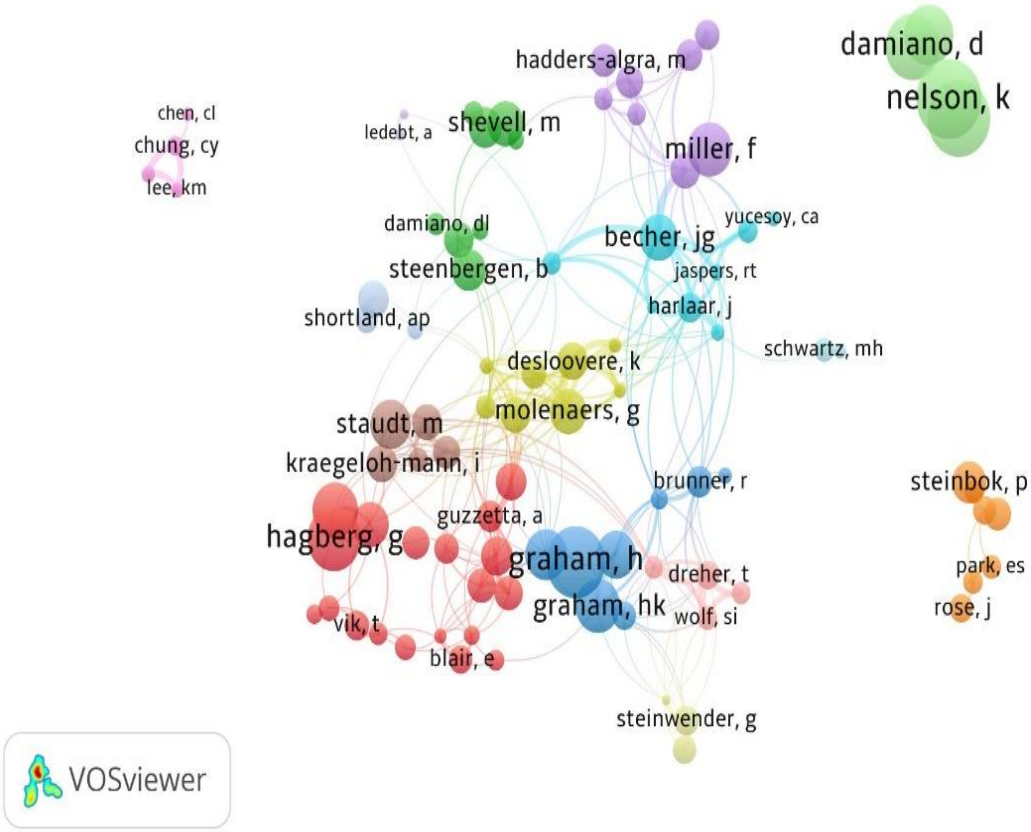

Fig.2

Network visualization-authorship pattern

5.9 Network visualization - citation with country wise

Figure 3 illustrated that the network visualization - citation with country wise. The authors have chosen citations from analytical forms and analytical countries. A country has received the required number of documents and citations 5. There were 108 countries, and the threshold was met by 65. The cumulative strength of 65 countries is linked with other countries would be determined for every 65 countries. The number of selected countries was 65. The total item was 65, clusters 11, links 1192, and total link strength 41604.

