



A SCIENTOMETRIC ANALYSIS OF FACIAL PARALYSIS RESEARCH LITERATURE

Shilpa P. Shahare^{1*}, Vaishali Khaparde², Deepa N. Gaikwad³,
Jayshila K. Khandare⁴, Rohini G. Landge⁵, Suraj M. Tayade⁶, Amrapali K. Khandare⁷

^{1*, 3, 4, 5, 6, 7} PhD Research Scholar, shilpa.shahare@gmail.com¹, dipti.dg85@gmail.com³,
jaya92.khandare@gmail.com⁴, smtayade.gmcp@gmail.com⁵, rohini9096@gmail.com⁷

²Professor and Head, Department of Library and Information Science, Dr. Babasaheb Ambedkar
Marathwada University, Aurangabad (M.S), khapardevaishali@gmail.com²

***Corresponding Author:** Shilpa P. Shahare
*PhD Research Scholar, shilpa.shahare@gmail.com

Abstract-

The main purpose of this study is to conduct a scientometric analysis of facial paralysis research publications from 2017 to 2021. To find the results of the study, a total of 854 research articles were retrieved from the PubMed database. The distribution of publications was studied based on the year, most productive authors, country, institutes, document type, source and keywords. It was identified that in the year 2021, the most articles were published, contributing 253 (29.63%), three authors ranked first, Guntinas-Lichius O, Jowett N, and Volk GF, each contributed 9 (0.20%), the relative growth rates decreased from 2018 (0.83) to 2021 (0.36), with the mean relative growth rate for this time period being 0.42, the doubling time is highest in 2021 with 1.93, Medicine published the most articles 33 (3.86%), Jena University Hospital in Germany topped the list with 82 (1.66%) articles, followed by Capital Medical University in China with 44 (0.89%) articles. The majority of documents were published in the form of articles, with 361 (42.27%) publications, followed by case reports with 322 (37.70%).

Keyword: Facial Paralysis, Scientometric, Pubmed Database, Causes, Treatment

1. Introduction

Scientometrics is the study of the quantitative elements of science as a system of communication. Analysis of citations in academic publications is at the focus of this research, but it is not the sole focus. It now plays a significant part in the evaluation and measurement of research performance in recent years. A subfield of bibliometrics is scientometric research. It is an essential research tool for comprehending the topics since it measures the usefulness of materials and the connections between documents and areas. Scientometrics, a variety of related topics, focuses on communication in the arts, social sciences, and sciences.

When nerves are damaged, Facial Paralysis results in a loss of facial movement. Bell's palsy is an example of a condition where facial paralysis can develop suddenly or gradually over several months (in the case of a head or neck tumor). When a brain tumor is the cause, facial paralysis typically takes time to emerge. Headaches, migraines, or hearing loss are just a few symptoms. A stroke could

paralyse your face. Other muscles on one side of the body may also be affected by a stroke. The duration of the paralysis may be brief or prolonged, depending on the reason.

Either a partial or complete impairment of the face's muscles is referred to as facial paralysis. For many different reasons, this may have an impact on people of all ages. Sometimes the paralysis just affects a section of the face, other times it affects the full face, and very infrequently both sides of the face can be paralysed. Because it affects facial movement, appearance, emotional expression, social interactions, and vital processes including blinking, breathing through the nose, speaking, and eating, this condition can be very difficult for many people. When there is facial paralysis, the cause should be carefully investigated because the recommended treatments may differ greatly depending on the cause. In order to analyse the risks and benefits of each treatment option in light of the patient's goals and quality of life, a detailed discussion between the patient and treating physician is required for the treatment of facial paralysis.

Causes of Facial Paralysis

Facial paralysis can have a wide range of causes that are generally divided into congenital (existing at birth), acute (occurring over a short period of time), or chronic (occurring over a longer period of time).

- Swelling or damage to the facial nerve, which sends messages from the brain to the muscles of the face.
- Damage to the person's brain that transmits signals to the muscles of the face
- Birth trauma can result in facial paralysis in infants.
- Congenital paralysis can affect one or both sides and is evident at birth.
- The duration of acute facial paralysis is usually less than three days.
- In general, chronic facial paralysis gets worse over time and lasts for a longer duration. This may affect just a small section of the face or the full face.

