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Research Article

# The Use of Botulinum Toxin in Temporomandibular Disorders: A Bibliometric Study

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**Abstract**

**Aim:** Botulinum toxin injections are an important issue that is widely used, and many scientific articles have been published in patients with temporomandibular joint disorders (TMD). The aim of this study was to evaluate the status of activity the use of botulinum toxin in TMD during the period 1978-2023.

**Material and Methods:** Articles published until April 1, 2023 were searched in Web of Science. The top 50 articles with the highest citations and suitable for the study topic were selected among the totally 299 articles.

**Results:** Even though the articles published about botulinum injection in TMD have increased in recent years, there is no regular increase over the years. The most cited article was published in 2015 and the number of citations in Web of Science was 194. While there was no difference in productivity among the authors, the most productive country was the United States. Türkiye was found to be above the average among other countries.

**Conclusion:** This bibliometric study of the top 50 most-cited papers in Web of Science the use of botulinum toxin in TMD recognized a quantitative and qualitative analysis of this very favorable research field.

**Keywords:** Botulinum toxin, bibliometrics, temporomandibular disorders

## INTRODUCTION

Temporomandibular joint disorders (TMD) are a complex disorder involving muscles and bones with an incidence of approximately 15% in the population. According to the American Academy of Orofacial Pain, TMD are divided into two groups. These are the myogenous type, which is related to the masticatory muscles, and the arthrogenous type, which is related to the temporomandibular joint. In both types, the aim is to eliminate the symptoms of the patients and to ensure that mandibular movements occur within physiological limits (1-3).

Botulinum toxin was discovered by Justinus Kerner in 1817 it was used for the treatment of strabismus in the 1980s, for the treatment of hemifacial spasm in the 1990s, and for cosmetic purposes after the beginning of the 2000s. In the following years, its use for cosmetic purposes in the facial area has increased rapidly. The patients mostly complain of orofacial pain in TMD. Studies have shown that botulinum toxin injections are more effective than placebo in muscular dysfunction disorders that cause TMD (4-8).

Bibliometrics is a set of literature reviews of articles published on related topics to show areas such as the historical process, the country of publication and the authors who published them. It aims to measure the impact of an article based on the number of citations it has received, which is generally accepted as one of the measures of the importance of the article. Bibliometric analysis shows current approaches to the subject, as well

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as the relationship between authors and the impact of the field and guides current research (9-12).

TMD are an important area in dentistry. Treatments or deficiencies in this field have always been the subject of research for dentistry. The lack of a bibliometric analysis on botulinum toxin injections in TMD may be a deficiency for the development and interaction of this field. Considering this deficiency, the aim of this study is to evaluate the development and status of scientific activity in the relevant field between 1978 and 2023 through bibliometric analysis of scientific articles and to shed light on current research. The aim of this study is to conduct a bibliometric analysis of the articles published on botulinum injection used in TMD.

## MATERIAL AND METHOD

The characteristics of the publications in the scientific literature on the use of botox in TMD, such as authors, study design, study years and number of citations are presented in the form of bibliometric analysis.

Keywords were created to determine the selection criteria for this bibliometric analysis. When selecting search words related to the topic, keywords were selected to select the most broadly relevant articles. The selected free keywords, synonyms and indexing for appropriate topics were identified from https://www.ncbi.nlm.nih.gov/mesh.

When synonyms for TMD and Botox were examined, common words were identified and searched by typing in Web of Science (Clarivate Analytics, 1500 Spring Garden St, Philadelphia, United States of America).

Articles published until April 1, 2023, were searched with the formulation (ALL=(temporomandibular)) AND ALL=(botulinum) in the Web of Science (WOS).

The first 50 articles with the highest number of citations and appropriate to the study topic were selected of the 299 articles that emerged because of the search. The selected articles were transferred to an excel file to create a draft.

## RESULTS

Fifty of the first 78 most highly cited articles on the subject published in WOS until April 1, 2023, were selected. The most cited article was published in 2015 and the number of citations in WOS was 194. The least cited article was published in 2017 and the number of citations was 21. The average number of citations of the top 50 most highly cited articles was 52.68. The number of citations and names of the articles are shown in Table 1.

