Systematic Review

An Analysis of Bibliometric Research on Sumatriptan (Imitrex, Tosymra) Linked to Migraine Relief

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ARTICLE INFO

ABSTRACT

Episodic headaches are a common neurovascular disorder called migraine characterized by a throbbing pain that is typically felt on one side of the brain, however it can occasionally affect both sides. However, no visual bibliometric analysis has been conducted on the effects of sumatriptan on migraine over the past 10 years. **Objective:** To identify the current status and emerging trends of the global use of sumatriptan associated with the relief of migraine from 2011 to 2022. **Methods:** Approximately 3154 publications (500 from PubMed and 2654 from dimensions) in CSV format were exported from PubMed and dimensions to VOS viewer. The keywords applied for searching were "sumatriptan" and "sumatriptan in migraine". **Results:** The results of bibliometric analysis of the occurrence of keywords by VOS viewer revealed the top four most occurring keywords as "effect", "relief", "model", and "mechanism". The bibliometric analysis for the graphical distribution of a maximum number of articles by countries in 2011-2022 reveals Germany, the US, and Australia as the top three countries. The analysis for a maximum number of publications by organizations in 2011-2022 showed the top three organizations with a maximum number of articles are "Headache Core Center, Springfield, USA", "Montefiore Medical Center, USA", and "Experimental Medicine Research Center, Tehran University". **Conclusions:** The compiled data of this exploration will make it easier for other academic research work to find authentic and fruitful results for complex future studies.

INTRODUCTION

The Greek words Biblion (book) and Merton were used to create the term "bibliometrics" (to measure) [1]. The article "Statistical bibliography or bibliometrics" introduced this term and defined it as "the application of mathematical and statistical methods to books and other media of communication" [2, 3]. To measure and analyze the productivity of literature in a particular field or journal, the field of library and information science uses a research methodology called bibliometrics [4]. It measures a research field's contribution using statistical indicators, taking into account various nations, organizations, journals, or authors, and it forecasts trends or hotspots in the field [5-7]. The Centre for Science and Technology Studies at Leiden University in the Netherlands offers VOSviewer, a free Java-based program. It enables researchers to build and visualize bibliometric networks using information from bibliometric searches of significant databases to produce a citation map [8, 9]. Episodic headaches are a common neurovascular disorder called migraine characterized by throbbing pain that usually affects one side of the head (but can affect both sides) [10, 11]. It frequently manifests as severe, unilateral, pulsating headache attacks that are accompanied by other symptoms like photophobia, phonophobia, nausea,

vomiting, tingling or numbness in the extremities, and extreme sensitivity to sound, light, and smell [12, 13]. If untreated, a migraine attack typically lasts from 4 hours to 72 hours [12]. Globally, acupuncture therapy has been used to treat migraines [14]. A 2016 study on the global burden of disease estimates that 1.04 billion people worldwide experience migraines, with a 14.4% global prevalence rate [15-17]. Women are three times more likely than men to experience migraines, and the likelihood of migraine in children rises with age [18]. Additionally, about 10% of elderly people experience migraines annually [19]. The majority of disabilities in the world are caused by migraines, which account for one-third of lost years of disability-adjusted life [20]. Sumatriptan nasal spray (Tosymra; Promius Pharma/Dr. Reddy's Laboratories) was approved by the US Food and Drug Administration (FDA) on January 27, 2019, for the immediate treatment of migraine in adults with or without aura [21]. Aura is a selective 5-hydroxytryptamine1B/1D (5-HT1B/1D) receptor agonist is a sumatriptan nasal spray [22]. In 1992, the FDA approved Imitrex, a subcutaneous injection form of sumatriptan, to treat migraines [23]. If the patient does not respond to the first treatment for the migraine attack before using sumatriptan nasal spray for subsequent migraine attacks [24], the diagnosis should be reevaluated [25]. It is not advised to use sumatriptan nasal spray to treat or prevent cluster headaches [26]. Sumatriptan is a selective 5-HT1B/1D receptor agonist [27, 28]. Sumatriptan exerts agonist effects on 5-HT1B/1D receptors found on intracranial blood vessels and trigeminal sensory nerves [29]. This causes constriction of the cranial vessel and inhibits the release of pro-inflammatory neuropeptides [28].