Treatment of Facial Paralysis

To choose the most effective course of treatment, it is essential to determine the reason of the facial paralysis. Sometimes the best course of action is to wait for the face function to become better on its own. Others may require surgery, minimally invasive face injections, medicinal therapy, or physical therapy. Facial paralysis affects everyone differently, so each patient's treatment must be tailored to their unique needs and paralysis situation.

The objectives of treatment must take each of these factors into consideration because facial paralysis has such a wide range of effects on an individual's life. The ultimate objective of treatment is to regain as much symmetry and function of the face as possible so that the patient can live a normal life free from physical or social limitations brought on by their facial paralysis. The best route of treatment depends on figuring out what caused the facial paralysis. The quantitative aspects and qualities of science and scientific study are the focus of scientometrics. Thus, Scientometric analysis helpful to analysis the facial paralysis research literature.

2. Review of Literature

Khaparde, V and Pawar, S (2013) examined the patterns of authorship and author collaboration in information technology using a sample of 17917 articles gathered from LISA between 2000 and 2009. There are 1.80 authors on average per article. The study's overall 10-year degree of collaboration (C) is 0.71, although the year-by-year degree of collaboration is nearly identical, with a mean value of 0.49. The number of multi-author articles above single author publications has increased during the past ten years. According to the study, group or team research is more prominent than solo research in the field of information technology. **Santhakumar R and Kaliyaperumal (2014)** studied between 2003 and 2012, a total of 144567 publications were published in the field, reflecting the growth and development of mobile technology as reflected in the engineering index database. The average number of publications published per year was 14456.7, with 2011 having the highest number of publications published (20318). Authors from China contributed the most publications compared to

other countries, with India ranking seventh in terms of productivity during this time period. Wang, Wei is the most prolific author, with 223 publications, followed by Barolli, Leonard with 160. The Institute of Electrical and Electronic Engineering (IEEE), New York (USA), has the most publications (1248), followed by South-East University (China) with 508 publications, Nokia Research Centre, Cambridge (UK) with 502 publications, and Nanyang Technological University (Singapore) with 290 publications. Over a ten-year period, relative growth rates (RGR) dropped from 0.98 in 2004 to 0.13 in 2012. The doubling time (DT) increased gradually from 0.71 in 2004 to 5.15 in 2012. **Mikhail, S and et.al (2020)** analysed current research trends and properties of bio-oil and hydrochar, the solid and liquid byproducts of hydrothermal carbonization, from 2009 to 2018 and from 2010 to 2018, respectively. As per study by-products (hydrochar and bio-oil) created by the thermochemical process known as hydrothermal carbonization were the subject of a bibliometric analysis to shed light on their possible applications, looked at 659 publications on hydrochar and 71 articles on bio-oil using the Web of Science Core Database. Additionally, the scientific research conducted by numerous organisations, publications, authors, and nations has been compiled and reviewed. Gephi was used to analyse the relationships between co-authors, co-citations, and co-keywords in the two fields. **Dhage, S., Khaparde, V.S. and Ambhore, S.P. (2020)** 9799 documents on Sydenham Chorea Disease were examined. It covered topics such as determining the Sydenham chorea research of papers, listing the most productive authors, and distribution of publications by institutions. Despite being a general technique, concept mapping is especially helpful for social researchers and research teams as they develop and elaborate research project ideas. It is also particularly helpful when researchers want to involve pertinent stakeholder groups in the process of developing the research project. Though concept mapping serves a variety of functions, including strategy planning, product development, market analysis, decision-making, and measurement development, the focus of this article is on its ability to support research project development. The study's particular goals were to look at the publication output, market share, and ranking of the top 25 countries for Sydenham chorea research from 2000 to 2018. **Atlasi, R and et.al (2021)**, examined 309 core papers were obtained from 56,402 records. Three of these core papers were in the endocrinology category, and it was discovered that the most common type of publication was original papers, with editorial papers coming in second place. The United States had the most published documents, followed by China. The "British Medical Journal" and the "Journal of Medical Virology" were ranked first and second, respectively. The top organization with the highest proportion of scientific publications was "Harvard University," and the top-ranked journal that published highly-cited papers was "the Lancet."

