
Research output on Migraine in Asian Countries: A Scientometric Study

Pramod Kumar Singh

Sr. Assistant Professor,
Department of Library and Information Science,
University of Jammu, Jammu, India, 180006.
pk Singh22@gmail.com

Pooja Rana

Research Scholar,
Department of Library and Information Science,
University of Jammu, Jammu, India, 180006.
pr27.23.0000@gmail.com

RiyaKhajuria

Research Scholar,
Department of Library and Information Science,
University of Jammu, Jammu, India, 180006.
khajuriariya9086@gmail.com

Abstract

Migraine is a highly prevalent type of nervous system disorder in patients worldwide and it is as prevalent in Asian countries as it is at the global level. It is the most common headache diagnosis in neurological services in Asian countries. This study provides insight to the decision-makers and scientific community regarding the research productivity in the field of Migraine, especially in Asian countries as many neurologists in this region treat migraine common to tension-type headaches. A fluctuation in the number of papers was noticed between the years 2012-2021 with a gradual growth i.e. a four-fold increase over the last 10 years. Over 63.62% of the publications were contributed by more than four authors. English was found to be the most prominent language used in the publications accounting for (97.36%) followed by the Japanese language (1.05%).

Keywords

Scientometrics, Migraine, Asian countries

Electronic access

The journal is available at www.jalis.in



Journal of Advances in Library and Information Science
ISSN: 2277-2219 Vol. 11. No.3. 2022. pp.314-322

Introduction

Migraine is a highly prevalent disorder of the nervous system in patients worldwide. WHO has marked migraine among the world's top 20 leading causes of disability? It is a kind of throbbing headache characterized by periodic, commonly unilateral, often pulsatile headaches that affect children, adolescents, or early adult life and repeats in a declining frequency with age. After puberty the chances of its occurrence are more prevalent in women than men, it is highest between 30 and 45 years in both sexes. The word 'migraine' has been derived from the Latin word "hemicrania" (Hemi means half and Crania means skull). It is the oldest ailment known to mankind (Mandal, 2019). It is caused by a variety of symptoms. But the most essential feature of migraine, considered by most people is that it's a painful headache (The Migraine Trust, n.d.).

The two major types of migraine categorized by the World Health Organization are a) migraine with aura, and b) migraine without aura. Migraine with aura, for many years, was referred to as classic and neurological migraine. In this type of migraine, headache happens after and along with disturbances in the nervous system whereas in migraine without aura, there is an unexpected rise of headache over a count of minutes with or without nausea and vomiting, followed by the same pattern as migraine with aura but temporarily (Ropper & Samuels, 2005). A well-known classification scheme for migraine has been developed by the International Headache Society, which is known as the International Classification of Headache Disorders (ICHD). It defines migraine as one of the main types of primary headaches, along with other types of headaches (Donaghy, 2009). It has reportedly affected about 15 percent of the European Community and is the most commonly referred neurological disorder in the UK. Several population-based studies have shown that approximately 57-85% of the people suffering from migraine reported severe pain with their attacks (Stewart & Lipton, 1994).

Wang et al. (2008) in a study revealed the profile and conditions of migraine patients' treatment in Asian countries stood far from ideal healthcare utilization situations. Many neurologists in Asian countries consider migraine common to tension-type headaches in their clinics. From the study, it was found that the constant range between 50.9% to 85.8% population have headache complaints similar to migraine and

many patients with probable migraine didn't receive proper medication and adequate treatment.

To characterize the impact of migraine on society it is necessary to know the impact of migraine on individual life. The economic costs of migraine may arise from both direct costs and indirect costs. A Canadian study has shown that migraine caused problems with interpersonal relationships in over 70 % of patients, and had a major impact on their social plans. Despite this, only 44% were taking over-the-counter medication and 19% of migraine sufferers had never sought medical attention due to which they either missed their work schedule or worked with disability at their workplace. Finally, an accounting of the economic impact of migraine can be used to assess the value of effective diagnosis and treatment.

