e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(2); 568-574

Original Research Article

Efficacy of Pregabalin and Gabapentin in Treatment of Neuropathic Pain at a Tertiary Care Hospital: A Prospective Study

Preksha Barot[1], Jitendra Vaghela[2], Radhika Panchal[3], Sohil Makwana[4]

[1]Assistant Professor, Department of Pharmacology, GMERS Medical College, Dharpur, Patan, Gujarat

[2]Assistant Professor, Department of Pharmacology, NAMO Medical Education and Research Institute, Silvassa

[3]Tutor, Department of Pharmacology, NAMO Medical Education and Research Institute, Silvassa

[4]Associate Professor, Department of Pharmacology, GMERS Medical College, Dharpur, Patan, Gujarat

Received: 26-10-2022 / Revised: 30-11-2022 / Accepted: 20-12-2022

Corresponding author: Dr Sohil Makwana

Conflict of interest: Nil

Abstract

Background and Aim: One of the most common pain-related disorders, neuropathic pain (NeP), is frequently underdiagnosed and undertreated. Pregabalin (PGB) and gabapentin (GBP) are both used to treat neuropathic pain, however there is equipoise. Pregabalin and gabapentin's effectiveness in treating neuropathic pain at a government tertiary care hospital was evaluated in the current study.

Material and Methods: The cases were split into two groups at random. Pregabalin was given to Group 1 (N=80) (300 mg). For 24 weeks, Group 2 (N=80) got one dose of Gabapentin (600 mg) every day. The Douleur Neuropathique 4 questions are used to diagnose neuropathic pain, which is then quantified using a pain rating system. Efficacy of drug was based on their capability to decrease neuropathic pain at regular intervals.

Results: Since the mean pain rating scores for groups 1 and 2 at the first day of OPD are 7.94 and 7.96, respectively, there is no discernible difference between them (baseline). But by the fourth week, group 1 is significantly different from group 2 in terms of pain rating (p 0.005). Similar to this, group 1 is statistically significantly more effective than group 2 at week 24.

Conclusion: Pregabalin and GBP were both significantly effective, in our opinion. According to effectiveness, pregabalin 300 mg taken once daily improved symptoms and signs more than gabapentin 600 mg administered once daily. According to the study, pregabalin is more effective than gabapentin for treating neuropathic pain.

Keywords: Efficacy, Gabapentin, Neuropathic pain, Pregabalin

Introduction

Pain is thought to be a signaling system for tissue damage, either already present or impending. Nociceptive pain and neuropathic pain (NeP) are two types of pain that are essentially common, and it is important to differentiate between the two because of the

significant differences in their etiologies, presentations, and therapy [1,2]. Neuropathic pain is described by the International association for the study of pain (IASP) as "pain induced by a lesion or disease of the somatosensory nerve system [3]. The central nervous system or the peripheral nervous system may be the site of the lesion or disease. Allodynia, hyperalgesia, electrical and shooting pain, and spontaneous burning pain are typical clinical symptoms of neuropathic pain. The DN4 questionnaire is the screening tool for the diagnosis of neuropathic pain that is most frequently used in OPDs. Allodynia, hyperalgesia, electrical and shooting pain, and sudden searing pain are typical clinical symptoms of NeP. Along with the considerable load of NeP, the physical and mental pain that goes along with it has a negative influence on life quality (QoL). Neurons in many brain areas related to senses, emotion, cognition, integrative processing, and pain regulation are impacted by NeP. NeP is frequently linked to depression, which suggests that maladaptive changes in these regions cause behavioral changes [4-7].

Worldwide, NeP is underdiagnosed, and treatment is often inadequate [8-11]. The direct and indirect effects of NeP affect not only the person but also the family and society as a whole. The severity of NeP is linked to decreased productivity, and it necessitates additional doctor visits and drug dosages. NeP's financial cost is a major worry in emerging nations like India. Although there are few reports on NeP's prevalence, it has a significant economic impact in India. According to a recent study from India, patients with type 2 diabetes mellitus had a reported prevalence of diabetic peripheral neuropathy (DPN) of 29.2%. (T2DM) [12-14].

Tricyclic antidepressants (TCA), gabapentinoids, and serotonin norepinephrine reuptake inhibitors are the first options for treating neuropathic pain (SNRI). Tramadol may occasionally be added either by itself or with the first line. The fixed dosage combination (FDC) of gabapentinoids, such as pregabalin, with TCAs like nortriptyline, is beneficial and increases adherence to therapy.