3.Objectives of Research

The broad goal of this study is Scientometric Analysis of Facial Paralysis Research Literature which is available in Pubmed Database during the period 2017 to 2021. Following are the main objectives.

1. To determine the Annual Production of research literature.
2. To study the Relative Growth Rate (RGR) and Doubling Time (DT) of articles.
3. To examine the Most Productive Authors of articles.
4. To analyzed the Most Productive Journals of articles.
5. To find out Most productive Countries and Affiliations of research articles.
6. To check the most Frequent Keywords of articles.
7. To examine the Type of Document- Wise distribution of articles.

4. Research Methodology

Research data on facial paralysis was extracted from Pubmed database (developed and is maintained by the National Center for Biotechnology Information (NCBI), at the U.S. National Library of Medicine (NLM)). Full- text articles were used in this study. A total 854 research publications were downloaded during the period 2017 to 2021 and evaluated based on various parameters such as year, author, source, country, institution, document type and keywords. Further, data were analyzed using Microsoft Excel, Biblioshiny: Bibliometrix R Package and Vosviewer software tools for scientometric analysis.

5. Data Analysis and Interpretation

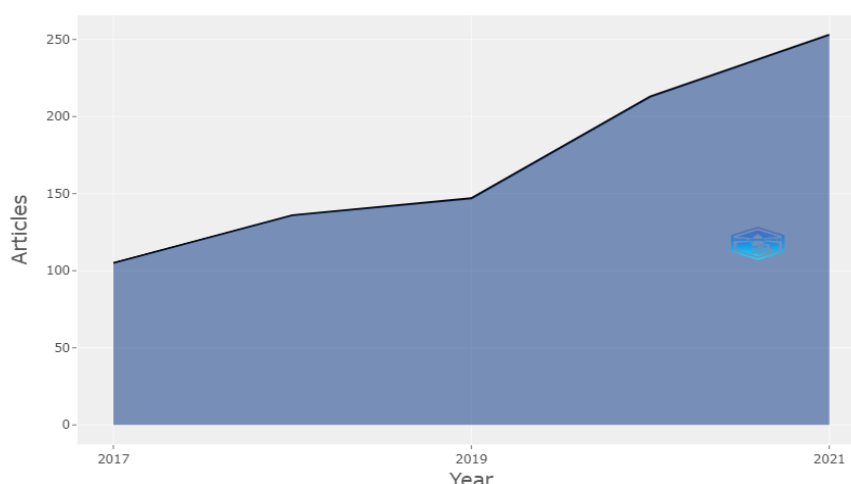
5.1 Annual Production of Research Article.

The Annual Production of Facial Paralysis Research Articles from 2017 to 2021 is shown in Table No.1 and Figure No.1 It shows that there will be a continuous increase in article production from 2017 to 2021. The year 2021 had the most articles published, contributing 253 (29.63%), followed by 213 (24.94%) in the year 2020. In 2017, 105 (12.30%) articles were published, which was the lowest number recorded.

Table No.1 Annual Production of Articles

Year	Article	Percentage
2017	105	12.30
2018	136	15.93
2019	147	17.21
2020	213	24.94
2021	253	29.63
Total	854	100.00

Figure No.1 Annual Production of Articles
Annual Scientific Production



5.2 Relative Growth Rate (RGR) and Doubling Time (DT)

Relative rate of growth (RGR) is rate relative to size- that's a rate of growth per unit time, as proportion of its size at that moment in time, it's also called the exponential rate of growth, t the continual rate of growth.

Doubling Time (DT)

There is direct comparison between the relative rate of growth (RGR) and doubling time (DT) and therefore the corresponding doubling time was analyzed using the subsequent formula,

$$\text{Doubling Time (DT)} = ((0.693) / \text{RGR})$$

Table No.2 Relative Growth Rate (RGR) and Doubling Time (DT) of Articles

S.No.	Year	Article	Cumulative	W1	W2	RGR	Mean [R(A)]	DT (A)	Mean DT (A)
1	2017	105	105		4.65				
2	2018	136	241	4.65	5.48	0.83		0.83	
3	2019	147	388	5.48	5.96	0.48	0.42	1.44	1.16
4	2020	213	601	5.96	6.39	0.43		1.61	

5	2021	253	854	6.39	6.75	0.36		1.93	
Total		854							

Table No. 2 shows that over a five-year period, its relative growth rates reduced from 2018 (0.83) to 2021 (0.36), with the mean relative growth rate for this time period being 0.42. The mean doubling time is 1.16, and it grew from 0.83 in 2018 to 1.93 in 2021. The doubling time is highest in 2021 with 1.93. As a result, the doubling time rose as the rate of publication growth reduced.