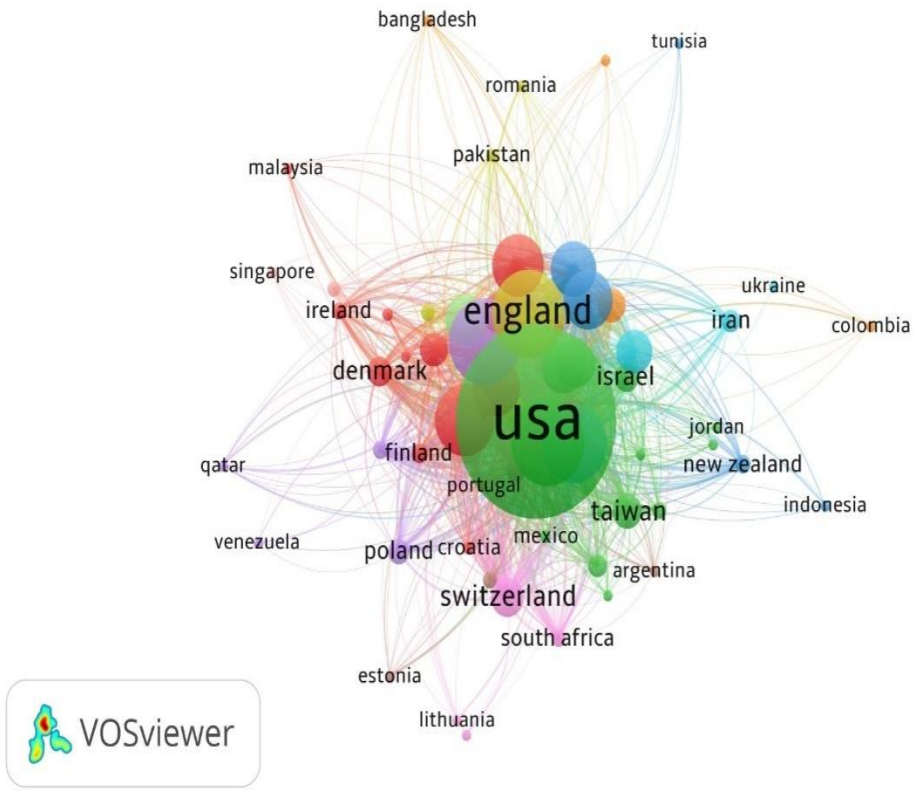

Fig.3

Network visualization - citation with country wise

5.10 Network visualization-author keywords co-occurrences

Figure 4 focused on the network visualization-author keywords co-occurrences. Criteria were chosen for the whole counting process. The number of keywords chosen was a minimum of 25. A total of 15382 keywords were published, and 88 sources met the thresholds. On each of the 88 sources, it was determined the cumulative co-occurrence strength ties to other keywords. The author's keywords were chosen with full linking power. There were 88 in all, 7 in the cluster; 1240 were linked and 3300 in all.

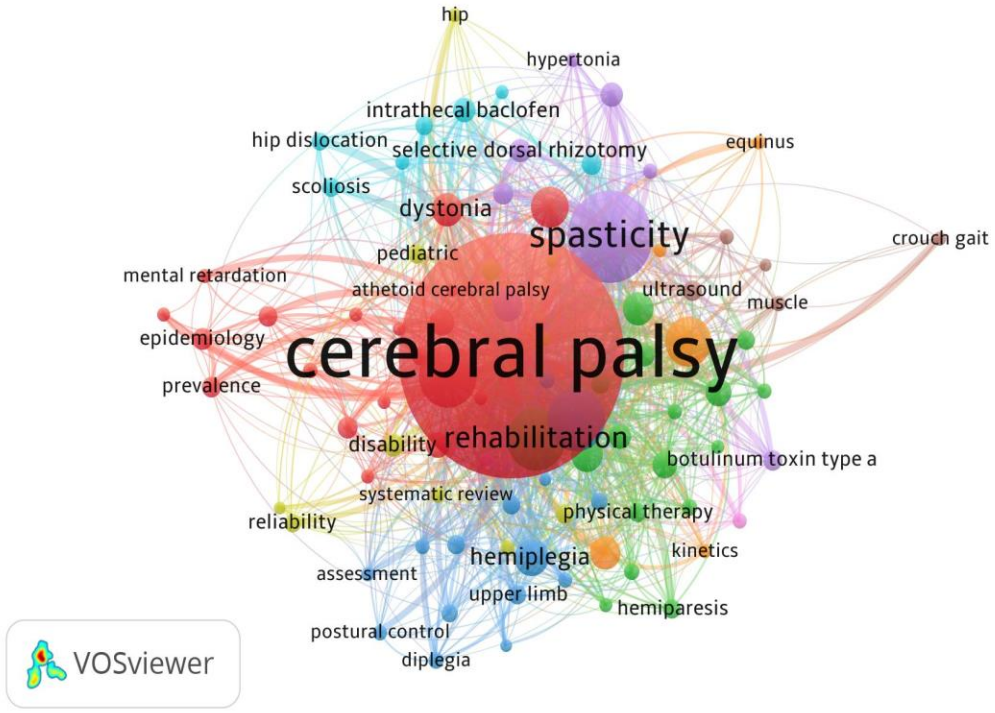

Fig.4.