Therefore, A comprehensive bibliometric analysis of sumatriptan migraine from 2011 to 2022 using Pubmed and VOSviewer was done by integrating the knowledge from map of nations, organizations, writers, keywords, and cited references. This study offers an alternative viewpoint on the practice of using sumatriptan to treat migraines. Despite many limitations, this data thoroughly depicts the global migraine trend. Publications are generally on the rise, with a higher growth rate from 2011 to 2022 than from 2010 to 2019.

METHODS

The PubMed and Dimension databases were implemented and the search technique applied. The following keywords were used in a comprehensive examination of PubMed: "migraine", "headache", "neurology", etc. To ensure that only peer-reviewed articles published between 2011 and 2022 were included, filters were implemented. Articles that were published in English and had a primary focus on migraines were included. Excluded studies were those without peer review or those unrelated to migraine. To facilitate analysis, relevant data was extracted, such as the abstract, journal information, authors, title, and year of publication. VOSviewer was used to import the data for the bibliometric study. The citation network visualization and analysis, co-authorship patterns, and keyword occurrences capabilities of this software led to its selection. Keywords like "migraine", "epidemiology", "treatment", and "pathophysiology" were chosen in accordance to the objectives of the study. A second researcher independently analyzed a random sample of 3154 articles to verify the accuracy of the data (figure 1).
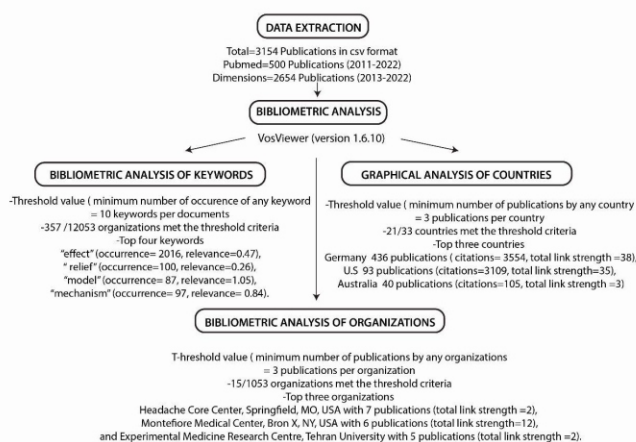

Figure 1: Flowchart for bibliometric analysis of sumatriptan in migraine from the year 2011-2022

A total of 3154 publications (500 from PubMed and 2654 from dimensions) were exported in CSV format to the VOS viewer. The bibliometric analysis of keywords showed "effect", "relief", "model", and "mechanism" as the top four keywords. The graphical analysis of countries reveals Germany, the US, and Australia as the top three countries with the maximum number of publications from 2011-2022. While the bibliometric analysis of organizations reveals "Headache Core Center, Springfield, USA", "Montefiore Medical Center, USA", and "Experimental Medicine Research Center, Tehran University" as the top three centers for publishing a maximum number of articles.

RESULTS

Bibliometric Analysis of Publication Output

The Bibliometric analysis on sumatriptan in migraine using Vosviewer was performed after extracting the data from dimensions and Pubmed. The total number of publications available online for retrieval was 3154 (2654 exported from dimensions from 2011-2-22 and 500 exported from Pubmed from 2011-2022). The figure 2 shows 2015 has the highest number of publications as compared to other years.
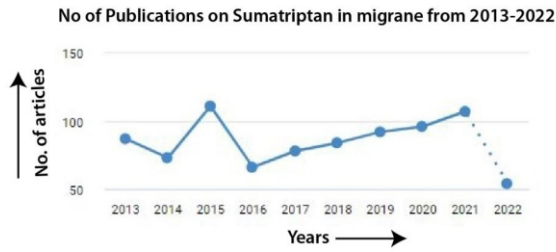
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Figure 2: Graphical representation of several publication publications on sumatriptan in migraine from the year 2011 to 2022.