Pregabalin and gabapentin are examples of gabapentinoids. They are a class of anticonvulsants that work by limiting the release of neurotransmitters by blocking presynaptic alpha-2-delta calcium channels in the dorsal horn [15,16]. They are considered first line agents in the treatment of neuropathic pain by multiple international societies [17]. Gabapentin and pregabalin both have been shown to be effective in post herpetic neuralgia and diabetic peripheral neuropathy [17-22]. The present study was undertaken to assess the efficacy of pregabalin and gabapentin in treatment of neuropathic pain at a tertiary care hospital.

Material and Methods

The current study was planned as a prospective study carried out over a 14-month period at the department of pharmacology connected to a medical college in an Indian Tertiary care facility.

Inclusion criteria:

The study comprised patients of either sex who were at least 18 years old, had a confirmed diagnosis of neuropathic pain based on their clinical presentation, and were willing to participate. Exclusion standards Patients over the age of 18 who had a confirmed diagnosis of neuropathic pain based on their clinical presentation and were willing to participate in the trial were enrolled.

Exclusion criteria

The study excluded participants who were 18 years of age or older, had other types of pain that were not confirmed to be neuropathic

pain, refused to give their consent, or had concomitant diseases. The institutional ethical committee provided its ethical approval, and each subject provided signed informed permission.

The cases were split into two groups at random. Pregabalin was given to Group 1 (N=80) (300 mg). For 24 weeks, Group 2 (N=80) got one dose of Gabapentin (600 mg) every day. The patients were assessed based on a thorough history, current symptoms, and prior symptoms. Patients who have been diagnosed with neuropathic pain visit the outpatient department. After approving the consent form, which was presented in both Hindi and English or any other language the patient can comprehend, the patient was included in the study. Medications: the drugs which we compare in the study were pregabaln and gabpentin, these two were most widely used and available at our tertiary care centre where study was conducted.

Pregabalin is a gamma-amino butyric acid (3-isobutyl) derivative with anticonvulsant, antiepileptic, anxiolytic, and analgesic properties. Pregabalin selectively binds to alpha-2-delta (2) subunits of presynaptic voltage-dependent calcium channels (VDCCs) in the central nervous system, while the precise mechanism of action is uncertain (CNS). Pregabalin binds to VDCC 2 subunits, inhibiting synaptic transmission and reducing neuronal excitability. This prevents calcium influx and the subsequent calcium-dependent release of several neurotransmitters, including glutamate, norepinephrine, serotonin, dopamine, and substance P, from the presynaptic nerve terminals of hyperexcited neurons. Pregabalin has no effect on the absorption or breakdown of GABA since it does not directly bind to GABA-A or GABA-B receptors. Pregabalin is an anticonvulsant and a neuronal activity inhibitor used to treat painful neuropathy. The anticonvulsant drug gabapentin is a synthetic counterpart of the neurotransmitter gamma-aminobutyric acid. Gabapentin appears to block excitatory neuron activity, while its precise method of action is uncertain. Additionally, this substance has analgesic qualities.

Pregabalin binds to VDCC 2 subunits, inhibiting synaptic transmission and reducing neuronal excitability. This prevents calcium influx and the subsequent calcium-dependent release of several neurotransmitters, including glutamate, norepinephrine, serotonin, dopamine, and substance P, from the presynaptic nerve terminals of hyperexcited neurons. Pregabalin has no effect on the absorption or breakdown of GABA since it does not directly bind to GABA-A or GABA-B receptors. Pregabalin is an anticonvulsant and a neuronal activity inhibitor used to treat painful neuropathy. The anticonvulsant drug gabapentin is a synthetic counterpart of the neurotransmitter gamma-aminobutyric acid. Gabapentin appears to block excitatory neuron activity, while its precise method of action is uncertain. Additionally, this substance has analgesic qualities. The NPRS is a segmented numerical version of the visual analog scale (VAS), in which the respondent chooses an integer value between 0 and 10 that best describes the degree of their pain. Horizontal bars or lines are the most typical format. The NPRS is grounded by phrases that describe the extremes of pain severity, much like the VAS. The 11-point numeric scale goes from "no pain" to "pain as awful as you can conceive" or "worst pain imaginable," with "0" denoting one extreme of pain and "10" denoting the other.

