



## Functional Outcomes of Epidural Steroid Injection in Chronic Lower Back Pain

Hilal Sultan Farooqi<sup>1</sup>, Shahid Ayub<sup>2</sup>, Aetizaz Alam<sup>3</sup>, Rizwan Ullah<sup>1</sup>, Wali Rahman<sup>1</sup>, Muhammad Imran Khan<sup>1</sup>, Waseem Haider<sup>1</sup>

<sup>1</sup>Department, Khyber Teaching Hospital, Peshawar, Pakistan

<sup>2</sup>Department, Hayatabad Medical Complex, Peshawar, Pakistan

<sup>3</sup>Department, Cork University Hospital, Cork, Ireland

### ARTICLE INFO

**Keywords:** Chronic pain, Epidural injections, Low back pain

**Correspondence to:** Muhammad Imran Khan,  
Department, Khyber Teaching Hospital,  
Peshawar, Pakistan.  
Email: [immykhan655@gmail.com](mailto:immykhan655@gmail.com)

### Declaration

**Authors' Contribution:** All authors equally contributed to the study and approved the final manuscript.

**Conflict of Interest:** No conflict of interest.

**Funding:** No funding received by the authors.

### Article History

Received: 10-04-2025 Revised: 17-05-2025

Accepted: 24-05-2025 Published: 30-05-2025

### ABSTRACT

**Background:** Chronic low back pain is a common musculoskeletal condition affecting a large proportion of adults worldwide. It is usually defined as pain in the lumbar region lasting more than three months and it often leads to reduced mobility and limitation in daily activities. Epidural steroid injection is an interventional procedure used to reduce inflammation around nerve roots. **Objective:** To determine the functional outcomes of epidural steroid injection in patients with chronic lower back pain. **Study Design:** Descriptive study. **Duration and Place of Study:** This study was conducted from 05 December 2024 to 05 April 2025 in the Department of Orthopedics, Khyber Teaching Hospital, Peshawar. **Methodology:** A total of 185 patients aged 18–70 years having chronic lower back pain. All patients received epidural injection containing 80 milligram triamcinolone with bupivacaine. Functional outcome was assessed after 4 weeks using Macnab criteria. Data were analyzed using Statistical Package for Social Sciences version 25. **Results:** The mean age was  $43.47 \pm 15.89$  years. Mean body mass index was  $27.38 \pm 2.87$  kilogram per square meter and mean duration of pain was  $21.99 \pm 8.78$  months. Male patients were 113 (61.1%) and females were 72 (38.9%). Good functional outcome was observed in 83 (44.90%) patients, fair in 46 (24.90%), excellent in 28 (15.10%) and poor in 28 (15.10%). **Conclusion:** Epidural steroid injection showed favorable functional improvement in many patients with chronic lower back pain.

### INTRODUCTION

Chronic low back pain is a significant health concern commonly observed in practice, and it is estimated to affect a significant percentage of the adult population worldwide.<sup>1</sup> Chronic low back pain is generally defined as pain located in the lower back and is usually persistent for more than three months.<sup>2</sup> Chronic low back pain can be caused by different factors, such as degenerative disc disease, lumbar disc herniation, spinal stenosis, ligamentous strain and muscle weakness.<sup>3</sup> Patients with chronic low back pain often complain of persistent pain, stiffness in the lower back, decreased flexion, and sometimes pain radiating to the lower limbs.<sup>4</sup> This condition not only compromises physical functioning but also adversely affects the quality of life.

There are several therapeutic measures for the treatment of chronic low back pain, and the basic aim is to reduce pain, increase mobility, and improve the functional activity of the individual.<sup>5</sup> In the first instance, conservative treatment is usually recommended, and this involves rest, physiotherapy, exercise therapy, and the use of analgesic

medications such as non-steroidal anti-inflammatory drugs and muscle relaxants.<sup>6</sup> Lifestyle modifications and muscle strengthening are also important for improving spinal stability. In some patients, these conservative treatments are enough to improve their condition; however, there are also some patients who continue to experience pain even after extensive medical treatment.<sup>7</sup> In such cases, pain management is recommended.

