



COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF CARBAMAZEPINE AND GABAPENTIN IN THE MANAGEMENT OF TRIGEMINAL NEURALGIA

Aswad Ahmed¹, Fida Baloch², Shahzaman Memon³, Wajid Ali Rajper⁴, Naveed Irfan⁵, Muzaffar Qayum Khan Ghauri⁶

Abstract

Objective: This study's purpose was to evaluate the effectiveness of carbamazepine and gabapentin for the treatment of "Trigeminal Neuralgia". **Study design:** A prospective randomized clinical trial. **Study period:** Six-month study was conducted from 15 March 2023 to 15 September 2023. **Study settings:** The study was conducted in the "Department of Oral Medicine", Faculty of Dentistry and Allied Sciences, Isra University Hyderabad Sindh. **Material and method:** A total of 60 clinically diagnosed patients of Trigeminal Neuralgia were enrolled after meeting inclusive criteria. Patients were diagnosed by clinical examination and a detailed history of pain. Doubtful patients were evaluated by radiographic examination. The patient's demographical features were recorded in the MS Excel worksheet (2013). Patients were randomly separated into two groups, A and B. Group A patients were treated with carbamazepine whereas Group B patients received Gabapentin. All the patients were advised to follow up on the "7th day", "15th day", and 1-month period to evaluate the drug response. Data were analyzed through the SPSS 20 version. **Results:** A total of 60 trigeminal neuralgia patients were enrolled, 23 (38.3%) out of 60 were male and 37 (61.7%) were female patients. The average age of male participants was 53.61 years and the mean age of female participants was 52.12 years. 31(51.7%). A total of 13 male and 21 female patients had pain in the right side of the face, whereas 10 males and 16 females had pain in the left side of the face. TN was most commonly found in the Maxillary region as compared to the Mandibular area. The study reported an important pain decrease in Group B as likened to Group A. **Conclusion:** In our research study it was concluded that both drug carbamazepine and gabapentin can be used to treat Trigeminal neuralgia patients, but in this research study we found Gabapentin can be proven effective when compared to carbamazepine in pain relief and management of TN. **Keywords:** "Trigeminal Neuralgia", Gabapentin, Carbamazepine, pain management

1. Assistant professor, BDS, MDS Oral and Maxillofacial Surgery,
2. Professor BDS, MDS Oral and Maxillofacial Surgery,
3. Assistant Professor BDS, MSc Oral Pathology, , Mirpurkhas.
4. Senior Registrar BDS, M.Sc (Oral & Maxillofacial Surgery) Department Of Oral Medicine, Bibi Aseefa Dental Collage Larkana
5. Associate Professor, BDS, MSC (Community and Preventive Dentistry)
6. Assistant Professor, Mirpurkhas BDS, MCPS (Orthodontics), MPH

Correspondence Author¹: Shahzaman Memon, Email: dr.shahzamanmemon@gmail.com. Contac: 03343111096

How To Cite This Article: Ahmed A¹, Baloch F², Memon S³, Rajper WA⁴, Irfan N⁵, Ghauri MQK⁶ **COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF CARBAMAZEPINE AND GABAPENTIN IN THE MANAGEMENT OF TRIGEMINAL NEURALGIA.**

JPUMHS;2023;13:04,67-72. <http://doi.org/10.46536/jpumhs/2023/13.04.473>

Received Nov 07,2023, Accepted On 15 December 2023, Published On 31 December 2023.

INTRODUCTION:

"Trigeminal neuralgia" (TN) is a common facial neurological complaint that affects the "trigeminal nerve"¹. "Trigeminal neuralgia" was described by the committee of the

"International Association for the Study of Headache" as unilateral" facial pain syndrome, which is considered severe, sudden, sharp, and acute pain. It can also occur in one or more

JPUMHS divisions of the “trigeminal nerve”². The pain of TN is usually activated by nonnoxious stimuli like yawning, washing of face, speaking, brushing teeth, and eating or it may be spontaneous with pain-free intervals.³ The etiology of trigeminal neuralgia is still a topic of discussion, however, researchers reported many different etiology regarding TN, but recent research describes it as compression of the trigeminal nerve by vessels, tumors in the posterior fossa and change in the concentration (Na+) and ionic inductance after nerve damage.⁴ Trigeminal neuralgia symptoms can sometimes be mistaken for dental problems due to the nature of the pain and its location, therefore tooth extraction is a common practice by dentists. Therefore proper history of pain and exact etiology is important for the diagnosis of trigeminal neuralgia.

