

A BIBLIOMETRIC STUDY ON “BRAIN ABSCESS” IN WEB OF SCIENCE DATABASE

WEB OF SCIENCE VERİTABANINDA “BEYİN APSESİ” ÜZERİNE BİR BİBLİYOMETRİK ÇALIŞMA

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Abstract

Introduction The aim of this study is to analyze the articles in the ISI Web of Knowledge-Science database with the keyword "brain abscess" in the title and to make a bibliometric analysis.

Materials and Methods As a result of the research made in the WoS database; The years in which the articles were published, the journals in which they were published and the languages of publication, the publisher companies of the journals, the countries where the studies were conducted, the first name authors of the articles and the institutions the authors were affiliated with, the categories of the studies in the WoS database and whether financial support was received in the preparation/publishing of the studies were examined, the number of citations to the articles was single were calculated individually and collectively.

Results The demographic data similar between the groups. When the groups were compared in terms of preoperative and postoperative FVC and FEV1 values, the postoperative FVC values in Group K and Group S were found to be significantly lower than the preoperative values (p=0.001, p=0.002, respectively). Postoperative PEF values were significantly lower than preoperative values (p=0.024, p=0.024, p=0.001, respectively). When compared within groups, postoperative VC values in Group K and Group S were found to be significantly lower than preoperative values (p=0.037, p=0.012, respectively). When the groups were compared statistically in terms of preoperative and postoperative FEV1/FVC values, no significant difference was found (p>0.05).

Conclusion The presented study is the first to demonstrate Turkey's research efficiency in this area. Thanks to the increase in bibliometric research, we suggest that the scientific efficiency values of the published studies will be revealed and that future studies should be reviewed accordingly, and new bibliometric researches should be conducted.

Keywords Brain Abscess, Web of Science, Bibliometric study, Bibliometric analysis.

Özet

Amaç Bu çalışmanın amacı, başlığında “beyin absesi” anahtar sözcüğü geçen ve ISI Web of Knowledge-Science veritabanında yer alan makaleleri inceleyerek bibliometrik analizini yapmaktır.

Gereç ve Yöntem WoS veritabanında yapılan araştırma sonucunda; makalelerin yayınlandığı yıllar, yayınlandığı dergiler ve yayın dilleri, dergilerin bağlı bulunduğu yayıncı şirketler, çalışmaların yapıldığı ülkeler, makalelerin ilk isim yazarlara ve yazarların bağlı bulunduğu kurumlar, çalışmaların WoS veritabanındaki kategorileri ile çalışmaların yapılmasında/yayınlanmasında finansal destek alınıp alınmadığı incelendi, makalelere yapılan atıf sayıları tek tek ve toplu olarak hesaplandı.

Bulgular Çalışma kapsamında “Brain Abscess” anahtar sözcüğünü içere 994 makale belirlendi. Bu eserlere toplamda 16330 atıf yapıldığı ve H indeksinin 57 olduğu belirlendi. Makalelerin en sık (n=41, %4,1) 2008 yılında yayınlandığı, en sık (n=29, %3.0) Surgical Neurology dergisinde yayınlandığı, büyük çoğunluğunun (n=892, %89.8) İngilizce dili kullanılarak yazıldığı, yayınlanan ülkeler arasında ilk sırada Amerika'nın (n=239, %24.0) geldiği tespit edildi.

Sonuç Sunulan çalışma Türkiye'nin bu alandaki araştırma verimliliğini gösteren ilk çalışma niteliğindedir. Bibliometrik araştırmaların artması sayesinde, yayınlanan çalışmaların bilimsel verimlilik değerlerinin ortaya konulacağını ve gelecekteki çalışmaların da buna göre gözden geçirilerek yeni bibliometrik araştırmaların yapılması gerektiğini önermekteyiz.

Anahtar Kelimeler Beyin Apsesi, Web of Science, Bibliometrik çalışma, Bibliometrik analiz

INTRODUCTION

Brain abscess is defined as a focal suppurative process that begins as an area of cerebritis localized within the brain parenchyma and that develops into pus surrounded by a well-vascularized capsule (1). Brain abscesses are reported to typically present with progressive headache, a fluctuating level of consciousness, and a progressive focal neurological deficit and/or seizure, and the patients may report focal neurological symptoms of sudden onset (2). It is reported that the infectious process affecting the central nervous system can threaten the life and vital neurological functions of the person; the prognosis of these patients has improved significantly in recent years with the help of methods such as Computed Tomography and Magnetic Resonance Imaging and the new generation antibiotics, but the morbidity and mortality of central nervous system infections are remarkably high despite these improvements (1-4).