Epidural steroid injection is a frequently utilized interventional technique for the treatment of chronic low back pain, especially in patients with radicular pain due to nerve root irritation or disc herniation.<sup>8</sup> Epidural steroid injection is a method of injecting a corticosteroid medication into the epidural space of the spine. The corticosteroid eases pain by reducing inflammation around the nerve roots, which in turn increases the patient's functional capacity.<sup>9</sup> This treatment is effective in reducing pain in patients with low back pain, numbness in the legs, and difficulty in moving.<sup>10</sup> This is a minimally invasive treatment, and patients are discharged after a few hours of treatment. This is a suitable option before opting

for surgical options. Various studies have confirmed the effectiveness of epidural steroid injections in patients with low back pain.<sup>11</sup> The pain is reduced, and patients are able to function normally after undergoing epidural steroid injections.<sup>12</sup> The effectiveness of pain relief varies from patient to patient.

Chronic low back pain is commonly found among patients attending hospitals in Peshawar, and it has a significant effect on the functional activities of patients. Epidural steroid injection is commonly used to treat chronic low back pain; however, there is little data regarding its functional outcomes in patients of the region. This study aims to evaluate the functional outcomes of epidural steroid injection in chronic low back pain patients of Peshawar.

## METHODOLOGY

A descriptive study was carried out in the Department of Orthopedics at Khyber Teaching Hospital, Peshawar, from 05 December 2024 to 05 April 2025. Ethical approval for conducting the research was taken from the hospital research review board. The required sample size was calculated by using WHO sample size calculator with assumptions of anticipated proportion of poor outcomes after epidural injection 14%,<sup>13</sup> confidence level 95%, and margin of error 5%, giving a final sample size of 185 patients. Patients having age between 18 and 70 years and belonging to both genders were included. Only those individuals were selected who had complaint of low back pain according to defined study criteria and the symptoms were present for more than 6 months. Chronic low back pain in this study was considered when a patient had pain in lumbar or sacral region with Visual Analog Scale score greater than 4 and the complaint persisted for more than 6 months. Patients were excluded if they had cauda equina syndrome characterized by bowel or bladder control loss with neurological deficit, rapidly progressive neurological deficit such as sensory loss or motor weakness in the involved nerve root, evidence of infection with lymphocyte count greater than 11000 mm<sup>3</sup> or ESR more than 30 mm/hr, known bleeding disorder with PT greater than 19 or APTT greater than 38, or previously diagnosed ischemic heart disease. After explanation about study purpose, risks and expected benefits, written informed consent was obtained from every participant before enrollment. Baseline demographic information was collected including age (years), gender, BMI, residence and duration of complaints. Detailed clinical history was taken from all patients and physical examination of spine and neurological status was performed.

All procedures were performed by the same consultant orthopedic surgeon to maintain uniformity. Patients were positioned appropriately and the lower back region was prepared with sterile gauze soaked in pyodine solution. Superficial local anesthetic was given at the injection site. After that an epidural injection was administered consisting of 80 mg steroid (triamcinolone) combined with long acting anesthetic agent (bupivacaine). Patients were followed after 4 weeks of treatment in the outpatient department. Functional assessment was done at follow-up visit and findings were documented by the researcher on specially designed proforma. Functional outcome of

treatment was assessed after 4 weeks according to Macnab's criteria. The criteria for an excellent outcome were based on the patient showing no pain, no restrictions in movement, and being able to carry on normal work and activities. A good outcome was based on the patient showing pain but being able to carry on modified work. A fair outcome was based on partial improvement in functional capacity, with the patient being handicapped and unable to carry on normal work. A poor outcome was based on symptoms related to nerve root involvement and additional operative interventions at the same spinal level, despite the duration of follow-up.

