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Original Research Article

Comparative Efficacy of Jaipur Block versus Modified Jaipur Block in the Management of Postherpetic Neuralgia: A Randomized Controlled Trial

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Abstract:

Background: Postherpetic neuralgia (PHN) is among the most refractory chronic pain syndromes encountered in clinical practice. Subcutaneous nerve block therapy offers a practical, cost-effective interventional option suitable for outpatient settings; however, no prospective randomized comparison between the dexamethasone-based Jaipur Block and the methylprednisolone-based Modified Jaipur Block has been published. The present study was undertaken to address this gap.

Methods: Eighty patients with PHN attending the outpatient department of a tertiary dermatology centre were randomly allocated into Group A (Jaipur Block, n=40) and Group B (Modified Jaipur Block, n=40). Subcutaneous injections were administered at the site of maximum pain within the affected dermatome at 6-week intervals, for a maximum of three sessions over six months. Pain severity was assessed using the Visual Analogue Scale (VAS, 0–10 cm) at baseline and at each follow-up visit.

Results: Both interventions produced statistically significant reductions in VAS after each injection ($p<0.05$). Mean VAS in Group A declined from 4.88 at baseline to 0.41±0.15 following the third injection; in Group B, from 4.50 to 0.70±0.22. Complete pain relief (VAS=0) was achieved in 80.6% of evaluable Group A patients versus 73.5% in Group B; the intergroup difference was not statistically significant ($p>0.05$). Disease duration under six months and age below 60 years were the strongest positive predictors of outcome.

Conclusion: Both blocks are effective in PHN. The original dexamethasone-based Jaipur Block is recommended as the preferred regimen, given its marginally superior complete-relief rate and better performance in elderly patients and those with ophthalmic dermatome involvement. Early initiation of therapy, ideally within six months of onset, is critical for optimal outcomes.

Keywords: Postherpetic Neuralgia, Jaipur Block, Modified Jaipur Block, Subcutaneous Nerve Block, Visual Analogue Scale, Neuropathic Pain, Dexamethasone, Methylprednisolone, Randomized Controlled Trial.

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Introduction

Postherpetic neuralgia (PHN) is defined as pain persisting for more than one month after the resolution of the herpes zoster rash. It represents the most common and dreaded long-term complication of herpes zoster and remains notoriously refractory to treatment. The condition results from viral damage to sensory ganglia and peripheral nerve fibres, leading to peripheral sensitization of nociceptors, ectopic impulse generation at injured axons, and central sensitization within the spinal dorsal horn. Patients typically experience a combination of spontaneous burning pain, mechanical allodynia, and hyperalgesia that can severely impair sleep, daily functioning, and overall quality of life.

The risk of developing PHN increases markedly with advancing age. Population-based studies indicate that approximately 5% of herpes zoster patients younger than 60 years develop PHN, whereas the incidence exceeds 20% in individuals older than 80 years [1]. This age-related rise is attributed to the progressive decline in varicella-zoster virus-specific cell-mediated immunity. Given the rapidly ageing population in India, PHN is emerging as an important and often under-recognised public health concern in dermatology and pain-management clinics nationwide.

Conventional pharmacological therapies — including tricyclic antidepressants, gabapentinoids, opioids, and topical agents — provide satisfactory

relief in only about half of affected individuals, and systemic side effects frequently limit their use, particularly in older adults [2]. This therapeutic shortfall has stimulated interest in targeted interventional procedures. Subcutaneous nerve blocks directed at the painful dermatome are especially attractive in the Indian outpatient context because they are inexpensive, require no sophisticated equipment, and avoid systemic adverse effects.

The Jaipur Block was originally described by Bhargava and Bhargava (1998) using a combination of 2% lignocaine, 0.5% bupivacaine, and dexamethasone; complete relief was reported in 96% of 3,960 patients [3]. Subsequently, Puri (2011) modified the technique by replacing dexamethasone with methylprednisolone and documented 90% complete relief in a series of 30 patients [4]. Despite widespread clinical adoption of both regimens, no prospective randomized comparative trial has been published to date. The present study was therefore designed to evaluate and compare the analgesic efficacy of the Jaipur Block and the Modified Jaipur Block in a randomized cohort of PHN patients at a tertiary dermatology centre in Rajasthan, India, using the Visual Analogue Scale as the primary outcome measure.