Bibliometric Analysis of Keywords

The keywords in a research study are crucial since they reveal an in-depth understanding of the research topic. Systematic keyword analysis on that topic can be used in better understanding of research gaps and growth patterns in a discipline. In order to evaluate the strength of links between different keywords, it is common to practise to examine the co-occurrence of keywords in numerous articles. A link is a pair of elements that occur together, such as a keyword, and the number of cited references between them is represented by the total link strength. The number of published data in articles also indicate how frequent the migraine cases are being reported. Each cluster's circles and letters show how closely related the individual keywords are to one another. The size of the circle is closely related to how frequently a keyword appears in the title and abstract. As a result, the frequency of letters and circles affects their size. The more often a keyword appears, the bigger the letters and circles get. The lines' thickness reveals the relative strength of pairs of keywords, and each shade represents a group of terms. The length of the lines reveals a rough correlation between the term's repetition (Figure 3).
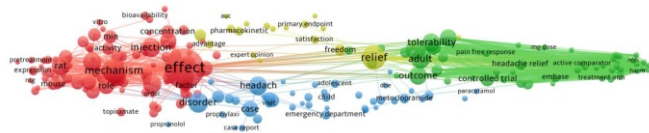

Figure 3: Co-occurrence of keywords visualized in a network

The figure 3 is a representation of network visualization of the co-occurrence of keywords in publications on sumatriptan use in migraine from the data extracted from dimensions and PubMed 2011-2022. The total 214 keywords (items) were distributed into a total of 4 clusters, of which cluster 1 has 98 items (keywords) (red color), cluster 2 contains 53 keywords (green colors), cluster 3 contains 44 keywords (blue color), and cluster 4 contains 19 items (yellow color) shown in figure 3. The list of top 10 keywords with their occurrences and link strengths. And the size of circles indicates the frequency of patients (occurrences) reported migraine.

The attribute known as "Total link strength" quantifies the overall strength of a researcher's co-authorship connections with other researchers. A co-occurrence relationship between two terms is represented by a link. The VOSviewer handbook states that each link has a strength, which is shown by a positive number. The minimum number of occurrences of keywords required to take part in research was set to 10. Out of 12053 organizations, 357 met the threshold criteria. The top three keywords that appeared were "effect" (occurrence= 2016, relevance=0.47), "relief" (occurrence=100, relevance=0.26), "model" (occurrence= 87, relevance=1.05), "mechanism" (occurrence= 97, relevance= 0.84) (table 1).

Table 1: Bibliometric Analysis of co-occurrence of top 10 keywords in Publications on sumatriptan in migraine

Sr. no	Keywords	Occurrence	Links	Total link strength	Relevance
1	Effect	206	212	2253	0.47
2	Relief	100	191	1251	0.26
3	Mechanism	97	187	1324	0.84
4	Model	87	169	1059	1.05
5	Day	73	180	820	0.63
6	Level	73	192	889	0.53
7	Injection	69	171	763	0.74
8	Adult	69	172	1165	0.54
9	Development	68	179	826	0.80
10	Rat	68	120	856	0.6

Graphical Analysis of Countries

Bibliometric analysis of countries indicates which countries have published maximum and minimum articles on the required topic which is a way to analyze the role of any country in certain research. The intensity between the countries and the frequency of their co-authorship publications are indicated by the distance between the clusters on the map and the lines linking them. This provides a decent indication of the power of collaborations between nations in the research of tourism and sustainability as shown in figure 4. The minimum number of documents published by a country required to take part in research was set to 3. Out of 33 countries, 21 met the threshold criteria. The top three countries for publishing the maximum number of articles were Germany with 436 publications (citations= 3554, total link strength =38), the U.S with 93 publications (citations=3109, total link strength=35), and Australia with 40 publications (citations=105, total link strength =3). The total 19 keywords (items) were distributed into a total of 7 clusters, of which cluster 1 has 4 countries (red color), cluster 2 contains 4 countries (green color), cluster 3 contains 3 countries (dark blue color), cluster 4 has 3 keywords (yellow color), cluster 5 has 2 keywords (purple color), cluster 6 has 2 countries (light blue), and cluster 7 has 1 country (orange color) as shown in figure 4. The list of all countries divided into clusters is mentioned in table 2.