**Table 1. The 50 most-cited papers on the use of botulinum toxin in temporomandibular disorders**

| Rank | Paper | Number of Citations (WOS) | All databases' citations | Paper type |
|---|---|---|---|---|
| 1 | Gauer RL, Semidey MJ. Diagnosis and treatment of temporomandibular disorders. Am Fam Physician. 2015 Mar 15;91(6):378-86. | 194 | 211 | Article |
| 2 | Romero-Reyes M, Uyanik JM. Orofacial pain management: current perspectives. J Pain Res. 2014 Feb 21;7:99-115. | 135 | 169 | Review |
| 3 | Blitzer A, Sulica L. Botulinum toxin: basic science and clinical uses in otolaryngology. Laryngoscope. 2001 Feb;111(2):218-26. | 127 | 141 | Article |
| 4 | Wieckiewicz M, Boening K, Wiland P, Shiau YY, Paradowska-Stolarz A. Reported concepts for the treatment modalities and pain management of temporomandibular disorders. J Headache Pain. 2015;16:106. | 122 | 133 | Review |
| 5 | Guarda-Nardini L, Manfredini D, Salamone M, Salmaso L, Tonello S, Ferronato G. Efficacy of botulinum toxin in treating myofascial pain in bruxers: a controlled placebo pilot study. Cranio. 2008 Apr;26(2):126-35. | 102 | 114 | Article |
| 6 | Durham J, Newton-John TR, Zakrzewska JM. Temporomandibular disorders. BMJ. 2015 Mar 12;350:h1154. | 81 | 85 | Review |
| 7 | Ernberg M, Hedenberg-Magnusson B, List T, Svensson P. Efficacy of botulinum toxin type A for treatment of persistent myofascial TMD pain: a randomized, controlled, double-blind multicenter study. Pain. 2011 Sep;152(9):1988-1996. | 81 | 91 | Article |
| 8 | Calixtre LB, Moreira RF, Franchini GH, Alburquerque-Sendín F, Oliveira AB. Manual therapy for the management of pain and limited range of motion in subjects with signs and symptoms of temporomandibular disorder: a systematic review of randomised controlled trials. J Oral Rehabil. 2015 Nov;42(11):847-61. | 78 | 83 | Review |
| 9 | Kurtoglu C, Gur OH, Kurkcu M, Sertdemir Y, Guler-Uysal F, Uysal H. Effect of botulinum toxin-A in myofascial pain patients with or without functional disc displacement. J Oral Maxillofac Surg. 2008 Aug;66(8):1644-51. | 71 | 79 | Article |

