**DOI:** https://doi.org/10.54393/pjhs.v6i12.3453

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 12 (December 2025)

**Original Article**

OPEN ACCESS

# Effectiveness and Safety of Carbamazepine versus Gabapentin in the Pharmacological Management of Trigeminal Neuralgia

**Maria Jabbar[1*], Uzair Bin Akhtar[1], Komal Akram[1], Mustafa Ayub Khawaja[1] and Muhammad Khalil[1]**

[1]Department of Oral and Maxillofacial Surgery, Sharif Medical and Dental College, Lahore, Pakistan

## ARTICLE INFO

***Keywords:***
Carbamazepine, Gabapentin, Safety, VAS Score

***How to Cite:***
Jabbar, M., Akhtar, U. B., Akram, K., Khawaja, M. A., & Khalil, M. (2025). Effectiveness and Safety of Carbamazepine versus Gabapentin in the Pharmacological Management of Trigeminal Neuralgia: Carbamazepine vs Gabapentin in Trigeminal Neuralgia. Pakistan Journal of Health Sciences, 6(12), 36-40. https://doi.org/10.54393/pjhs.v6i12.3453

***Corresponding Author:**
Maria Jabbar
Department of Oral and Maxillofacial Surgery, Sharif Medical and Dental College, Lahore, Pakistan
dr.mariajabbar@gmail.com

Received Date: 26th August, 2025
Revised Date: 24th November, 2025
Acceptance Date: 7th December, 2025
Published Date: 31st December, 2025

## ABSTRACT

Carbamazepine is considered the first-line pharmacological therapy for trigeminal neuralgia (TN). Gabapentin, another antiepileptic drug, is increasingly used, but its role as a substitute for carbamazepine remains uncertain. **Objectives:** To compare the effectiveness and safety of gabapentin and carbamazepine in the management of trigeminal neuralgia. **Methods:** This prospective comparative study included 80 patients presenting to the Department of Oral and Maxillofacial Surgery at Sharif Medical and Dental Hospital from February 2023 to January 2024. Patients were divided into two groups of 40 each: Group A received gabapentin 300 mg twice daily, and Group B received carbamazepine 200 mg twice daily. Pain intensity was assessed using the Visual Analogue Scale (VAS), and frequency of attacks was recorded on the 3rd, 7th, and 15th days of follow-up. Side effects were also documented. Mann-Whitney U and Chi-square tests were used for statistical analysis, with $p \leq 0.05$ considered significant. **Results:** Group A exhibited lower median VAS scores compared to Group B at all follow-up intervals, with statistically significant differences on the 2nd and 3rd follow-ups. Although gabapentin demonstrated fewer adverse effects, carbamazepine showed the highest percentage of good therapeutic response based on reduced frequency of attacks. **Conclusions:** Both drugs are effective in managing trigeminal neuralgia. Carbamazepine provides superior pain relief and reduction in attack frequency, whereas gabapentin is associated with fewer side effects.

## INTRODUCTION

Trigeminal neuralgia (TN) is a prevalent form of neuropathic pain. It is abrupt, typically unilateral, intense, short, acute, and persistent, with attacks lasting some few seconds to around two minutes within in region over one or even more trigeminal nerve divisions [1]. The condition typically contains trigger zones and is frequently brought on by regular activities. The pain always seems to be ipsilateral to the trigger point. Frequent extra-oral trigger zones are found laterally to the ala nasi, just over the mental foramen, as well as over the supraorbital foramen. Touching, specific neck gestures, speaking, eating, swallowing, shaving, tooth brushing, and even brisk airflow can all be triggers [2]. An estimated 5.9 per 100,000 females and 3.4 per 100,000 males are affected each year. With increasing age, the prevalence rises notably, with females showing a slightly higher susceptibility [3]. The American Academy for Neurology, as well as the European Federation of Neurological Societies, both suggested carbamazepine (CBZ) for a first medical treatment for TN, since this has been shown to reduce episodes in up to 88% of cases. Pharmacotherapy is presently the most popular method for treating TN [4]. The curative efficacy of CBZ is indeed somewhat limited. Poor tolerance of major side reactions, including dizziness, nausea, and especially white blood cell depletion, compromises the medication's effectiveness [5]. In addition, several studies indicate that CBZ is ineffective for partial cases [6]. When evaluating the degree of pain associated with trigeminal neuralgia, the