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests,

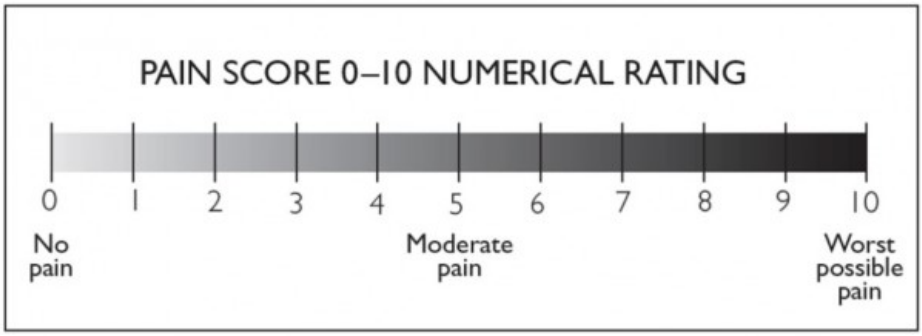
confidence level and level of significance were set at 95% and 5% respectively.

Results

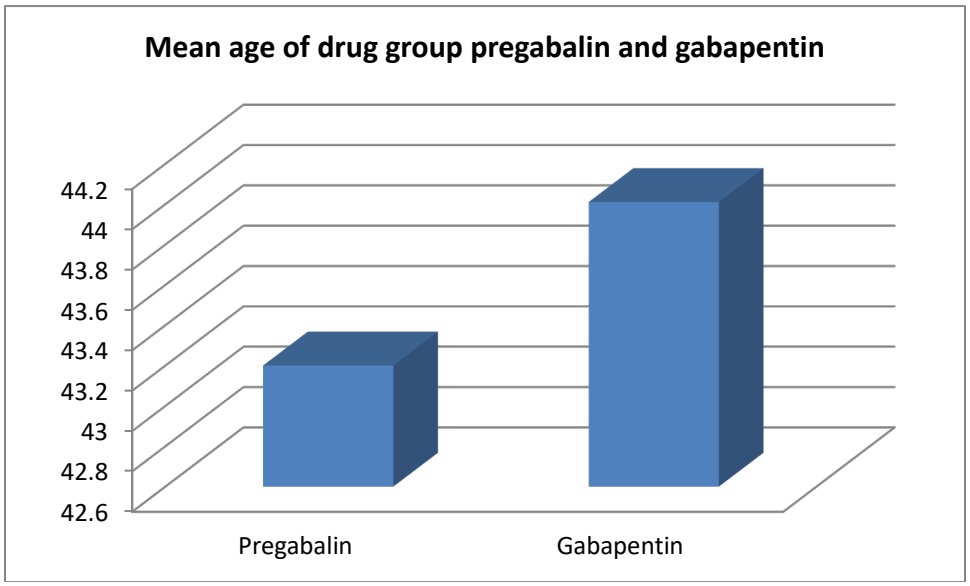
Final 160 patients who met the requirements for inclusion and gave their consent to participate in the study were enrolled, and they were then randomly divided into two groups.

Pregabalin group 1's mean population age in our study was 43.2 05.10, while gabapentin group 2's mean population age was 44 10.1; as a result, these groups' average population ages are comparable. (Graph 1) Out of 160 patients, 69 (43.12%) were female overall and 91 (56.87%) were male. In group 1 (pregabalin), there were 32 female overall and 44 male. Additionally, there were 37 females and 47 males in group 2 (gabapentin).

There were 160 total study participants, with 80 in each group. Signs and symptoms were evaluated at weeks 4, 12, and 24. Given that the mean pain rating scores for groups 1 and 2 (gabapentin) at the first day of OPD are 7.94 and 7.96, respectively, there is no discernible difference between them (baseline). But by the fourth week, group 1 is significantly different from group 2 (Gabapentin) in terms of pain rating ($p<0.05$). Similar to this, group 1 (pregabalin) is statistically significantly more effective than group 2 (gabapentin) at week 24. ($p<0.05$). (Table 1)



Graph 1: Numeric pain rating scale (NPRS)



Graph 2

Table 1: Comparison of mean scores between two groups at 4th week, 12th week and 24th week

Variable	Day 1	4th week	12th week	24th week
Level of significance among pregabalin and gabapentin	0.08	0.001*	0.002*	0.001*

* indicates statistically significance at p≤0.05
Test applied: student t test

Discussion

While PGB and GBP were both considerably effective in reducing the severity of pain in patients with Neuropathic pain, it was shown that GBP was superior when put head-to-head. Moreover, regardless of the sequence order, GBP was linked to fewer and less severe AEs. Although PGB and GBP both significantly reduced pain-related impairment (as measured by ODI), neither was superior when put head to head.