Table 2: Bibliometric Analysis of countries in Publications on sumatriptan in migraine

Sr. no	Countries	Documents	Links	Total Link Strength	Citations
Cluster 1 (4 items) Red Color					
1	Australia	40	3	3	105
2	Belgium	5	2	4	53
3	India	7	1	1	166
4	Netherlands	13	6	12	842

|	Cluster 2 (4 items) Green Color				
5	Brazil	5	1	1	44
6	Iran	3	1	1	65
7	Spain	7	1	1	48
8	US	93	13	35	3109
	Cluster 3 (3 items) Dark Blue Color				
9	Canada	23	3	6	195
10	Denmark	18	6	10	934
11	France	6	3	4	4
	Cluster 4 (3 items) Yellow Color				
12	Austria	35	2	7	112
13	Germany	436	7	38	3554
14	Switzerland	23	5	23	92
	Cluster 5 (2 items) Purple Color				
15	Norway	7	3	4	277
16	Sweden	7	4	5	219
	Cluster 6 (2 items) Light Blue Color				
17	Turkey	4	1	2	50
18	UK	38	11	25	869
	Cluster 6 (2 items) Light Blue Color				
19	Italy	17	3	4	676
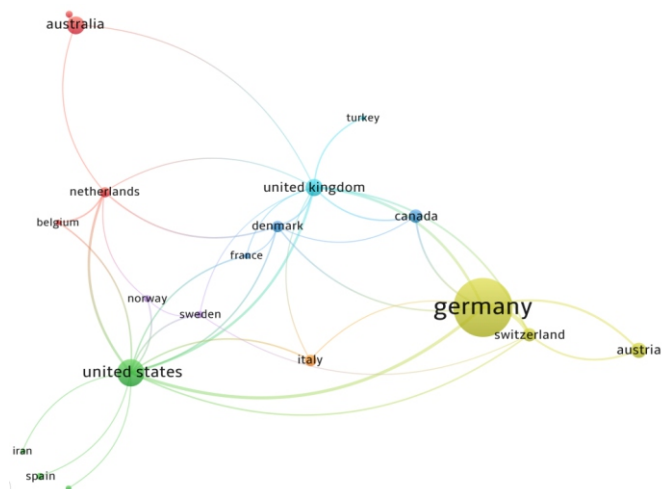
Figure 4: Network Visualization of Countries.

The figure is a representation of the geographical analysis of countries for publications on sumatriptan use in migraine from the data extracted from dimensions 2011-2022. The top 3 countries with the maximum number of publications include Germany, U.S., and Australia.

Bibliometric Analysis of Organizations

The minimum number of documents published by an organization required to take part in research was set to 3. Out of 1053 institutions, 15 met the threshold criteria. The top three institutions for publishing a maximum number of articles were Headache Core Center, Springfield, MO, USA with 7 publications (total link strength =2), Montefiore Medical Center, Bron X, NY, USA with 6 publications (total link strength=12), and Experimental Medicine Research Centre, Tehran University with 5 publications (total link strength =2). The total 7 organizations keywords (items)

were distributed into a total of 2 clusters, of which cluster 1 has 4organizations (red color), and cluster 2 contains 3 organizations (green colors shown in figure 5. The list of all countries divided into clusters is mentioned in table 3.

Table 3: Bibliometric Analysis of organizations who published data on sumatriptan in migrane

Sr. no	Organizations	Documents	Links	Total Link Strength
	Cluster 1 (4 items) Red Color			
1	Albert Einstein College of Medicine, Department of Epidemiology and Population Health, Bronx, NY, USA	4	13	28
2	Albert Einstein College of Medicine, Department of Neurology, Bronx, New York, USA	4	4	7
3	Bronx, New York, USA: Montefiore Medical Center	6	13	28
4	US-based Vector Psychometric Group, LLC, Chapel Hill, North Carolina	3	4	10
	Cluster 2 (3 items) Green Color			
5	Avanir Pharmaceuticals, Inc., Aliso Viejo, CA, USA	4	6	12
6	Headache Care Center, Springfield, MO, USA	7	13	28
7	Jefferson Headache Center, Philadelphia, PA, USA	3	2	2

Figure 7: Network Visualization of Organizations

The figure is a representation of network visualization of organizations who have publications on sumatriptan use in migraine from the data extracted from dimensions and PubMed 2011-2022. Greater number of associations come under the red cluster zone.