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| **10** | Freund B, Schwartz M, Symington JM. Botulinum toxin: new treatment for temporomandibular disorders. Br J Oral Maxillofac Surg. 2000 Oct;38(5):466-71. | 70 | 72 | Article |
| **11** | Borodic GE, Acquadro MA. The use of botulinum toxin for the treatment of chronic facial pain. J Pain. 2002 Feb;3(1):21-7. | 68 | 76 | Article |
| **12** | Guarda-Nardini L, Stecco A, Stecco C, Masiero S, Manfredini D. Myofascial pain of the jaw muscles: comparison of short-term effectiveness of botulinum toxin injections and fascial manipulation technique. Cranio. 2012 Apr;30(2):95-102. | 67 | 70 | Article |
| **13** | Schwartz M, Freund B. Treatment of temporomandibular disorders with botulinum toxin. Clin J Pain. 2002 Nov-Dec;18(6 Suppl):S198-203. | 64 | 65 | Article |
| **14** | Mujakperuo HR, Watson M, Morrison R, Macfarlane TV. Pharmacological interventions for pain in patients with temporomandibular disorders. Cochrane Database Syst Rev. 2010 Oct 6;(10):CD004715. | 62 | 64 | Review |
| **15** | Sidebottom AJ. Current thinking in temporomandibular joint management. Br J Oral Maxillofac Surg. 2009 Mar;47(2):91-4. | 62 | 67 | Article |
| **16** | Nixdorf DR, Heo G, Major PW. Randomized controlled trial of botulinum toxin A for chronic myogenous orofacial pain. Pain. 2002 Oct;99(3):465-473. | 61 | 66 | Article |
| **17** | Freund B, Schwartz M, Symington JM. The use of botulinum toxin for the treatment of temporomandibular disorders: preliminary findings. J Oral Maxillofac Surg. 1999 Aug;57(8):916-20; discussion 920-1. | 56 | 60 | Article |
| **18** | Ivanhoe CB, Lai JM, Francisco GE. Bruxism after brain injury: successful treatment with botulinum toxin-A. Arch Phys Med Rehabil. 1997 Nov;78(11):1272-3. | 56 | 59 | Article |
| **19** | Raphael KG, Janal MN, Sirois DA, Dubrovsky B, Wigren PE, Klausner JJ, Krieger AC, Lavigne GJ. Masticatory muscle sleep background electromyographic activity is elevated in myofascial temporomandibular disorder patients. J Oral Rehabil. 2013 Dec;40(12):883-91. | 54 | 56 | Article |
| **20** | De Boever JA, Nilner M, Orthlieb JD, Steenks MH; Educational Committee of the European Academy of Craniomandibular Disorders. Recommendations by the EACD for examination, diagnosis, and management of patients with temporomandibular disorders and orofacial pain by the general dental practitioner. J Orofac Pain. 2008 Summer;22(3):268-78. | 51 | 54 | Review |
| **21** | Bakke M, Møller E, Werdelin LM, Dalager T, Kitai N, Kreiborg S. Treatment of severe temporomandibular joint clicking with botulinum toxin in the lateral pterygoid muscle in two cases of anterior disc displacement. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005 Dec;100(6):693-700. | 46 | 51 | Article |
| **22** | Lacković Z, Filipović B, Matak I, Helyes Z. Activity of botulinum toxin type A in cranial dura: implications for treatment of migraine and other headaches. Br J Pharmacol. 2016 Jan;173(2):279-91. | 45 | 47 | Article |
| **23** | Beddis H, Pemberton M, Davies S. Sleep bruxism: an overview for clinicians. Br Dent J. 2018 Sep 28;225(6):497-501. | 43 | 46 | Article |
| **24** | Song PC, Schwartz J, Blitzer A. The emerging role of botulinum toxin in the treatment of temporomandibular disorders. Oral Dis. 2007 May;13(3):253-60. | 43 | 45 | Review |
| **25** | Daelen B, Thorwirth V, Koch A. Treatment of recurrent dislocation of the temporomandibular joint with type A botulinum toxin. Int J Oral Maxillofac Surg. 1997 Dec;26(6):458-60. | 43 | 43 | Article |
| **26** | Fu KY, Chen HM, Sun ZP, Zhang ZK, Ma XC. Long-term efficacy of botulinum toxin type A for the treatment of habitual dislocation of the temporomandibular joint. Br J Oral Maxillofac Surg. 2010 Jun;48(4):281-4. | 40 | 43 | Article |
| **27** | Ihde SK, Konstantinovic VS. The therapeutic use of botulinum toxin in cervical and maxillofacial conditions: an evidence-based review. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007 Aug;104(2):e1-11. | 40 | 42 | Review |
| **28** | Shim YJ, Lee MK, Kato T, Park HU, Heo K, Kim ST. Effects of botulinum toxin on jaw motor events during sleep in sleep bruxism patients: a polysomnographic evaluation. J Clin Sleep Med. 2014 Mar 15;10(3):291-8. | 39 | 44 | Article |