Bibliometrics, which was developed to evaluate the literature, is a statistical method used to mathematically analyze publications such as scientific books, research articles, etc., published in a specific field (5,6).

The aim of this study was to access the articles in the ISI Web of Knowledge-Science (WoS) database that have the keyword "brain abscess" in the title, and to analyze the distribution of these articles by year, country, first author, and institution.

MATERIAL and METHODS

Study data

The presented work is a research study in the healthcare field. Indexes that scan the journals that publish studies in the fields of health and science are the Science Citation Index (SCI) and Science Citation Index-Expanded (SCI-E). Therefore, articles published in the SCI and SCI-E indexes were chosen and included in this study.

The WoS database was used to analyze the articles published in journals scanned in the SCI and SCI-E indexes and

that had the keyword "Brain Abscess" in the title, in the current study. The articles were found to be published in 1980 and later, and they were retrospectively scanned by using the keyword "Brain abscess", that is listed in MeSH, in the search section of the WoS database.

By using the filtering feature of the WoS database, all articles and then only those published in the SCI and SCI-E indexes that index the journals where studies in the fields of health and science are published were filtered among the publications containing the keyword "Brain Abscess" in the title. Finally, as a result of the research performed in the WoS database; the years in which the articles were published, the journals where they were published and the languages of publication, the publisher companies of the journals, the countries where the studies were conducted, the first authors of the articles and the institutions the authors were affiliated with, the categories of the studies in the WoS database and whether financial support was received in the preparation/publishing of the studies were investigated and the number of citations to the articles was individually and collectively calculated.

Statistical Analysis

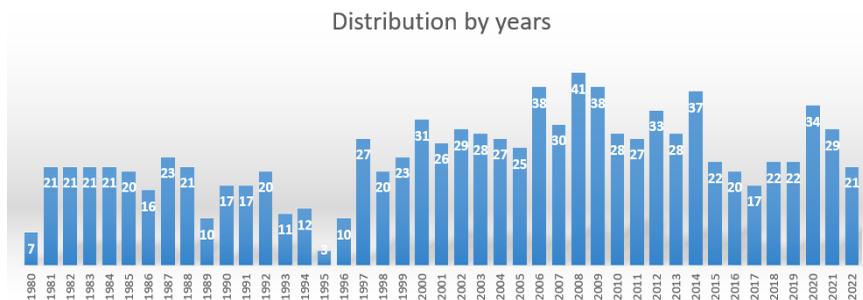
The data obtained in the study were transferred to the computer environment. The descriptive statistics of the data were analyzed with the SPSS (Version 22) software program. The comparison values were calculated at a confidence interval of 95%, and a p value <0.05 was accepted as statistically significant.

Limitations

Since the Social Sciences Citation Index (SSCI) is one of the non-SCI and non-SCI-E indexes where journals in the field of social sciences (politics, law, philosophy, etc.) are scanned, and the Arts and Humanities Citation Index (AHCI) is an index where journals in the field of arts and humanities (architecture, dance, etc.) are scanned, the articles published in these indexes were excluded from the study. In addition, only the title of the article and not all areas was scanned in order to prevent any misleading information. These two filters constitute the limitations of our study.

Table 1. Annual average and total citation information of the 10 articles with the highest number of citations.

Cited Article	Average number of citations per year (n)	Total
Discrimination of brain abscess from necrotic or cystic tumors by diffusion-weighted echo planar imaging. (8)	9.7	272
Clinical characteristics and outcome of brain abscess systematic review and meta-analysis. (9)	22.2	222
Brain-abscess - a review of 400 cases. (10)	5.16	222
Nocardial brain-abscess - treatment strategies and factors influencing outcome. (11)	7.13	214
Primary determinants of ischemic stroke/brain abscess risks are independent of severity of pulmonary arteriovenous malformations in hereditary hemorrhagic telangiectasia. (12)	13.25	212
Brain abscess and necrotic or cystic brain tumor: Discrimination with signal intensity on diffusion-weighted MR imaging. (13)	7.96	207
Brain abscess and necrotic brain tumor: Discrimination with proton MR spectroscopy and diffusion-weighted imaging. (14)	9.27	204
Brain-abscess - a study of 45 consecutive cases. (15)	4.79	182
Neuropathological and computerized tomographic findings in experimental brain-abscess. (16)	4.05	174
15-Year review of the mortality of brain-abscess. (17)	3.81	164



Graphic 1. Distribution of articles by years.