Materials and Methods

Study Design and Setting: This open-label, prospective, randomized comparative study was conducted over a two-year period in the Outpatient Department of Dermatology, Venereology and Leprology, SMS Medical College and Hospital, Jaipur, Rajasthan, India. The study protocol was approved by the Institutional Ethics Committee and carried out in strict accordance with the ethical guidelines for biomedical research involving human participants issued by the Indian Council of Medical Research (ICMR, 2006). Written informed consent was obtained from every participant before enrolment.

Participants: Adults presenting with PHN — defined as pain persisting for more than one month after the onset of herpes zoster rash — were eligible for inclusion. Following consent, patients were randomized 1:1 into the two study arms using a computer-generated random number sequence (n=40 per group). Key exclusion criteria were: known hypersensitivity to local anaesthetics; active infection at the intended injection site; known HIV infection or active malignancy; significant systemic illness (uncontrolled hypertension, diabetes mellitus, cardiac, hepatic, or renal disease); and pregnancy or lactation. Baseline laboratory evaluation comprised complete blood count, fasting blood glucose, renal and liver function tests, ESR, fasting lipid profile, chest radiograph, electrocardiogram, and HIV ELISA.

Interventions

Group A — Jaipur Block: One millilitre of dexamethasone (4 mg/ml) was added to a 30 ml vial of 2% lignocaine and, separately, to a 20 ml vial of 0.5% bupivacaine. From each mixture, 2.5 ml was withdrawn and injected subcutaneously at the site of maximum pain and visible scarring within the affected dermatome (total volume: 5 ml per session).

Group B — Modified Jaipur Block: The identical procedure was followed except that 1 ml of methylprednisolone acetate was substituted for dexamethasone in each vial. Injection volume and site were the same as in Group A.

The initial injection was administered at baseline (Week 0). Subsequent injections were given at Week 6 and Week 12, provided pain persisted. Rescue oral analgesics were permitted on an as-needed basis between visits. VAS assessments were performed at 3-week intervals throughout the six-month study period.

Outcome Measurement: The primary endpoint was the proportion of patients achieving complete pain relief (VAS=0) at the end of the study. Pain intensity was measured at every visit using the Visual Analogue Scale — a 10 cm horizontal line anchored by "No pain" (0) at one end and "Severe pain" (10) at the other. Patients marked their current pain level on the scale; the distance from the zero anchor was measured in centimetres and recorded as the VAS score.

Statistical Analysis: Data are presented as mean ± standard error of the mean (SEM). Within-group changes in VAS scores were analysed using the paired Student's t-test; between-group comparisons employed the unpaired t-test. Categorical variables, including relief rates, were compared with the Chi-square test. All tests were two-tailed, and a p-value <0.05 was considered statistically significant. Statistical analysis was performed using standard software.

Results

Patient Disposition and Baseline Characteristics: Of the 80 patients enrolled, 70 completed the full six-month follow-up (Group A: 36; Group B: 34). Ten patients were lost to follow-up (Group A: 4; Group B: 6) and were excluded from the efficacy analysis. The two groups were well balanced at baseline (Table 1). The study population comprised 42 males and 38 females (M:F ratio 1.1:1). The 61–70-year age group was the most frequently represented, accounting for 31.25% of the total cohort (n=25). The majority of

patients — 77.5% overall — had PHN of 1–6 months' duration at the time of enrolment.

Table 1: Baseline characteristics and demographic data

Parameter	Group A — Jaipur Block (n=40)	Group B — Modified Block (n=40)
Male : Female	24 : 16	18 : 22
Most common age group	61–70 years (n=10)	61–70 years (n=15)
PHN duration 1–6 months	29 (72.5%)	33 (82.5%)
PHN duration 6–12 months	9 (22.5%)	4 (10.0%)
PHN duration >12 months	2 (5.0%)	3 (7.5%)
Thoracic dermatome	23 (57.5%)	20 (50.0%)
Ophthalmic dermatome	5 (12.5%)	11 (27.5%)
Abdominal dermatome	9 (22.5%)	5 (12.5%)
Mean baseline VAS	4.88	4.50
Patients completing study	36 (90.0%)	34 (85.0%)

Dermatomal Distribution: Thoracic dermatomes were most commonly involved in both groups (Group A: 57.5%; Group B: 50.0%), followed by abdominal and ophthalmic distributions (Table 2). Limb, mandibular, maxillary, and sacral involvement was infrequent.