Collected data were entered and analyzed using IBM SPSS version 25. Quantitative variables such as age, BMI and duration of pain were presented as mean  $\pm$  standard deviation or median with interquartile range after assessment of normality through Shapiro Wilk test. Qualitative variables including gender, residence, education, socioeconomic status and functional outcomes were presented as frequencies and percentages. Functional outcomes were stratified with respect to age, gender, BMI and duration of pain to control possible effect modifiers. Post-stratification chi square test or Fisher exact test was applied where appropriate and p value  $\leq 0.05$  was taken as statistically significant.

## RESULTS

The mean age of the patients was found to be  $43.47 \pm 15.89$  years, whereas BMI were recorded as  $27.38 \pm 2.87$  kg/m<sup>2</sup> and the duration of pain had mean of  $21.99 \pm 8.78$  months (Table-I). In terms of gender distribution, majority of patients were male 113 (61.1%) and remaining were female 72 (38.9%). Regarding the residence, most of the patients belong to rural area 116 (62.7%) while urban patients they were 69 (37.3%). The educational status showed that illiterate patients was slightly more 94 (50.8%) as compared to literate 91 (49.2%). In relation to socioeconomic status, middle class patients was highest in number 86 (46.5%), followed by poor 79 (42.7%) and rich class was least 20 (10.8%). The comorbidities which were found includes diabetes mellitus in 24 (13.0%) patients and hypertension present in 28 (15.1%) of total participants (Table 1).

**Table 1**  
*Patient Demographics*

Demographics	Mean $\pm$ SD
Age (years)	43.47 $\pm$ 15.89
BMI	27.38 $\pm$ 2.87
Duration of Pain (months)	21.99 $\pm$ 8.78
Gender	Male n (%)
	Female n (%)
Residence	Rural n (%)
	Urban n (%)
Education	Literate n (%)
	Illiterate n (%)
Socioeconomic Status	Poor n (%)
	Middle n (%)
	Rich n (%)
Diabetes Mellitus	Yes n (%)
	No n (%)
Hypertension	Yes n (%)
	No n (%)

Regarding the functional outcomes observed after epidural steroid injection, the good outcome was most frequently noted among all patients 83 (44.90%), while fair outcome was recorded in 46 (24.90%) cases. The excellent and poor outcomes were found equally in 28 (15.10%) patients each, and total sample size was 185 (100%) (Table 2).

**Table 2**  
*Frequency of Functional Outcomes of Epidural Steroid Injection in Chronic Lower Back Pain (n=185)*

Functional Outcomes	Frequency	% age
Excellent	28	15.10%
Good	83	44.90%
Fair	46	24.90%
Poor	28	15.10%
Total	185	100%

In patients with age ≤50 years, excellent outcome was seen in 16 (14.2%) while in patients having age >50 years excellent outcome was recorded in 12 (16.7%). With respect to gender, male patients showed excellent outcomes in 21 (18.6%) whereas female patients had excellent outcomes in only 7 (9.7%), however the association was not statistically significant (p=0.121). For BMI group, in patients with BMI ≤25 kg/m<sup>2</sup>, excellent outcome was noted in 7 (14.6%) and in patients with BMI >25 kg/m<sup>2</sup> the excellent outcome was 21 (15.3%), and this association approach near significance level (p=0.071, Fischer Exact Test). The duration of pain also showed no significant association with functional outcomes (p=0.909), where in patients with pain duration ≤12 months excellent outcome was found in 6 (15.4%) and in those with pain duration >12 months it was 22 (15.1%) (Table 3).