RESULTS

When the keyword "Brain abscess" included in MeSH was scanned in all the publications within the WoS database, it was seen to be included in the title of a total of 1963 publications. Of these, 1181 were articles. Of these articles, 994 were identified when only those published in journals indexed within the scope of SCI and SCI-E were filtered, and these were included in the study. All (100%) of the 994 articles included in the scope of the study had been published in the journals within the scope of SCI-E, and 246 (24.7%) were found to be Open Access while 96 (9.6%) had received financial support for publication. Besides, it was found that 994 articles had received 16,330 citations since the day they were published, the mean number of citations to these articles per year was 379.8, the mean number of citations per article was 16.43, and the H index of all the articles was 57. The 10 articles with the highest number

of citations in addition to the mean annual number of citations and the total number of citations for these articles are shown in the table (7-16) (Table 1).

No filtering for years was applied to the articles included in this study and all published articles were reviewed. We found that the articles had been included in WoS since 1980 and different numbers of articles had been published every year until 2022; however, the most articles were published in 2008 (n=41, 4.1%), 2006 (n=38, 3.8%), and 2009 (n=38, 3.8%) while the smallest number of articles were published in 1995 (n=3, 0.3%). The years in which the articles were published and the number of articles per year are given in the graph (Graphic 1).

Regarding the language of the articles, we found that 892 articles (89.8%) were published in English, 32 (3.2%) in French, 26 (2.6%) in German, 16 (1.6%) in Spanish, 15 (1.5%) in Japanese, 3 (0.3%) in Turkish, 3 (0.3%) in Czech,

Table 2. Journals in which the articles were published the most.

Journal Name	Number (n)*	Percentage (%)
Surgical Neurology	29	3.0
Journal of Clinical microbiology	26	2.7
Acta Neurochirurgica	22	2.2
Journal of Neurosurgery	22	2.2
Childs Nervous System	21	2.1
British Journal of Neurosurgery	19	1.9
Neurosurgery	19	1.9
Clinical Infectious Diseases	16	1.6
Journal of Clinical Neuroscience	16	1.6
Neurological Surgery	15	1.5
American Journal of Neuroradiology	14	1.4
World Neurosurgery	13	1.3
Infection	12	1.2
Scandinavian Journal of Infectious Diseases	12	1.2
Clinical Neurology and Neurosurgery	11	1.1
Journal of Korean Neurosurgical Society	11	1.1
Neurologia Medico Chirurgica	11	1.1
Neuroradiology	11	1.1
Pediatric Infectious Disease Journal	11	1.1
BMC Infectious Diseases	9	0.9
Journal of Computer Assisted Tomography	9	0.9
Internal Medicine	8	0.8
Journal of Craniofacial Surgery	8	0.8
Medicine	8	0.8
Others	641	64,5
Total	994	100,0

*In the table, the journals in which 8 or more studies were published are given.

2 (0.2%) in Italian, 2 (0.2%) in Portuguese, 2 (0.2%) in Russian, and 1 (0.1%) in Icelandic.

When the journals where the presented studies had been published were investigated, Surgical Neurology was at the forefront with 29 (3%) articles, followed by the Journal of Clinical Microbiology with 26 (2.7%) articles, Acta Neurochirurgica and the Journal of Neurosurgery with 22 (2.2%) articles each, and Child's Nervous System with 21 (2.1%) articles (Table 2). The publisher companies of the journals where the articles had been published were investigated and revealed that Elsevier ranked first among the publisher companies with 192 (19.3%) articles, followed by Springer Nature with 122 (12.3%), Lippincott Williams & Wilkins with 87 (8.8%), and Taylor & Francis with 42 (4.2%) articles (Table 3).

Evaluation of the countries where the articles had been published showed the United States to rank first with 239 articles (24.0%), followed by Japan with 94 (9.5%) articles, India with 89 (9.0%) articles, and Turkey and France with 52 (5.3%) articles each (Table 4).

A review of the first authors showed Bodilsen J. to be the

first author with the most articles on "Brain Abscess" with 14 (1.4%) articles followed by Gupta R.K. and Prasad K.N. with 12 (1.3%) articles each (Table 5). Considering the institutions of the first authors of the articles, Udice French Research Universities ranked first with 24 (2.5%) articles, followed by the University of California System with 20 (2.1%) articles, and the Chang Gung Memorial Hospital with 18 (1.8%) articles (Table 6).