Table 2: Dermatomal distribution of PHN across both treatment groups

Dermatomal Segment	Group A (n=40)	Group B (n=40)	Total (n=80)
Thoracic	23 (57.5%)	20 (50.0%)	43 (53.8%)
Abdominal	9 (22.5%)	5 (12.5%)	14 (17.5%)
Ophthalmic	5 (12.5%)	11 (27.5%)	16 (20.0%)
Limb	2 (5.0%)	1 (2.5%)	3 (3.8%)
Mandibular	1 (2.5%)	1 (2.5%)	2 (2.5%)
Maxillary	0	1 (2.5%)	1 (1.3%)
Sacral	0	1 (2.5%)	1 (1.3%)

VAS Reduction at Successive Timepoints: Both groups exhibited progressive and statistically significant declines in mean VAS scores after each injection (Table 3). In Group A, mean VAS declined from 4.88 at baseline to 2.51±0.33 following the first injection, 1.21±0.24 after the second, and 0.41±0.15 after the third. The corresponding values in Group B were 4.50 at baseline, declining to 2.40±0.38, 1.17±0.30, and 0.70±0.22 after successive injections. All within-group changes were statistically significant ($p<0.05$). Inter-group differences at every timepoint were not significant ($p>0.05$).

Table 3: Mean VAS scores at successive timepoints — intra-group comparison (paired t-test) and inter-group comparison (unpaired t-test)

Timepoint	Group A VAS ± SEM	Group B VAS ± SEM	Intra-group p	Inter-group p
Baseline	4.88	4.50	—	>0.05
After 1st injection	2.51 ± 0.33	2.40 ± 0.38	<0.05	>0.05
After 2nd injection	1.21 ± 0.24	1.17 ± 0.30	<0.05	>0.05
After 3rd injection	0.41 ± 0.15	0.70 ± 0.22	<0.05	>0.05

Complete Pain Relief at Study End: Complete pain relief (VAS=0) at the conclusion of the study was recorded in 29 of 36 evaluable patients in Group A (80.6%) and 25 of 34 patients in Group B (73.5%). This difference was not statistically significant ($p>0.05$). Table 4 presents the number of patients achieving complete relief after each injection and cumulative relief rates at study end.

Table 4: Complete pain relief (VAS=0) by injection number and cumulative rate at study end

Injection	Group A: Relief / Total	Cumulative (A)	Group B: Relief / Total	Cumulative (B)
After 1st injection	7 / 39	17.9%	11 / 37	29.7%
After 2nd injection	10 / 30	43.6%	7 / 23	48.6%
After 3rd injection	12 / 19	80.6%	7 / 16	73.5%

Influence of Age, PHN Duration, and Dermatomal Segment: Complete pain relief was achieved in more than 89% of patients below 60 years of age in both groups. All three patients aged 81–90 years in Group A failed to achieve complete relief; no patient in Group B fell into this age bracket. PHN duration was the single strongest predictor of outcome. Among patients with disease duration of 1–6 months, complete relief was achieved in 88.5% (23/26) of Group A and 81.5% (22/27) of Group B patients. In the 6–12-month duration subgroup, response rates fell markedly: 62.5% (5/8) in Group A and only 25% (1/4) in Group B. Thoracic dermatomes showed the highest success rates (≥89% in both groups, Table 5). Ophthalmic involvement was the least responsive, with complete relief in 60% of Group A versus only 36.4% of Group B patients — a clinically important differential that consistently favoured the Jaipur Block.

Table 5: Complete pain relief (VAS=0) at study end by dermatomal segment

Dermatomal Segment	Gr. A Enrolled	Gr. A Complete Relief (%)	Gr. B Enrolled	Gr. B Complete Relief (%)
Thoracic	21	19 (90.5%)	18	16 (88.9%)
Abdominal	9	5 (55.6%)	5	3 (60.0%)
Ophthalmic	5	3 (60.0%)	11	4 (36.4%)
Mandibular	1	1 (100%)	1	1 (100%)
Limb	2	2 (100%)	1	1 (100%)

Discussion

The present randomized study demonstrates that both the Jaipur Block and the Modified Jaipur Block produce clinically meaningful and statistically significant pain relief in patients with PHN, achieving complete-relief rates of 80.6% and 73.5%, respectively. No statistically significant difference was observed between the two regimens overall, and in everyday practice either formulation may be selected based on local availability of corticosteroids. Nevertheless, the data consistently indicate a marginal advantage for the dexamethasone-based Jaipur Block in the two clinically important subgroups of elderly patients and those with ophthalmic dermatome involvement.