**Table 3**  
*Association of Functional Outcomes of Epidural Steroid Injection with Demographic Factors*

Demographic Factors	Subgroup	Excellent n(%)	Good n(%)	Fair n(%)	Poor n(%)	p-value
Age group (years)	≤50	16 (14.2%)	55 (48.7%)	28 (24.8%)	14 (12.4%)	0.463
	>50	12 (16.7%)	28 (38.9%)	18 (25.0%)	14 (19.4%)	
Gender	Male	21 (18.6%)	54 (47.8%)	24 (21.2%)	14 (12.4%)	0.121
	Female	7 (9.7%)	29 (40.3%)	22 (30.6%)	14 (19.4%)	
BMI group (Kg/m <sup>2</sup> )	≤25	7 (14.6%)	27 (56.3%)	12 (25.0%)	2 (4.2%)	0.071*
	>25	21 (15.3%)	56 (40.9%)	34 (24.8%)	26 (19.0%)	
Duration of Pain (months)	≤12	6 (15.4%)	19 (48.7%)	8 (20.5%)	6 (15.4%)	0.909
	>12	22 (15.1%)	64 (43.8%)	38 (26.0%)	22 (15.1%)	

\*Fischer Exact Test

**DISCUSSION**

The predominant functional outcome was good in 83 patients (44.90%), and fair in 46 patients (24.90%). The above-mentioned functional outcomes can be attributed to the mechanism of epidural injection therapy, which involves the injection of steroids into the epidural space

and thereby decreases inflammation around the nerve root, resulting in pain relief and thereby promoting functional outcomes. The functional outcomes were excellent in only 28 patients (15.10%), which is quite low compared to the above-mentioned outcomes. This is probably because patients with long-standing pain and structural changes do not benefit from injection therapy, and their nerve root pain has become chronic and is not easily relieved. The poor functional outcomes were observed equally in 28 patients (15.10%). The above-mentioned functional outcomes can be attributed to severe nerve root compression, which is not adequately relieved with injection therapy.

The present study evaluated functional outcomes of epidural steroid injection in chronic lower back pain in 185 patients. Good functional outcome was most commonly observed in 83 (44.90%) patients followed by fair in 46 (24.90%), excellent in 28 (15.10%) and poor in 28 (15.10%) patients. These findings are in agreement with Jayaseeli P *et al.*<sup>14</sup> who also reported that epidural steroid injection group showed superior functional outcomes as compared to conservative management, with 90% patients resuming satisfactory occupational activity. Similarly, Kurupati RB *et al.*<sup>15</sup> also found that 45 out of 58 patients (78%) experienced significant functional improvement at 6 months follow-up, which further support the finding of present study that majority of patients achieve good to excellent outcomes after epidural steroid injection. The scientific reason for these positive outcomes is that corticosteroids when delivered *via* epidural route reduce perineural inflammation and inhibit the release of prostaglandins and cytokines around the compressed nerve root, which leads to reduction in pain and improvement in functional capacity.<sup>16</sup>

The mean age of patients in present study was 43.47 ± 15.89 years and male patients were more 113 (61.1%) as compared to females 72 (38.9%). These demographic findings are comparable to Shah S *et al.*<sup>13</sup> who reported mean age of 38.64 ± 7.99 years with male predominance of 78% in their study on caudal epidural steroid injection. Saqib M *et al.*<sup>17</sup> also reported similar gender distribution with 55 females and 54 males and mean age 49.37 ± 10.46 years in their study. The male predominance across these studies may be explained by the fact that males are more involved in physical labor and occupational activities which increase mechanical stress on lumbar spine and predispose them to chronic lower back pain.

Regarding the near significant association of BMI with functional outcomes (p=0.071), patients with BMI >25 kg/m<sup>2</sup> showed poor outcomes in 26 (19.0%) as compared to only 2 (4.2%) in normal BMI group. This observation is supported indirectly by Elsharkawy AME *et al.*<sup>18</sup> who found that structural and pathological changes in spine such as Modic changes negatively influence the treatment response to epidural steroid injection, with Modic-ESI subgroup showing mean VAS 7.33 ± 0.82 and ODI 52.4 ± 7.1 at 12 weeks. The reason for poor outcomes in higher BMI patients is that excess body weight increase mechanical loading on lumbar vertebrae and also obesity is associated with chronic systemic inflammation which may reduce the anti-inflammatory effectiveness of injected steroids.