Quantitative evaluation of the scientific production of Migraine is a great asset for the decision-makers and the scientific community to overcome various challenges and hurdles. Various statistical tools and techniques are used to measure the output of all research and development of subjects. The scientometric study is one such useful tool and technique. The study conducted by Stewart & Lipton (1994) provides a rationale for the development of migraine impact measures for use in clinical practice which provides the basis for effective healthcare interventions.

Scientometric studies are conducted at regular intervals for assessment of the research process and for determining the allocation of funds to the research institutes. Scientometrics is a powerful instrument of science for the effective analysis and evaluation in different spheres of science for social prosperity. Many authors specify principle specialties of this quantitative-based analysis of various complex elements contained in scientific publications: like multidisciplinary nature of the subject, rearrangement of factors permanently based on the degree of their impact, reproducible nature of objects and less pertinence of mathematical formula, in essence, social sciences differ from the natural sciences principally within the kind of their variables (Ivancheva, 2008). Scientometric analysis of migraine in Asian countries may develop a comprehensive insight among the researchers and decision-makers regarding the global output of migraine in Asian countries. Therefore I attempt to perform scientometrics as a subject field to analyze the research productivity on migraine in Asian

countries from the period 2012-2021. Many objectives have been analyzed for this purpose.

Related literature

Gupta et al. (2016) presented a study on migraine research in which they consulted 579 Indian publications covered in the Scopus database and found that the ten most productive countries accounted for a 75.30% share of publication output during 2006-15. This study was made with the perspective of Indian publication share in global publication output which came out to be 2.56% during 2006-15. It was concluded that there is a need to undertake R&D and to record migraine research for growing public health problems and frame a national policy in this area. Given the measure of research output, Arora (2004) conducted a bibliometric analysis of literature on migraine, consulting papers published in Index Medicus, covering a period of 1992-2002. The major purpose of this study was to examine the studies and research conducted on various aspects of the 'Migraine'. The analysis was conducted at two levels. The bibliometric laws were studied and it was found that quantity and quality do not always coincide as the ones with the largest quantity are not qualitatively the best. In the end, it was observed that the study at both levels gives a picture of the nature and characteristics of the journals and authors, who are involved in producing papers on 'Migraine'. Another consideration in the field given by Kissin (2014) is that he finds signs of progress in the pharmacotherapy of chronic pain over the past 35 years using scientometric analysis. More than 5000 articles were analyzed in biomedical journals covered by PubMed. In the analysis, it was found that despite the huge increase in publications, the scientometric analysis does not reveal any signs of really successful drugs for chronic pain. However, this study does not focus exclusively on migraine. Robert et al. (2016) presented a study that charts the growth of scientific journal literature on headaches. It was found that the scientific literature on headaches increased nearly fourfold during the period covered in this study. Two journals named Headache and Cephalalgia published the largest number of articles out of the total publication, which is more than threefold i.e. 141 journals in 1983-1984 to 462 in 2013-2014. Therefore it was concluded that the growth of scientific literature on headache research is rapidly increasing, thereby stimulating the need to conduct a further bibliometric investigation of this field. In the field of migraine different studies focused on various

aspects. Park, Park, Park, Yoon&Bae (2017) conducted a study intending to provide a detailed list of the most-cited articles on headache disorder in journals that had made a key contribution in the field. The top100 cited articles were selected from the Institute for Scientific Information Database which is available under the banner of Web of Science. Migraine came out to be the most common topic subject. Thus this study makes it possible to recognize the research trends and academic achievements in this field. Also, Lu et.al. (2021) conducted a study recently to show the global trends of migraine research using scientometric analysis using WOS, VOSviewer, and CiteSpace and showed a rising trend in the growth in migraine research from 2010 to 2019. Among the countries, the USA become the leading country on account of publications on migraine at the global level. Many emerging topics such as risk factors, prevention, and migraine-related targets were identified in the study. The major study to identify the migraine prevalence rate in the case of Asian countries was carried out by Wang and Shuu in the year 2003 by conducting epidemiologic studies of headaches in Asia using HIS. In this study, he found out the prevalence rates in Asia are similar to western countries i.e. 3.2% to 3.9%.and the rate of CDH in Asia is as high as in western countries and concluded that migraine is a significant disease in Asia.