5.3 Most Productive Authors of Research Articles

The top 20 most productive authors of facial paralysis articles from 2017 to 2021 are listed and shown in Table 3 and Figure 2. From the 854 research publications, 4460 authors were identified. It was found that three authors ranked first position, Guntinas-Lichius O, Jowett N, and Volk GF, each contributed 9 (0.20%). This is followed by Hadlock TA and Wang Y, who share second position with a contribution of 8(0.17%).

Table No. 3 Top- 20 Most Productive Authors

S.No .	Authors	Articles	Rank	Percentage
1	Guntinas-Lichius O	9	1	0.20
2	Jowett N	9	1	0.20
3	Volk GF	9	1	0.20
4	Hadlock TA	8	2	0.18
5	Wang Y	8	2	0.18
6	Li X	7	3	0.16
7	Van Veen MM	7	3	0.16
8	Byrne PJ	6	4	0.13
9	Lee JH	6	4	0.13
10	Li J	6	4	0.13
11	Zhang Y	6	4	0.13
12	Hadlock T	5	5	0.11
13	Ishii LE	5	5	0.11
14	Ishii M	5	5	0.11
15	Li Z	5	5	0.11
16	Liu S	5	5	0.11
17	Liu X	5	5	0.11
18	Nduka C	5	5	0.11
19	Wang C	5	5	0.11
20	Belluardo M	4	6	0.09

Figure No. 2 Top-20 Most productive Authors



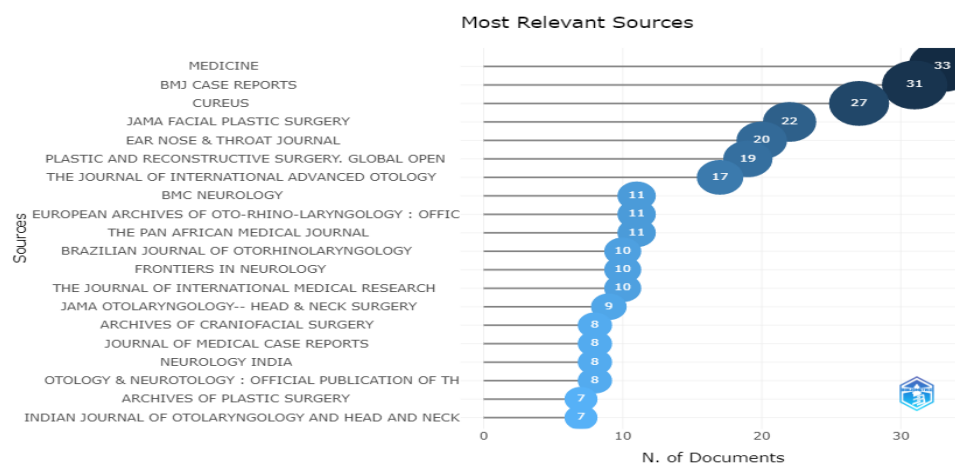
5.4 Most Relevant Sources of Research Article

The top 20 most productive Journals on facial paralysis published during 2017 and 2021 are shown in Table No. 4 and Figure No. 3. It was revealed that out of 374 sources, Medicine published the most articles 33 (3.86%). BMJ Case Reports which holds the second-highest ranking with 31(3.63%) contribution, followed by Cureus, with 27 (3.16%) articles published.