Network visualization-author keywords co-occurrences

5.11 Authorship publications

Figure 5 demonstrated the authorship publications of the articles. There have been single authors' contributions of 373 articles, followed by two authors' contributions (701). It is followed by three authors (884) articles, four authors (1042), five authors (838), six authors (720), seven-authors contributions (437) articles and followed by eight authors (257), nine authors (140), ten authors (82), eleven authors (67), and so on. Single article in Just contributed similarly to authors 24, 27, 29, 31, 32, 38, 40, 52, 74, and 79.

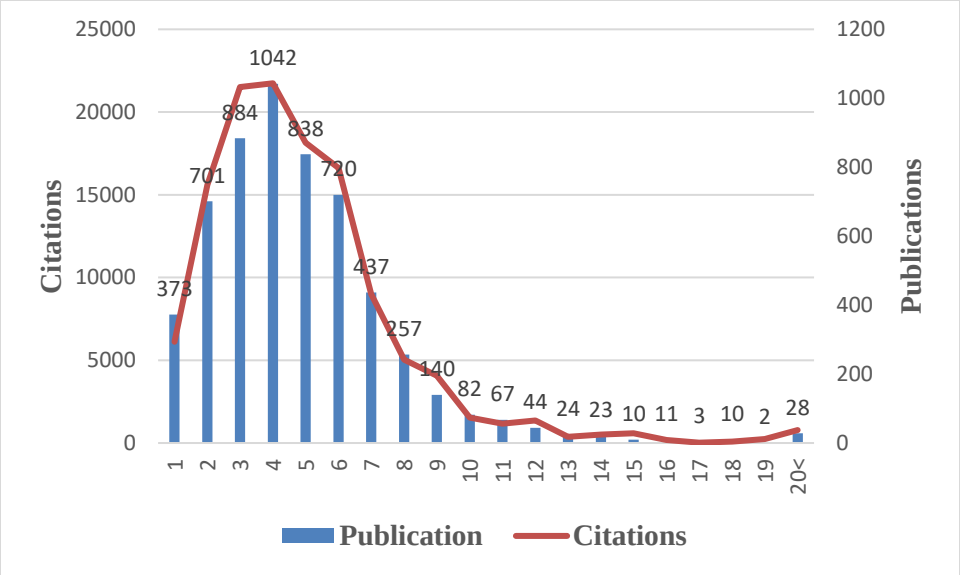

Fig. 5
Authorship Publications

6. Finding of the Study

The important findings of this study can be summarized as follows:

- CP research articles published in journals during the year 1900-2020. Out of 5696 articles, the highest number of research articles (TP = 1531) were published in 2016-2020, followed by 2011-2015 with 1472 articles.
- It is noticed that article (4857) was the most frequent form of publication.
- The Royal Children's Hospital Melbourne (Australia) was the most productive institution to publish 129 articles.
- The study finds that while the United States is ranked 1st with its 1554 articles contribution.
- Graham HK (University of Melbourne, Australia) was the most successful author of 72 articles published in 1994. Graham HK ranked first with 3841 citations in 1994; On the author's quality parameters h_index and g_index, Graham HK ranked first with h_index value 34 and g_index value 61 the year 1994.
- Developmental Medicine and Child Neurology (Wiley-Blackwell, United States) IF=3.532 has published the highest number of articles (626) on CP with the highest

number of citations, 22173. The highest cited documents received were 686 ‘Long-Term Medical and Social Consequences of Preterm Birth’ by Moster D, published in the New England Journal of Medicine in 2008.

- The author’s minimum document count was 15, and the author’s minimum citation was 5. 5. There were a total of 16,137 authors, and 95 met the threshold. The total strength of co-authorship linked with other authors has been calculated for each of the 95 authors.
- A minimum number of documents and their citation for the country in question 5 are given. There was a total of 108 countries, and 65 meet the threshold.
- In the counting method, we selected fractional counting. The minimum number of keyword occurrences selected 20. Total keywords were 7294, 90 of which met the threshold.
- In the counting method, we selected fractional counting. The minimum number of keyword occurrences selected 20. Total keywords were 7294, 90 of which met the threshold.