The critical evaluation of the literature reveals that the prevalence of migraine in Asia is low range but close to those reported in western countries and the extent of negligence on the part of administrators and managers of health care sectors in acknowledgment of migraine as a serious health ailment. This indicates the need to conduct a scientometric to find out the research output on Migraine in Asian countries. In light of the previous consideration, the present study uses the scientometric study of Migraine in Asian countries to put light to an up to date facts and figures and to identify the status of migraine research in Asian countries. Therefore the researcher has chosen scientometrics as a subject field to analyze the research productivity of migraine in Asian countries from 2012 to 2021 covered in the PubMed database.

Objectives of the study

This study aims to analyze the research performance of Asian countries in Migraine research in the global context. This is done by studying the publication output during 2012-21, particularly in Asian Countries, the present study focuses on the following objectives:

1. To quantify the scientific productivity in the field of migraine research in Asian countries during 2012-21;
2. To find out the publication performance of the countries in Migraine research;
3. To study the relative use of different languages;
4. To identify core journals producing research articles on migraine in Asian countries;
5. To study the distribution of migraine research output by broad subject areas;
6. To study the contribution of authors;
7. To determine author productivity;
8. To study authorship patterns, and;
9. To identify the organizations researching migraine in Asian countries.

Data source and method

Publications in the field of migraine are extracted using the Pub-Med database for a period of ten years (2012-2021): the time frame set for the retrieval of data was from Jan 1, 2012, to Dec31, 2021. This study focuses on research output on migraine in Asian countries. The phrase search used for the retrieval of data was “migraine in Asian countries”. This query resulted in 569 publications. Pub-Med database is free to access with an internet connection, which no doubt makes it a great source for researchers. It provides access to over 16 million citations from MEDLINE and other lifescience journals for biomedical articles. It includes links to many sites providing full-text articles and other resources. Its wider coverage of the journal is also taken into consideration as the basis of its selection as a data collection tool. A total of 569 articles were retrieved from PubMed. Which was then tabulated using MS-Excel and relevant formulas and statistics were used to evaluate the same.

Analysis and results

Annual output and Growth Patterns:

The research output on migraine in Asian countries consisted of 569 publications from 2012 to 2021(*Table 1*). The annual growth of publications on migraine in Asian countries has shown a gradual increase in the publication from the year 2012 to 2021. However, an average of 57 publications are published as an annual output. The number started with only 41 articles published in the year 2012. A fluctuation in the number of publications occurred between the years 2012 to 2017. A decrease in the percentage of publications has been observed in the

year 2016(decrease of 18.64%) and 2019 (decrease from 10.90%) but surprisingly a sudden increase in the publication has been observed in the year 2021 in which 104 articles were published which accounts to 18.28% of the total output. The year was mostly impacted by COVID-19 and most of the articles published in the year 2019 were dedicated to the effect of COVID-19 on migraine patients and similar concepts. The impact of Covid-19 has altered the researchers to evaluate the impact of such measures on migraine patients. Thus, there is an increasing and decreasing trend in the publications of articles per annum with a rapid increase in the year 2021. The growth pattern is shown in (Chart 1).

Table 1: Annual publication output on migraine in Asian countries during 2012-21.

Year	Cumulative No. of articles
2012	41
2013	48
2014	59
2015	59
2016	48
2017	47
2018	55
2019	49
2020	59
2021	104