Table No. 4 Top- 20 Most Relevant Sources

S.No.	Source	Articles	Percentage
1	Medicine	33	3.86
2	BMJ Case Reports	31	3.63
3	Cureus	27	3.16
4	Jama Facial Plastic Surgery	22	2.58
5	Ear Nose & Throat Journal	20	2.34
6	Plastic And Reconstructive Surgery. Global Open	19	2.22
7	The Journal of International Advanced Otology	17	1.99
8	BMC Neurology	11	1.29
9	European Archives of Oto-Rhino-Laryngology	11	1.29
10	The Pan African Medical Journal	11	1.29
11	Brazilian Journal of Otorhinolaryngology	10	1.17
12	Frontiers in Neurology	10	1.17
13	The Journal of International Medical Research	10	1.17
14	Jama Otolaryngology-- Head & Neck Surgery	9	1.05
15	Archives of Craniofacial Surgery	8	0.94
16	Journal of Medical Case Reports	8	0.94
17	Neurology India	8	0.94
18	Otology & Neurotology	8	0.94
19	Archives of Plastic Surgery	7	0.82
20	Indian Journal of Otolaryngology and Head and Neck Surgery	7	0.82

Figure No. 3 Top- 20 Most Relevant Sources

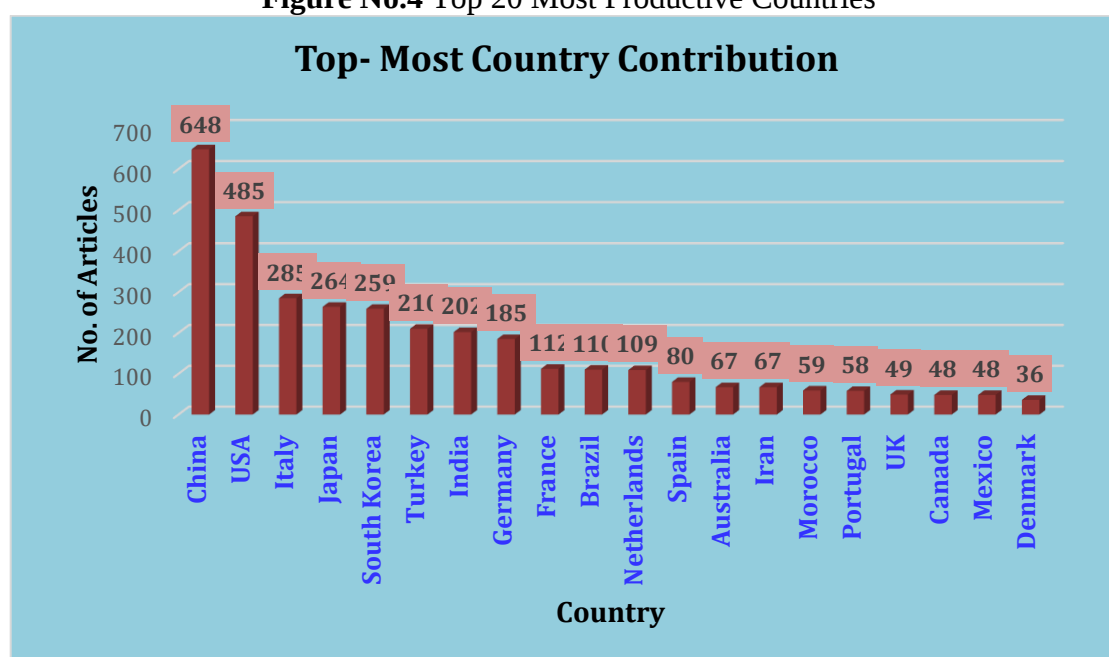


5.5 Most Productive Countries of research articles

The top 20 most productive countries are represented in Table 5 and Figure 4. A total 3933 countries were analyzed from 854 research articles. It is observed that China is the most productive country, contributing 648 (16.48%) research paper, followed by the United States 485 (12.33%), Italy (285 (7.25%)), and Japan 264 (6.71%), respectively.