The distribution of the articles by the categories used by WoS was also investigated in this study. We found that some articles were included in more than one category, and accordingly a total of 1498 articles were listed in 18 categories with 328 (21.9%) articles in Clinical Neurology, 279 (18.6%) in Surgery, 140 (9.4%) in Infectious Diseases, and 112 (7.5%) in Medicine, General Internal categories (Table 7).

Financial support had been received during the research and/or publication phase by 96 (9.6%) of the 994 articles evaluated within the scope of the study; this financial support had been provided by 65 supporting institutions for a total of 200 times for the 96 articles. Of these instituti-

Table 3. The companies that the journals in which the articles are published are affiliated with.

Company Name	Number (n)*	Percentage (%)
Elsevier	192	19.3
Springer Nature	122	12.3
Lippincott Williams & Wilkins	87	8.8
Taylor & Francis	42	4.2
Wiley	41	4.1
Oxford Univ. Press	33	3.3
Amer Soc. Microbiology	30	3.0
Amer Assoc. Neurological Surgeons	28	2.8
Thieme Medical Publishers	25	2.6
Igaku-Shoin Ltd.	15	1.5
Amer Soc. Neuroradiology	14	1.4
Japan Neurosurgical Soc.	11	1.1
Korean Neurosurgical Soc.	11	1.1
Univ Chicago Press	10	1.0
Sage	9	0.9
Wolters Kluwer Medknow Publications	9	0.9
Japan Soc. Internal Medicine	8	0.8
Karger	8	0.8
Others	299	30,1
Total	994	100,0

* In the table, the companies in which the journal with 8 or more articles were published are given.

Table 4. Distribution of studies by countries.

Company Name	Number (n)*	Percentage (%)
Elsevier	192	19.3
Springer Nature	122	12.3
Lippincott Williams & Wilkins	87	8.8
Taylor & Francis	42	4.2
Wiley	41	4.1
Oxford Univ. Press	33	3.3
Amer Soc. Microbiology	30	3.0
Amer Assoc. Neurological Surgeons	28	2.8
Thieme Medical Publishers	25	2.6
Igaku-Shoin Ltd.	15	1.5
Amer Soc. Neuroradiology	14	1.4
Japan Neurosurgical Soc.	11	1.1
Korean Neurosurgical Soc.	11	1.1
Univ Chicago Press	10	1.0
Sage	9	0.9
Wolters Kluwer Medknow Publications	9	0.9
Japan Soc. Internal Medicine	8	0.8
Karger	8	0.8
Others	299	30,1
Total	994	100,0

* In the table, the companies in which the journal with 8 or more articles were published are given.

ons, the National Institutes of Health (NIH) USA and the United States Department of Health and Human Services were found to support 32 (16%) articles each, followed by the NIH National Institute of Neurological Disorders and Stroke (NINDS) with support of 20 (10%) articles. The data on the institutions supporting the articles have been provided in the table (Table 8).

DISCUSSION and CONCLUSION

Brain abscess is a serious and life-threatening infectious disease that is seen in 4 to 9 out of every 1000 people worldwide; it can cause serious neurological sequelae, but the mortality rate has been reported to have decreased from 40% to 10% with the help of neurosurgical techniques, modern imaging methods, effective laboratory tests, and treatments developed in recent years (17). It can be said that scientific research and studies on brain abscess play

Table 5. Distribution of the first name authors of the article.

Authors	Number (n)*	Percentage (%)
Bodilsen J	14	1.4
Gupta RK	12	1.3
Prasad KN	12	1.3
Enzmann DR	11	1.2
Lu CH	11	1.2
Britt RH	10	1.1
Chang WN	10	1.1
Nielsen H	9	1.0
Husain M	8	0.8
Brouwer MC	7	0.7
Obana WG	7	0.7
Rathore RKS	7	0.7
Van De Beek D	7	0.7
Husain N	6	0.6
Kielian T	6	0.6
Ojha BK	6	0.6
Placone RC	6	0.6
Scheld WM	6	0.6
Others	833	83,8
Total	994	100,0

* In the table, the names of the first authors of 6 or more articles are given.

Table 6. Institutions that the first authors were affiliated with.