DISCUSSION

We conducted a scientometric analysis of migraine research published between 2011 and 2022 as part of our investigations, and we created a knowledge map comprising the nations and territories, organizations, writers, keywords, and cited references. After analyzing the development trend of the total number of publications, we found an interesting phenomenon: The past 20 years analysis showed that the overall development trend of the total number of migraine research publications has been increased year by year. The average total number of publications available online were 3154 (2654 exported from dimensions from 2011-2-22 and 500 exported from Pubmed from 2011-2022), whereas data analysis of 2010 to 2019 (2013.9) showed that it was greater than the data analysis published in 2000-2009 (1271.0). However, the

average growth rate for 2000-2009 (7.999%) is greater than the growth rate analysis in the years of 2010-2019 (5.348%). The slope of the linear regression equation is also compared with 2000-2009. It was also observed that the highest number of publications were reported in in 2014 as compared to other years [30]. It is worthwhile to note that in the era of COVID-19, about 50% of migraine sufferers said that their regular discomfort got worse during the lockdown. A worsening of the migraineurs' clinical course was associated with altered triggers and the psychological effects of the lockdown . In 2011-2022, out of 33 countries, 21 met the threshold criteria. The top three countries for publishing the maximum number of articles were Germany with 436 publications (citations= 3554, total link strength =38), the U.S with 93 publications (citations=3109, total link strength=35), and Australia with 40 publications (citations=105, total link strength =3). The top 3 countries with a maximum number of publications on sumatriptan use in migraines from 2011-2022 include Germany, the U.S., and Australia [31]. In 2011-2022, the top three organizations for publishing the maximum number of articles were Headache Core Center, Springfield, MO, USA with 7 publications (total link strength =2), Montefiore Medical Center, Bron X, NY, USA with 6 publications (total link strength=12), and Experimental Medicine Research Centre, Tehran University with 5 publications (total link strength =2). This investigation has a number of limitations. First, despite the fact that the search technique looks for MeSH subject word synonyms in PubMed, it can still overlook certain material. Furthermore, the capacity of the dimension to eliminate duplication is constrained, which could skew the findings of the study. Just a Pubmed analysis was done, therefore the general trend may not be accurately represented. Furthermore, the criteria we apply need to be further enhanced because part of the material will be published online ahead of time, which will lead to inconsistencies between the date of collection and publication.

CONCLUSIONS

In this paper, we used Pubmed and VOSviewer to conduct a bibliometric analysis of sumatriptanon migraine from 2011 to 2022 and acquired the knowledge mapping of countries, institutions, authors, keywords, and Cited references. This study provides a new perspective on the trend of using sumatriptanfor the relief of migraine. Although this study has some limitations, it fully reveals the global trend of migraine. The overall trend of publications is increasing year by year, and the growth rate in 2011–2022 is greater than that in 2010–2019.

Authors Contribution

Conceptualization: MU
Methodology: MU
Formal analysis: MU, MOM ,AS, MTT
Writing-review and editing: AQ, SI, SSZ

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

REFERENCES

[1]   Pritchard A. Statistical bibliography or bibliometrics. Journal of Documentation. 1969; 25: 348.

[2]   Siddique N, Ur Rehman S, Ahmad S, Abbas A, Khan MA. Library and information science research in the Arab World: a bibliometric analysis 1951–2021. Global Knowledge, Memory and Communication. 2023 Jan; 72(1/2): 138-59. doi: 10.1108/GKMC-06-2021-0103.