7. Conclusion

The research was based on the web of science database. The analysis focuses on how the patterns in cerebral palsy literature have grown in the year-wise frequency between 1990 and 2020 in publications and citations. The highest cited documents received were 686 ‘Long-Term Medical and Social Consequences of Preterm Birth’ by Moster D, published in the New England Journal of Medicine in 2008. The second most cited document was ‘Maternal Infection and Cerebral Palsy Infants of Normal Birth Weight’ by Grether JK, published in the Journal of the American Medical Association in 1997. Developmental Medicine and Child Neurology IF=3.532 have published the highest number of articles on CP. Cerebral palsy is a category of conditions that impair a person’s ability to move and keep balance and posture. Graham HK (University of Melbourne, Australia) was the most successful author of 72 articles published in 1994.

References:

[1] Safra, J. E. (1968). The New Encyclopaedia Britannica (pp. 37–38). Encyclopedia Britannica, Inc.

[2] Albrecht, G., Snyder, S., Bickenbach, J., & Mitchell, D. (2006). Learning Disability. In Encyclopedia of disability (Vol-3, p. 1034). SAGE Publications Inc.

[3] CDC. (2020). What is Cerebral Palsy? CDC. US Department of Health & Human Services.

[4] National Trust. (1918). Cerebral Palsy. National Trust, New Delhi, 1–2.

[5] Lazarou, I., Nikolopoulos, S., Petrantonakis, P. C., Kompatsiaris, I., &Tsolaki, M. (2018). EEG-based brain-computer interfaces for communication and rehabilitation of people with motor impairment: A novel approach of the 21st century. In Frontiers in Human Neuroscience (Vol. 12). Frontiers Media S. A.

[6] McNamara, L., & Casey, J. (2007). Seat inclinations affect the function of children with cerebral palsy: A review of the effect of different seat inclines. In Disability and Rehabilitation: Assistive Technology (Vol. 2, Issue 6, pp. 309–318).

[7] Levitt, S., & Addison, A. (2018). Treatment of cerebral palsy and motor delay.

[8] Pichora-Fuller, M. K., & Singh, G. (2006). Effects of Age on Auditory and Cognitive Processing: Implications for Hearing Aid Fitting and Audiologic Rehabilitation. Trends in Amplification, 10(1), 29–59.

[9] Jones, M. W., Morgan, E., Shelton, J. E., & Thorogood, C. (2007). Cerebral palsy: introduction and diagnosis (part I). Journal of Pediatric Health Care, 21(3), 146–152.

[10] Cole, F. J.; Eales, N. B. (1917). The history of comparative anatomy: Part I.—A statistical analysis of the literature. Science Progress (1916-1919), 11(44), 578–596.

[11] Osareh, F. (1996). Bibliometrics, citation analysis, and co-citation analysis: A review of literature II. In Libri (Vol. 46, Issue 4, pp. 217–225).

[12] Pritchard, A. (1969). Statistical bibliography or bibliometrics. Journal of Documentation, 25(4), 348.

[13] Yeung, A. W. K., Goto, T. K., & Leung, W. K. (2017a). A bibliometric review of research trends in neuroimaging. In Current Science (Vol. 112, Issue 4, pp. 725–734).

[14] Sweileh, W. M., Al-Jabi, S. W., Sawalha, A. F., &Zyoud, S. H. (2016). Bibliometric profile of the global scientific research on autism spectrum disorders. SpringerPlus, 5(1), 1–10.

[15] Merigó, J. M., Blanco-Mesa, F., Gil-Lafuente, A. M., &Yager, R. R. (2017). Thirty Years of the International Journal of Intelligent Systems: A Bibliometric Review. International Journal of Intelligent Systems, 32(5), 526–554.

[16] Yeung, A. W. K., Goto, T. K., & Leung, W. K. (2017b). A bibliometric review of research trends in neuroimaging. Current Science, 112(4), 725–734.

[17] Mu, Y. P., Li, N., Guan, L. J., Wang, C. N., Shang, S. Y., & Wang, Y. (2012). Therapies for children with cerebral palsy: A web of science-based literature analysis. Neural Regeneration Research, 7(33), 2632–2639.

[18] Hernandez-Reif, M., Fielda, T., Largie, S., Diego, M., Manigat, N., Seoanes, J., &Bornsteinb, J. (2005). Cerebral palsy symptoms in children decreased following massage therapy. Early Child Development and Care, 175(5), 445–456.

[19] Kurz, M. J., Heinrichs-Graham, E., Arpin, D. J., Becker, K. M., & Wilson, T. W. (2014). Aberrant synchrony in the somatosensory cortices predicts motor performance errors in children with cerebral palsy. Journal of Neurophysiology, 111(3), 573–579.

