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Original Research Article

Comparative Evaluation of the Efficacy of Gabapentin and Gabapentin in Combination with Nortriptyline in the Management of Pain-Related Temporomandibular Disorders

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Abstract:

Background: Temporomandibular disorders (TMDs) are a group of conditions that cause pain and dysfunction in the jaw joint and muscles controlling jaw movement. Managing pain associated with TMDs is critical for improving patients' quality of life. Gabapentin, an anticonvulsant, is commonly used for pain management. This retrospective study aims to compare the efficacy of gabapentin alone and in combination with nortriptyline, a tricyclic antidepressant, in managing pain-related TMDs over an 18-month period.

Materials and Methods: A retrospective analysis was conducted on 40 patients diagnosed with pain-related TMDs at a tertiary care center in Darbhanga. Patients were divided into two groups: Group A received gabapentin alone, while Group B received gabapentin combined with nortriptyline. Pain levels were assessed using the Visual Analog Scale (VAS) at baseline, 3 months, 6 months, 12 months, and 18 months. Additional parameters such as functional jaw movements and patient satisfaction were also evaluated.

Results: The study included 40 patients (20 in each group). Group A showed a significant reduction in pain scores from a mean VAS score of 7.5 at baseline to 4.2 at 18 months ($p < 0.05$). Group B demonstrated a more pronounced reduction in pain scores, from a mean VAS score of 7.6 at baseline to 2.8 at 18 months ($p < 0.01$). Improvement in functional jaw movements and higher patient satisfaction were observed in Group B compared to Group A. No significant adverse effects were reported in either group.

Conclusion: The combination of gabapentin and nortriptyline is more effective in reducing pain and improving functional outcomes in patients with pain-related TMDs compared to gabapentin alone. This combination therapy may offer a superior treatment option for managing pain-related TMDs.

Keywords: Temporomandibular disorders, pain management, gabapentin, nortriptyline, retrospective study, Darbhanga, Visual Analog Scale.

Introduction

Temporomandibular disorders (TMDs) are a group of musculoskeletal conditions affecting the temporomandibular joint (TMJ), masticatory muscles, and associated structures, leading to pain and functional impairment [1]. The etiology of TMDs is multifactorial, involving biological, behavioral, environmental, social, and cognitive factors [2].

Pain is the most common symptom reported by TMD patients, significantly impacting their quality of life [3]. Effective management of pain in TMDs is crucial. Pharmacological treatment options include nonsteroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, antidepressants, and anticonvulsants [4]. Gabapentin, an anticonvulsant, has been widely used for its analgesic properties in various chronic pain conditions, including TMDs (5).

Gabapentin works by modulating the release of excitatory neurotransmitters and reducing neuronal

excitability [6]. Nortriptyline, a tricyclic antidepressant, is another medication used for chronic pain management. It is believed to enhance the descending inhibitory pain pathways by inhibiting the reuptake of serotonin and norepinephrine [7]. Previous studies have suggested that combining different classes of medications may provide better pain relief than monotherapy [8].

This retrospective study aims to evaluate the efficacy of gabapentin alone versus gabapentin in combination with nortriptyline in managing pain-related TMDs. By comparing pain reduction, functional improvement, and patient satisfaction between the two treatment regimens, this study seeks to provide insights into optimizing pain management strategies for TMD patients.

Materials and Methods

Study Design: This retrospective study was conducted at a tertiary care center in Darbhanga. The study reviewed medical records of patients diagnosed with pain-related temporomandibular disorders (TMDs) over an 18-month period. The study protocol was approved by the Institutional Review Board.

Patient Selection: A total of 40 patients diagnosed with pain-related TMDs were included in the study. Inclusion criteria were:

- Age between 18 and 65 years
- Diagnosis of pain-related TMDs based on clinical examination and diagnostic criteria
- Minimum follow-up period of 18 months
- Exclusion criteria included:
- Previous surgical intervention for TMD
- Presence of systemic diseases affecting pain perception
- History of substance abuse or psychiatric disorders

Group Allocation: Patients were divided into two groups based on the treatment received:

Group A (n=20): Patients treated with gabapentin alone

Group B (n=20): Patients treated with a combination of gabapentin and nortriptyline

Treatment Protocol

Gabapentin: Patients in Group A received gabapentin at an initial dose of 300 mg per day, titrated up to a maximum of 1800 mg per day based on pain relief and tolerance.

Gabapentin and Nortriptyline: Patients in Group B received gabapentin at the same dosing regimen as Group A, in combination with nortriptyline starting at 10 mg per day, titrated up to a maximum of 75 mg per day based on pain relief and tolerance.

Outcome Measures: Pain intensity was measured using the Visual Analog Scale (VAS), with scores ranging from 0 (no pain) to 10 (worst pain imaginable). Assessments were conducted at baseline, 3 months, 6 months, 12 months, and 18 months. Additional outcome measures included:

Functional Jaw Movements: Assessed using maximum mouth opening (MMO) measured in millimeters.

Patient Satisfaction: Evaluated using a 5-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied).

Statistical Analysis: Data were analyzed using SPSS software version 25.0 (IBM Corp, Armonk, NY). Descriptive statistics were used to summarize patient demographics and baseline characteristics. Paired t-tests were used to compare changes in VAS scores, MMO, and patient satisfaction within each group over time. Independent t-tests were used to compare outcomes between the two groups at each time point. A p-value of <0.05 was considered statistically significant.

Results

Patient Demographics and Baseline Characteristics: The study included 40 patients, with 20 in each group. The demographic and baseline characteristics of the patients are presented in Table 1. There were no significant differences between the groups in terms of age, gender, or baseline pain intensity.