**DOI:** https://doi.org/10.54393/pjhs.v6i12.3453

Visual Analogue Scale (VAS) is a sensitive and dependable instrument. It uses a 0–10 scale, with 0 denoting no discomfort and 10 denoting the worst conceivable suffering. Its usage in TN is still validated by recent research. For instance, Al Habil et al. employed VAS scores to measure pain reduction in patients with trigeminal neuralgia receiving non-pharmacological therapy, demonstrating its sensitivity and applicability for tracking changes in TN-related pain [7]. Meanwhile, more contemporary Antiseizure medications called gabapentin (GBP) are now frequently utilized in the therapeutic practice of TN. Investigations have shown that GBP has many potential applications in severe pain disorders, particularly neuropathic pain [8]. Moreover, in numerous international pain management clinics, GBP has become the medicine of first preference for treating all varieties of severe neuropathic pain. Its side effects include a minimal incidence of negative responses, no interactions with certain other medicines that affect the neurological systems, as well as a clear feeling of its effectiveness [9]. Additionally, GBP can be utilized as a substitute for CBZ if TN cannot be controlled to lessen its severity [10]. Yet compared to CBZ, its effectiveness and safety are still debatable [11]. This study aimed to compare the effectiveness and safety of CBZ with GBP in the pharmacological treatment of trigeminal neuralgia.

## METHODS

This observational study was conducted on 80 patients; the sample size was calculated with the WHO sample size determination software, taking the effectiveness of carbamazepine in the treatment of trigeminal neuralgia as 94.1% with a 95 % confidence level at 0.06 precision [12]. The study was conducted on 80 patients visiting the oral and maxillofacial OPD, Sharif Medical and Dental Hospital Lahore, during 1 1-year period from February 2023 to January 2024. The study was approved by the institutional ethics review committee of Sharif Medical Research Center (Ref. No: SMRC/279-23). All participants provided written informed consent before enrollment, in accordance with the Declaration of Helsinki (2013 revision) [13]. Participant confidentiality was ensured through complete de-identification of personal data and secure, restricted-access storage. Data handling and management followed the FAIR (Findable, Accessible, Interoperable, and Reusable) data principles [14], ensuring that data were organized systematically, stored securely, and made accessible only in accordance with ethical and institutional requirements. Patients with diagnosed trigeminal neuralgia were included in this study irrespective of their age. Patients taking any anti-epileptic or Anticonvulsant, patients with a history of any surgical treatment for trigeminal neuralgia, or patients not willing to undergo follow-up were excluded from the study. After informed consent, using a non-probability convenience sampling technique, patients were allocated into two groups of 40 patients each: group A and group B. The patients with trigeminal neuralgia type 1 (A spontaneously occurring facial pain consisting of transient electric shock-like aches, acute in onset as well as termination," meaning that the discomfort signs are only present for as long as the pain incident lasts (temporary pain) were included in group A. The patients having trigeminal neuralgia type 2 (A sudden commencement of facial discomfort that is marked by short, electric shock-like aches, quick onset, and a persistent, dull, diffuse background discomfort. This ongoing discomfort could last anywhere between a few minutes to several hours, and was included in group B [15]. Group A was treated with gabapentin 300mg BD daily. Group B was treated with carbamazepine daily at 200mg twice a day. Another physician who was blind about the patients as well as the drugs reviewed the response of the drug and handed it over to the first physician who diagnosed and numbered the patients. Pain relief was observed at the 3rd, 7th, and 15th day intervals during follow-up. All information was collected on a specially designed form. A visual analogue scale was used to score the pain. The response of VAS was recorded as 1 (no pain) - 10 (worst pain). The response of the patients to the therapeutic effectiveness of the drug was decided based on the frequency of attacks, i.e., good response: no attacks of pain; average response: two to three attacks of pain per day; and nonresponsive with no decrease in frequency of attacks of pain [11]. All participants were actively monitored for adverse drug reactions (ADRs) throughout the study. At each follow-up visit (Day 3, Day 7, and Day 15), ADRs were assessed using a structured WHO-UMC–based checklist covering common reactions to carbamazepine and gabapentin, including dizziness, fatigue, headache, constipation, nausea, and dry mouth. Any new symptoms after treatment initiation were documented and graded for severity (mild, moderate, severe) and temporal association with the drug. Participants were also advised to report symptoms occurring between follow-ups. All ADRs were recorded in the proforma, and their frequencies were compared between the two treatment groups. Because of their non-normal distribution, continuous variables have been presented as median (IQR) and evaluated using the Shapiro-Wilk test. VAS scores were compared between treatment groups using the Mann-Whitney U test. The Chi-square test was used to assess categorical variables, such as attack incidence and adverse outcomes. The Bonferroni correction was used to take into consideration multiple comparisons between visits to follow up. A statistically significant p-value was defined as $<0.05$. SPSS version 23.0 was used for the analyses.