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| **29** | Majid OW. Clinical use of botulinum toxins in oral and maxillofacial surgery. Int J Oral Maxillofac Surg. 2010 Mar;39(3):197-207. | 36 | 37 | Review |
| **30** | Liddell A, Perez DE. Temporomandibular joint dislocation. Oral Maxillofac Surg Clin North Am. 2015 Feb;27(1):125-36. | 35 | 37 | Article |
| **31** | Pihut M, Ferendiuk E, Szewczyk M, Kasprzyk K, Wieckiewicz M. The efficiency of botulinum toxin type A for the treatment of masseter muscle pain in patients with temporomandibular joint dysfunction and tension-type headache. J Headache Pain. 2016;17:29. | 34 | 39 | Article |
| **32** | De la Torre Canales G, Câmara-Souza MB, do Amaral CF, Garcia RC, Manfredini D. Is there enough evidence to use botulinum toxin injections for bruxism management? A systematic literature review. Clin Oral Investig. 2017 Apr;21(3):727-734. | 33 | 36 | Review |
| **33** | Chen YW, Chiu YW, Chen CY, Chuang SK. Botulinum toxin therapy for temporomandibular joint disorders: a systematic review of randomized controlled trials. Int J Oral Maxillofac Surg. 2015 Aug;44(8):1018-26. | 33 | 36 | Review |
| **34** | Raphael KG, Tadinada A, Bradshaw JM, Janal MN, Sirois DA, Chan KC, Lurie AG. Osteopenic consequences of botulinum toxin injections in the masticatory muscles: a pilot study. J Oral Rehabil. 2014 Aug;41(8):555-63. | 33 | 34 | Article |
| **35** | Martínez-Pérez D, García Ruiz-Espiga P. Recurrent temporomandibular joint dislocation treated with botulinum toxin: report of 3 cases. J Oral Maxillofac Surg. 2004 Feb;62(2):244-6. | 33 | 37 | Case Report |
| **36** | Sycha T, Kranz G, Auff E, Schnider P. Botulinum toxin in the treatment of rare head and neck pain syndromes: a systematic review of the literature. J Neurol. 2004 Feb;251 Suppl 1:I19-30. | 31 | 33 | Article |
| **37** | Freund BJ, Schwartz M. Relief of tension-type headache symptoms in subjects with temporomandibular disorders treated with botulinum toxin-A. Headache. 2002 Nov-Dec;42(10):1033-7. | 31 | 35 | Article |
| **38** | Moore AP, Wood GD. Medical treatment of recurrent temporomandibular joint dislocation using botulinum toxin A. Br Dent J. 1997 Dec 13-27;183(11-12):415-7. | 30 | 32 | Article |
| **39** | Monroy PG, da Fonseca MA. The use of botulinum toxin-a in the treatment of severe bruxism in a patient with autism: a case report. Spec Care Dentist. 2006 Jan-Feb;26(1):37-9. | 29 | 31 | Article |
| **40** | Ghurye S, McMillan R. Orofacial pain - an update on diagnosis and management. Br Dent J. 2017 Dec;223(9):639-647. | 28 | 31 | Article |
| **41** | Awan KH. The therapeutic usage of botulinum toxin (Botox) in non-cosmetic head and neck conditions - An evidence based review. Saudi Pharm J. 2017 Jan;25(1):18-24. | 28 | 29 | Review |
| **42** | Santana-Mora U, López-Ratón M, Mora MJ, Cadarso-Suárez C, López-Cedrún J, Santana-Penín U. Surface raw electromyography has a moderate discriminatory capacity for differentiating between healthy individuals and those with TMD: a diagnostic study. J Electromyogr Kinesiol. 2014 Jun;24(3):332-40. | 27 | 29 | Article |
| **43** | Zhang LD, Liu Q, Zou DR, Yu LF. Occlusal force characteristics of masseteric muscles after intramuscular injection of botulinum toxin A(BTX - A)for treatment of temporomandibular disorder. Br J Oral Maxillofac Surg. 2016 Sep;54(7):736-40. | 26 | 28 | Article |
| **44** | Güven O. Management of chronic recurrent temporomandibular joint dislocations: a retrospective study. J Craniomaxillofac Surg. 2009 Jan;37(1):24-9. | 26 | 27 | Article |
| **45** | Mor N, Tang C, Blitzer A. Temporomandibular Myofacial Pain Treated with Botulinum Toxin Injection. Toxins (Basel). 2015 Jul 24;7(8):2791-800. | 25 | 32 | Review |
| **46** | Vázquez Bouso O, Forteza González G, Mommsen J, Grau VG, Rodríguez Fernández J, Mateos Micas M. Neurogenic temporomandibular joint dislocation treated with botulinum toxin: report of 4 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010 Mar;109(3):e33-7. | 25 | 25 | Article |
| **47** | Almukhtar RM, Fabi SG. The Masseter Muscle and Its Role in Facial Contouring, Aging, and Quality of Life: A Literature Review. Plast Reconstr Surg. 2019 Jan;143(1):39e-48e. | 24 | 25 | Review |