In contrast to present study findings, Upadhyay CS *et al.*<sup>19</sup> and Erçalık T *et al.*<sup>20</sup> reported significant improvement in all patients at each follow-up interval using VAS and ODI scores, which suggest slightly better overall outcomes than what was observed in present study where 28 (15.10%) patients still had poor outcomes. This difference may be because those studies used more detailed and sensitive pain scoring tools and included patients with relatively shorter symptom duration, whereas present study included patients with mean pain duration of 21.99 ± 8.78 months which is considerably longer and chronic nerve compression for longer duration leads to structural nerve changes that become less responsive to steroid therapy. Soin A *et al.*<sup>21</sup> also highlighted in their clinical review that epidural steroid injections provide significant short-term relief within 4–12 weeks but long-term outcomes beyond six months remain inconsistent, which is also consistent with the proportion of poor outcomes seen in present study.

The current study has some limitations which need to be considered while interpreting the results. First and foremost, this is a single-center trial, and therefore it is difficult to generalize it to diverse population groups and clinical settings. The duration of follow-up is not long

enough to evaluate long-term functional outcomes of epidural steroid injection, which is an integral part of treatment outcomes. The sample group is also too small, and therefore it is better to conduct this trial on a larger scale and multiple centers. The current trial does not compare epidural steroid injection with other treatment modalities, which is essential to prove the superiority of this technique.

## CONCLUSION

The present study concluded that epidural steroid injections are an effective therapeutic intervention in achieving a favorable functional outcome in patients with chronic low back pain. A majority of patients showed good to excellent functional recovery after receiving epidural steroid injections, and it can thus be considered a therapeutic intervention in the management of chronic low back pain.

**Disclaimer:** None declared.

## Acknowledgment

The author thankful to the medical staff of the department. Their help in keeping proper patient record and organizing the clinical information made this research possible and easier to complete.