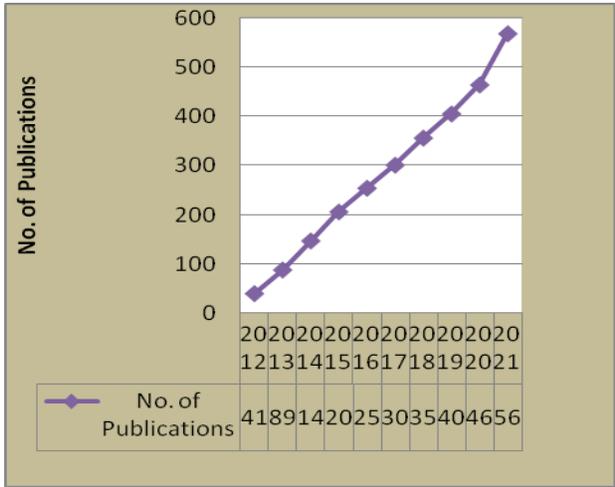


Chart 1: Growth patterns from 2012 to 2021 in migraine publication

Language of Publication

The language-wise distribution of articles helps us know the most dominant language used in scientific communication on the subject. It is also helpful to evaluate the contribution of a country in the derivation of new scientific information in the field of migraine research. The plotted 3D line graph shows the research output on migraine according to the language of publications. Mainly 5 languages have been identified contributing to this field of publication. These are the English language, Japanese language, Russian language, Chinese Language, Turkish language, and, Spanish language. The majority of the publications are in the English language which constitutes a major portion of the output accounting for 97.36% of the total publications. The second leading language on the list is the Japanese language accounting for 1.05% followed by the Russian Language (0.70%), These figures show the frequent usage of the English language in the writing of articles and papers and that very few articles are written in their language. Therefore, it is made evident from the facts that English is the most prominent language used in the publication of Migraine research in Asian countries during 2012-2021. The language-wise distribution of articles is shown in (Chart 2).

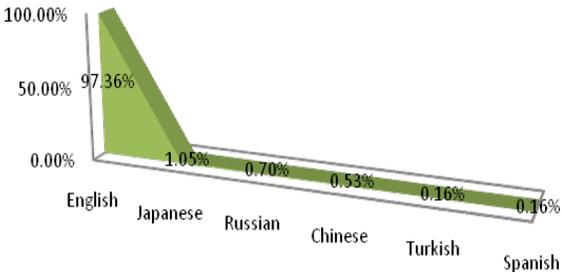


Chart 2: Language-wise distribution of articles during 2012-2021.

Significant Keywords or topics:

This study identified major PubMed research areas or keywords concentrated within migraine research in Asian countries. Migraine-related research is indexed in the PubMed database under significant keywords i.e. more than Fifty-six significant keywords have been identified in the migraine literature. Analysis of the research output on migraine in Asian countries in the context of different subjects revealed that 34.21% (156 articles) of the total research output have been indexed under the keywords: migraine disorders

constituting 40.71% (n=233) of the research output, followed by Headache accounting for 30.10% (171 articles). The keyword Chronic Migraine was found to be the third most majorly used keyword in migraine publications. Other keywords like Epidemiology (5.71%), Adolescence (4.21%), Acupuncture (3.11%), Risk factors (2.98%), Prevalence (2.83%), Medical Care (2.46%), Polymorphism (2.63%), Burden (2.28%), migraine with aura (2.28%), Cohort study (2.28%), Diagnosis (1.75%), CADASIL (1.23%) and NOTCH-3 (1.23%) were other prominent areas of researches in migraine publications during 2012-2021. The graphical representation of the data is shown in (Chart 3).

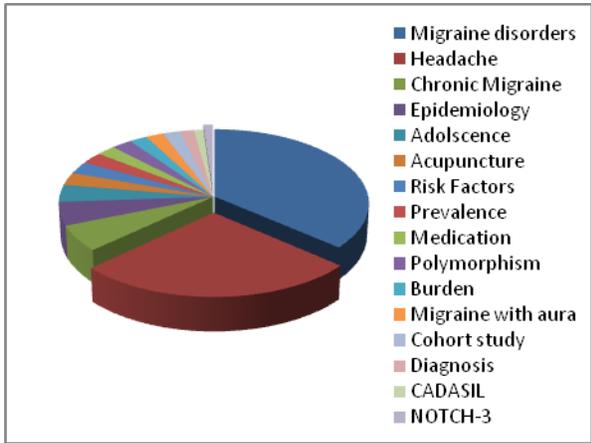


Chart 3: significant keywords in Migraine literature during 2012-21.