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| 48 | Tinastepe N, Küçük BB, Oral K. Botulinum toxin for the treatment of bruxism. Cranio. 2015 Oct;33(4):291-8. | 23 | 28 | Review |
| 49 | Abouelhuda AM, Khalifa AK, Kim YK, Hegazy SA. Non-invasive different modalities of treatment for temporomandibular disorders: review of literature. J Korean Assoc Oral Maxillofac Surg. 2018 Apr;44(2):43-51. | 22 | 27 | Review |
| 50 | Patel AA, Lerner MZ, Blitzer A. IncobotulinumtoxinA Injection for Temporomandibular Joint Disorder. Ann Otol Rhinol Laryngol. 2017 Apr;126(4):328-333. | 21 | 21 | Article |

The journal with the highest JCR®IF-2021 rate of published articles is BMJ-British Medical Journal with 96.216. Of the top 50 most cited articles, 37.5% of the journals are Q1 status journals, and it was determined as the group with the highest status with 12 of the 32 journals published. The journals and JCR®IF-2021 of the publications are shown in Table 2.

The top three most cited articles were written in the United States and the most cited authors was identified as Gauer and Semidey. No more than one article by an institution or author was identified in the top 50 most cited articles. Author information and institutional information are shown in Table 3.

While the United States is the country with the highest number of 50 articles, the fact that the second highest number is the United Kingdom shows that the publications do not belong to a continent. A total of 21 different countries were included in the study. Distribution of the countries where articles were published is shown in Figure 1.