[20] Wu, F., Wang, X., Li, X., Jiang, H., Huang, T., … C. L.-F. In, U. (2020). The Most Cited Original Articles in Brain Imaging of Children with Cerebral Palsy: A Bibliometric Analysis Between 1984 and 2019. Frontiers in Neurology, 11, 955.

[21] Fan, J. H., & Pan, X. X. (2011). Bibliometrics Analysis of Child Cerebral Palsy by Acupuncture and Moxibustion Treatments. Chinese Journal of Information on Traditional Chinese Medicine.

[22] Jabali, Karim A; Ashiqu, M.; Ahmad, S.; Rahman, S. (2020). A Bibliometric Analysis of Research Productivity on Diabetes Modeling and Artificial Pancreas 2001 to 2020. Library Philosophy and Practice, 1–19.

[23] Shepherd, E., Salam, R. A., Middleton, P., Han, S., Makrides, M., Mcintyre, S., Badawi, N., & Crowther, C. A. (2018). Neonatal interventions for preventing cerebral palsy: An overview of Cochrane Systematic Reviews. In Cochrane Database of Systematic Reviews (Vol. 2018, Issue 6). John Wiley and Sons Ltd.

[24] Huang, Q. feng, Wu, H. gan, Liu, J., & Hong, J. (2012). Bibliometric analysis of diseases spectrum of moxibustion therapy. Journal of Acupuncture and Tuina Science, 10(6), 342–348.

[25] Haque, M. I., Ahmad, S., & Azad, M. S. (2020). Lincoln Mapping of scientific literature on Islamic Economics, Banking and Finance 1955 to 2020. Library Philosophy and Practice, 1–29.

[26] Brown, T., Gutman, S. A., Ho, Y. S., & Fong, K. N. K. (2017). Highly cited occupational therapy articles in the science citation index expanded and social sciences citation index: A bibliometric analysis. American Journal of Occupational Therapy, 71(6).

[27] Kocak, M., García-Zorita, C., Marugán-Lázaro, S., Çakır, M. P., & Sanz-Casado, E. (2019). Mapping and clustering analysis on neuroscience literature in Turkey: a bibliometric analysis from 2000 to 2017. Scientometrics, 121(3), 1339–1366.

[28] Anwar, M. (2020). Research Productivity of Indian Authors in the Online Journal of Library Philosophy and Practice from 2008 to 2013: A Bibliometric Study / Analysis. International Journal of Library and Information Studies, 10(2), 85–94.

[29] Li, R., Sun, J., Hu, H., Zhang, Q., Sun, R., Zhou, S., Zhang, H., & Fang, J. (2020). Research trends of acupuncture therapy on knee osteoarthritis from 2010 to 2019: A bibliometric analysis. In Journal of Pain Research (Vol. 13, pp. 1901–1913). Dove Medical Press Ltd.

[30] Pei, W., Peng, R., Gu, Y., Zhou, X., &Ruan, J. (2019). Research trends of acupuncture therapy on insomnia in two decades (from 1999 to 2018): a bibliometric analysis. BMC Complementary and Alternative Medicine, 19(1), 225-.

[31] Hussain, Akhtar, & Fatima, N. (2010). A bibliometric analysis of the 'Chinese librarianship: an International Electronic Journal (2006 - 2010). Chinese Librarianship: An International Electronic Journal, 31, 1–14. http://www.iclc.us/cliej/cl31HF.pdf%5CnA

[32] Hussain, A. (2017). Scholarly research in "Journal of King Saud University-Computer and Information Sciences" (2004-2014): A Scientometric assessment. Library Philosophy and Practice.

[33] Hussain, A., Fatima, N., & Kumar, D. (2011). Bibliometric analysis of the "Electronic Library" journal (2000-2010) in the Electronic. Webology, 8(1), 1–11.

[34] Yadava, S. M., Patrick, H. S., Ananth, C. V., Rosen, T., & Brandt, J. S. (2019). Top-cited articles in the journal: a bibliometric analysis. American Journal of Obstetrics and Gynecology, 220(1), 12–25.

[35] Hussain, A & Fatima, N. (2011). A bibliometric analysis of the “IFLA Journal” during 2006-2010. International Journal of Information Research, 1(1), 2–12.