[3]   Mahapatra N and Sahoo J. Metrics employed in the evaluation of research productivity: A systematic literature review. Journal of Librarianship and Information Science. 2023 Sep; 55(3): 868-85. doi: 10.1177/09610006221104798.

[4]   Ullah M, Butt IF, Haroon M. The Journal of Ayub Medical College: a 10-year bibliometric study. Health Information & Libraries Journal. 2008 Jun; 25(2): 116-24. doi: 10.1111/j.1471-1842.2007.00757.x.

[5]   Zhou S, Tao Z, Zhu Y, Tao L. Mapping theme trends and recognizing hot spots in postmenopausal osteoporosis research: a bibliometric analysis. PeerJ. 2019 Nov; 7: e8145. doi: 10.7717/peerj.8145.

[6]   Tao L, Zhou S, Tao Z, Wen K, Da W, Meng *et al.* The publication trends and hot spots of scoliosis research from 2009 to 2018: a 10-year bibliometric analysis. Annals of Translational Medicine. 2020 Mar; 8(6). doi: 10.21037/atm.2020.02.67.

[7]   He K, Zhan M, Li X, Wu L, Liang K, Ma R. A bibliometric of trends on acupuncture research about migraine: quantitative and qualitative analyses. Journal of Pain Research. 2022 Apr: 1257-69. doi: 10.2147/JPR.S361652.

[8]   Waltman L, Van Eck NJ, Noyons EC. A unified approach to mapping and clustering of bibliometric networks. Journal of Informetrics. 2010 Oct; 4(4): 629-35. doi: 10.1016/j.joi.2010.07.002.

[9]   Van Eck NJ and Waltman L. Citation-based clustering of publications using CitNetExplorer and VOSviewer. Scientometrics. 2017 May; 111: 1053-70. doi: 0.1007/s1

1192-017-2300-7.

[10] Jensen R and Stovner LJ. Epidemiology and comorbidity of headache. The Lancet Neurology. 2008 Apr; 7(4): 354-61. doi: 10.1016/S1474-4422(08)70 062-0.

[11] Diener HC, Kronfeld K, Boewing G, Lungenhausen M, Maier C, Molsberger A et al. Efficacy of acupuncture for the prophylaxis of migraine: a multicentre randomised controlled clinical trial. The Lancet Neurology. 2006 Apr; 5(4): 310-6. doi: 10.1016/S1474-4 422(06)70382-9.

[12] Lipton RB, Munjal S, Brand-Schieber E, Rapoport AM. DFN-02 (sumatriptan 10 mg with a permeation enhancer) nasal spray vs placebo in the acute treatment of migraine: A double-blind, placebo-controlled study. Headache: The Journal of Head and Face Pain. 2018 May; 58(5): 676-87. doi: 10.11 11/head.13309.

[13] Spindler BL and Ryan M. Medications approved for preventing migraine headaches. The American Journal of Medicine. 2020 Jun; 133(6): 664-7. doi: 10.1 016/j.amjmed.2020.01.031.

[14] Wells RE, O'Connell N, Pierce CR, Estave P, Penzien DB, Loder E et al. Effectiveness of mindfulness meditation vs headache education for adults with migraine: a randomized clinical trial. JAMA Internal Medicine. 2021 Mar; 181(3): 317-28. doi: 10.1001/jamain ternmed.2020.7090.

[15] Steiner TJ and Stovner LJ. Global epidemiology of migraine and its implications for public health and health policy. Nature Reviews Neurology. 2023 Feb; 19(2): 109-17. doi: 10.1038/s41582-022-00763-1.

[16] Safiri S, Pourfathi H, Eagan A, Mansournia MA, Khodayari MT, Sullman MJ et al. Global, regional, and national burden of migraine in 204 countries and territories, 1990 to 2019. Pain. 2022 Feb; 163(2): e293-309. doi: 10.1097/j.pain.0000000000002275.

[17] Stovner LJ, Nichols E, Steiner TJ, Abd-Allah F, Abdelalim A, Al-Raddadi RM et al. Global, regional, and national burden of migraine and tension-type headache, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet Neurology. 2018 Nov; 17(11): 954-76. doi: 10.1016/S1474 -4422(18)30322-3.