Table No.5 Top 20 Most Productive Countries

S.No.	Country	Article	Percentage
1	China	648	16.48
2	USA	485	12.33
3	Italy	285	7.25
4	Japan	264	6.71
5	South Korea	259	6.59
6	Turkey	210	5.34
7	India	202	5.14
8	Germany	185	4.70
9	France	112	2.85
10	Brazil	110	2.80
11	Netherlands	109	2.77
12	Spain	80	2.03
13	Australia	67	1.70
14	Iran	67	1.70
15	Morocco	59	1.50
16	Portugal	58	1.47
17	UK	49	1.25
18	Canada	48	1.22
19	Mexico	48	1.22
20	Denmark	36	0.92

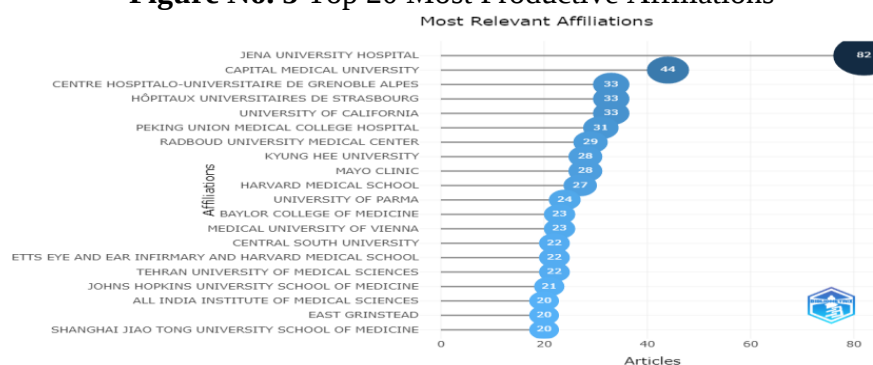
Figure No.4 Top 20 Most Productive Countries

5.6 Most Productive Affiliation of research article

Table 6 and Figure 5 show the most productive and prolific top 20 institutions on facial paralysis research articles. A total of 4942 affiliations were analysed from 854 research articles. Jena University Hospital in Germany topped the list with the most articles (82 (1.66%). Capital Medical University, China is the second most productive institute with 44 (0.89%) articles followed with Centre Hospitalo-Universitaire De Grenoble Alpes, France, Hôpitaux Universitaires De Strasbourg, France and University Of California, USA, this three institutions contribute similar 33 (0.67%) articles each.

Table No. 6 Top 20 Most Productive Affiliations

S.No.	Institute	Articles	Percentage
1	Jena University Hospital, Germany	82	1.66
2	Capital Medical University, China	44	0.89
3	Centre Hospitalo-Universitaire De Grenoble Alpes, France	33	0.67
4	Hôpitaux Universitaires De Strasbourg, France	33	0.67
5	University Of California, USA	33	0.67
6	Peking Union Medical College Hospital, China	31	0.63
7	Radboud University Medical Center, Netherland	29	0.59
8	Kyung Hee University, South Korea	28	0.57
9	Mayo Clinic, USA	28	0.57
10	Harvard Medical School, USA	27	0.55
11	University Of Parma, Italy	24	0.49
12	Baylor College Of Medicine, USA	23	0.47
13	Medical University of Vienna, Austria	23	0.47
14	Central South University, China	22	0.45
15	Massachusetts Eye And Ear Infirmary And Harvard Medical School, USA	22	0.45
16	Tehran University Of Medical Sciences, Iran	22	0.45
17	Johns Hopkins University School Of Medicine, USA	21	0.42
18	All India Institute Of Medical Sciences, India	20	0.40
19	East Grinstead, UK	20	0.40
20	Shanghai Jiao Tong University School Of Medicine, China	20	0.40

Figure No. 5 Top 20 Most Productive Affiliations

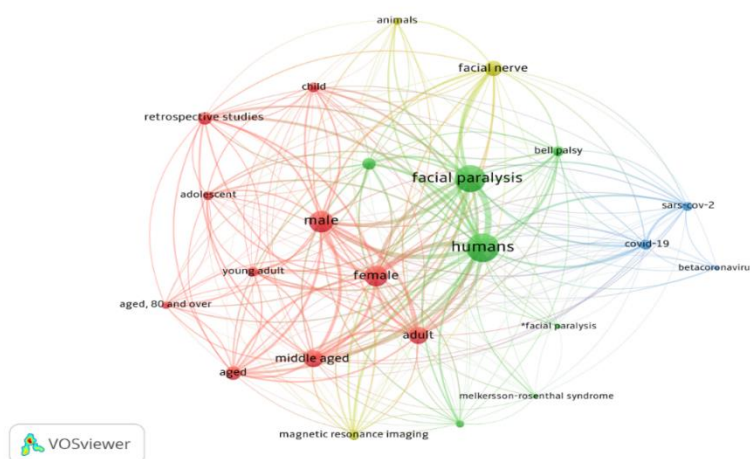
5.7 Most Frequent Keywords of Research Articles