**DOI:** https://doi.org/10.54393/pjhs.v6i12.3453

## RESULTS

A total of 80 participants were included in the study, with a mean age of 43±9.5 years, with 46% males and 34% females. The study showed that the VAS scores on the 1st follow-up of group A (Gabapentin) (md=5.00, n=40) were lower than group B (Carbamazepine) (md=6.00, n=40). The same was the case regarding VAS scores at the 2nd and 3rd follow-ups as well. It was reported that a significant difference in the VAS scores on the 2nd follow-up was seen between both groups, with group A (md=6.50, n=40) having a lower score as compared to group B (md=7.00, n=40). Similarly, Group A (md=7.00, n-40) had a lower VAS score on the third follow-up as compared to Group B (md=8.00, n=40), and this difference was statistically significant (Table 1).

**Table 1:** Therapeutic Effectiveness of Gabapentin and Carbamazepine in Trigeminal Neuralgia Patients as Assessed by VAS Score on Follow-Up Visits

| Follow-up | Gabapentin Median (IQR) | Carbamazepine Median (IQR) | p-value |
|---|---|---|---|
| 1st | 5.0 (4-6) | 6.0 (5-7) | 0.001* |
| 2nd | 6.5 (5-7) | 7.0 (6-8) | 0.025* |
| 3rd | 7.0 (6-8) | 8.0 (7-9) | 0.001* |

Study results showed a statistically significant association between the therapeutic efficacy of Gabapentin and Carbamazepine and the patient response based on frequency of attacks on follow-up visits. It was seen that the highest percentage of good response was reported by patients who were treated using Carbamazepine (Table 2).

**Table 2:** Therapeutic Efficacy of Gabapentin and Carbamazepine as Assessed by Frequency of Attacks on Follow-Up Visits

| Follow-up | Response | Gabapentin n (%) | Carbamazepine n (%) | p-value |
|---|---|---|---|---|
| 1st | Good | 5 (21%) | 19 (79%) | 0.001* |
| | Average/Not responsive | 35 (87.5%) | 21 (52.5%) | |
| 2nd | Good | 15 (37%) | 26 (63%) | 0.025* |
| | Average/Not responsive | 25 (62.5%) | 14 (37%) | |
| 3rd | Good | 14 (27%) | 38 (73%) | 0.001* |
| | Average/Not responsive | 26 (73%) | 2 (27%) | |

Results showed a statistically significant association between the side effects of dizziness, fatigue, headache, and constipation with the drugs administered (Gabapentin and Carbamazepine). It was seen that dizziness and headache were reported more by the group administered Carbamazepine, while fatigue and constipation were experienced more by patients who were given Gabapentin (Table 3).