The effectiveness of the medicine was assessed using a numerical pain rating scale that was measured at specific intervals and the reduction in neuropathic pain. The cases were split into two groups at random. Pregabalin was given to Group 1 (N=80) (300 mg). For 24 weeks, Group 2 (N=80) got one dose of Gabapentin (600 mg) every day. The observation was performed at the baseline, followed by periods of time at 4, 12, and 24 weeks. When compared to the respective predecessor times in both groups, we discovered that the numerical pain rating score (NPRS) within each group considerably (p0.05) decreased at all post periods. There have been numerous research on the safety and effectiveness of medications for neuropathic pain. Pregabalin is more effective than gabapentin in treating persistent neuropathic pain in people with spinal cord injury, according to research by Attal *et al* [23]. Pregabaline significantly reduced neuropathic cancer pain and neuropathic symptoms compared to other antineuropathic medications, statistically and clinically, while preserving morphine. In a paper that was published, Kiss and colleagues summarized, presented, and assessed national and international guidelines that had been produced over the previous five years [24]. Pregabalin is more successful than gabapentin, according to Robertson *et al*., who analyzed papers to compare the efficacy and adverse effects of the two drugs in the treatment of sciatica [25]. Pregabalin is a successful treatment for post herpetic neuralgia, according to Bruce C. M. Wang *et al*12-week .'s simulation model that was customized for China and used data from 1000 patients with pNeP and PHN to assess the cost-effectiveness of pregabalin with gabapentin [26].

Pregabalin versus gabapentin was the subject of a randomized, double-blind, cross-over trial by Robertson *et al*., which demonstrated the efficacy of pregabalin in comparison to gabapentin in easing sciatica sufferers' pain and contributed to a better understanding of the range of treatment choices [27] Pregabalin was used to treat a patient for PHN after gabapentin treatment failed in a case report by Kopel *et al* [28].

Pregabalin might work as a first-line treatment for PHN as well as other neuropathic and chronic pain conditions. In individuals with spinal cord injury-related neuropathic pain, the efficacy order from highest to lowest was pregabalin, gabapentin, amitriptyline, carbamazepine, and placebo based on the average pain intensity following treatment.

The study included limitations, including the possibility that each person might perceive pain differently. Statistical error is possible due to the limited sample size, absence of blinding, or placebo group. Larger sample sizes and studies with several perspectives can improve results. To get additional data, larger groups and longer follow-up are required.

Conclusion

Both GBP and pregabalin were significantly effective. According to effectiveness, pregabalin 300 mg taken once daily improved symptoms and signs more than gabapentin 600 mg administered once daily. Pregabalin was shown to be more effective than gabapentin at treating neuropathic pain, according to the study, albeit its findings may need to be confirmed on a larger sample size.

References

1. Cohen SP, Mao J. Neuropathic pain: Mechanisms and their clinical implications. BMJ 2014;348: f7656.
2. Costigan M, Scholz J, Woolf CJ. Neuropathic pain: A maladaptive response of the nervous system to damage. Annu Rev Neurosci 2009; 32:1-32.
3. Hobbs RD. Classification of chronic pain descriptions of chronic pain syndromes and definitions of pain terms. IASP. 2002; 2:212-8.
4. Jensen MP, Chodroff MJ, Dworkin RH. The impact of neuropathic pain on health-related quality of life: Review and implications. Neurology 2007; 68:1178-82.
5. Mccarberg BH, Nicholson BD, Todd KH, PalmerT, Penles L. The impact of pain on quality of life and the unmet needs of pain management: Results from pain sufferers and physicians participating in an internet survey. Am J Ther 2008; 320:312-20.
6. Borsook D. Neurological diseases and pain. Brain 2012; 135:320-44.
7. Dermanovic Dobrota V, Hrabac P, Skegro D, Smiljanic R, Dobrota S Prkacin I, *et al*. The impact of neuropathic pain and other comorbidities on the quality of life in patients with diabetes. Health Qual Life Outcomes 2014; 12:171.
8. Hall GC, Carroll D, Parry D, McQuay HJ. Epidemiology and treatment of neuropathic pain: The UK primary care perspective. Pain 2006; 122:156-62.
9. Harrison RA, Field TS. Post stroke pain: Identification, assessment, and therapy. Cerebrovasc Dis 2015; 39:190-201.
10. Arco RD, Nardi SM, Bassi TG, Paschoal Vdel A. Diagnosis and medical treatment of neuropathic pain in leprosy. Rev Lat Am Enfermagem 2016;24: e2731.
11. Westaway KP, Alderman CP, Frank OR, Husband AJ, Rowett D, Le Blanc T. Optimising therapy for patients with neuropathic pain. J Pharm Pract Res 2014; 44:44-7.
12. Schaefer C, Sadosky A, Mann R, Daniel S, Parsons B, Tuchman M, *et al*. Pain severity and the economic burden of neuropathic pain in the United States: BEAT neuropathic pain observational study. Clinicoecon Outcomes Res 2014; 6:483-96.
13. Rowbotham DJ. Neuropathic pain and quality of life. Eur J Pain 2002;6 Suppl B: 19-24.
14. Bansal D, Gudala K, Muthyala H, Esam HP, Nayakallu R, Bhansali A, *et al*. Prevalence and risk factors of development of peripheral diabetic neuropathy in type 2 diabetes mellitus in a tertiary care setting. J Diabetes Investig 2014; 5:714-21.
15. Dworkin RH, O'Connor AB, Audette J, Baron R, Gourlay GK, Haanpää ML, *et al*. Recommendations for the pharmacological management of neuropathic pain: an overview and