Authors' Institutions	Number (n)*	Percentage (%)
Udice French Research Universities	24	2.5
University of California System	20	2.1
Chang Gung Memorial Hospital	18	1.8
Aalborg University	17	1.7
Aalborg University Hospital	17	1.7
Sanjay Gandhi Postgraduate Institute of Medical Sciences	17	1.7
Assistance Publique Hopitaux Paris APHP	16	1.6
US Department of Veterans Affairs	15	1.5
Veterans' Health Administration VHA	15	1.5
King George S Medical University	14	1.4
Stanford University	14	1.4
Post Graduate Institute of Medical Education Research Pgimer Chandigarh	13	1.3
Universite Paris Cite	13	1.3
Chang gung University	10	1.0
Pennsylvania Commonwealth System of Higher Education Pcshe	10	1.0
University of California San francisco	10	1.0
University of Texas System	10	1.0
All India Institute Of Medical Sciences AIIMS New Delhi	9	0.9
Others	723	72.7
Total	994	100.0

* In the table, the institution names of 9 or more authors are given.

an important role in the diagnosis and treatment of the disorder and undoubtedly contribute significantly to the literature. While evaluating this contribution of scientific research and studies to the literature, the number of citations and the H index can give us important clues in this regard. The H index of the published articles was seen to be 57 in the presented study. Besides, the contribution of each article to the literature can be evaluated separately by investigating the most cited articles on the subject of brain abscess together with the mean annual number of citati-

ons from the time of publication. The study conducted by Ebisu et al. in 1996 (7) has received 272 citations, and the study conducted by Brouwer et al. in 2014 (8) has received an annual average of 22.2 citations; thus, they have made a significant contribution to a large number of research work and studies (Table 1).

A total of 994 articles included in WoS are present in the current study and these are all the articles that have been published from the past to the present on the subject of brain abscess. The first one was published in 1980 and

Table 7. WoS category distribution of articles.

Category	Number (n)	Percentage (%)
Clinical Neurology	328	21.9
Surgery	279	18.6
Infectious Diseases	140	9.4
Medicine General Internal	112	7.5
Pediatrics	97	6.4
Microbiology	92	6.1
Neurosciences	90	6.0
Radiology Nuclear Medicine Medical Imaging	88	5.9
Immunology	62	4.1
Neuroimaging	33	2.2
Pathology	32	2.1
Otorhinolaryngology	27	1.8
Medicine Research Experimental	24	1.6
Veterinary Sciences	21	1.4
Dentistry Oral Surgery Medicine	17	1.2
Public Environmental Occupational Health	16	1.1
Tropical Medicine	15	1.0
Pharmacology Pharmacy	13	0.9
Cardiac Cardiovascular Systems	12	0.8
Total*	1498	100,0

* Since some studies fall into more than one category, the total number of articles categorized is higher than the total number of articles included in the study.

Table 8. Institutions giving financial support to the studies.

Institutions providing financial support	Number (n)*	Percentage (%)
National Institutes of Health NIH USA	32	16.0
United States Department of Health Human Services	32	16.0
NIH National Institute of Neurological Disorders Stroke NINDS	20	10.0
Indian Council of Medical Research ICMR	7	3.5
National Natural Science Foundation of China NSFC	7	3.5
NIH National Center for Research Resources NCRR	6	3.0
NIH National Cancer Institute NCI	5	2.5
Copenhagen University Hospital Rigshospitalet	4	2.0
European Commission	4	2.0
NIH National Institute of Allergy Infectious Diseases NIAID	4	2.0
NIH National Institute of Mental Health NIMH	4	2.0
European Research Council ERC	3	1,5
Grants In Aid for Scientific Research Kakenhi	3	1,5
Japan Society for The Promotion of Science	3	1,5
Ministry Of Education Culture Sports Science and Technology Japan Mext	3	1,5
NIH National Institute of Diabetes Digestive Kidney Diseases NIDDK	3	1,5
Norwegian Epilepsy Society	3	1,5
Wellcome Trust	3	1,5
Others	54	27.0
Total**	200	100,0

* In the table, the countries where 3 or more articles were published are given.

** 65 institutions provided financial support for 96 articles 200 times in total, and the numbers and percentages were adjusted accordingly.

the number of articles included in the WoS database has varied every year. The distribution of the articles by year reveals no statistically significant increase or decrease ($p>0.05$) but there was an increase in the number of articles in 2000 and later compared to the 80s and 90s (Graph 1), indicating that brain abscess as a subject has not lost its popularity in the scientific arena from the past to the present, and is even becoming more popular.

English is commonly used in many countries worldwide and it is also the lingua franca of scientific research (articles, books, international congresses, etc.). We found in this study that articles on brain abscess had been written in many languages, but the majority of the authors preferred the English language ($n=892$, 89.8%) as expected.