Core Journals:

The Scientometric analysis helps to determine the core journals containing the research articles on the topic under study (Table 2). It is necessary to know the most productive journals and use this to create links to show their relationship in that field area. The 192 journals were analyzed concerning their productivity of articles on migraine in Asian countries. The 75 papers on migraine were published in the *Journals of Headache and Pain*, constituting 13.18% of the total publication. *The Journal of Headache and pain* has shown significant consistency in the publication of migraine research particularly in Asian countries. This journal is specifically dedicated to headache and related pain syndromes including epidemiology, public health, etc. *Cephalalgia* with 44 publications becomes the second-highest journal in the publication of migraine-related research. The other leading journals in the field are *Headache* with 27 articles, *PLoS One* (17 articles), *BMC Neurology* (12 articles), *Scientific*

Reports (12 Articles), and *Medicine* (11), and many more are listed in the table. These top 20 journals have contributed to about 50% of the total publication output whereas 10 journals have contributed 3 papers each, 33 journals published 2 papers each, and 129 journals published 1 paper each.

Table 2: The 30 most productive journals in the field of migraine according to the number of their publications

S. No.	Journal title	Country of Publication										Total Papers	% of papers
		12	13	14	15	16	17	18	19	20	21		
1	The Journal of Headache and Pain	8	6	6	11	6	9	6	5	11	7	75	13.18
2	Cephalalgia	7	4	3	7	4	2	2	5	-	4	44	7.73%
3	Headache	2	4	3	2	2	1	8	2	1	9	27	4.82%
4	PLoS ONE	1	1	-	2	2	1	3	2	1	3	17	2.99%
5	BMC Neurology	1	1	-	2	2	1	2	1	1	3	12	2.11%
6	Scientific Reports	1	-	1	-	-	-	1	2	2	5	12	2.11%
7	Medicine (Baltimore)	-	-	-	2	5	-	1	2	1	-	11	1.93%
8	International journal of environmental research and public health	-	-	-	1	-	1	2	-	2	4	10	1.75%
9	BMI open	-	-	-	1	-	1	2	3	1	1	9	1.58%
10	Neurological Sciences	-	-	-	1	-	1	2	3	1	1	10	1.75%
11	Clinical neurology and neurosurgery	1	2	-	-	1	1	2	1	-	3	7	1.23%
12	Neurology India	-	-	2	-	-	2	1	-	-	1	6	1.05%
13	Agri	1	1	1	-	-	-	1	1	1	-	6	1.05%
14	Brain & Development	-	-	2	-	-	-	1	1	-	-	6	1.05%
15	European journal of neurology	1	1	2	1	-	-	-	-	-	1	6	1.05%
16	European neurology	1	-	1	-	1	1	-	-	-	-	5	0.87%
17	Biomed research international	-	1	2	1	-	-	-	1	-	-	5	0.87%
18	Journal of neurology	-	-	-	-	1	-	1	-	2	1	5	0.87%
19	Journal of clinical neuroscience	2	-	1	-	-	1	1	-	-	-	5	0.87%
20	Internal medicine	1	-	-	1	-	1	-	-	-	1	4	0.70%

Country of Publication

The geographical scattering of the articles shown in (Chart 4) depicts the contribution of different countries in producing research literature on migraine in Asian countries. A total of 30 countries contributed to the field area, out of which the global share of the top 10 most productive Asian countries on migraine research consisted of 469 articles out of 569 total

publications which constitute 82.42% of the total share of total output during 2012-22. The top 10 Asian countries are shown in (Chart 4). Taiwan published the most publication on migraine during this period accounting for 18.10% (n=103), followed by China which lags by 2 publications from becoming the leading country in publications on migraine research, it accounts for 17.75% of the total share (n=101). Third on the list is Japan and Turkey which constitute an equivalent share as a contribution towards migraine research accounting for 10.36% each. The next on the list are Iran, India, Saudi Arabia, Russia Israel, Pakistan, and Malaysia constituting an account of 8.43%, 4.92%, 3.16%, 2.81%, 2.63%, 2.10% & 1.75% respectively. However, the major share of the publications seem to come from the top 10 countries which are 469 out of a total 569. The rest 100 publications are published by other 20 countries which shows a very limited amount of migraine research is conducted in these countries.