**Table 2. The journals and JCR®IF-2021 of the publications**

| Journal Name | Paper Numbers | JCR® IF2021 | Quartile Category |
|---|---|---|---|
| AMERICAN FAMILY PHYSICIAN | 1 | 5.305 | Q1 |
| ANNALS OF OTOLOGY RHINOLOGY AND LARYNGOLOGY | 1 | 1.973 | Q3 |
| ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION | 1 | 4.06 | Q1 |
| BMJ-BRITISH MEDICAL JOURNAL | 1 | 96.216 | Q1 |
| BRITISH DENTAL JOURNAL | 3 | 2.727 | Q3 |
| BRITISH JOURNAL OF ORAL & MAXILLOFACIAL SURGERY | 4 | 2.018 | Q3 |
| BRITISH JOURNAL OF PHARMACOLOGY | 1 | 9.473 | Q1 |
| CLINICAL JOURNAL OF PAIN | 1 | 3.423 | Q2 |
| CLINICAL ORAL INVESTIGATIONS | 1 | 3.607 | Q2 |
| COCHRANE DATABASE OF SYSTEMATIC REVIEWS | 1 | 11.874 | Q1 |
| CRANIO-THE JOURNAL OF CRANIOMANDIBULAR & SLEEP PRACTICE | 3 | 1.67 | Q4 |
| HEADACHE | 1 | 5.311 | Q1 |
| INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY | 3 | 2.986 | Q2 |
| JOURNAL OF CLINICAL SLEEP MEDICINE | 1 | 4.324 | Q2 |
| JOURNAL OF CRANIO-MAXILLOFACIAL SURGERY | 1 | 3.192 | Q2 |
| JOURNAL OF ELECTROMYOGRAPHY AND KINESIOLOGY | 1 | 2.641 | Q2 |
| JOURNAL OF HEADACHE AND PAIN | 2 | 8.588 | Q1 |
| JOURNAL OF NEUROLOGY | 1 | 6.682 | Q1 |
| JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY | 3 | 2.136 | Q4 |
| JOURNAL OF ORAL REHABILITATION | 3 | 3.558 | Q2 |
| JOURNAL OF OROFACIAL PAIN | 1 | 2.824 | Q1 |
| JOURNAL OF PAIN | 1 | 5.383 | Q1 |
| JOURNAL OF PAIN RESEARCH | 1 | 2.832 | Q3 |
| JOURNAL OF THE KOREAN ASSOCIATION OF ORAL AND MAXILLOFACIAL SURGEONS (Emerging Sources Citation Index) | 1 | - | - |
| LARYNGOSCOPE | 1 | 2.97 | Q2 |
| ORAL AND MAXILLOFACIAL SURGERY CLINICS OF NORTH AMERICA | 1 | 3.13 | Q2 |
| ORAL DISEASES | 1 | 4.068 | Q1 |
| ORAL SURGERY ORAL MEDICINE ORAL PATHOLOGY ORAL RADIOLOGY AND ENDODONTOLOGY | 3 | 1.457 (year 2011) | Q2 (year 2011) |
| PAIN | 2 | 7.926 | Q1 |
| PLASTIC AND RECONSTRUCTIVE SURGERY | 1 | 5.169 | Q1 |
| SAUDI PHARMACEUTICAL JOURNAL | 1 | 4.562 | Q2 |
| SPECIAL CARE IN DENTISTRY (Emerging Sources Citation Index) | 1 | - | - |
| TOXINS | 1 | 5.075 | Q3 |

**Table 3. Institutes and countries of the most cited authors**

| First Author | Institution | Country | Number of citations |
|---|---|---|---|
| **Gauer, RL** | Womack Army Medical Center | US | 194 |
| **Romero-Reyes, M** | New York University College of Dentistry | US | 135 |
| **Blitzer, A** | St. Luke's-Roosevelt Hospital Center | US | 127 |
| **Wieckiewicz, M** | Wroclaw Medical University | Poland | 122 |
| **Guarda-Nardini, L** | University of Padova | Italy | 102 |
| **Durham, J** | Newcastle University | UK | 81 |
| **Ernberg, M** | Karolinska Institutet | Sweden | 81 |
| **Calixtre, LB** | ederal University of São Carlos | Brazil | 78 |
| **Kurtoglu, C** | Cukurova University | Türkiye | 71 |
| **Freund, B** | University of Toronto | Canada | 70 |