The incidence of TN is reported as 0.7-27 per 100,000 approximately.⁵ Maxillary region and right side of the face is more usually precious sides are reported frequently.⁶ According to numerous studies, it typically affects women more frequently than men and usually happens in the fourth or sixth decade of life.⁷ Proper diagnosis of TN is major task for the dental physician before starting treatment, the “diagnostic clinical criteria abridged” by “International Headache Society” (IHS) suggests at least four of these must be current to make the diagnosis.⁸

1. **Character:** Shooting, sharp electric shock-like, , and insincere. 2. **Severity:** Moderate to severe. 3. **Duration:** Each incident of pain lasts no more than 2 minutes, numerous incidents during the day. 4. **Periodicity:** There are pain-free stretches of time, sometimes lasting several weeks or months in between episodes. 5. **Site:** Circulation of trigeminal nerve area. Mostly independent. 6. **Radiation:** Within the trigeminal nerve area or beyond. 7. **Provocation feature:** Light touch such as talking washing eating, 8. **Relieving factor:** Often sleep, anticonvulsant drugs. ⁹.

Associated features: Trigger area, weight loss, poor excellence of life, and unhappiness

The management of trigeminal neuralgia is commonly done with pharmacological drugs including lamotrigine, baclofen, topiramate, pregabalin, botulinum toxin-A, phenytoin levetiracetam, and capsaicin⁹, whereas the

surgical treatment is a considerable option in case of failure of pharmacological drugs. Carbamazepine is well known as the first line of therapy for the treatment of trigeminal neuralgia.¹⁰ Along with this medical professionals always struggle to find a specific drug that effect specifically with lesser side effects to achieve better therapeutic approaches.

Carbamazepine also known as Tegretol, is an anticonvulsant and analgesic medicine used to control seizures and alleviate pain caused by trigeminal neuralgia¹¹ The FDA first approved carbamazepine in 1965.¹² The voltage-gated sodium channel is kept inactive by carbamazepine throughout its action. Besides carbamazepine, Gabapentin a versatile and widely prescribed medication, has carved its niche in the medical world, transcending its initial purpose as an antiepileptic drug.¹³ Originally developed to manage seizures, it has found utility in treating a diverse array of medical conditions, from chronic pain to mood disorders. Gabapentin's unique mechanism of action, which involves modulating the release of certain neurotransmitters in the brain, caught the attention of medical professionals seeking alternatives for patients facing a myriad of neurological and neuropathic challenges.¹⁴ Carbamazepine and gabapentin both drugs are both commonly prescribed for the managing of “trigeminal neuralgia”, therefore the medical trial was showed to compare the efficiency of “Carbamazepine and gabapentin” in the management of “trigeminal neuralgia”

MATERIALS AND METHODS:

This six-month comparative “prospective randomized clinical” experimental was carried out from 15 March 2023 to 15 September 2023. The learning was directed in the “Department of oral medicine”, faculty of Dentistry and Allied Sciences, Isra University Hyderabad Sindh. The study protocols were revised and permitted by the ethical and review commission Isra University Hyderabad.

A total of 60 clinically diagnosed patients of trigeminal neuralgia were enrolled by the Consecutive nonprobability sampling technique. The diagnosis of trigeminal neuralgia patients was done by following International Headache Society (IHS) guidelines. The patient’s age, gender, medical

JPUMHS

history, side of the face, and region were recorded during clinical examination. The patients with reported severe systemic illness, any odontogenic pain, and temporomandibular disorders were excluded from the study. People who were unwilling to attend scheduled follow-up appointments were also eliminated.

All 60 patients were randomly divided into Group A (n=30) and Group B (n=30), trigeminal neuralgia patients of Group A were treated with Carbamazepine 200mg-600mg (product: Tegral™ “Novartis pharma Pakistan LTD” 200-600mg/day). Whereas group B was

Results:

The study enrolled 60 Trigeminal Neuralgia (TN) patients in total; out of those, 23 (38.3%) were men, and 37 (61.7%) were women.