**Table 3:** Side Effects Associated with Gabapentin and Carbamazepine as Reported by Trigeminal Neuralgia Patients

| Side Effect | Gabapentin n (%) | Carbamazepine n (%) | p-value |
|---|---|---|---|
| Dizziness | 9 (27.3%) | 24 (72.7%) | 0.001* |
| Fatigue | 17 (100%) | 0 (0%) | 0.001* |
| Headache | 0 (0%) | 6 (100%) | 0.026* |
| Constipation | 11 (100%) | 0 (0%) | 0.001* |
| Nausea | 18 (41.9%) | 25 (58.1%) | 0.116 |
| Dry mouth | 11 (52.4%) | 10 (47.6%) | 0.799 |

## DISCUSSION

In our study, it was found that both gabapentin and carbamazepine reduce the intensity of the pains in trigeminal neuralgia, although their side-effects are also different: the former (gabapentin) has more side-effects (constipation, exhaustion), whereas the latter (carbamazepine) has more side-effects (headaches, dizziness). Such results are in line with the previous studies [7], although other data indicate that carbamazepine is a little more efficient with certain subtypes of TN. These differences could be due to differences in the patient groups, dosage schedule, and study designs. Carbamazepine has been viewed as the most effective treatment for TN [8]. It acts by inhibiting voltage-gated sodium channels and hence making neurons less excitable [9]. As the meta-analysis reveals, the effect of carbamazepine was 1.600 (95% CI 1.1852161, p=0.002), which is much more effective than placebo in pain treatment [15]. Systematic review too proved that carbamazepine was able to significantly decrease the frequency and intensity of pain among the TN patients [16]. Gabapentin is an antiseizure drug that is a calcium channel modulator, which can regulate the release of neurotransmitters and has been researched as an alternative to carbamazepine. A 2023 meta-analysis and review indicated that both gabapentin and carbamazepine had identical efficacy (OR=2.02, 95% CI 1.562.62, p=0.00001), whereas the rate of adverse events was significantly lower with gabapentin (OR=0.28, 95% CI 0.2137, p=0.00001) [17]. These findings are consistent with ours, in which carbamazepine-medicated patients had a higher number of headaches and dizziness, and gabapentin-medicated patients had a higher number of fatigue and constipation. It has also been reported that the side-effect profile of gabapentin is usually not as strong as that of carbamazepine, which is an important determinant of medication adherence and general quality of life [18]. One clinical study found that the difference in treatment response was significant ($p<0.05$): with 15 days of treatment, Group I demonstrated good therapeutic efficacy, 56.2, and Group II demonstrated good therapeutic efficacy, 58.4 average good therapeutic efficacy was 43.8 and 41.6, respectively [11]. In line with this, our research established that the highest proportion of excellent responders was the carbamazepine group. There was another study that reported that after 72 hours, 52.38% of

**DOI:** https://doi.org/10.54393/pjhs.v6i12.3453

patients who were treated with 400 mg carbamazepine showed excellent response, 28.57% showed average response, and 19% did not show any significant pain reduction. Comparatively, a good response occurred in 52.38 percent of the gabapentin group and an average response in 42.8 percent of the same group at 600 mg [19]. Several other studies also verify the fact that pharmacological therapy has never been tried before any intervention undertaken in the management of TN pain [7, 10]. Carbamazepine remains a good first-line therapy with mixed results in the benefits and relapse rates reported [17, 20]. There is also evidence of Pregabalin and gabapentin concerning efficacy in neuralgic pain [16]. There are some significant limitations to this study. Initially, non-probability convenience sampling was used to recruit patients, and TN subtype rather than randomization was used to assign patients to therapy groups. Selection bias and confounding could be introduced by this method, which could restrict the capacity to draw conclusive causal inferences and impact the groups' comparability. this study was conducted just for educational purposes. It was an observational study on a group of patients. So, the findings cannot be used for treatment strategies and outcomes. As a result, the findings should be regarded cautiously and mainly as representative of actual clinical practice. Future research should include large-scale, randomized controlled trials with longer follow-up periods to validate these preliminary findings, minimize bias, and provide stronger evidence for establishing treatment guidelines. Additionally, standardized diagnostic criteria, validated outcome tools, and stratified randomization should be incorporated to improve methodological rigor.

