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Original Research Article

Comparison of Oxcarbazepine Versus Carbamazepine in the Management of Trigeminal Neuralgia in Patients Presenting in the Outpatient Department of Neurology, Jinnah Postgraduate Medical Centre

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Abstract: *Trigeminal neuralgia is a chronic pain condition characterized by recurrent episodes of severe facial pain. Carbamazepine is the first-line pharmacological treatment, but oxcarbazepine has emerged as a potential alternative with better tolerability and fewer side effects.* ***Objective:*** *To compare the efficacy of oxcarbazepine and carbamazepine in managing trigeminal neuralgia in patients presenting to the outpatient department of Neurology at Jinnah Postgraduate Medical Centre (JPMC), Karachi.* ***Methods:*** *This randomized controlled trial was conducted at Ward 28, Department of Neurology, JPMC, Karachi, from 21st September 2024 to 21st March 2025 after ethical approval from the institutional review board. A total of 122 patients aged 25–80 years of either gender with a clinical diagnosis of trigeminal neuralgia were enrolled using non-probability consecutive sampling. Patients with a history of surgical intervention for trigeminal neuralgia were excluded. Participants were randomly assigned to receive either oxcarbazepine or carbamazepine, and treatment efficacy was evaluated using the Visual Analogue Scale (VAS) for pain intensity. The primary endpoint was pain relief, and treatment response was categorized as good, moderate, or unresponsive.* ***Results:*** *Patients treated with oxcarbazepine demonstrated significantly greater pain relief than those on carbamazepine, as reflected by a lower mean VAS score (2.6 ± 1.2 vs. 3.7 ± 1.89, p = 0.001). Efficacy analysis revealed a good response in 69% of the oxcarbazepine group compared to only 20% in the carbamazepine group (p < 0.0001). Moreover, 66% of patients in the carbamazepine group remained unresponsive, whereas only 13% in the oxcarbazepine group showed no improvement.* ***Conclusion:*** *Oxcarbazepine is more effective and better tolerated than carbamazepine in managing trigeminal neuralgia, providing superior pain control and a more favorable response profile. These findings support oxcarbazepine as a preferable first-line treatment option in clinical practice.*

Keywords: Oxcarbazepine, Carbamazepine, Trigeminal Neuralgia, Efficacy

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Introduction

The neurological condition known as trigeminal neuralgia (TN) leads to long-term facial nerve pain through sharp, intense attacks that resemble electroshock sensations (1). The pain episodes of TN often start following normal daily activities, including speaking, light touch, and chewing. TN causes severe life-quality degradation that results in disabilities during daily routines, in addition to mental health issues (2). Carbamazepine serves as the primary medication for treating acute neuralgic pain because of its ability to reduce acute facial episodes in patients. The side effects triggered by this treatment commonly lead to dizziness and drowsiness, and can sometimes cause serious hematological reactions. These factors constrain patient willingness to use this drug and decrease tolerance levels (3, 4). Researchers developed the anticonvulsant drug oxcarbazepine from carbamazepine to provide comparable therapeutic effects and potentially better tolerability than its predecessor. Medical research has shown the effectiveness and tolerability of carbamazepine and oxcarbazepine for treating TN (5). Research combining three double-masked trials revealed that both drugs generated meaningful pain relief, and 88% of participants achieved at least a 50% reduction in pain level. The treatment data showed that patients had better tolerability of oxcarbazepine, since it caused fewer patients to stop their therapy due to adverse effects. The clinical evaluation of TN patients through a real-world study showed that carbamazepine achieved an 88.3% success rate, while oxcarbazepine demonstrated a 90.9% success rate. Major side effects required the carbamazepine group to stop or decrease medication frequency more often at 29.6%, compared to the 12.6% of patients in the oxcarbazepine group. The data suggests that carbamazepine showed a higher incidence of side-effects at 43.6% compared to the lower 30.3% with oxcarbazepine, thus indicating a superior tolerability profile for oxcarbazepine (6). Healthcare professionals use the Liverpool Adverse Events Profile to evaluate the side effects of antiepileptic drugs for both medications. Patients who received carbamazepine treatment experienced more adverse symptoms than the oxcarbazepine group, which supports the claim that oxcarbazepine produces better efficacy during clinical use (7). The selection between carbamazepine and oxcarbazepine therapy for TN requires evaluation of personal patient conditions, as well as assessment of possible side effects and pre-existing medical conditions. The better tolerability of oxcarbazepine provides a strong option, but especially helps patients suffering from serious side effects from carbamazepine (8, 9). More research activities and clinical studies work toward optimizing therapeutic approaches for TN to improve patient outcomes and quality of life. The present research aims to compare the efficacy of oxcarbazepine and carbamazepine in managing trigeminal neuralgia in patients in the outpatient department of neurology, Jinnah Postgraduate Medical Centre.