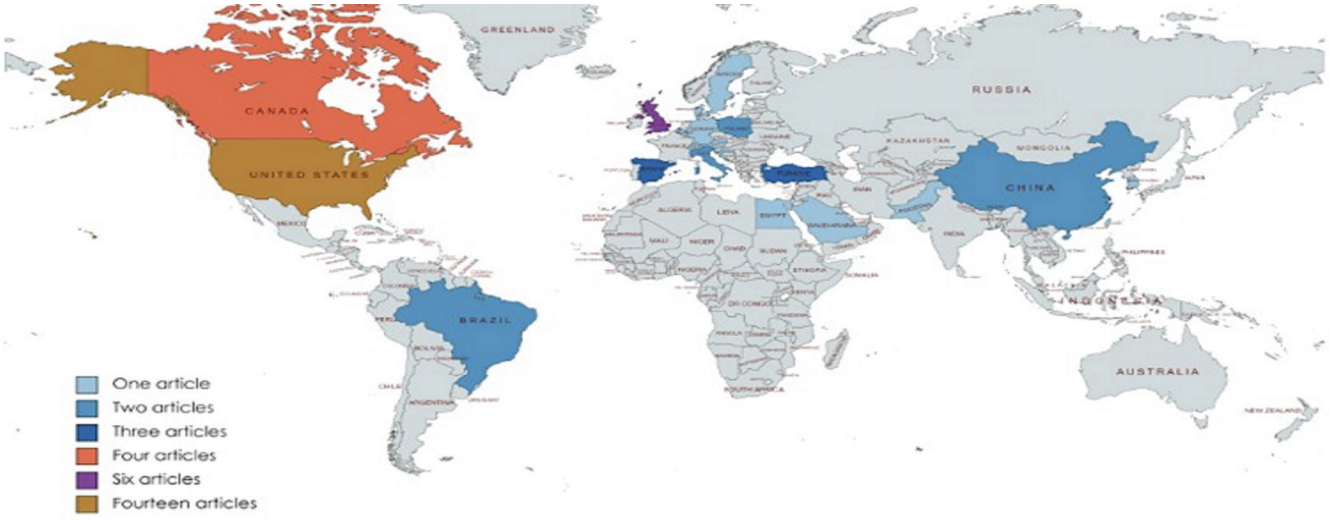


**Figure 1.** Contribution of each country in the distribution of the use of Botulinum Toxin in Temporomandibular Disorders articles

## DISCUSSION

Since bibliometric studies on the use of botulinum toxin in TMD have not been identified in the literature and to fill the gap in this field, this study aims to evaluate the scientific studies conducted between 1978-2023. This study was conducted by selecting search words ("temporomandibular and "botulinum") to find and evaluate relevant articles in the WOS database.

The application of botulinum toxin for aesthetic purposes after the 2000s has intensified the studies in this field. When we look at the years of the 50 most cited articles about botulinum injection in TMD, it is seen that there has been an increase in recent years. The year with the highest number of publications was 2015. At the same time, the most cited Gauer and Semidey's (1) article was published in 2015.

When we evaluate the countries of the authors, it is seen that the United States holds the majority on this subject. 14 of the top 50 articles were published in the United States, followed by 6 articles from the United Kingdom. The United States is not only numerically productive, but also the country with the top 3 most cited articles. Türkiye ranked above the average among the 21 countries with total publications with 3 articles published.

While first 40 articles evaluated were identified as articles in the Science Citation Index-Expanded database except 1, the article published by Monroy and da Fonseca (13) was identified as Emerging Sources Citation Index as a category in the journal Special Care in Dentistry. Most of the published studies were identified as 66% research articles, 1 was identified as 2% case report and 32% as review articles.

It is a natural process that the citation rates of articles increase as the period of publication increases. However, this literature review shows that the most cited article was published in 2015 with 194 citations, while an article published in 1997 received 30 citations. It can be said that many issues such as the subject matter of the articles and the methods of their production affect the citation rates.

## CONCLUSION

Although the number of articles published in the field of botulinum use in TMD has increased over the years, an order cannot be mentioned. Research articles are considered to receive more citations than other types of articles. The use of botulinum in TMD can be published by many journals in the Q1-Q2 WOS category.

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***Conflict of Interest:*** *The authors have no conflicts of interest to declare.*

***Ethical approval:*** *The article does not require ethics committee permission.*

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9. Tarazona-Alvarez B, Lucas-Dominguez R, Paredes-Gallardo V, et al. A bibliometric analysis of scientific production in the field of lingual orthodontics. Head Face Med. 2019;15:1-10.
10. Jacimovic J, Jakovljevic A, Nagendrababu V, et al. A bibliometric analysis of the dental scientific literature on covid-19. Clin Oral Investig. 2021;25:6171-83.
11. Paschoal MAB, Belém FV, Clementino LC, Martins PA. Application of lasers in dentistry: a bibliometric study of the top 100 most-cited papers. Braz Oral Res. 2022;36:e104.
12. Balel Y. Bibliometric analysis of international publication trends in impacted third molar surgery research (2000-2020). Br J Oral Maxillofac Surg. 2021;59:1220-6.
13. Monroy PG, da Fonseca MA. The use of botulinum toxin-a in the treatment of severe bruxism in a patient with autism: a case report. Spec Care in Dentist. 2006;26:37-9.