[18] Safiri S, Kolahi AA, Hoy D, Buchbinder R, Mansournia MA, Bettampadi D et al. Global, regional, and national burden of neck pain in the general population, 1990-2017: systematic analysis of the Global Burden of Disease Study 2017. BMJ. 2020 Mar; 368. doi: 10.1136/ bmj.m791.

[19] Tepper S, Ashina M, Reuter U, Brandes JL, Doležil D, Silberstein S et al. Safety and efficacy of erenumab for preventive treatment of chronic migraine: a randomised, double-blind, placebo-controlled phase 2 trial. The Lancet Neurology. 2017 Jun; 16(6): 425-34. doi: 10.1016/S1474-4422(17)30083-2.

[20] Stovner LJ, Hagen K, Jensen R, Katsarava Z, Lipton RB, Scher AI et al. The global burden of headache: a documentation of headache prevalence and disability worldwide. Cephalalgia. 2007 Mar; 27(3): 193-210. doi: 10.1111/j.1468-2982.2007.01288.x.

[21] Al-Salama ZT and Scott LJ. Sumatriptan nasal powder: a review in acute treatment of migraine. Drugs. 2016 Oct; 76: 1477-84. doi: 10.1007/s40265-016 -0641-9.

[22] Fala L. Tosymra (Sumatriptan) Nasal Spray Approved for the Acute Treatment of Migraine, with or without Aura. American Health and Drug Benefits 2019 Mar; 12.

[23] Silberstein S, Winner PK, McAllister PJ, Tepper SJ, Halker R, Mahmoud RA et al. Early Onset of Efficacy and Consistency of Response Across Multiple Migraine Attacks From the Randomized COMPASS Study: AVP-825 Breath Powered® Exhalation Delivery System (Sumatriptan Nasal Powder) vs Oral Sumatriptan. Headache: The Journal of Head and Face Pain. 2017 Jun; 57(6): 862-76. doi: 10.1111/head.13 105.

[24] Winner P, Rothner AD, Saper J, Nett R, Asgharnejad M, Laurenza A et al. A randomized, double-blind, placebo-controlled study of sumatriptan nasal spray in the treatment of acute migraine in adolescents. Pediatrics. 2000 Nov; 106(5): 989-97. doi: 10.1542/ped s.106.5.989.

[25] Charles A. The pathophysiology of migraine: implications for clinical management. The Lancet Neurology. 2018 Feb; 17(2): 174-82. doi: 10.1016/S1474-4422(17)30435-0.

[26] Djupesland PG, Flint A, Sheldrake CD, Docekal P. Nasal delivery of sumatriptan powder with a novel bi-directional device is highly effective in treating a single migraine attack. Headache. 2008; 48: LB-S70. doi:

[27] Hargreaves RJ and Shepheard SL. Pathophysiology of migraine—new insights. Canadian Journal of Neurological Sciences. 1999 Nov; 26(3): 12-9. doi: 10.1 017/S0317167100000147.

[28] Tepper SJ and Johnstone MR. Breath-powered sumatriptan dry nasal powder: an intranasal medication delivery system for acute treatment of migraine. Medical Devices: Evidence and Research. 2018 May: 147-56. doi: 10.2147/MDER.S130900.

[29] Tepper SJ, Rapoport AM, Sheftell FD. Mechanisms of action of the 5-HT1B/1D receptor agonists. Archives

of Neurology. 2002 Jul; 59(7): 1084-8. doi: 10.1001/arc hneur.59.7.1084.

[30] Zhao T, Guo J, Song Y, Chen H, Sun M, Chen *et al*. A bibliometric analysis of research trends of acupuncture therapy in the treatment of migraine from 2000 to 2020. Journal of Pain Research. 2021 May: 1399-414. doi: 10.2147/JPR.S306594.

[31] Zhao Y and Li WT. Knowledge Mapping of Migraine: A Bibliometric Analysis (2000-2019). Research Square. 2021 Jan. doi: 10.21203/rs.3.rs-142994/v1.