Methodology

After the ethical approval from the institutional review board, this randomised control trial was conducted at Ward 28, Department of Neurology, Jinnah Postgraduate Medical Centre (JPMC) Karachi from 21st September 2024 to 21st March 2025. Through non-probability consecutive sampling, 122 patients aged 25-80 years, of both genders, presenting with trigeminal neuralgia of any frequency and severity, were included in the present study. Patients who had undergone any surgical

procedure for the treatment of trigeminal neuralgia, with renal and hepatic issues such as chronic renal failure and chronic liver disease, patients with seizures, patients who were intolerant to and allergic to both treatment drugs, and pregnant and lactating mothers were excluded from the present study. After informed consent from the recruited patients, detailed demographics of each patient, including name, gender, age, residence, educational status, and employment status, were obtained. Each patient was assessed for duration, frequency, severity, and pain. Patients were randomly distributed to either Group A (oxcarbazepine) or Group B (carbamazepine) using a lottery method. Group A patients were treated with oxcarbazepine (150 mg twice daily up to 1800 mg), and Group B patients were treated with carbamazepine (100 mg twice daily up to 1200 mg). Patients were started on a minimum dose, which was titrated upwards depending on the severity of symptoms. Patient safety was assessed for side effects such as drowsiness, dizziness, diplopia, nausea, and hyponatremia. Patients were counselled about these side effects and instructed to report to the principal investigator in case of any disability or interference in daily activities. Each patient was followed up every month, and the outcome, i.e., the efficacy of the treatment, was assessed six months after the treatment. After the data collection, analysis was conducted using the Statistical Package for Social Science (SPSS), Version 26. Mean and standard deviation were calculated for quantitative variables like age (years), duration of pain (days), frequency of pain before and after treatment, and VAS pain score before and after treatment in both groups. Frequency and percentages were calculated for categorical variables like gender, age in groups, residence, educational status, employment status, and side of pain. Efficacy was compared between the groups by applying a chi-square test. P value <0.05 was considered significant.

Results

The study included 122 participants, divided equally into oxcarbazepine (n=61) and carbamazepine (n=61). The mean age of participants in both groups was nearly identical (49.2±12.5 vs. 49.3±12.5, p = 0.97). Gender distribution was similar, with 57% males and 43% females in the oxcarbazepine group, compared to 61% males and 39% females in the carbamazepine group (p = 0.78). Regarding residence, 61% of oxcarbazepine users were urban residents versus 56% in the carbamazepine group, with no significant difference (p = 0.678). Educational status varied, with a higher proportion of matriculated individuals in the oxcarbazepine group (28%) than the carbamazepine group (8%). In contrast, intermediate and graduate education levels were more common among carbamazepine users (p = 0.384). Employment status was nearly the same, with 61% of oxcarbazepine patients employed versus 64% in the carbamazepine group (p = 0.771) (Table 1).

Before treatment, the duration of pain was comparable between groups (264.09±78.8 vs. 265.05±78.1 days, p = 0.947). Pain predominantly affected the right side in both groups (54% vs. 57%, p = 1). The mean VAS score before treatment was similar (7.5±1.5 vs. 7.6±1.5, p = 1). However, the severity of pain differed significantly (p = 0.031), with 54% of oxcarbazepine patients experiencing severe pain compared to 41% in the carbamazepine group. In comparison, moderate pain was reported in 48% and 49% of patients, respectively. Pain frequency was almost identical, with 41% of oxcarbazepine users experiencing fewer than five episodes per day compared to 39% in the carbamazepine group (p = 1) (Table 2).

After treatment, pain relief was more significant in the oxcarbazepine group, as reflected by a lower VAS score (2.6±1.2 vs. 3.7±1.89, p = 0.001). Efficacy analysis showed a significantly better response with oxcarbazepine (p < 0.0001), with 69% of patients experiencing a good response compared to only 20% in the carbamazepine group. Conversely, 66% of carbamazepine users remained unresponsive versus 13% in the oxcarbazepine group (Table 3). Side effects were present in both groups, but were not significantly different (Figure 1), including diplopia (8 vs. 10, p = 0.099), dizziness (8 vs. 10), drowsiness (8 vs. 11), hyponatremia (9 vs. 10), and nausea (9 vs. 10). Notably, a higher proportion of oxcarbazepine users reported no side effects (19 vs. 10), suggesting a better tolerability profile.