The complete-relief rate with the Jaipur Block in this series (80.6%) is lower than the 96% reported by Bhargava and Bhargava in their original retrospective series [3]. This difference is largely attributable to the prospective randomized design, broader inclusion criteria, and more heterogeneous patient mix in the current study, including a higher proportion of ophthalmic cases and patients with longer disease duration — both well-recognised adverse prognostic factors. Similarly, the 73.5% complete-relief rate with the Modified Jaipur Block compares favourably with Puri's earlier report of 90% [4], considering the larger sample size and greater case diversity in our series.

Local anaesthetics in both blocks — lignocaine and bupivacaine — interrupt ectopic afferent discharges from damaged nociceptors by blocking voltage-gated sodium channels, thereby attenuating the peripheral drive to central sensitization in the dorsal horn. The corticosteroid component (dexamethasone or methylprednisolone) further reduces neurogenic inflammation within the affected dermatome, suppresses pro-inflammatory cytokine production, and may stabilise the membranes of sensitized nerve fibres [5,6]. The marginal superiority of dexamethasone, observed particularly in older patients and ophthalmic cases, may be related to its greater anti-inflammatory potency per milligram and longer duration of action relative to methylprednisolone; these mechanistic distinctions merit formal investigation in a specifically designed trial.

Disease duration emerged as the single most powerful prognostic factor. Among Group B patients with 6–12 months of pain, only one in four achieved complete relief — a 75% failure rate. Prolonged PHN is associated with progressive epidermal nerve fibre depletion, irreversible neuronal loss in the dorsal root ganglion, and entrenched central sensitization that becomes increasingly resistant to peripheral interventions [5,6]. These observations underscore the importance of initiating nerve-block therapy as early as possible in the disease course, preferably within the first six months of symptom onset, before these neuroplastic changes become established.

Advanced age was also associated with poorer outcomes. All three patients in the 81–90-year bracket in Group A failed to respond, and response rates declined progressively beyond 70 years. Age-related baseline epidermal nerve fibre loss and diminished regenerative capacity following viral injury are well documented [7]. Older patients should therefore receive realistic pre-treatment counselling regarding prognosis and may require multimodal pharmacotherapy or referral to specialist pain services when nerve block therapy alone proves insufficient.

Ophthalmic PHN proved particularly resistant to treatment in this series, with complete relief achieved in only 36.4% of Group B patients compared with 60% in Group A. Trigeminal neuropathic pain is inherently more refractory than truncal PHN, reflecting the dense central representation of the trigeminal system and the anatomical proximity of the trigeminal ganglion to the central nervous system, which limits the effectiveness of purely peripheral interventions [8,9]. Patients who do not respond adequately to subcutaneous blocks in the ophthalmic distribution should be considered for adjunctive treatments such as intradermal botulinum toxin A, intrathecal methylprednisolone, or more advanced pain procedures [10].

Limitations. The open-label design introduces the possibility of performance and detection bias, as neither patients nor outcome assessors were blinded to group allocation. The Visual Analogue Scale, although validated and widely used, is a unidimensional instrument that does not capture sleep quality, mood, or physical functioning. The sample size, while adequate for the primary endpoint, is relatively small for robust subgroup inferences. Finally, the use of rescue analgesics was not formally quantified and may have exerted a minor confounding effect on VAS scores between visits.

Conclusion

In this randomized comparative study conducted at a tertiary care centre in Rajasthan, India, both the Jaipur Block and the Modified Jaipur Block produced clinically significant and statistically meaningful reductions in PHN pain, with broadly equivalent overall efficacy (complete relief 80.6% versus 73.5%; $p>0.05$). The dexamethasone-based Jaipur Block is recommended as the preferred regimen, particularly for elderly patients and those with ophthalmic dermatome involvement. Early institution of therapy — within the first six months of PHN onset — is essential to maximise the benefit of either block. Larger, double-blind, multicentre randomized controlled trials employing validated multidimensional neuropathic pain instruments (such as DN4 or LANSS) and quality-of-life measures are warranted to further define the optimal role of subcutaneous nerve-block therapy within a comprehensive PHN management algorithm.

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