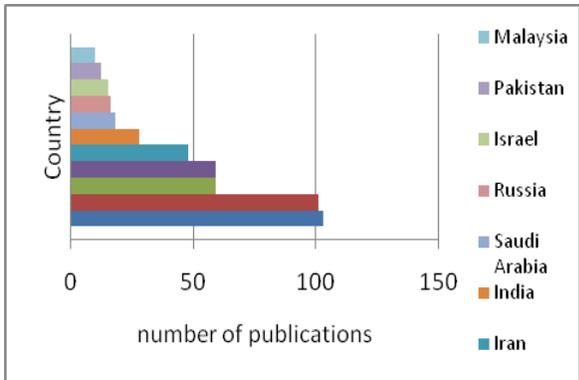


Chart 4: Top ten countries publishing articles in the present database.

Authors and Authorship pattern:

More than 1259 authors contributed to the publication on migraine. A total of 569 papers were analyzed, where the number of authors has increased due to the multi-authored nature of the publications. The most productive authors found was Jong-ling Fuh, constituting a share of 2.98% of total output, followed by Takeshima, Takao (1.93%), Elena R. Lebedeva (1.93%), Kim, Byung-Kun (1.93%), Wang, Shuu-Jiun (1.93%), Sakai, Fumihiko (1.75%) and Shengyuan Yu (1.58%). More than 32 articles are contributed by three authors collaboration, 68 articles are written by two authors collaboration, 6 articles are published in single-authorship and about 362 articles are written in multi-authorship. (Table 4) shows the top 10 leading authors in Asian Countries in the publication of migraine literature.

The authorship pattern shown in (Chart 5) of articles determines the type of research. In recent times it is seen that there is a trend toward collaboration in almost all fields of science. It helps to determine the collaborative trends in research. With the help of the authorship pattern, the extent of collaboration in research can be measured. (Table 3) shows the distribution of single and multiple authors for publications on migraine in Asian countries. It is evident from the table that 98.25% of the total publication is multi-authored, while the remaining 1.75% of the total publication share is single-authored articles. The extent of collaboration can be measured by calculating the ratio of multi-authored papers to the total number of papers published. The formula to calculate it is,

$$C = \frac{Nm}{Nm + Ns}$$

Where C = Extent of Collaboration,
Nm = Number of multi-authored papers,
Ns = Number of single-authored papers.

Applying this formula to the data given in the table, we have,

$$C = \frac{563}{563 + 8}$$

$$C = \frac{563}{569} = 0.98$$

The extent of collaboration is 0.98

Table 3: Distribution of single and multi-authors for publications on migraine in Asian countries

Type of Authorship	No. of Publications	% of publication
Single Authors	6	1.05%
Two Authors	32	5.62%
Three Authors	68	11.95%
Four Authors	101	17.75%
More than Four authors	362	63.62%
Total	569	100%

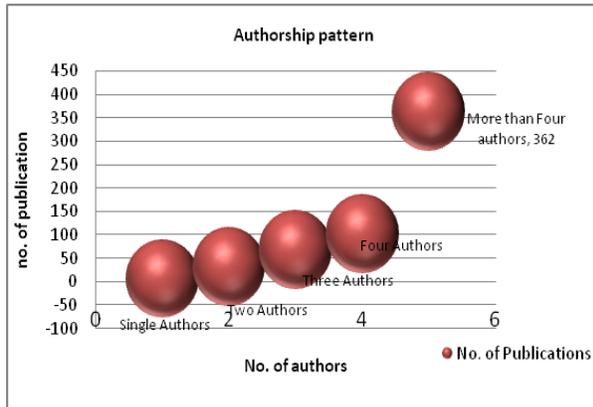


Chart 5: Single and multi-authors contribution to publications on migraine in Asian countries during 2012-21.

Table 4: 2012-2021 Top 10 leading authors in migraine literature concerning Asian countries.