Gender	Frequency	Percentage	Mean Age	P-value
Male	23	38.3%	53.61	<0.001
Female	37	61.7%	52.12	

Side of face	Male	Female	Total	Percentage	P-value
Left	10	16	26	43.3%	<0.05
Right	13	21	34	56.7%	
Bilateral	0	0	0	0%	
Location of pain					
Maxillary area	14	22	36	60%	
Mandibular area	09	15	24	40%	

The mean vas score of 8.231 ± 0.817 was recorded in group A and 7.921 ± 0.231 was in group B on the first visit (Baseline/day-0). The mean \ VAS score after the 7th day of treatment in group A was 5.831 ± 0.932 and in group B was 4.1251 ± 1.071 , after “15 days mean of VAS

treated with gabapentin 200-600mg (product: Neoab™ “ Hinton Pharma Pvt. LTD” 600mg/day). The drug dosage was slightly increased when the drug was not showing any response. VAS score of pain was recorded on baseline (day-0), 7th, 15th, and 30th days (one month) after receiving treatment. All participants were advised to appear on follow-up days.

The data was examined by using SPSS 20. Percentage, frequency, mean, standard deviation, mean difference, T-test, and P value was determined to evaluate research data.

Patients' average ages were 52.12 years for women and 53.61 years for men. (as shown in table-I)

Involvement of the Side of the face was recorded in patients of both genders. A total of 13 male and 21 female patients (56.7%) had agony in the right side of the face, whereas 10 males and 16 females (43.3%) had pain in the left side of the appearance. The study found maxillary region is most common as compared to the mandibular region, a total of 14 males and 22 females had the maxillary region affected (60% of both gender) while 09 male and 14 female patients had pain in the mandibular area (40% of both gender) shown in table-II

in group A was 4.251 ± 1.026 and in group B was 3.063 ± 1.2790 . whereas during the last visit of the clinical trial, the cruel of VAS after 30 days in group A was 3.752 ± 1.0135 and in group B was 2.9331 ± 1.2845 . The study found the mean difference in pain reduction mentioned in Table No:III, therefore the results found significant pain reduction in both groups, but gabapentin was observed more effective as compared to Carbamazepine for the pain reduction in trigeminal neuralgia patients. medications to manage the pain, including anticonvulsant drugs like carbamazepine or gabapentin. In severe cases, surgical options may be considered.

This current research trial enrolled 60 patients of Trigeminal Neuralgia (TN). 23 (38.3%) out of 60 were male and 37 (61.7%) were female patients, the ratio of female patients was high as compared to male patients, as much other research and literature also found increased female ratio, results observed significant ($p < 0.001$) according to gender, the results are

Table-III Comparison of pain reduction in Group A and Group B during follow-up								
Follow up Period	Group A				Group B			
	Mean	Mean difference	T-test	p-value	Mean	Mean difference	T-test	p-value
7 th day	5.831	3.400	14.999	< 0.005	4.1251	4.106	23.610	< 0.0001
15 th day	4.251	3.979	16.613	< 0.005	3.063	5.168	18.651	< 0.0001
30 th day	3.7527	4.478	18.842	< 0.005	2.9331	5.298	19.061	<0.0001

study *Lee et al (KJP-2015)*, it was evident that women outnumbered men, with a ratio of

2.14:1. each gender. Male patients were 53.61 years old on average, whereas female patients were 52.12 years old on average (<0.05).¹⁷

In our retrospective study, a significant pain reduction was observed in every follow-up, and the pain was measured by VAS at every visit. The mean pain VAS score was 8.231 ± 0.817 in group A, while 7.921 ± 0.231 was in group B on the first visit (Baseline/day-0) before treatment, there was not any notable difference between both groups. After 7 days of treatment in group A the VAS score was 5.831 ± 0.932 and 4.1251 ± 1.071 in group B, on the 7th day a significant pain reduction and the change among both groups was notable. The mean difference was observed at 3.400 in group A whereas in group B the mean difference was 4.106 before starting treatment, after 15 days mean of VAS in collection A was 4.251 ± 1.026 and in group, B was 3.063 ± 1.2790 , on 15th day the mean difference from 1st visit till 15th day follow up in pain reduction was noted 3.979 in group A and 5.168 was in group B. whereas during the last visit of a clinical trial the mean of VAS after 30 days in collection A was 3.752 ± 1.0135 and the mean difference was noted as 4.478 and in group B the mean pain reduction was 2.9331 ± 1.2845 whereas the mean difference in pain reduction from first day to last day was 5.298. we found that Group B patients of trigeminal neuralgia were treated with gabapentin had significant ($P < 0.005$) pain reduction in every follow-up period as compared to Group A which was treated with carbamazepine in our research study (as shown in table-III).