The articles included in the evaluation were most frequently published in the following journals: Surgical Neuro-

logy (n=29, 3.0%), Journal of Clinical Microbiology (n=26, 2.7%), Acta Neurochirurgica (n=22, 2.2%), Journal of Neurosurgery (n=22, 2.2%), and Child's Nervous System (n=21, 2.1%) (Table 2). Elsevier ranked first among the publisher companies of the journals where the articles were published (n=192, 19.3%), and was followed by Springer Nature (n=122, 12.3%), Lippincott Williams & Wilkins (n=87, 8.8%), and Taylor & Francis (n=42, 4.2%) (Table 3). Based on the numbers and rates detected, the specified journals and companies made a significant contribution to the literature on brain abscess. These findings also indicate that these journals at the SCI and SCI-E level and their affiliated companies are respected and preferred in their fields.

According to TÜBİTAK Ulakbim data, the United States is the country with the highest number of publications worldwide between 2010 and 2015 (18). The number of studies conducted and the citations they received should be evaluated in order to observe the scientific development and performance of different countries. This is important in order for the conducted studies to be inspiring for other scientists and direct them towards the relevant research activities (19). The articles in the current study were most often the product of studies conducted in the United States (n=239, 24.0%), followed by Japan (n=94, 9.5%), India (n=89, 9.0%), Turkey (n=52, 5.3%), and France (n=52, 5.3%) (Table 4). Considering the number of articles from Turkey among the articles within the scope of the current study, in addition to the ratio to all articles and Turkey's place in the country ranking, it can be said that studies from Turkey and in particular those concerning "brain abscess" make a significant contribution to the literature. Many scientists from many parts of the world were found to have conducted scientific studies on this particular subject and to have published their results in the literature, in the current study focusing on articles on brain abscess. The names of the authors with 6 or more articles published are given in table 5 and Bodilsen J. (n=14, 1.4%), Gupta R.K. (n=12, 1.3%), and Prasad K.N. (n=12, 1.3%) can be seen at the forefront while the institutions of the first authors are

given in table 6 where Udice French Research Universities (n=24, 2.5%), the University of California System (n=20, 2.1%), and the Chang Gung Memorial Hospital (n=18, %1.8) take the top places. Although not a definite judgment, the authors and institutions mentioned here seem to have contributed more to the enrichment of the literature on "brain abscess" compared to others.

Based on the categorization performed by WoS, the articles were found to be most commonly published in the Clinical Neurology (n=328, 21.9%), Surgery (n=279, 18.6%), Infectious Diseases (n=140, 9.4%), Medicine, General Internal (n=112, 7.5%), and Pediatrics (n=97, 6.4%) categories although there were studies in almost all categories (Table 7). The subject of brain abscess is generally considered to be within the realm of the Neurosurgery and Infectious Diseases specialties but it may also be of interest to many medical branches and require an interdisciplinary approach. Of the 994 articles reviewed in this study, financial support was found to have been provided only for 9.6% (n=96), and the most common institutions providing financial support were the National Institutes of Health (NIH) USA (n=32, 16%), the United States Department of Health and Human Services (n=32, 16%), and the NIH National Institute of Neurological Disorders and Stroke (NINDS) (n=20, 10%). Only a few scientific studies had been supported when the percentages are considered but supporting scientific research and studies could be expected to be effective in encouraging scientists to conduct further research and studies, thus enriching the literature in terms of both quantity and quality.

Bibliometric research helps to determine the level of the scientific studies published in the literature on the subjects determined by the researchers, and also to assess the distribution of the articles to the publications while revealing the data on how the publications change by journal, year, country, first author, author institution, WoS category, etc. Although bibliometric studies can be performed on many databases, we believe that those conducted using the WoS database, which includes the SCI and SCI-E indexes involving reputable journals, is more valuable than studies on

other databases.

A bibliometric study was conducted on “brain abscess” in the current study, and the number of studies from Turkey in this field, their percentage, and the country rankings were revealed. This study is the first to show the effectiveness of studies from Turkey in this field.

In conclusion, the scientific place of studies conducted on the field of “brain abscess” in the literature has been revealed to some extent, based on the results obtained from the current study. Accordingly, we believe that the scientific effectiveness of the published studies will be revealed thanks to the increase in bibliometric studies, and new bibliometric studies should be conducted by reviewing future studies accordingly.

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The authors report no financial interest.

Conflict of Interest

The authors declare no competing interest.

Ethical Approval

Ethical Approval dated February 15, 2023, with decision no: 884 was received from the İzmir Bakırçay University Non-Invasive Clinical Study Ethics Committee in order to conduct the study.

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