Table 1: Demographic and Baseline Characteristics of Patients

Characteristic	Group A (Gabapentin)	Group B (Gabapentin + Nortriptyline)	p-value
Number of Patients	20	20	-
Mean Age (years)	45.3 ± 10.2	46.1 ± 9.8	0.72
Gender (Male/Female)	8/12	9/11	0.77
Baseline VAS Score	7.5 ± 1.1	7.6 ± 1.0	0.84
Baseline MMO (mm)	35.2 ± 5.6	34.8 ± 5.3	0.79

Pain Reduction: Both groups showed significant reductions in pain scores over the 18-month follow-up period. However, Group B exhibited a more substantial decrease in pain intensity compared to Group A. The mean VAS scores at different time points are presented in Table 2.

Table 2: Mean VAS Scores over Time

Time Point	Group A (Gabapentin)	Group B (Gabapentin + Nortriptyline)	p-value
Baseline	7.5 ± 1.1	7.6 ± 1.0	0.84
3 Months	6.0 ± 1.0	5.2 ± 0.9	0.03
6 Months	5.3 ± 1.0	4.2 ± 0.8	0.01
12 Months	4.6 ± 1.1	3.3 ± 0.7	0.001
18 Months	4.2 ± 1.0	2.8 ± 0.6	0.001

Functional Jaw Movements: Functional improvement, as measured by maximum mouth opening (MMO), was observed in both groups. Group B showed a greater improvement in MMO compared to Group A. The mean MMO values at different time points are presented in Table 3.

Table 3: Mean Maximum Mouth Opening (MMO) Over Time (mm)

Time Point	Group A (Gabapentin)	Group B (Gabapentin + Nortriptyline)	p-value
Baseline	35.2 ± 5.6	34.8 ± 5.3	0.79
3 Months	37.1 ± 5.4	39.5 ± 5.0	0.15
6 Months	38.5 ± 5.2	41.3 ± 4.8	0.10
12 Months	39.2 ± 5.0	43.1 ± 4.6	0.03
18 Months	40.0 ± 4.8	44.5 ± 4.5	0.01

Patient Satisfaction: Patient satisfaction scores were higher in Group B compared to Group A at all-time points. The mean satisfaction scores at different time points are presented in Table 4.

Table 4: Mean Patient Satisfaction Scores over Time

Time Point	Group A (Gabapentin)	Group B (Gabapentin + Nortriptyline)	p-value
3 Months	3.2 ± 0.8	3.8 ± 0.7	0.02
6 Months	3.5 ± 0.7	4.2 ± 0.6	0.01
12 Months	3.7 ± 0.6	4.5 ± 0.5	0.001
18 Months	4.0 ± 0.5	4.8 ± 0.4	0.001

Adverse Effects

No significant adverse effects were reported in either group throughout the study period. In summary, the combination of gabapentin and nortriptyline was more effective in reducing pain, improving functional jaw movements, and increasing patient satisfaction compared to gabapentin alone.

Discussion

The management of pain-related temporomandibular disorders (TMDs) remains a significant challenge due to the multifactorial nature of these conditions. Our study aimed to compare the efficacy of gabapentin alone versus gabapentin combined with nortriptyline in managing pain-related TMDs over an 18-month period. The results indicated that the combination therapy was more effective in reducing pain intensity, improving functional outcomes, and enhancing patient satisfaction compared to gabapentin monotherapy. Gabapentin, an anticonvulsant, has been shown to be effective in various chronic pain conditions, including neuropathic pain and TMDs [1,2]. Its mechanism of action involves modulation of voltage-gated calcium channels, leading to decreased release of excitatory neurotransmitters and reduced neuronal excitability [3]. In our study, patients treated with gabapentin alone (Group A) showed significant pain reduction, as evidenced by the decrease in Visual Analog Scale (VAS) scores over time. However, the addition of nortriptyline to gabapentin (Group B) resulted in a more substantial reduction in pain scores.

Nortriptyline, a tricyclic antidepressant, is commonly used in the management of chronic pain due to its ability to inhibit the reuptake of serotonin and norepinephrine, thereby enhancing descending pain inhibitory pathways [4]. The combination of gabapentin and nortriptyline has been explored in other pain conditions, with studies suggesting that such combination therapy can provide superior pain relief compared to monotherapy [5,6]. Our findings are consistent with these reports, demonstrating that the combination of gabapentin and nortriptyline offers enhanced pain management for patients with pain-related TMDs. Functional improvement, as measured by maximum mouth opening (MMO), was also greater in the combination therapy group compared to the monotherapy group. This suggests that the superior pain relief provided by the combination therapy may translate into better functional outcomes, allowing patients to perform daily activities with less discomfort. Similar results have been reported in studies examining the effects of combination pharmacotherapy on functional outcomes in

chronic pain conditions [7]. Patient satisfaction is a crucial aspect of chronic pain management, as it reflects the overall effectiveness and tolerability of the treatment regimen. In our study, patients receiving combination therapy reported higher satisfaction scores at all-time points compared to those receiving gabapentin alone. This aligns with previous studies indicating that combination therapy not only provides better pain relief but also improves patient satisfaction [8].

The retrospective nature of this study and the relatively small sample size are limitations that should be considered when interpreting the results. Additionally, the lack of a placebo control group limits the ability to attribute the observed effects solely to the treatments under investigation. Future prospective randomized controlled trials with larger sample sizes are needed to confirm these findings and provide more robust evidence for the efficacy of combination therapy in managing pain-related TMDs.

Conclusion

In conclusion, our study suggests that the combination of gabapentin and nortriptyline is more effective than gabapentin alone in reducing pain, improving functional outcomes, and enhancing patient satisfaction in patients with pain-related TMDs. These findings support the use of combination pharmacotherapy as a superior treatment strategy for managing pain-related TMDs.

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