## REFERENCES

- Wei Y, Xie Y, Xuan A, Gu H, Lian Y, Wang Z, *et al.* Analysis and comparison of the trends in burden of low back pain in China and worldwide from 1990 to 2021. *J Health Popul Nutr.* 2025;44(1):39. <https://doi.org/10.1186/s41043-025-00768-8>
- Herman PM, Qureshi N, Arick SD, Edelen MO, Hays RD, Rodriguez A, *et al.* Definitions of chronic low back pain from a scoping review, and analyses of narratives and self-reported health of adults with low back pain. *J Pain.* 2023;24(3):403-412. <https://doi.org/10.1016/j.jpain.2022.10.012>
- Li W, Qin S, Jiao Z, Sun T, Xu Y, Li S. Clinical and pathological considerations in lumbar herniated disc associated with inflammatory lesions. *Medicine (Baltimore).* 2021;100(43):e27611. <https://doi.org/10.1097/MD.00000000000027611>
- Luo S, Zhang J, Sun S, Zhang J, Li J, Wang S, *et al.* Relationship between the flexion relaxation phenomenon and kinematics of the multi-segmental spine in nonspecific chronic low back pain patients. *BMC Musculoskelet Disord.* 2024;25(1):68. <https://doi.org/10.1186/s12891-024-07188-3>
- Van Amstel R, Noten K, Malone S, Vaes P. Associations between trunk mobility, pain, and quality of life in individuals with chronic low back pain treated with different therapeutic protocols: potential clinical parameters. *J Back Musculoskelet Rehabil.* 2026;39(1):197-205. <https://doi.org/10.1177/10538127251358730>
- Nicol V, Verdaguer C, Daste C, Bissierex H, Lapeyre É, Lefèvre-Colau MM, *et al.* Chronic low back pain: a narrative review of recent international guidelines for diagnosis and conservative treatment. *J Clin Med.* 2023;12(4):1685. <https://doi.org/10.3390/jcm12041685>
- Kogler J, Rajačić D, Bobovec D. The effect of epidurolysis in treatment of low back pain - an evidence based review. *Acta Clin Croat.* 2023;62(Suppl4):46-52. <https://doi.org/10.20471/acc.2023.62.s4.7>
- Cohen SP, Greuber E, Vought K, Lissin D. Safety of epidural steroid injections for lumbosacral radicular pain: unmet medical need. *Clin J Pain.* 2021;37(9):707-717. <https://doi.org/10.1097/AJP.0000000000000963>
- Manion J, Little J, Barry G, Ghasemlou N. Mineralocorticoid receptor antagonism reduces inflammatory pain measures in mice independent of the receptors on sensory neurons. *Cells.* 2024;13(2):147. <https://doi.org/10.3390/cells13020147>
- Park CH, Lee SH. Relationships between the spinal dural pulsations and the short-term efficacy of lumbar epidural steroid injection. *Pain Res Manag.* 2024;2024:1824269. <https://doi.org/10.1155/2024/1824269>
- Carassiti M, Pascarella G, Strumia A, Russo F, Papalia GF, Cataldo R, *et al.* Epidural steroid injections for low back pain: a narrative review. *Int J Environ Res Public Health.* 2021;19(1):231. <https://doi.org/10.3390/ijerph19010231>
- Meng H, Fei Q, Wang B, Yang Y, Li D, Li J, *et al.* Epidural injections with or without steroids in managing chronic low back pain secondary to lumbar spinal stenosis: a meta-analysis of 13 randomized controlled trials. *Drug Des Devel Ther.* 2015;9:4657-67. <https://doi.org/10.2147/DDDT.S85524>
- Shah S, Rehman L, Ahmed N, Anwar M, Chaudry MA, Shabbir A. Frequency of improved functional outcome in patients with lumbar disc prolapse treated with caudal epidural steroid injections. *Pak J Med Health Sci.* 2014;8(3):622-4.
- Jayaseeli P, Suganthi S, Devendran R. Comparison of functional outcome and pain relief of epidural triamcinolone vs conservative management for lumbar disc disease. *Int J Acad Med Pharm.* 2023;5(5):1014-1018. <https://doi.org/10.47009/jamp.2023.5.5.199>
- Kurupati RB, Kumar VA, Sadalagi PS, *et al.* Functional outcome of chronic low back ache due to prolapsed intervertebral disc treated with caudal epidural steroid injection. *Int J Orthop Sci.* 2020;6(3):237-240. <https://doi.org/10.22271/ortho.2020.v6.i3d.2207>
- Oliveira CB, Maher CG, Ferreira ML, Hancock MJ, Oliveira VC, McLachlan AJ, *et al.* Epidural corticosteroid injections for lumbosacral radicular pain. *Cochrane Database Syst Rev.* 2020;4(4):CD013577. <https://doi.org/10.1002/14651858.CD013577>

17. Saqib M, Bhatti SN, Khan MA, *et al.* Outcome analysis of two different injection solutions for epidural injection in radicular lumbar backache syndromes. *J Ayub Med Coll Abbottabad.* 2016;28(4):709-714.
18. Elsharkawy AME, Elsharkawy SME. Effectiveness of epidural steroid injections and facet joint blocks in alleviating persistent low back pain. *Adv Spine J.* 2026;44:100-106. <https://doi.org/10.57055/2974-4822.1328>
19. Upadhyay CS, Tripathi PM, Kumar M. Effectiveness of caudal epidural steroid injections for chronic low back pain: a clinical evaluation. *Int J Pharm Qual Assur.* 2025;16(3):416-421. <https://doi.org/10.25258/ijpqa.16.3.70>
20. Erçalık T, Gencer Atalay K, Şanal Toprak C, Gündüz OH. Outcome measurement in patients with low back pain undergoing epidural steroid injection. *Turk J Phys Med Rehabil.* 2019;65(2):154-159. <https://doi.org/10.5606/tftrd.2019.2350>
21. Soin A, Gupta M, Abd-Elsayed A, *et al.* Lumbar epidural steroid injections for chronic spinal pain: a clinical review of efficacy and evidence. *Cureus.* 2025;17(12):e98348. <https://doi.org/10.7759/cureus.98348>