## CONCLUSIONS

The results of this study show that carbamazepine and gabapentin are both useful medications for treating trigeminal neuralgia, but they have different clinical advantages. Over the course of follow-up visits, carbamazepine had superior treatment efficacy, as seen by larger reductions in pain intensity and attack frequency. Gabapentin, on the other hand, was linked to a more favorable side-effect profile, suggesting improved tolerance. Consequently, gabapentin may be a good substitute for people who cannot handle carbamazepine or have negative side effects, but carbamazepine is still the more efficient first-line medication for quick pain relief. It is advised to conduct more extensive, long-term research to validate these results and direct the choice of customized treatments.

## Authors Contribution

Conceptualization: MJ
Methodology: MJ, UBA, KA, MK
Formal analysis: KA
Writing review and editing: MJ, UBA, MAK, MK

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

## Conflicts of Interest

All the authors declare no conflict of interest.

## Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

## REFERENCES

[1] Munoz-Vendrell A, Valín-Villanueva P, Tena-Cucala R, Campoy S, Martinez-Yélamos S, Huerta-Villanueva M. Second-Line Pharmacological Treatment Strategies for Trigeminal Neuralgia: A Retrospective Comparison of Lacosamide, Gabapentin and Baclofen. Headache: The Journal of Head and Face Pain. 2025 May. doi: 10.1111/head.14952.

[2] Basu I, Perry M. Initial assessment of the "Head and Neck" patient. InDiseases and Injuries to the Head, Face and Neck: A Guide to Diagnosis and Management 2021 Feb 17 (pp. 57-134). Cham: Springer International Publishing.

[3] Cao X, Shen Z, Wang X, Zhao J, Liu W, Jiang G. A Meta-Analysis of Randomized Controlled Trials Comparing the Efficacy and Safety of Pregabalin and Gabapentin in the Treatment of Postherpetic Neuralgia. Pain and Therapy. 2023 Feb; 12(1): 1–8. doi: 10.1007/s40122-022-00451-4.

[4] Flickinger JC Jr, Kim H, Kano H, Greenberger JS, Arai Y, Niranjan A, *et al.* Do Carbamazepine, Gabapentin, or Other Anticonvulsants Exert Sufficient Radioprotective Effects to Alter Responses from Trigeminal Neuralgia Radiosurgery? International Journal of Radiation Oncology Biology Physics. 2012 Jul; 83(4): e501–e506. doi: 10.1016/j.ijrobp.2012.01.016.

[5] Fricke-Galindo I, LLerena A, Jung-Cook H, López-López M. Carbamazepine Adverse Drug Reactions. Expert Review of Clinical Pharmacology. 2018 Jul; 11(7): 705–718. doi: 10.1080/17512433.2018.1486707.

[6] Wiffen PJ, McQuay HJ, Edwards JE, Moore RA. Gabapentin for Acute and Chronic Pain. Cochrane Database of Systematic Reviews. 2005; CD005452. doi: 10.1002/14651858.CD005452.

[7] AlHabil Y, Al-Sayed K, Salameh A. Trigeminal Neuralgia Improvement Following Transcutaneous Electrical Nerve Stimulation (TENS): A Systematic

**DOI:** https://doi.org/10.54393/pjhs.v6i12.3453

Review and Meta-Analysis. BMC Neurology. 2025 Jan; 25(1): 13. doi: 10.1186/s12883-024-04014-2.