DISCUSSION

JOURNAL OF PEOPLES UNIVERSITY OF MEDICAL AND HEALTH SCIENCES FOR WOMEN. 2023:13(04)

Trigeminal neuralgia also known as “tic douloureux”, is an enduring and extremely painful neurological illness that disturbs the “trigeminal nerve”, one of the major nerves answerable for impression in the face.¹⁵ The trigeminal nerve is the fifth cranial nerve and is responsible for transmitting sensations of touch, pain, and temperature from the face to the brain.¹⁶ The exact cause of trigeminal neuralgia is often unknown, but it is thought to be related to compression or irritation of the trigeminal nerve by a blood vessel, a tumor, or other structural abnormalities. Treatment for trigeminal neuralgia often involves The study observed that the maxilla was the most commonly affected region found in the study (as mentioned in table-II) 60% of patients found pain in the maxilla while 40% had pain in the mandible region.¹⁷ *Siqueira et al* also reported maxilla occurred more commonly as compared to the mandible¹⁸, whereas *Shah et al* described the mandible as a normally occurring region in Trigeminal neuralgia patients *Shah et al* reported mandible was a commonly occurring region in Trigeminal neuralgia patients¹⁹ The study found the right side of the face was usually precious as compared to the left side. *Ramish et al(2021)* also reported Right side of the face is exaggerated usually.²⁰ *Kaur et al (2018)* reported comparable results during their research study, according to this 66.66% of patients had a good reaction to the “carbamazepine therapy”, on the other side, 100% of patients reported a good reaction²¹ However other research was carried out to compare Gabapentin with other drugs to

evaluate the efficacy of drugs. We discovered that, similar to research by Lemos et al. (2008), individuals with TN who took gabapentin either alone or in conjunction with local infusions of ropivacaine to block pain triggers saw satisfactory results.²²

CONCLUSION

In our research study, it was concluded that both drug carbamazepine and gabapentin can be used to treat Trigeminal neuralgia patients, but in this research study, we found Gabapentin can be proven effective when compared to carbamazepine in pain relief and management of TN.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors

ACKNOWLEDGEMENTS: We would like to thank the all contributors and staff and other persons for providing useful information.

AUTHORS' CONTRIBUTIONS: All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared.

REFERENCE

1. Cruccu G, Finnerup NB, Jensen TS, Scholz J, Sindou M, Svensson P, Treede RD, Zakrzewska JM, Nurmikko T. Trigeminal neuralgia: new classification and diagnostic grading for practice and research. *Neurology*. 2016 Jul 12;87(2):220-8.
2. Puri N, Rathore A, Dharmdeep G, Vairagare S, Prasad BR, Priyadarshini R, et al. A clinical study on comparative evaluation of the effectiveness of carbamazepine and combination of carbamazepine with baclofen or capsaicin in the management of Trigeminal Neuralgia. *Niger J Surg* 2018;24:95-9
3. Sarlani E, Grace EG, Balciunas BA, Schwartz AH. Trigeminal neuralgia in a patient with multiple sclerosis and chronic inflammatory demyelinating polyneuropathy. *The Journal of the American Dental Association*. 2005 Apr 1;136(4):469-76.
4. Sabalys G, Juodzbaly G, Wang HL. Aetiology and pathogenesis of trigeminal neuralgia: a comprehensive review. *J Oral Maxillofac Res*. 2013 Jan 1;3(4):e2. doi: 10.5037/jomr.2012.3402. PMID: 24422020; PMCID: PMC3886096.
5. Gerwin R. Chronic Facial Pain: Trigeminal Neuralgia, Persistent Idiopathic Facial Pain, and Myofascial Pain Syndrome-An Evidence-Based Narrative Review and Etiological Hypothesis. *Int J Environ Res Public Health*. 2020 Sep 25;17(19):7012. doi: 10.3390/ijerph17197012. PMID: 32992770; PMCID: PMC7579138.
6. Akhter F. Examining the Clinical Characteristics of Trigeminal Neuralgia at a Dental Hospital: A Prospective Study. *Cureus*. 2023 Feb 11;15(2):e34862. doi: 10.7759/cureus.34862. PMID: 36923198; PMCID: PMC10010314.
7. Arvind M, SR P. A Retrospective Study on Side of Nerve Involvement and Distribution of Pain in Patients with Trigeminal Neuralgia. *Indian Journal of Public Health Research & Development*. 2020 Jan 1;11(1).
8. Filadora V, Moner M, Lena M. Gabapentin for idiopathic TN: Report of two cases. *Neurology* 1997;48:1467-71.
9. Al-Quliti KW. Update on neuropathic pain treatment for trigeminal neuralgia. The pharmacological and surgical options. *Neurosciences (Riyadh)*. 2015 Apr;20(2):107-14. doi:

- 10.17712/nsj.2015.2.20140501. PMID: 25864062; PMCID: PMC4727618.
10. Keppel Hesselink JM, Schatman ME. Phenytoin and carbamazepine in trigeminal neuralgia: marketing-based versus evidence-based treatment. *Journal of Pain Research*. 2017 Jul 17;1663-6.
 11. Tremont-Lukats IW, Megeff C, Backonja MM. Anticonvulsants for neuropathic pain syndromes: mechanisms of action and place in therapy. *Drugs*. 2000 Nov;60:1029-52.
 12. Tolou-Ghamari Z, Zare M, Habibabadi JM, Najafi MR. A quick review of carbamazepine pharmacokinetics in epilepsy from 1953 to 2012. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*. 2013 Mar;18.
 13. Petroff OA, Hyder F, Rothman DL, Mattson RH. Effects of gabapentin on brain GABA, homocarnosine, and pyrrolidinone in epilepsy patients. *Epilepsia*. 2000 Jun;41(6):675-80. doi: 10.1111/j.1528-1157.2000.tb00227.x. PMID: 10840398.
 14. Charles P Taylor, Nicolas S Gee, Ti-Zhi Su, Jeffery D Kocsis, Devin F Welty, Jason P Brown, David J Dooley, Philip Boden, Lakhbir Singh, A summary of mechanistic hypotheses of gabapentin pharmacology, *Epilepsy Research*, Volume 29, Issue 3, 1998, Pages 233-249, ISSN 0920-1211,
 15. Kareppa MS, Savant PB, Jangid MS, Acharya PN. A comprehensive review of trigeminal neuralgia. *Asian Journal of Pharmacy and Technology*. 2023 Mar 1;13(1):51-4.
 16. Edvinsson JC, Viganò A, Alekseeva A, Alieva E, Arruda R, De Luca C, D'Ettore N, Frattale I, Kurnukhina M, Macerola N, Malenkova E. The fifth cranial nerve in headaches. *The journal of headache and pain*. 2020 Dec;21:1-7.
 17. von Eckardstein KL, Keil M, Rohde V. Unnecessary dental procedures as a consequence of trigeminal neuralgia. *Neurosurgical Review*. 2015 Apr;38:355-60.
 18. Siqueira SR, Teixeira MJ, Siqueira JT. Clinical characteristics of patients with trigeminal neuralgia referred to neurosurgery. *European journal of dentistry*. 2009 Jul;3(03):207-12.
 19. Shah SA, Murad N, Salaar A, Iqbal A. Trigeminal neuralgia: analysis of pain distribution and nerve involvement. *Pakistan Oral Dent J*. 2008;28(1):37-41.
 20. Tariq R, Janjua OS, Mehmood S, Khalid MU, Zafar KJ, Hameed S. Comparison of effectiveness of carbamazepine versus topiramate for the management of trigeminal neuralgia. *Pakistan Armed Forces Medical Journal*. 2021 Aug 27;71(4):1360-63.
 21. Kaur B, Dhir P. Evaluation of the efficacy of carbamazepine and gabapentin in the management of trigeminal neuralgia: A clinical study. *J Indian Acad Oral Med Radiol* 2018;30:253-6.
 22. Lemos L, Flores S, Oliveira P, Almeida A. Gabapentin supplemented with ropivacain block of trigger points improves pain control and quality of life in trigeminal neuralgia patients when compared with gabapentin alone. *Clin J Pain* 2008;24:64-75.