Rank	Authors	Frequency	%age
1.	Fuh, Jong-Ling	17	2.99%
2.	Takeshima, Takao	11	1.93%
2.	Lebedeva, Elena R.	11	1.93%
2.	Kim, Byung-Kun	11	1.93%
3.	Wang, Shii-Jiun	10	1.76%
3.	Sakai, Fumihiko	10	1.76%
4.	Yu, Shengyuan	9	1.58%
5.	Kim, Won Joo	8	1.40%
6.	Chen, Hsuan-Ju	7	1.23%
6.	Chen, Yung-Tai	7	1.23%
6.	Kao, Chia-Hung	7	1.23%
6.	He, Mianwong	7	1.23%
7.	Harnod, Tomor	6	1.05%
8.	Lin, Herng-Ching	5	0.87%
8.	Kobzeva, Natalia R.	5	0.87%
9.	Kim, Jiyoung	4	0.70%
9.	Peng, Kuan-Po	4	0.70%
9.	Rao, Girish N.	4	0.70%
10.	Mittal, Balraj	3	0.53%
10.	Pradhan, Sunil	3	0.53%
10.	Gururaj, Gopal Krishna	3	0.53%
10.	Risal, Ajay	3	0.53%
10.	Kulkarni, Girish	3	0.53%

Contribution of Institution:

The chart shows that among the top contributing organizations, the universities contribute the major share of publications, accounting for 45.34% of the total publication, followed by Hospitals (34.79%), Colleges (9.66%), Research Institutes (7.02), Clinics (2.81) and Associations (0.25%). The leading organizations in the list for publishing research

articles on migraine particularly in Asian countries during the period of 2012-21 are shown in (Table 5) which reflects that the topmost institute in the list is Taipei Veterans General Hospitals Taiwan (n=20) contributing the maximum number of publications in the field area followed by Chinese PLA General Hospital China (n=19). The institution that came third on the list is National Yang-Ming, University of School of Medicine Taiwan (n=14). However 4th, 5th and 6th position is occupied by the First Affiliated Hospital of Chongqing Medical University China (n=10), the Urals State Medical University Russia (n=9), and China Medical University Hospital (n=8). These six institutions alone contribute to about 15% of the total publication output. These six institutions from Asia are identified to be the most frequent contributors in the field of migraine research during this period (Chart 6).

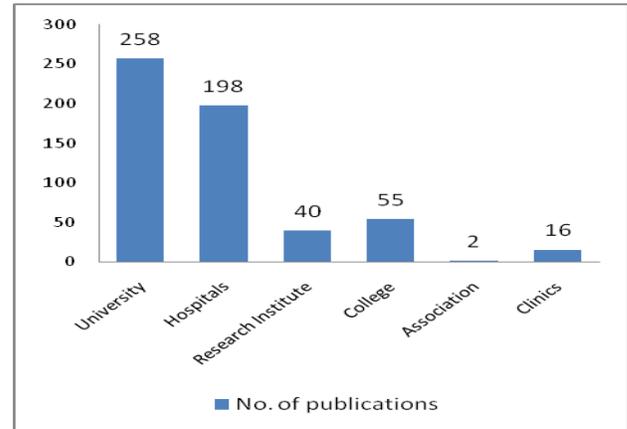


Chart 6: Contribution of organizations for Publications related to migraine in Asian countries during 2012-21.

Table 5: Top six leading organizations for publications related to migraine in Asian countries during 2012-21.

Rank	Institution or Organisation	Number of publications	(%age) of publications
1	Taipei Veterans General Hospital	20	3.51%
2	Chinese PLA General Hospital	19	3.34%
3	National Yang-Ming, University of School of Medicine Taiwan	14	2.46%
3	The first affiliated Hospital of Chongqing Medical University	10	1.76%