[8] Khadilkar SV and Patil VA. Medical Management of Trigeminal Neuralgia. Neurology India. 2021 Mar; 69(Suppl 1): S199–S205. doi: 10.4103/0028-3886.315996.

[9] LeDoux JE et Pine DS. Using Neuroscience to Help Understand Fear and Anxiety: A Two-System Framework. American Journal of Psychiatry. 2016 Nov; 173(11): 1083–1093. doi: 10.1176/appi.ajp.2016.16030353.

[10] Lee JY, Lee GH, Yi SH, Sim WS, Kim BW, Park HJ. Non-Surgical Treatments for Trigeminal Neuralgia from the Perspective of a Pain Physician: A Narrative Review. Biomedicines. 2023 Aug; 11(8): 2315. doi: 10.3390/biomedicines11082315.

[11] Agarwal R and Kumari S. Comparison of Carbamazepine and Gabapentin in Management of Trigeminal Neuralgia: A Clinical Study. Journal of Advanced Medical and Dental Sciences Research. 2020 Nov; 8(11): 38–41.

[12] Agarwal A, Kaur R, Ashfaque F, Hadi Z, Anis MW, Ali A, *et al.* Precision Medicine Approaches in Epilepsy: A Systematic Review of Genetic Markers and Personalized Treatment Strategies. Precision Medical Sciences. 2024 Jun; 13(2): 72–83. doi: 10.1002/prm2.12139.

[13] World Medical Association. World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. Journal of the American Medical Association. 2013 Nov; 310(20): 2191–2194. doi: 10.1001/jama.2013.281053.

[14] Copes LE, Lucas LM, Thostenson JO, Hoekstra HE, Boyer DM. A Collection of Non-Human Primate Computed Tomography Scans Housed in MorphoSource: A Repository for 3D Data. Scientific Data. 2016 Feb; 3(1): 1–8. doi: 10.1038/sdata.2016.1.

[15] Ma Y, Du H, Zheng S, Zhou Z, Zhang H, Ma Y, *et al.* High-Entropy Approach vs. Traditional Doping Strategy for Layered Oxide Cathodes in Alkali-Metal-Ion Batteries: A Comparative Study. Energy Storage Materials. 2025 May. doi: 10.1016/j.ensm.2025.104295.

[16] Guo M, Shen W, Zhou M, Song Y, Liu J, Xiong W, et al. Safety and Efficacy of Carbamazepine in the Treatment of Trigeminal Neuralgia: A Meta-Analysis in Biomedicine. Mathematical Biosciences and Engineering. 2024 Mar; 21(4): 5335–5359. doi: 10.3934/mbe.2024235.

[17] De Stefano G, Di Pietro G, Truini A, Cruccu G, Di Stefano G. Considerations when Using Gabapentinoids to Treat Trigeminal Neuralgia: A Review. Neuropsychiatric Disease and Treatment. 2023 Dec; 2007–2012. doi: 10.2147/NDT.S407543.

[18] Pergolizzi JV Jr, Gharibo C, Magnusson P, Breve F, LeQuang JA, Varrassi G. Pharmacotherapeutic Management of Trigeminal Neuropathic Pain: An Update. Expert Opinion on Pharmacotherapy. 2022 Jul; 23(10): 1155–1164. doi: 10.1080/14656566.2022.2087507.

[19] Iqbal S, Rashid W, ul Ain Q, Atiq T, Noor R, Irfan F. Efficacy of Carbamazepine and Oxcarbazepine for Treating Trigeminal Neuralgia. BMC Journal of Medical Sciences. 2022; 3(2): 55–59. doi: 10.70905/bmcj.03.02.062.

[20] Zhao X, Ge S. The Efficacy and Safety of Gabapentin vs. Carbamazepine in Patients with Primary Trigeminal Neuralgia: A Systematic Review and Meta-Analysis. Frontiers in Neurology. 2023 May; 14: 1045640. doi: 10.3389/fneur.2023.1045640.