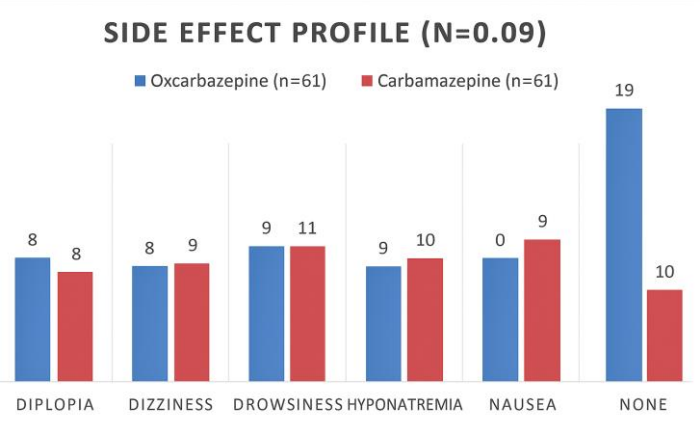

Figure 1 ***Side effects comparison between the groups***

Table 1: Demographic variables of the study participants in both groups

Variables	Oxcarbazepine (n=61)	Carbamazepine (n=61)	P value
Age (Years)	49.2±12.5	49.3±12.5	0.97
Gender			0.78
Male	35 (57%)	37 (61%)	
Female	26 (43%)	24 (39%)	
Residence			0.678
Urban	37 (61%)	34 (56%)	
Rural	24 (39%)	27 (44%)	
Educational status			0.384
Illiterate	16 (26%)	16 (26%)	
Primary	9 (15%)	10(16%)	
Matriculation	17 (28%)	5 (8%)	
Intermediate	9 (15%)	16 (26%)	

Graduate	10(16%)	14 (23%)	
Employment status			0.771
Employed	37 (61%)	39 (64%)	
Unemployed	24 (39%)	22 (36%)	

Table 2: Clinical Variables before treatment

Variables	Oxcarbazepine (n=61)	Carbamazepine (n=61)	P value
Duration of Pain Days	264.09±78.8	265.05±78.1	0.947
Side of Pain			1
Right	33 (54%)	35 (57%)	
Left	29 (48%)	27 (44%)	
VAS Score Before Treatment	7.5±1.5	7.6±1.5	1
Severity of Pain			0.031
Mild	0	6 (10%)	
Moderate	29 (48%)	30 (49%)	
Severe	33 (54%)	25 (41%)	
Frequency			1
<5	25 (41%)	24 (39%)	
>5	36 (59%)	37 (61%)	

Table 3: Efficacy and pain score after treatment

Variables	Oxcarbazepine (n=61)	Carbamazepine (n=61)	P value
VAS Score After Treatment	2.6±1.2	3.7±1.89	0.001
Efficacy			<0.0001
Good Response	42 (69%)	12 (20%)	
Average Response	11 (18%)	9 (15%)	
Unresponsive	8 (13%)	40 (66%)	

Discussion

Research comparing oxcarbazepine to carbamazepine in TN treatment yields critical findings about both drugs' effectiveness and the patients' ability to tolerate them. The study began with equivalent baseline variables across both groups because age, gender, residential distinctions, and work status matched perfectly (10, 11). The pre-treatment analysis revealed statistically significant results, in which the oxcarbazepine group demonstrated more severe pain cases (54%) than the carbamazepine group (41%) ($p = 0.031$). Patients on oxcarbazepine treatment reported significantly better pain relief compared to carbamazepine patients according to VAS scores ($p = 0.001$). The mean VAS score after treatment showed patients taking oxcarbazepine achieved a result of 2.6±1.2 while those taking carbamazepine experienced 3.7±1.89. Most patients receiving oxcarbazepine achieved good results, as measured by 69% compared to only 20% of patients receiving carbamazepine ($p < 0.0001$). Di Stefano et al.'s real-world study discovered that oxcarbazepine and carbamazepine produced 90.9% initial response rates while carbamazepine achieved 88.3% response rates (9). A comparison between carbamazepine and oxcarbazepine treatment showed that 29.6% of patients taking carbamazepine discontinued their therapy because of major side effects. However, this number decreased to 12.6% in the oxcarbazepine group, according to the study (12). Results in the current research support the findings about tolerability. The result showed that patients treated with oxcarbazepine reported fewer side effects (19 vs. 10) compared to patients receiving carbamazepine therapy, thus demonstrating better tolerability of oxcarbazepine. According to Beydoun et al.'s study, the adverse event profile prompted them to recommend oxcarbazepine as an acceptable option in carbamazepine intolerance scenarios (13). Patients who received oxcarbazepine therapy reported that 86.7% were pain-free at six months, when researchers evaluated both groups in Bangladesh (14). By comparison, only 60% of carbamazepine patients managed to limit their pain to mild. The patients receiving oxcarbazepine demonstrated complete absence of adverse effects during six months of treatment, whereas patients on carbamazepine developed side effects in 73.3% of cases.

Conclusion

Research data shows that TN treatment with oxcarbazepine yields superior pain control and better patient tolerability than carbamazepine, although both drugs are effective. Evidence shows that oxcarbazepine should become a primary medication of choice among patients who react poorly to carbamazepine therapy.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethical approval and consent to participate
Approved by the department concerned. (IRBEC-JPMA-24)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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