The top 20 keywords used from 2017 to 2021 in papers on facial paralysis are shown in Table No. 7 and Figure No. 6. 5931 keywords in total were taken from the 854 research publications. The keyword "humans" has been used by the researcher 517 times, which is the most used keyword, and second highest "facial paralysis" has been used 370 times, as per research articles.

Table No. 7 Top 20 Most Frequent Keywords

S.No.	Keywords	No. of Records
1	humans	517
2	facial paralysis	370
3	male	293
4	female	273
5	middle aged	191
6	adult	180
7	aged	120
8	retrospective studies	98
9	treatment outcome	93
10	young adult	66
11	bell palsy	61
12	child	62
13	adolescent	58
14	Magnetic resonance imaging	47
15	sars-cov-2	39

16	aged 80 and over	38
17	diagnosis differential	36
18	facial nerve	35
19	animals	32
20	covid-19	30

Figure No. 6 Top 20 Most Frequent Keywords

5.8 Document Wise Distribution of Article

Table No. 8 shows the document-wise distribution of various publication type. It is found that the majority of document published in the form of Article which consisting 361 (42.27%) publications, followed by Case Reports with 322 (37.70%). The least publications are found in form of clinical study, clinical trial, editorial and letter form only with 1 (0.12%).

Table No. 8 Document Wise Distribution of Article

S.No.	Document Type	Article	Percentage
1	Article	361	42.27
2	Case Reports	322	37.70
3	Review	55	6.44
4	Research Support	40	4.68
5	Comment	13	1.52
6	Meta- Analysis	13	1.52
7	Comparative Study	11	1.29
8	Observational Study	11	1.29
9	Multicenter Study	5	0.59
10	Randomized Controlled Trial	5	0.59
11	Systematic Review	4	0.47
12	Clinical Trial Protocol	3	0.35
13	Evaluation Study	2	0.23
14	Practice Guideline	2	0.23
15	Video-Audio Media	2	0.23
16	Clinical Study	1	0.12
17	Clinical Trial	1	0.12
18	Editorial	1	0.12
19	Letter	1	0.12
20	Validation Study	1	0.12
	Total	854	100.00

6. Major Findings

Annual Production growth of facial paralysis research articles has increasing from 2017 to 2021. The year 2021 had the most articles published, contributing 253 (29.63%), followed by 213 (24.94%) in the year 2020. The relative growth rates reduced from 2018 (0.83) to 2021 (0.36), with the mean relative growth rate for this time period being 0.42. The mean doubling time is 1.16, and it grew from 0.83 in 2018 to 1.93 in 2021. The doubling time is highest in 2021 with 1.93. It was found that three

authors ranked first position, Guntinas-Lichius O, Jowett N, and Volk GF, each contributed 9 (0.20%). This is followed by Hadlock TA and Wang Y, who share second position with a contribution of 8(0.17%). Medicine published the most articles 33 (3.86%). BMJ Case Reports which holds the second-highest ranking with 31(3.63%) contribution. Jena University Hospital in Germany topped the list with the most articles 82 (1.66%). Capital Medical University, China is the second most productive institute with 44 (0.89%) articles. The keyword "humans" has been used by the researcher 517 times, which is the most used keyword, and second highest "facial paralysis" has been used 370 times. Majority of document published in the form of Article which consisting 361 (42.27%) publications, followed by Case Reports with 322 (37.70%).

7. Conclusion

When nerves are damaged, facial paralysis results in a loss of facial movement. There may be a drooping or weakening of the facial muscles. One or both sides of the face may be affected. Any person who suffers facial paralysis must have the appropriate treatment as it affects him throughout his life. This study of scientometric analysis of facial paralysis research article output can help researchers and scientists find and collect more information about the causes and treatment of facial paralysis.

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