4	China The Urals State Medical University	9	1.58%
4	Russia China Medical University Hospital	8	1.41%

Conclusion

In conclusion, scientometric analysis of migraine research from PubMed to calculate the research output in Asian countries showed a steady increase in the number of publications during the period 2012-2021. However, a surprising hype in the publications is seen in the year 2021. The growth has been remarkable this year showing a significant rise from the previous years. This also shows the shift in the focus of researchers in Asian countries during the pandemic where most of the articles in 2021 were dedicated to studying the effect of covid-19 on migraine patients. Original articles and case reports contributed to the published content. Universities and Hospitals together are shown to contribute 50% of migraine literature in Asia. Still, more and more researches need to be conducted in Asian countries to solve the problem of migraine patients in this region. The Journal of Headache and Pain was found to be the leading journal in the field of migraine which showed significant consistency in publication during this period with an average of 7-8 publications/year. This information will help the journals to evaluate their shortcomings and strength and rejuvenate their activities accordingly and keep up with the quality of the journal by adding more and conducting new research in the field. This information will also be helpful to librarians, decision-makers, doctors, and medical educators to serve the migraine community and researchers in a better way. However, this is also beneficial for one to under the scope of migraine literature and endeavor to explore more.

According to the results obtained in this study, it is suggested, though the results have shown a significant hype in the year 2021 yet more research in the field area needs to be conducted to create awareness among researchers of the problems faced by migraine patients in Asian countries as well as in other parts of the world. Considering the issue of human health and the impact of migraine on the social and economic lives of people, all the research especially on migraine needs to be strengthened as required by allocation of more funds and collaboration with industries, allocation of suitable

resources so that the quality in the research can be maintained.

References

- [1.] Arora, V. (2004). Literature on migraine: a bibliometric analysis (Dissertation, Aligarh Muslim University, India). Retrieved from <http://ir.amu.ac.in/6522/1/DS%203372.pdf>.
- [2.] Donaghy, M. (Ed).(2009). Brain's Diseases of the Nervous System (12thed). New York: Oxford University Press.
- [3.] Gupta, R., Gupta, B. M., Bansal, J & Kumar, A. (2016).Scientometric assessment of India's migraine publications during 2006-15.*Journal of Young Pharmacists*, 8(4), 1-8. Retrieved from <http://www.jyoungpharm.org/sites/default/files/10.5530jyp.2016.4.2.pdf>.
- [4.] Ivancheva, L. (2008). Scientometrics today: A methodological overview. *Collnet Journal of Scientometrics and Information Management*, 2(2), 47-56. doi:10.1080./09737766.2008.10700853.
- [5.] Kissin, I. (2014). Scientometric assessment of drug for chronic pain, 1979-2013: Rapid growth of publication, paucity of successful drugs. *Journal of Pain Research*, 7, 505-514. Retrieved from <https://bit.ly/3Q1yMGo>
- [6.] Lu, T. et.al (2021). The global trends of migraine research from 2010 to 2019: A scientometric study. *Annals of Palliative Medicine*, 10(5), 5767-5779. doi:10.21037/apm-20-2546
- [7.] Park, K. M., Park, B. S., Park, S., Yoon, D. Y. &Bae, J. S. (2017). Top-100 cited articles on headache disorders: A bibliometric analysis. *Clinical Neurology and Neurosurgery*, 157, 40-45. Retrieved from <https://bit.ly/3R4nS3U>
- [8.] Robert, C., Wilson, C. S., Lipton, R. B. &Arreto, C. (2016). Growth of headache research: A 1983-2014 bibliometric study. *Cephalalgia*, 37(13), 1299-1309. doi: 10.1177/0333102416678636.
- [9.] Ropper, A. H. & Samuels, M. A. (2005).*Research productivity in soft skills: a bibliometric study* (Doctoral dissertation, BharathiarUniversity, Coimbatore, India). Retrieved from <https://bit.ly/3eaI45C>
- [10.] Stewart, W. F. & Lipton, R. B. (1994).The economic and social impact of migraine.*European Neurology*, 34(2), 12-17. Retrieved from <https://www.karger.com/Article/Pdf/119527>
- [11.] The Migraine Trust.(n.d.).*Migraine without aura*. Retrieved from <https://bit.ly/3TwEkeG>

- [12.] Wang, Shuu-Jiun.(2003). Epidemiology of migraine and other types of headache in Asia. *Headache*, 33(2), 104-108. doi:10.1007/s11910-003-0060-7
- [13.] Wang, S-J. (2008). Migraine disability awareness campaign in Asia: Migraine assessment for prophylaxis. *Headache*, 48, 1365-1365. doi:10.1111/j.1526-4610.2008.01088.x.