literature update. Mayo Clin Proc. 2010;85(3): S3-14.
16. Pan B, Yu H, Park J, Yu YP, Luo ZD, Hogan QH. Painful nerve injury upregulates thrombospondin-4 expression in dorsal root ganglia. J Neurosci Res. 2015;93(3):443-53.
17. Moulin DE, Clark AJ, Gilron I, Ware MA, Watson CP, Sessle BJ, *et al*. Pharmacological management of chronic neuropathic pain - consensus statement and guidelines from the Canadian pain society. Pain Res Manage. 2007;12(1):13-21.
18. Casale R, Symeonidou Z, Bartolo M. Topical treatments for localized neuropathic pain. Curr Pain Headache Rep. 2017;21(3):15.
19. Bates D, Schultheis BC, Hanes MC, Jolly SM, Chakravarthy KV, Deer TR, *et al*. A comprehensive algorithm for management of neuropathic pain. Pain Med. 2019;20(1): S2-12.
20. Van Seventer R, Feister HA, Young JP, Stoker M, Versavel M, Rigaudy L. Efficacy and tolerability of twice-daily pregabalin for treating pain and related sleep interference in postherpetic neuralgia: a 13- week, randomized trial. Curr Med Res Opinion. 2006; 22(2):375-84.
21. Richter RW, Portenoy R, Sharma U, Lamoreaux L, Bockbrader H, Knapp LE. Relief of painful diabetic peripheral neuropathy with pregabalin: a randomized, placebo-controlled trial. J Pain. 2005;6(4):253-60.
22. Arezzo JC, Rosenstock J, Lamoreaux L, Pauer L. Efficacy and safety of pregabalin 600 mg/d for treating painful diabetic peripheral neuropathy: a double-blind placebo-controlled trial. BMC Neurol. 2008; 8:33.
23. Mishra S, Bhatnagar S, Goyal GN, Rana SP, Upadhya SP. A comparative efficacy of amitriptyline, gabapentin, and pregabalin in neuropathic cancer pain: a prospective randomized double-blind placebocontrolled study. Am J Hospice Palliative Care. 2012; 29(3):177-82.
24. Kiss G. Drug therapy of neuropathic pain based on the latest recommendations. Ideggyogyaszati Szemle. 2015;68(3-4):93-8.
25. Robertson K, Marshman LA, Plummer D. Pregabalin and gabapentin for the treatment of sciatica. J Clin Neurosci. 2016; 26:1-7.
26. Wang BC, Liu D, Furnback WE, Bifa F, Dong P, Xie L, *et al*. The cost-effectiveness of pregabalin versus gabapentin for peripheral neuropathic pain (pNeP) and Postherpetic Neuralgia (PHN) in China. Pain Ther. 2016;5(1):81-91.
27. Robertson K, Marshman LAG, Hennessy M, Harriss L, Plummer D. Pregabalin versus gabapentin in the treatment of sciatica: study protocol for a randomised, double-blind, cross-over trial (PAGPROS). Trials. 2018;19(1):21.
28. Kopel J, Brower GL. Effectiveness of pregabalin as a secondary treatment for neuropathic pain from postherpetic neuralgia. Baylor Univ Medical J. 2020; 33(3):469-70.